WOODY PLANTS OF THE NORTHERN FOREST

A DIGITAL ATLAS

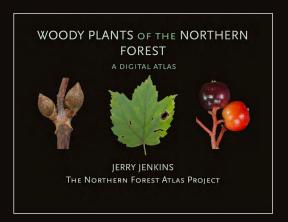


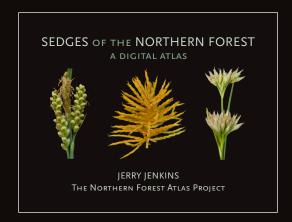


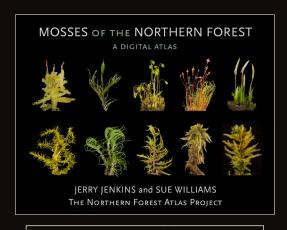
JERRY JENKINS
THE NORTHERN FOREST ATLAS PROJECT

PUBLICATIONS OF THE NORTHERN FOREST ATLAS PROJECT

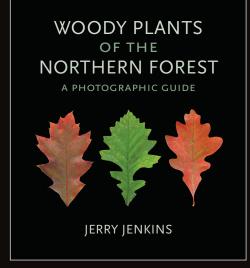
DIGITAL ATLASES

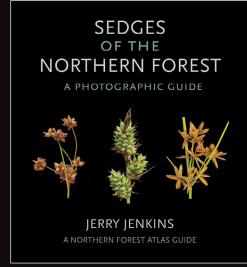


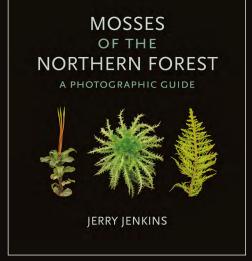




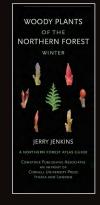
PHOTOGRAPHIC GUIDES







WATERPROOF FOLDING CHARTS













As of spring, 2020, the Atlas Project has produced digital atlases, paper photographic guides, and folding charts to woody plants, sedges, and mosses. The digital atlases are available for download from our website, northernforestatlas.org; the photographic guides and charts from Cornell University Press, cornellpress. cornell.edu. Photographic guides to grasses, a digital atlas of grasses, and a book-length field guide to woody plants will be published in 2022.

INTRODUCTION

This is a digital atlas of the woody plants of the Northern Forest Region (NFR). It includes over 1,600 pictures of about 270 species, plus brief notes on geography, ecology, and diagnostic characters. Most of the pictures are high-resolution digital composites, made with focus stacking or exposure stacking*. The nominal resolution is 300 ppi, which will allow you to enlarge them several times to see details. On a 5K Mac Retina, for example, I can enlarge them to 400% before they start to pixellate.

How to use it: The entries are alphabetical by family and species. Click on the bookmark icon (left column in Acrobat) to see the bookmarks, and expand them by clicking the triangles to drill to the species or group you want. Double click the bookmark to go to that page. View/Show/Hide lets you turn on the bookmark icon if it is not there.

Note that many entries have several pages of photos past the bookmarked page. Scroll down to see them.

Control L or Command L toggles full screen mode, which is nice except you lose the bookmarks. Control + and Control - or Command + and Command zoom in and out. You can also use the View menu, or Command Y and enter a magnification. Panning can be slow because of the image size; best to center on what you want to see and then zoom.

WHAT IT'S FOR: The atlas is really just a collection of zoomable pictures, something like a digital hand lens with specimens built in. It is not a standalone woody plant guide. We designed it as a companion to our new Atlas guide, the Woody Plants of the Northern Forest (Cornell University Press, April 2018). It will work equally well with any other woody plant guide. Our favorites are two classics: George A. Petrides, A Field Guide to Trees and Shrubs (Houghton Mifflin, 1958) and John Laird Farrar, Trees of Canada (Fitzhenry & Whiteside, 1995); and a new classic: Welby R. Smith, Trees and Shrubs of Minnesota (University of Minnesota Press, 2008).

OTHER ATLASES: We also have atlases of sedges and mosses, to accompany our Sedges of the Northern Forest (Cornell, 2019) and Mosses of the Northern

Forest (Cornell, 2020). Both are available on our website northernforestatlas. org. We are starting on grasses this year, and hope to have an atlas and a photographic guide in 2022.

ABOUT THE PHOTOGRAPHY: Most of the photos here are studio photos, either taken at home or with portable equipment I use on the road. I have included some field photos when I have them, to show habit and context. They involve compromises—it is very hard in the field to get real clarity and sharpness but they show things that the studio photos don't, and that is my goal.

The pictures mostly taken between 2010 to 2019. They got better as I went along. I started with single images using natural light and a 1x macro lens. I now focus stack and exposure stack everything, indoors and out, using LED panels and softboxes for consistent lighting and a suite of macro lenses, plus microscope lenses mounted on a 200 mm telephoto, with magnifications up to 10x.

My goals varied as well. I started off concentrating on leaves and buds, and then added flowers and fruits as I found them. I hope to add more flowers and fruits in the next two years. In the meantime, see Welby Smith's book, cited above, for wonderful flower and fruit pictures.

As a result, this collection is a mixed bag. Good photos, bad photos, photos I am proud to have shot, photos I would like to go back and reshoot. And, invisible but important, the photos I want to shoot but haven't yet. I give it to you not as a completed work but as a useful start.

Also as a statement: plants are beautiful and deep. Photography, at its best, can reveal things the eye can't see. To do this is a joy and privilege. Try it, and you will see.

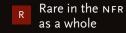
Also too, as a warning. The world, plants and all, is fragile, beautiful, and threatened. We need to attend to it, and act on its behalf. All of us. Immediately.

Status codes



Common in the proper habitat







Must know, a common and widespread species that you will encounter frequently

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* The source images are 16-bit RGB TIFFS with ProPhoto profiles embedded; if you have a calibrated monitor and set the working space in Acrobat to Prophoto RBG you should be pretty close to the original colors.







Two common genera, recently moved here from the Caprifoliaceae, with opposite toothed leaves that may be simple, lobed, or compound. The flowers are small and white, in flat-topped clusters, with five showy petals joined at their bases, tiny sepals, and an inferior ovary that develops into a fleshy fruit. Dogwoods and honeysuckles, our other common opposite-leaved shrubs, always have simple, untoothed leaves. Watch for Diervilla, bush honeysuckle, which has toothed leaves and looks like a viburnum.





RACEMOSA

ELDERBERRIES are sparsely branched shrubs with compound leaves and fat pithy branches that grow for a few years and then die back. *Canadensis* is common in open wetlands, *racemosa* in fertile woods. They have large flattopped clusters of small white flowers and produce small juicy berries.







COMMON ELDERBERRY is the common summer-flowering elderberry, found throughout the NFR in open minerotrophic wetlands and wet thickets. It is common on river shores, in shrub swamps, and in post-agricultural thickets. Its marks are white pith, early summer flowering, an average smell, and no large flower buds in winter.











Leaflets sharp-toothed, probably not distinguishable from red elderberry.











Berries dull red, turning purple black, used for wine and jam.







RED ELDERBERRY is the common early-flowering elderberry of moist fertile woods throughout the NFR. It differs from common elderberry in its conspicuous flower buds; reddish pith; smelly twigs; narrower, more convex flower clusters; and bright red berries.





Leaf and flower buds opening. The flower buds are raised on short shoots and have small side buds of their own.









Red elderberry, Baxter State Park, Maine, 10 July, 2012.





EDULE







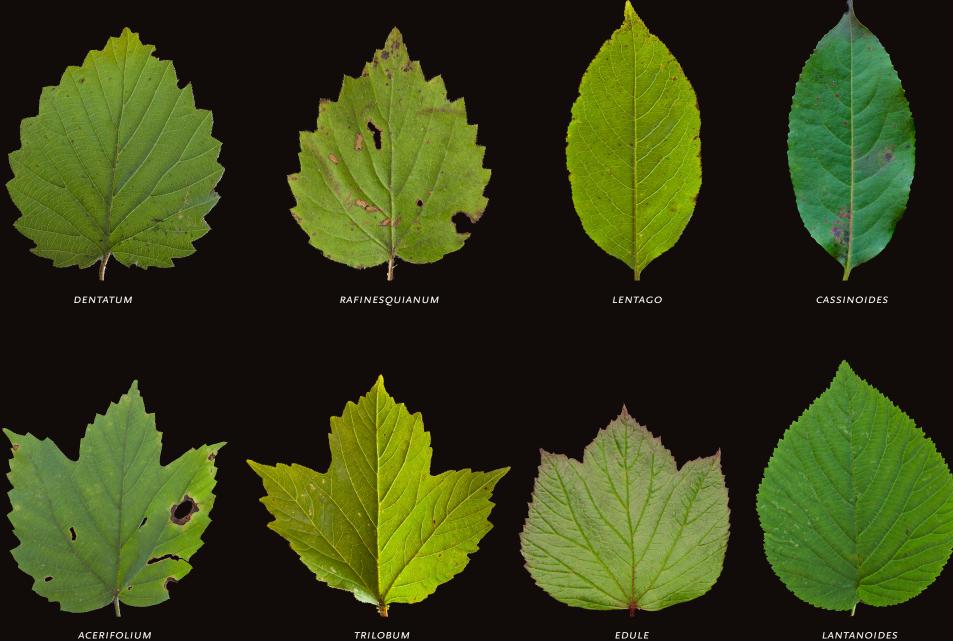




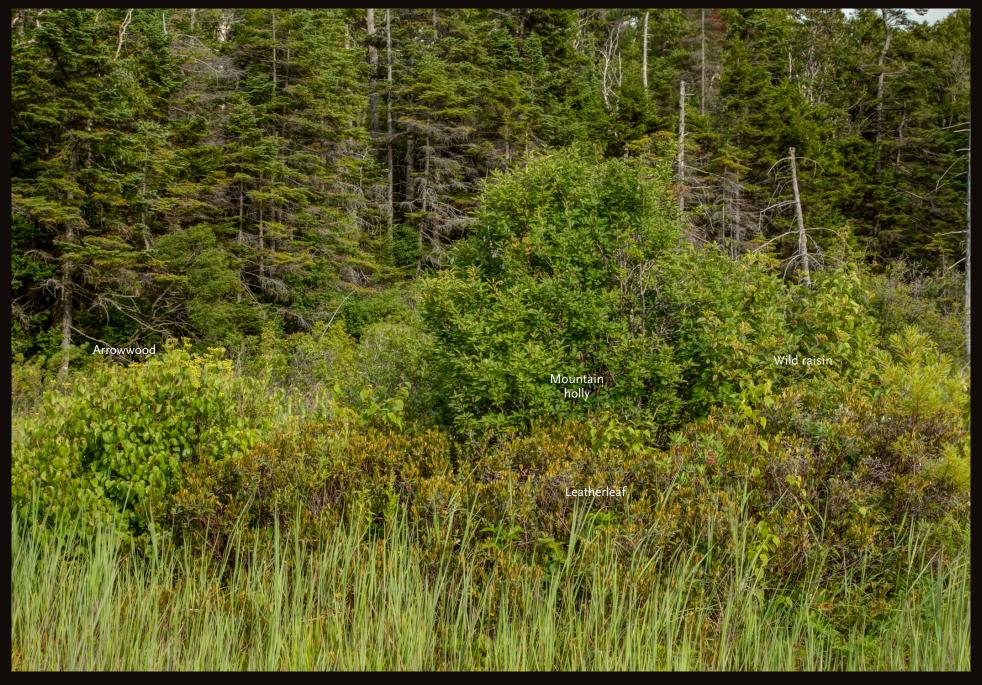


VIBURNUMS have paired leaves with teeth and often lobes; elongate leaf scars with three bundles scars; clustered white flowers with united petals and inferior ovaries; and fleshy fruits with a single stone. We have eight NFR species; seven are common in the proper habitats, though not necessarily throughout the NFR. *Edule* is rare and we don't have bud pictures. Its buds are like those of *trilobum* but deeper red or a bit purple.









Shrubs in a boggy beaver meadow at Branch Pond, Sunderland, Vermont. Arrowwood (Viburnum dentatum) and wild raisin (Viburnum cassinoides) are both common here.





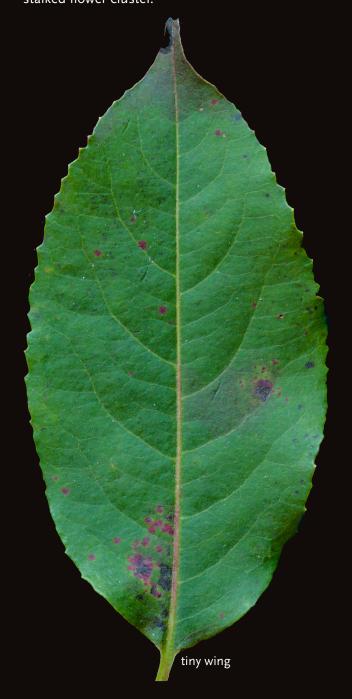


MAPLE-LEAVED VIBURNUM is common in open forests at low elevations throughout much of the NFR. It is especially common in warm, dry, rocky woods with oaks. The leaves, with three strong lobes and fine velvety fur, are distinctive. The twigs are similar to those of Rafinesque's viburnum, but perhaps hairier and with the side buds held closer to the twig.















WILD RAISIN is the common duckbill-bud viburnum of swamps, peatlands and cool forests in the eastern and central NFR. Its marks are the leaves with sharp teeth and winged leafstalks; the flower cluster raised on a central stalk; and some rusty color on the winter buds. Nannyberry is similar; its teeth are fine and sharper; its petioles not winged; its flower cluster without a visible stalk below the branches; and its winter buds often pinker or bluer.



























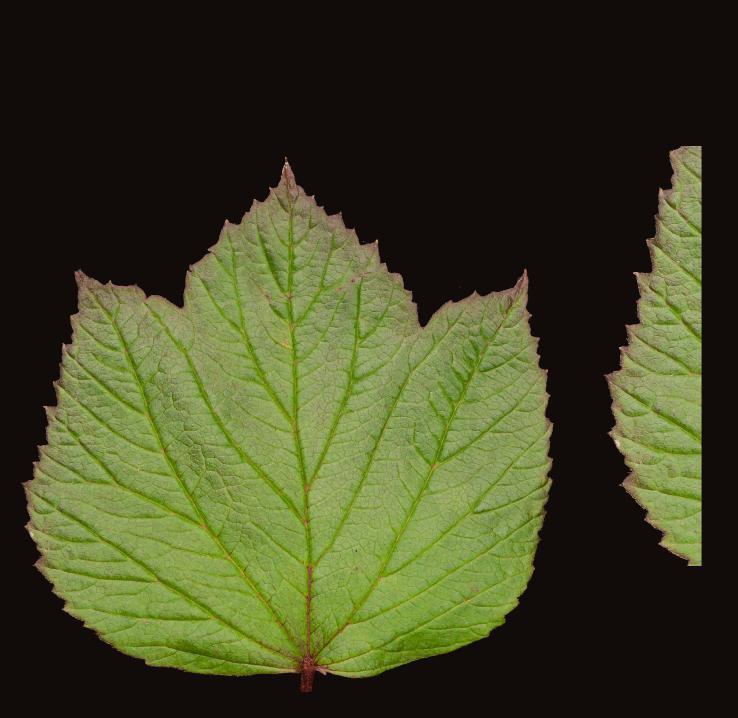




Immature fruits in long-stalked clusters on Viburnum dentatum.



SQUASHBERRY is a wide-ranging species, transcontinental in the subarctic and boreal, that is rare in the northern parts of the NFR. In the Northeast we see it along streams and trails in subalpine woods, extending up to the edge of the alpine zone. In the western NFR it is scattered in small quantities along the rocky shore of Lake Superior. Its marks are the mixture of oval and three-lobed leaves; the thickened tips of the teeth; and the small flower clusters without enlarged sterile flowers. Highbush cranberry is similar but is a taller shrub with large sterile flowers around the edge of the cluster and more deeply lobed leaves that have few teeth below the lobes, lack the thickened tips to the teeth, and have large glands on the leaf stalk.





NOTE THAT THE LEAVES ARE TOOTHED to near the base; the lobes are relatively shallow; unlobed leaves occur; and there are no glands where the petiole meets the leaf blade.







HOBBLEBUSH is an Appalachian species, common and locally an understory dominant in mid-elevation forests in the Northeast, rare or absent west of Lake Erie. It is a low or tall shrub with large heart-shaped leaves and arching branches, marked by the finely-toothed leaves; paired naked (scaleless) buds covered by tan, multibranched hairs; and flower clusters with large sterile flowers around the edges. It can root from the lower branches and form large thickets.











NOTE THE LARGE FLOWER CLUSTERS with sterile flowers around the outside; the finely-toothed leaves; and the bright red berries which turn dark at maturity. Most parts of the plant have stellate hairs.





Hobblebush with young fruits on a moist wooded bank on the shore of Dyer Bay, Steuben, Maine, 12 June, 2017.











RAFINESQUE'S VIBURNUM IS a common shrub in dry rocky or sandy woods and glades in the western NFR. It becomes rarer eastward, reaching the edge of the Appalachians in western New England but not crossing them. It is a colonial shrub, growing as single plants under canopy and making large clones on edges and in openings. The best marks are broadly oval leaves with coarse teeth and short simple hairs; and the rounded twigs without ridges or angles. Arrowwood is similar but is a wetland shrub and has ridged twigs.











THE TWIGS OF RAFINESQUE'S VIBURNUM are very similar to those of the maple-leaved viburnum, and the two often grow together. Rafinesque's grows in colonies and has smooth twigs; maple-leaved grows as individual plants and often has stellate hairs. Still, they look a lot alike. The flowers of Rafinesque's are pretty typical viburnum flowers except for the red calyces. I don't know if it always has them.









HIGHBUSH CRANBERRY, a tall shrub of wetlands, shores, and all sorts of edges, is common throughout the NFR. Its marks are the uniformly trilobed leaves which have broadly flaring lobes and relative few teeth near the base and conspicuous glands on the petiole where it joins the leaf. The buds are covered by two fused scales that look like a single scale; the out flowers in the cluster are sterile and enlarged; and the ripe fruits are translucent red and dangle. Squashberry, which is similar, is a rare northern species of mountains and rocky shores that has less strongly lobed leaves that lack petiolar glands and have thickened tips to the teeth. Its flowers are all small.









Highbush cranberry leaves, showing strong lobing and variable shape.

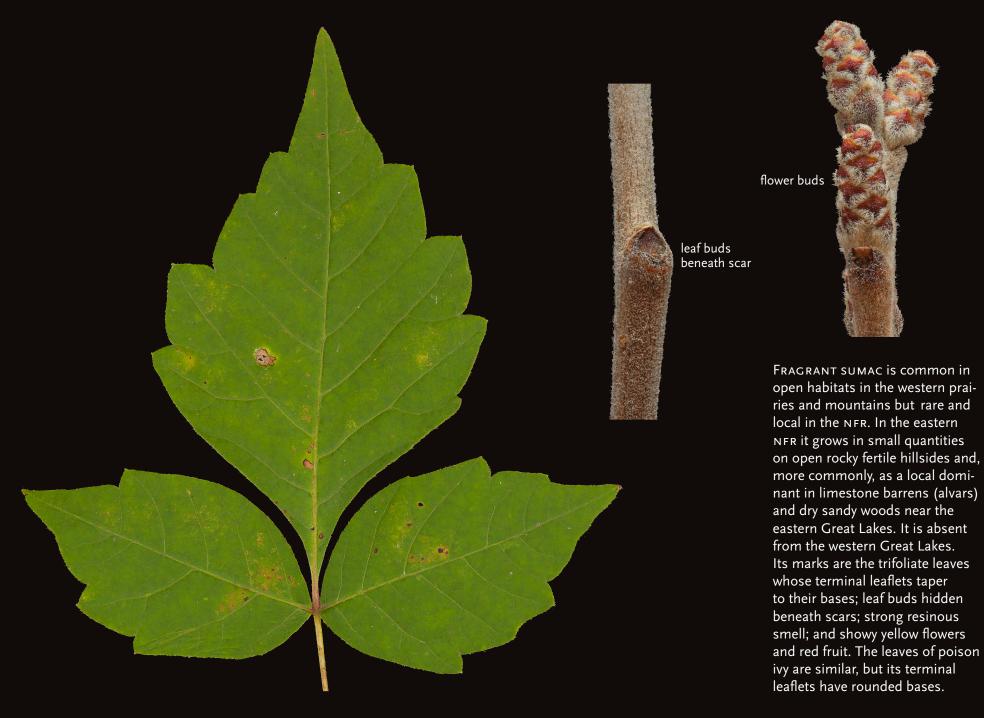




Highbush cranberry fruits, late October.













Twigs supple, shiny, with a varnish smell; leaf scars triangular, with a ring of bundle scars, raised on a remnant petiole base and covering a furry bud.













DWARF SUMAC is a distinctive species of the southeastern United States, rare or uncommon on open sandy soils in the southern NFR. I see it most frequently on sand plains and in dune thickets. Its marks are the leaves with wings between the leaflets, and the leaf scars that only surround the lower half of the bud.











SMOOTH SUMAC is the common sumac in the southern and western parts of the NFR. Its mark are hairy buds; the leaf scars that nearly surround the bud; smooth leaves and twigs; and fruits with short fat hairs. Staghorn sumac is hairy and often taller; the two are close and intermediate plants are common. Both favor successional habitats: roadsides, old fields, young woods, glades on rocky hills.













STAGHORN SUMAC is the common sumac of the northern and eastern NFR, found on roadsides, open rocky hills, and in fields, young woods, dry thickets, and disturbed ground. It is a colonial shrub or small tree with pinnately compound leaves; hairy leafstalks and branches; leaf scars that nearly surround the bud; and fruits with hairs over 1 mm long. Smooth sumac is the same but smoother. Intermediates are common.







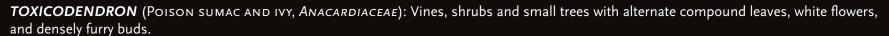


Female clone of staghorn sumac with fruits, White Creek, New York.

















RADICANS & RYDBERGII (POISON IVY)



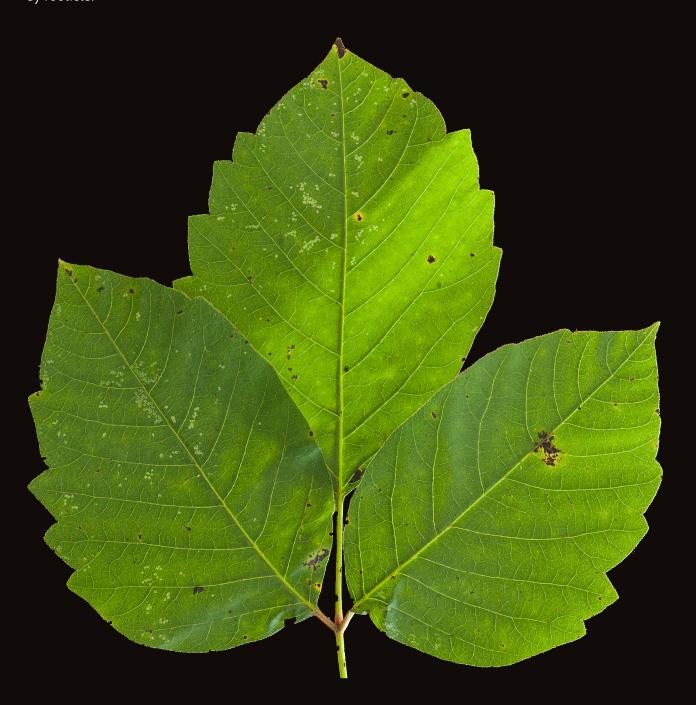






Toxicodendron includes the sumacs with smooth or irregularly toothed leaves; leaf scars that don't circle the bud; relatively small, open flower clusters; white flowers; and hairless white fruits. We have two trifoliate species, radicans and rydbergii, that differ in little more than the way they grow; and a single pinnately compound species, vernix. All contain the toxic oil urushiol and can cause severe allergic reactions.







TOXICODENDRON RADICANS is the common poison ivy of eastern North American, found in all sorts of open and successional habitats and dominant, impressively, along the east coast. It is common in the southern NFR and tends to be replaced by rydbergii in the north. The two are very similar: radicans is a robust plant that climbs trees with small red rootlets and can grow as a freestanding shrub or small tree to 3 meters tall. It may have, or like these may not have, hairs on the leaves, petiole, or fruit. Rydbergii is a low creeper that doesn't seem to produce rootlets or have hairs. Not a big difference.













TOXICODENDRON RYDBERGII is a wide-ranging northern and western species found throughout much of the NFR. It was formerly included in Toxicodendron radicans. The main differences is that radicans is a tall plant that makes aerial rootlets, and rydbergii is a low creeper than doesn't climb. The ranges of the two are largely separate but overlap in the NFR. They look like great subspecies to me.











Poison sumac is a reasonably common species of the southern Great Lakes and Atlantic Coastal Plain that is uncommon in swamps and fens in the southern NFR. We see it most commonly in fertile mixed swamps and in shrubby thickets around bog and fens. The alternate compound leaves with untoothed leaflets, coarse branches with large triangular leaf scars; and white flowers and berries are distinctive. The leaves often have red stalks, separating them quickly from black ash, which often grows in the same places.











Poison sumac twigs and old fruit-stalks, from a fertile mixed swamp in Shaftsbury, Vermont.





THE HOLLIES are tall bushes or small trees with oval leaves, stubby buds, and shield shaped leaf scars with a single bundle scar. All have small, mostly unisexual flowers and red fruits in late summer or fall. *Mucronata* has dark twigs, almost no teeth, and often purple on the leafstalks. *Laevigata* and *verticillata* have tiny stipules at the edge of the leaf scar and small teeth.

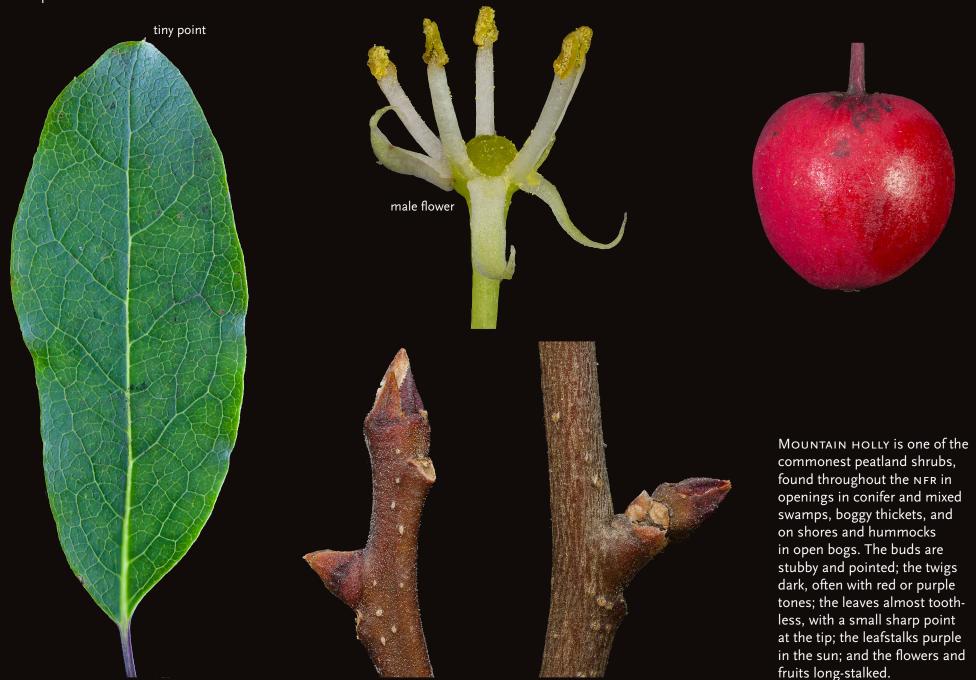
ILEX LAEVIGATA (SMOOTH WINTERBERRY, AQUIFOLIACEAE) Leaves completely smooth on the surface below; calyx lobes smooth; some flowers or fruits on stalks of 5 mm or more.





SMOOTH WINTERBERRY is a small tree of the Atlantic Coastal Plain, rare in wooded swamps along the southeast edge of the NFR. It resembles winterberry but grows a lot bigger and older. The leaves—no good photos yet—are smooth on the surfaces below; the edges of the sepals lack tiny hairs; and the fruits have short stalks.

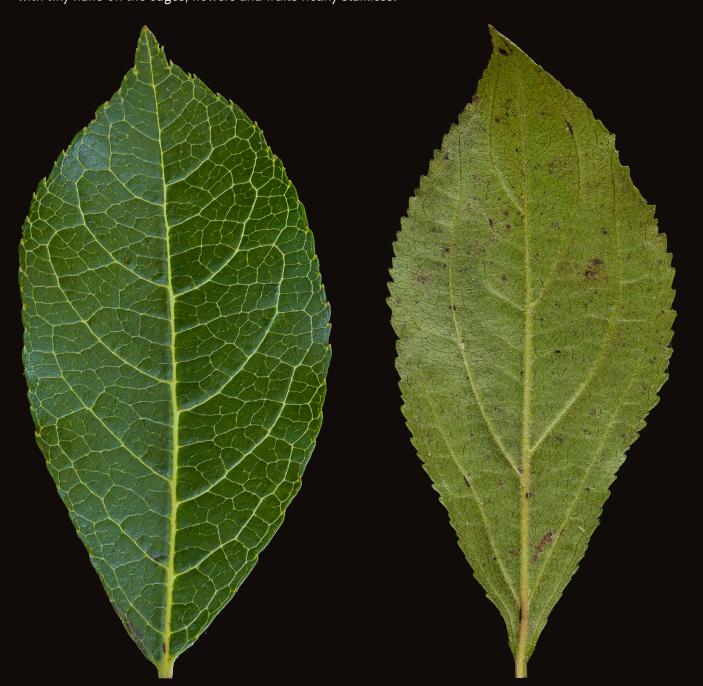














WINTERBERRY is a tall shrub or small tree, common throughout the NFR in shrub, conifer, and mixed swamps, in sedges meadows, on pond and river shores, and in boggy thickets. It is often found with mountain holly. Its marks are the evenly toothed leaves which are usually hairy on the veins and surfaces below; the tan twigs with stubby buds and tiny stipules; the minute hairs on the edges of the sepals; and the nearly stalkless flowers and fruits. Smooth winterberry has smoother leaves and sepals and stalked fruits; mountain holly has dark twigs, purple stalked leaves with at most a few teeth; and longstalked flowers and fruits.









Large winterberry in coastal thickets, Wedgeport Point, Nova Scotia, September 30, 2016.





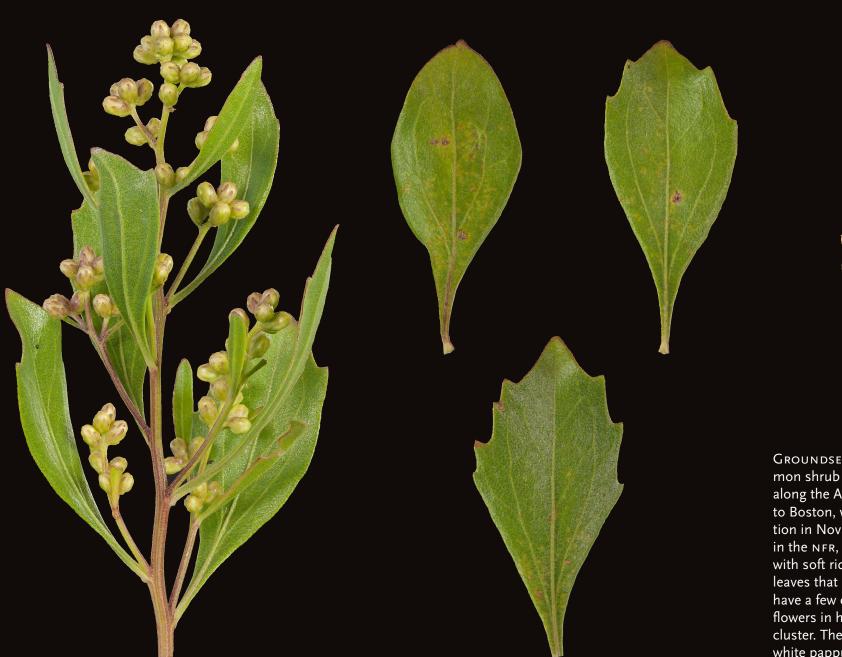






IVA





GROUNDSEL BUSH is a common shrub of salt-marsh edges along the Atlantic coast north to Boston, with a disjunct station in Nova Scotia. This puts it in the NFR, but barely. It is tall, with soft ridged twigs, fleshy leaves that are untoothed or have a few coarse teeth; and flowers in heads in a terminal cluster. The seeds have showy white pappus-hairs at maturity.





Marsh elder is a common plant of salt-marsh edges along the Atlantic Coast, north to southern Maine and Nova Scotia. It is also weedy in disturbed, salty soil. Its marks are fleshy, irregularly toothed opposite leaves; the small flowers in heads; and the achenes with glandular bumps. In the north it is usually small and often dies back to the ground. Baccharis is taller, has ridged twigs and leaves with at most a few coarse teeth, and has achenes with white pappus hairs.









Marsh-elder, with a small gaff-rigged ketch, shores of Mandell's Cove, Wedgeport, Nova Scotia, October 2017. Open-decked schooners and ketches were once common in the fishing fleets of southern Nova Scotia.







THUNBERGII





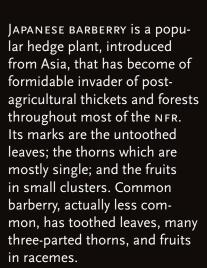




BARBERRIES have ridged twigs with thorns below the buds. The thorns are modified leaves and stipules. The vegetative leaves, which are spirally arranged, appear on short shoots just above the thorns. Both of our species are exotic hedge plants that have escaped and become invasive. Thunbergii has smooth-edged leaves, dark twigs with mostly single thorns, and fruits in small clusters. Vulgaris has toothed leaves, lighter twigs with thorns in threes, and fruits in racemes.















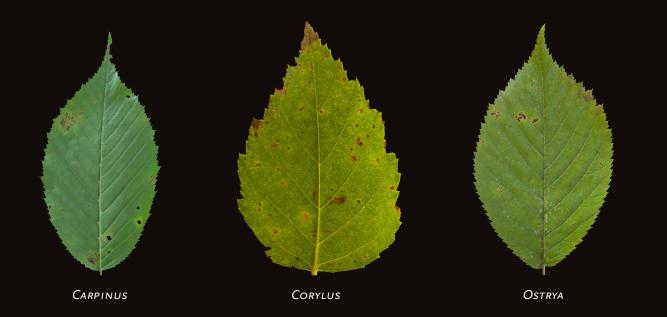


COMMON BARBERRY is an alien shrub, introduced from Europe as a cultivar and escaped, now common on calcareous bedrock and in limy wetlands in many parts of the NFR. Its marks are the tall, arching stems; the spiny teeth on the leaves; the red fruits in pendent racemes; and the thorns, which are often three-parted.

BETULACEAE (BIRCH FAMILY): Five common genera of trees and shrubs, typically with oval leaves with double teeth and leaf scars with three bundle scars; male flowers in catkins, fruits in small spikes; often with zigzag twigs.

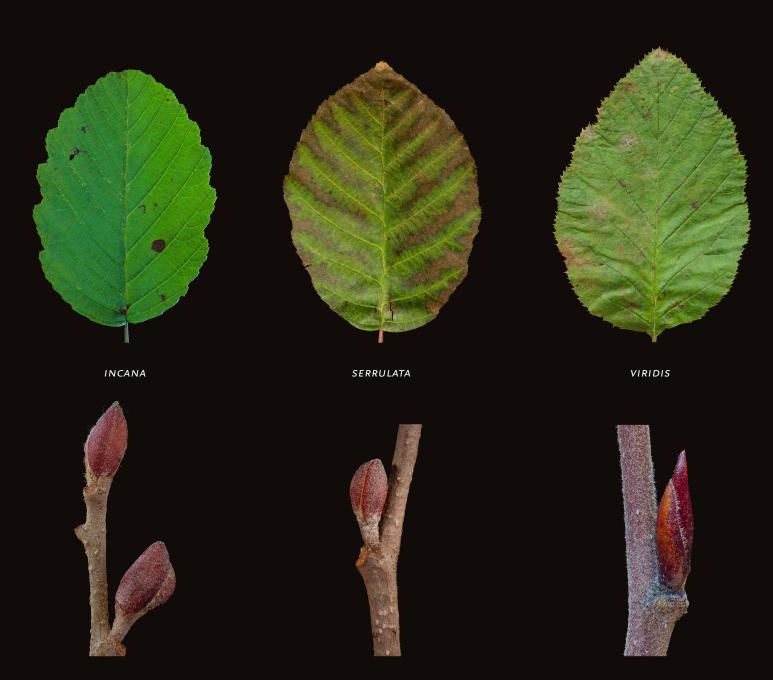






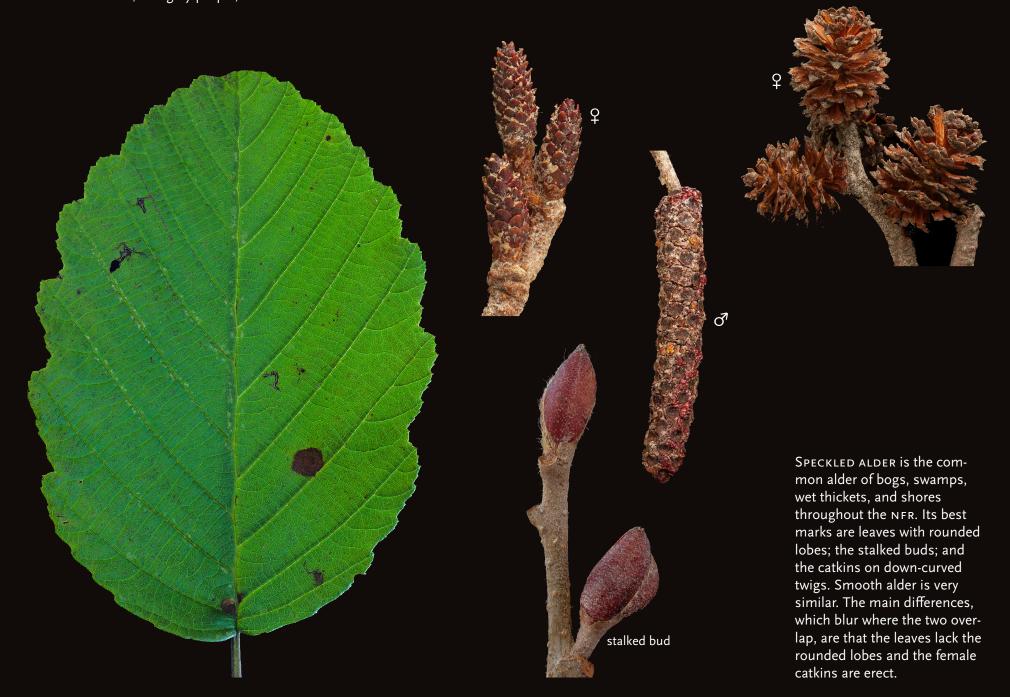
TREES AND SHRUBS with oval or oblong, toothed leaves and unisexual flowers in catkins and spikes. Male catkins elongate when flowering, often visible in the winter. A common group, found in forests, successional openings, river and lake shores, and wetlands throughout the NFR. The genera are quite distinct, but not always easy to distinguish by leaves alone. Buds, barks, and fruits can help. The species of Carpinus, Corylus, and Ostrya are distinct. Smooth and speckled alders intergrade broadly in the eastern NFR and are hard to separate. The white and dwarf birches are a polyploid tangle; everything that can hybridize does.





THE ALDERS are manystemmed, large-leaved shrubs of wetlands, shores, and mountain slopes, common throughout the NFR. *Incana*, speckled alder, is the commonest NFR species and occurs, at least in small amounts, in almost every sort of wetland species. Serrulata, smooth alder, is southern and either rare here or obscured by hybridization with incana. Viridis, green alder, is a northern species of shores and slopes, scarce overall but locally common along the coast, on the shores of the Great Lakes, and in the high mountains.













Open floodplain of the Oswegatchie River, Adirondacks, New York. The tall shrubs on the highest ground are mostly speckled alder; the lower blue vegetation is *Calamagrostis canadensis* and *Carex stricta*; the yellow-green bands at the edges of the channel are other sedges and herbs.

ALNUS SERRULATA (SMOOTH ALDER, *Betulaceae*): Leaves with low teeth but not shallow lobes; female catkins point up; side buds stalked, dull gray-purple; cones on short stalks.



ALNUS VIRIDIS (GREEN ALDER, *Betulaceae*): Leaves with fine sharp teeth; female catkins not visible in winter; buds sharp-pointed, deep shiny red; fruits on long stalks.







GREEN ALDER is a transcontinental species in the American arctic and subarctic, extending from Greenland to Alaska and western Asia. In the NFR it is common in the north where it grows on mountain slopes and river and lake shores, and rare on calcareous river shores in the south. It is the common alder of the northern Atlantic Coast, of ravines and subalpine thickets in the high mountains, and of the rocky shores of the northern Great Lakes. Its marks are the sharply toothed leaves, usually widest below the middle; the sharp-pointed, deep red buds; the stubby male catkins; and the female catkins and cones on long stalks.

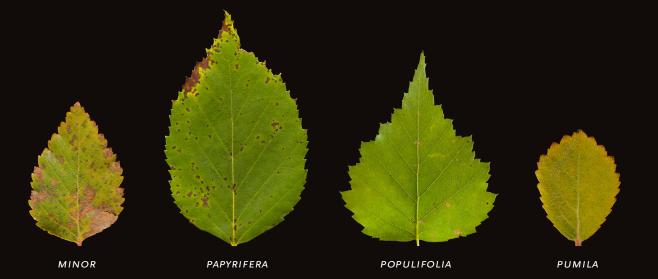




BETULA (BIRCH, BETULACEAE): Fruits with small papery scales but no leafy bracts; male catkins visible in winter; bark with horizontal marks, often peels.



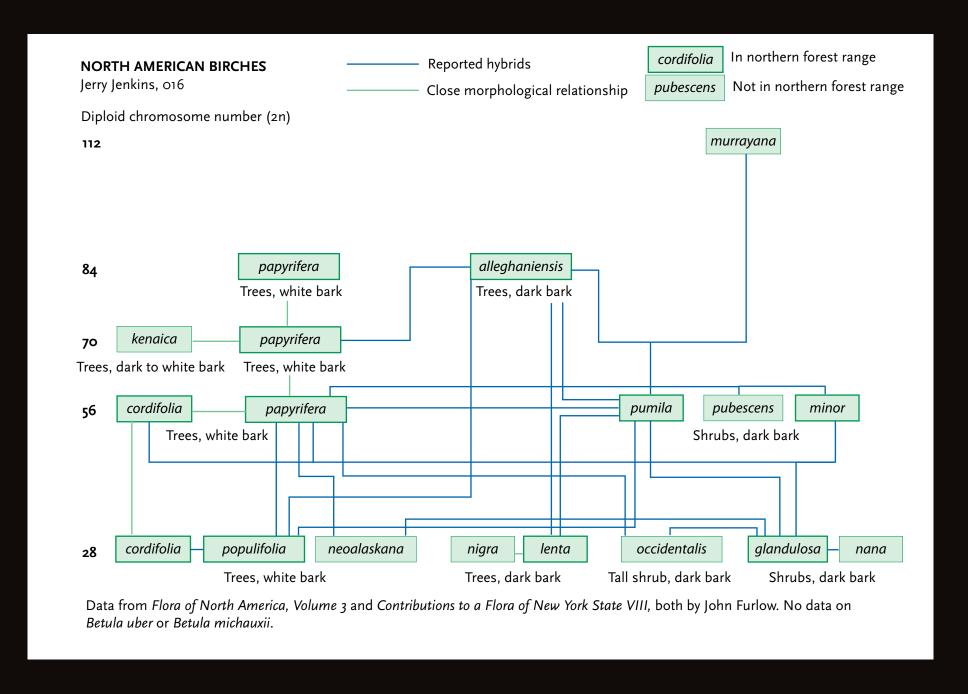




THE BIRCHES, with eight northern species, are found throughout the NFR. As a group, they are identified by having male catkins that are visible in the winter, and fruits in small cones with winged seeds and lobed bracts. The trees have typical birch bark with horizontal marking, at least when young. The shrubs, which tend to be northern and uncommon in the NFR, have dark bark, small round or oval leaves, and small catkins.

Taken as a group, the twenty North American species form a polyploid complex, with five different chromosome numbers (chart on p. 77). Two common species, *cordifolia* and *papyrifera* have multiple chromosome levels within the same species. At least ten of the twenty are polyploids and likely derived from ancestral hybridizations; at least sixteen are reported to hybridize with other birches.

Polyploid complexes are often difficult; the birches are no exception. If you are in the low-lands, away from heart-leaved birch and the shrubby birches, you will likely be fine. If you are in the mountains, or in fens with bog birch, or along the coasts of Maine and New Brunswick, watch out.





similar and closely related; it has dark, grey-black bark which cracks into chunks but doesn't curl and smooth buds and

scales.

























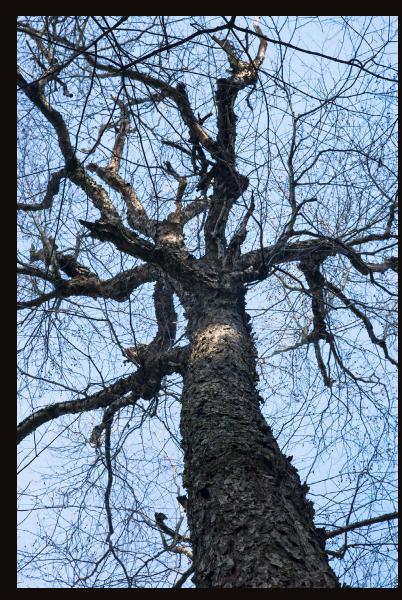
Yellow birch



Heart-leaved birch

Yellow and heart-leaved birch from Fundy National Park, New Brunswick. The yellow birches there are greyer and much less glossy than those inland; the heart-leaved birches often have silvery bark rather than white.







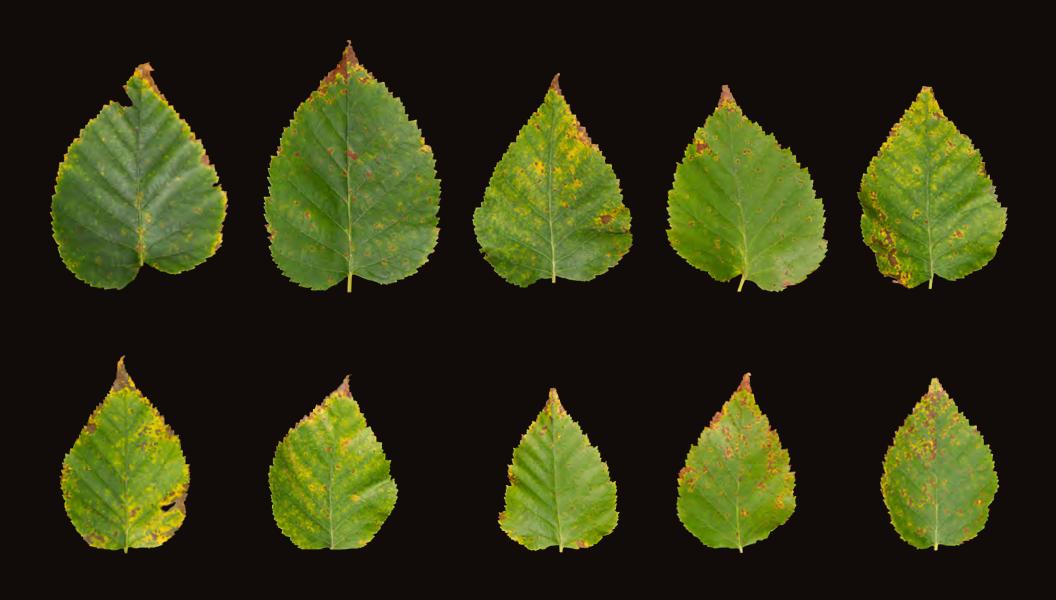
BETULA CORDIFOLIA (HEART-LEAVED BIRCH, *BETULACEAE*): Tree with white or silver, peeling bark; leaves consistently heart-shaped; middle lobe of cone scales long and skinny.







HEART-LEAVED BIRCH is a northern diploid related to paper birch and intergrading with it, sometimes recognized as a species and sometimes not. It differs from paper birch in the heart-shaped bases of the leaves; larger, furrier cone scales with a more pronounced central lobe; seeds with broader wings and longer stigmas; and more silvery or bronzy bark. All these differences are small and inconstant. Trees showing them are common in the northern NFR from Maine and the Maritimes west to Lake Superior. They often grow with ordinary paper birches, and look different.







Two birches on Quoddy Head, eastern Maine. The left one has the leaves of *cordifolia*, the right one the leaves of *papyrifera*.





Left, heart-leaved birch from Fundy National Park, New Brunswick. Above, fruits of heart-leaved birch showing long central lobes on the cone scales and seeds with broad wings and long stigmas.





RESIN BIRCH is the common dwarf birch of the arctic tundra and western mountains. It is rare and disjunct in alpine areas in the NFR. It is a low shrub in the alpine zone, taller in tundra, with small rounded leaves under two cm. long and twigs with large bumpy resin glands. Bog birch is similar, with longer, more oval leaves and twigs with small resin glands or none. The two hybridize whenever they get the chance.











Left, young black birch with tight bark and horizontal lenticels; it can be shinier than this. Right, old black birch with the bark cracking into plates.



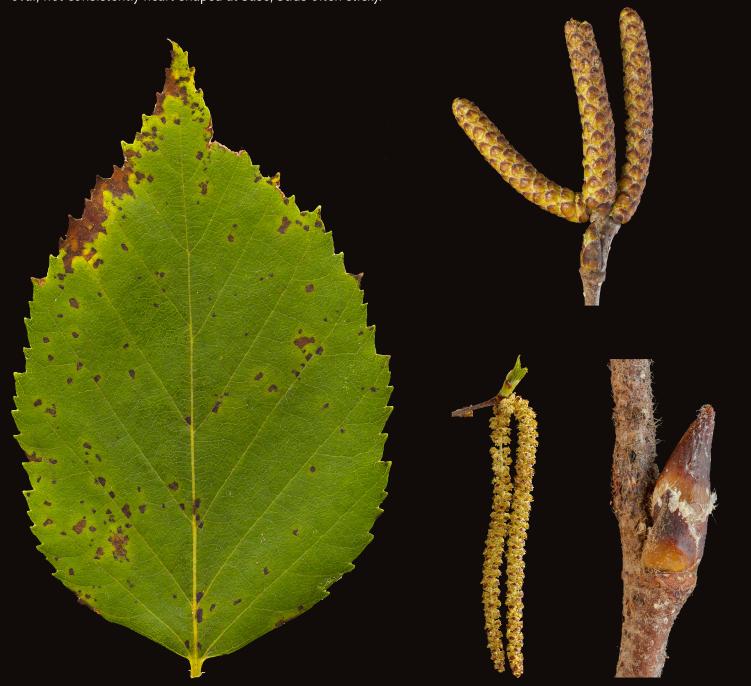


DWARF BIRCH is a shrubby birch of arctic and subarctic tundra in eastern Canada, disjunct southwards to alpine and subalpine summits in the NFR. Its defining marks are the pointed leaves with some irregularity in the sizes of the teeth; and twigs without large bumpy resin glands. Betula glandulosa is similar but has more rounded leaves and teeth and twigs with large resin glands. The NFR plants of minor could easily be hybrids of glandulosa with papyrifera or cordifolia, but there is no proof of this.



BETULA PAPYRIFERA (PAPER BIRCH, *Betulaceae*): Mature bark white, peeling in curls; side lobes of the scales point outwards; leaves broad oval, not consistently heart-shaped at base; buds often sticky.







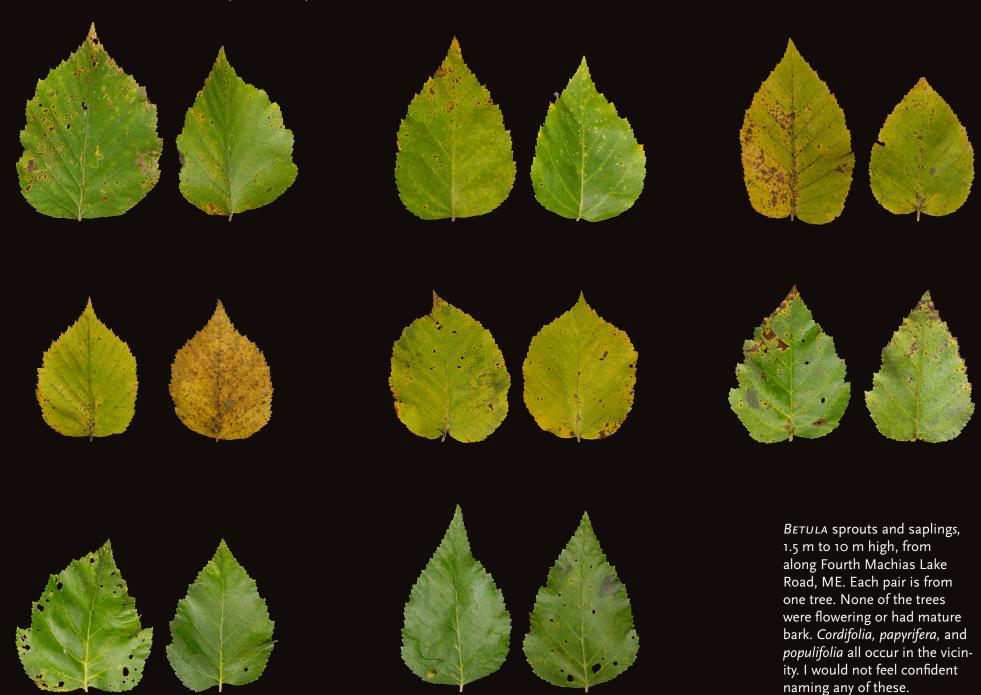
Paper birch is a transcontinental species complex, closely related to the other white-barked birches of North America and Europe, and, given opportunity, hybridizing freely with them and with the shrubby birches. The form we see commonly in the NFR has white, curly bark; broadly oval, double-toothed leaves with rounded bases; hairy or sticky twigs and buds; and male catkins in clusters of two or more. All these characters vary, and intermediates with gray birch and heart-leaved birch, our other white-barked birches, are common.





More paper birch characters: long female catkins; cone bracts with a short, broad center lobe; seeds with short styles; bark either smooth or curly.

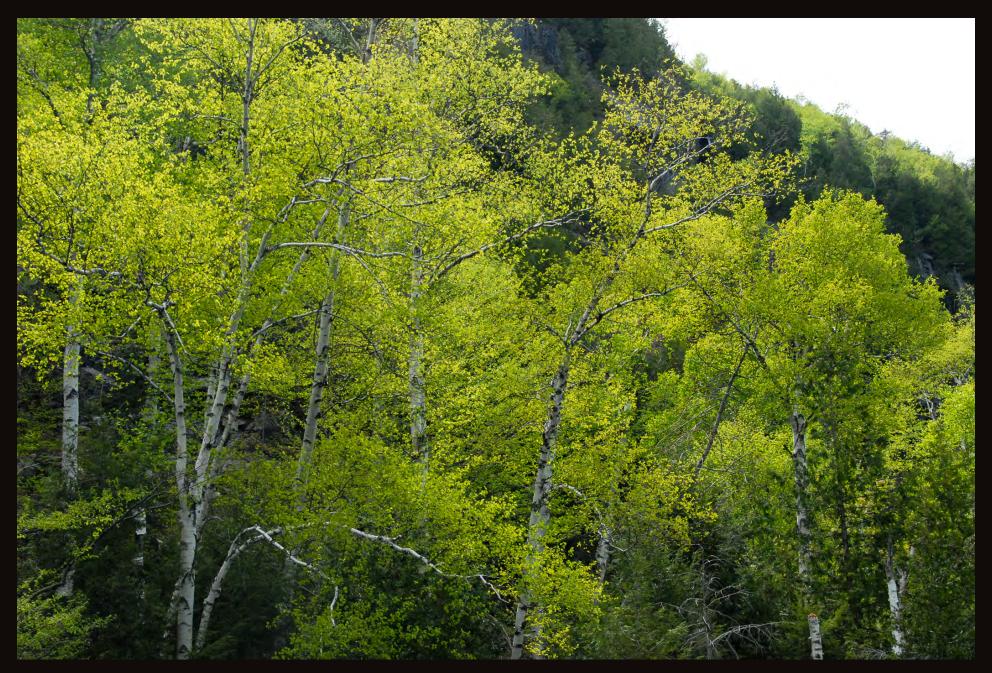








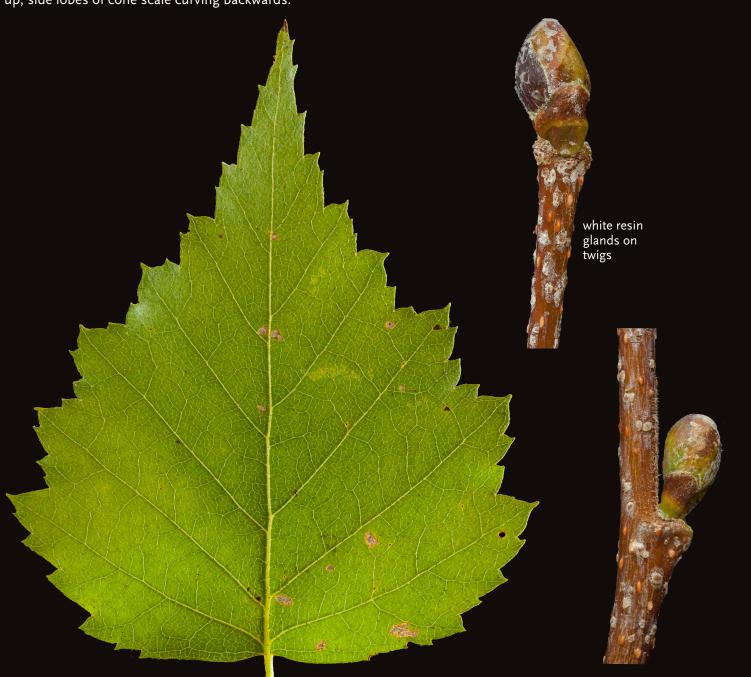




White birches with new leaves below the cliffs at Chapel Pond, Keene Valley, New York.

С

BETULA POPULIFOLIA (GRAY BIRCH, BETULACEAE): Small tree with tight white bark and conspicuous chevrons at the branch insertions, often retaining its lower branches; leaves rounded-triangular with squared-off bases and long tips; male catkins mostly single, pointing up; side lobes of cone scale curving backwards.



GRAY BIRCH is an early successional species of the northern Appalachians, common in old fields, post-agricultural woods, cut-over land and open wetlands in the eastern NFR, rare or absent west of Lake Erie. It is a small tree with white bark that doesn't peel; slender, dark, downswept lower branches that persist on the tree; triangular, coarsely double-toothed leaves with long tips; and single male catkins. The leaves are usually quite distinctive, but odd things happen at middle elevations and near the coast, especially if heart-leaved birch is around.







Leaves from small birches in a boggy beaver-meadow near Branch Pond, Sunderland, Vermont. They tend to resemble gray birch but with shorter tips, more evenly sized teeth, and more heart-shaped bases. None had catkins or fruit. Forms like this are reasonably common where heart-leaved and gray birches occur together.







Gray birches, White Creek, New York. Note tight, chalky white bark that doesn't peel; dark branches and dark chevrons.





BETULA PUMILA (Bog birch, *Betulaceae*): Low or tall shrubby birch with oval leaves with rounded, single teeth; twigs less glandular than *glandulosa*.







BOG BIRCH is a transcontinental species of northern fens, swamps, and shores, often associated with limy bedrock or seepage. It is common in the western NFR and much more local, though still widespread, in the east. Its marks are the oval leaves, up to about 4 cm long; and the slender, slightly furry twigs with large glands. Resin birch is similar but has smaller leaves, large resin on the twigs, and is alpine in the NFR. The two hybridize with each other, and with most of the tree-sized birches.







Musclewood is a small distinctive tree widely distributed in eastern North America, and common in moist woods and along streams in the southern half of the NFR. The dull-gray with muscle-like ridges is unique. Other good characters are the dark twigs; small dark buds with light-edged scales; finely-toothed leaves with unbranched side veins; and fruits attached to leafy bracts. It is the only member of the birch family that does not show male catkins in the winter.





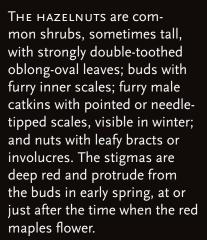






CORYLUS (HAZELNUT, BETULACEAE): Shrubs with rough-hairy leaves with broad bases and prominent double teeth; buds with dark lower scales and light hairy inner ones; catkins with hairy scales; fruit an edible nut with large leafy bracts, eaten by birds and squirrels before you get to them.







CORYLUS AMERICANA (AMERICAN HAZELNUT, *Betulaceae*): Shrub with rough-hairy leaves with broad bases and prominent double teeth; twigs with dark, gland-tipped hairs; buds with about 6 visible scales; male catkins on short stalks, with needle-tipped scales; nut subtended by two spreading bracts.









CORYLUS CORNUTA (BEAKED HAZELNUT, *BETULACEAE*): Shrub with rough-hairy leaves with broad bases and prominent double teeth; twigs without glandular hairs; buds with about 4 visible scales; male catkins stalklesss, without needle-tipped scales; nut enclosed in a long tube.













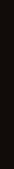
HOP HORNBEAM is a common eastern-North American tree, found throughout the NFR in both hardwoods and mixed woods. It is particular;y common on rocky hills at low elevations, often with red oak and shagbark hickory. It also occurs in successional woods on flood plains, but not usually in floodplain forests. Its marks are the oval, double-toothed leaves with some of the sideveins forked; the buds with slightly grooved scales; the male catkins, visible in winter, with needle-tipped scales with light edges; and the pods that enclose the seeds.































Symphoricarpos

THE HONEYSUCKLE FAMILY currently includes four NFR genera. Diervilla, bush honeysuckle, Linnaea, twinflower, and Symphoricarpos, snowberry, have a single NFR species each. Lonicera, honeysuckle, has seven. All have flowers borne in pairs or small clusters; inferior ovaries; small sepals; and united petals that often form a cup or tube. The viburnums and elderberries, formerly in this family, were thrown out for having numerous flowers in flat-topped clusters.







BUSH HONEYSUCKLE IS a low shrub, often arching, found throughout the northern Appalachians and around the Great Lakes, and common in the NFR. It is a typical plant of dry, open, ledgy woods, often growing on ledge tops and cascading down the faces. It likes openings and sandy soils and, while not firedependent, often increases after fires. Its marks are the paired oval leaves with sharp teeth and long points; the tubular, bilateral flowers with a dark yellow, hairy, lip; the slender fruits with persistent sepals; the ridged twigs; and the buds flattened against the twigs.

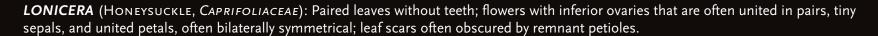




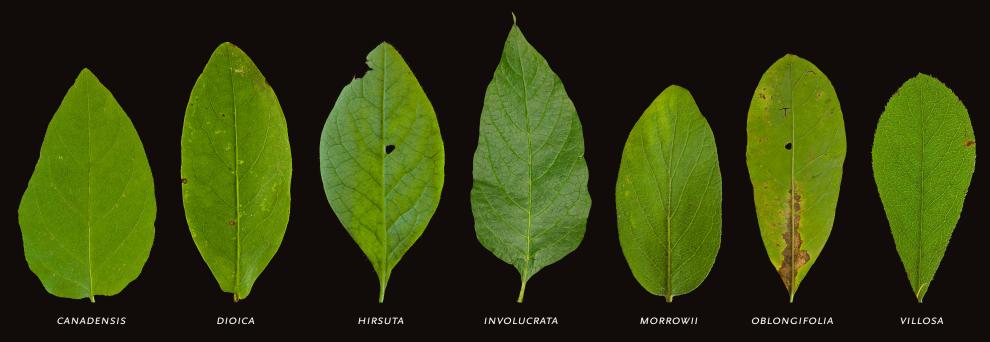




Twinflower, with the moss *Polytrichum commune* and velvet-leaf blueberry on the floor of a moist spruce-tamarack forest at Ampersand Pond, Harrietstown, New York.







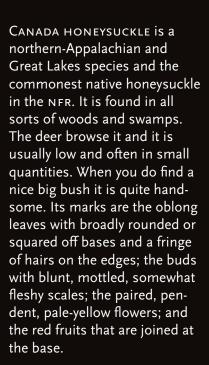


THE HONEYSUCKLES are shrubs and vines with opposite untoothed leaves and flowers with inferior ovaries, very small sepals, long, tubular corollas and exserted stamens and style. The flowers are commonly yellow or red, and often subtended by enlarged or fused leaves. They are borne in pairs, and the ovaries of a pair of flowers may be fused at the base. The fruits are berry-like and either red, blue, or black.

We have six native species in the NFR, found typically in fertile, rocky woods, plus an abundant alien found in post-agricultural woods and, increasingly, fertile wetlands.











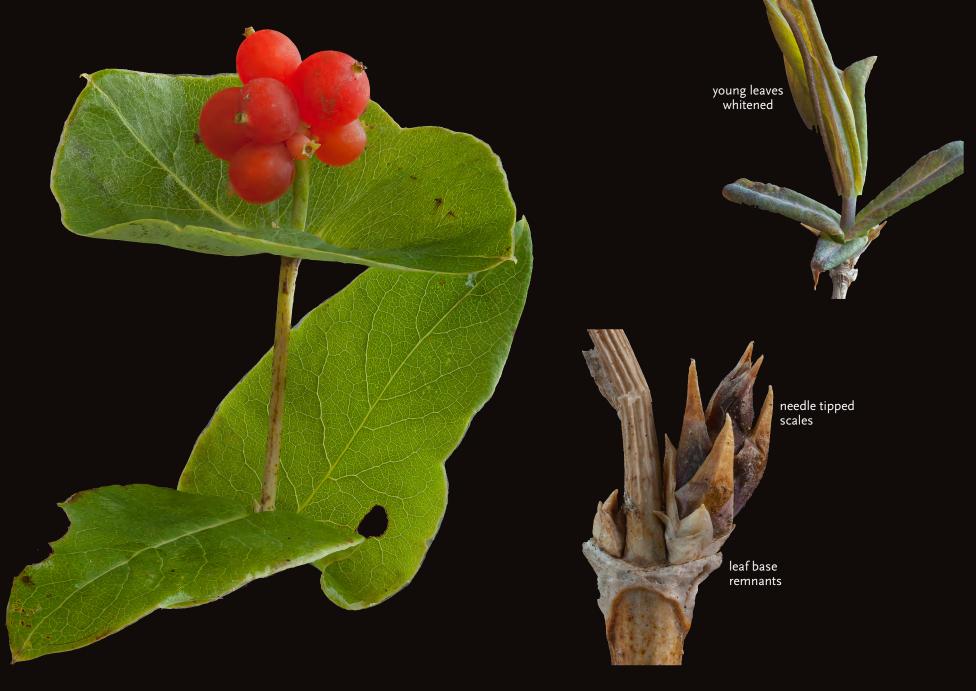
LONICERA DIOICA (LIMBER HONEYSUCKLE, *CAPRIFOLIACEAE*): Viny shrub with smooth, oblong leaves, whitened below; red-orange flowers subtended by a pair of fused leaves; bud scales needle-tipped.





LIMBER HONEYSUCKLE is one of our two viny honeysuckles, found most commonly in fertile, rocky woods and fertile swamps, but growing in a wide range of forests and thickets. It is mostly an Appalachian-Great Lakes species, found throughout the NFR but perhaps commoner near the Great Lakes. Its marks are the smooth, oblong leaves that are whitened below and meet at their bases; the smooth twigs and needletipped bud scales; and the red or yellow flowers and red fruits subtended by a pair of fused leaves.

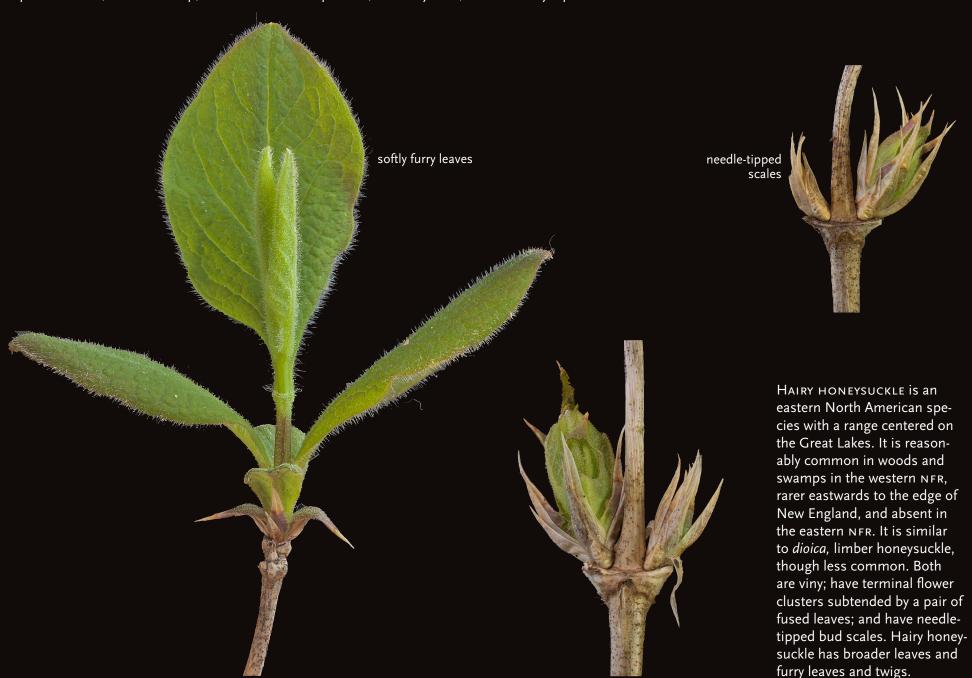








LONICERA HIRSUTA (HAIRY HONEYSUCKLE, *CAPRIFOLIACEAE*): Viny shrub with soft hairs on twigs and leaves; leaves broad in middle, tapered to base, rounded at tip; buds scales needle-pointed; flowers yellow, subtended by a pair of fused leaves.





LONICERA INVOLUCRATA (BLACK TWINBERRY, *CAPRIFOLIACEAE*): Leaves smooth, the largest over 10 cm long; flowers red and yellow, in pairs subtended by involucres of four red bracts; berries glossy black.



BLACK TWINBERRY is a western honeysuckle, with small disjunct populations in woods near the shore of Lake Superior. I have seen it once, in moist, fertile cedar woods with *Halenia* and *Petasites*. The leaves are large, veiny, and smooth. The flowers are red and yellow, subtended by four red bracts; the berries are glossy black. I have not seen either, and want to.





Black twinberry, with Rubus pubescens, Pyrola asarifolia, Petasites frigidus, and Cornus canadensis, Sleeping Giant National Park, Ontario.





Morrow's honeysuckle is an Asian species, introduced from cultivation and now an abundant invader of fields, roadsides, successional forests, and wetlands in the eastern NFR. It is a tall, very bushy species that can form dense thickets. Its marks are the oblong hairy leaves; long-lobed white or yellowish flowers in pairs; red berries; and hollow twigs with short stubby buds that point outwards. In the western NFR it is replaced or supplemented by Lonicera tartarica, Tartarian honeysuckle, and Lonicera ×bella, a variable series of hybrids between the two.





Twigs gray-brown, usually hairy, becoming hollow in the second year; leaf scars slightly raised, with shriveled petiole remnants; buds with small sharp scales; small buds often present above the main ones. Snowberry, Symphoricarpos, is similar, but with big shelves below the buds and no extra buds above the main ones.

LONICERA OBLONGIFOLIA (SWAMP FLY HONEYSUCKLE, CAPRIFOLIACEAE): Leaves oblong, broadly rounded at their tips and tapered to









SWAMP FLY HONEYSUCKLE IS an eastern North American species with a limited distribution, reasonably common in fens and fertile conifer swamps near the Great Lakes, rare elsewhere. In the eastern NFR it is a local species of rich fens and openings in cedar swamps. It is a medium-sized shrub with oblong, softly furry leaves that taper to their bases; twigs with solid pith; long, papery bud scales with sharp points; pairs of pale yellow flowers on long stalks; and long-stalked red berries.

LONICERA VILLOSA (MOUNTAIN FLY HONEYSUCKLE, *CAPRIFOLIACEAE*): Leaves oblong, broadly rounded at their tips and tapered to base, with stiff brownish hairs; flowers pale yellow; berries blue, with a white bloom; buds flattened against twigs, with two scales.





MOUNTAIN FLY HONEYSUCKLE is a wide-ranging shrub of the subarctic that comes south, in small quantities, to peatlands and shores in the northern NFR. We see it in fens and fertile swamps, on the shores of bog ponds, and, occasionally, on rocky headlands on the coast. It is a small shrub, not viny, with distinctly bluegreen leaves. Its marks are the stiff brown hairs on leaves and twigs; the buds covered by a single pair of scales; pale yellow flowers in pairs, with fused ovaries; and blue berries derived from the fused ovaries of a pair of flowers.



Note stiff hairs on leaves and stems; buds erect, parallel to stem, with a single pair of outer scales; blue berries derived from a pair of flowers.













SNOWBERRY is a wide-ranging northern shrub, common in the western mountains and western NFR, local or rare eastwards. In the western NFR it is common in open or early-successional forests; in the eastern NFR it is commonest in open rocky woods and on rocky shores on calcareous bedrock. Its marks are the rounded leaves with a fringe of fine hairs; the slender, hollow twigs; the small, rounded buds with dark-edged scales that sit on shelves; the leaf scars with a single bundle scar; and the small, pink cuplike flowers that produce pink berries.





















Section Phaestoglochin







Section Phaestoglochin











CLETHRA ALNIFOLIA (Sweet pepperbush, *Clethraceae*): Large, sharply toothed leaves, widest above the middle; furry buds without scales; white flowers in a terminal raceme.



















THE DOGWOODS are common shrubs and small trees with opposite leaves whose veins curve forwards, and small white flowers in terminal clusters. The buds are slender and pointed, with a single pair of clam-shell scales. The base of the leaf remains attached to the stem, and the leaf scars are raised on the remnant petioles. The flowers have four petals, united at their bases, and an inferior ovary. The fruits are fleshy and often bright red, blue, or white.



















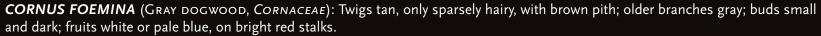




SILKY DOGWOOD is the common, dark red dogwood of wetlands, found throughout the NFR in wet meadows, marshes, swamps, and on pond and stream shores. Its marks are the dark-red winter twigs whose pith turns brown in the second or third year; densely furry tips of the twigs; and bright blue berries. Red osier dogwood has white pith and white berries, and is red all the way to the base. Both species can have green twigs in the summer.

CORNUS FLORIDA (FLOWERING DOGWOOD, *CORNACEAE*): Small tree; twigs green or purple; flower buds top-shaped; flowers in a dense cluster, subtended by large white bracts; fruits red.











GRAY DOGWOOD is the common dogwood of open brushy fields and successional woods throughout the NFR. It is also found on shores and in marshes. It spreads underground and forms dense rounded colonies. Its marks are the tan twigs with small dark buds, the brown pith of the older branches, and the white berries on bright red stalks.





Flowering colony of gray dogwood at the edge of a field, Lake Placid, New York.







ROUND-LEAVED DOGWOOD is an upland species found in forests throughout the NFR. In the eastern NFR we see it most characteristically on dry rocky hills with fertile soils. Its marks are the large, broadly rounded leaves that are rough on the upper surface; and the pink or green twigs with dark streaks or blotches.

CORNUS SERICEA (RED-OSIER DOGWOOD, *CORNACEAE*): Twigs and branches red in winter, with fine short hairs; plants often creeping; pith white; fruits white.





RED-OSIER DOGWOOD is a common wetland dogwood throughout the NFR, found in wet meadows, marshes, shrub swamps, fens, and on all sorts of shores. It can form extensive colonies by rooting at the tips of old branches. Its marks are the bright red stems which are typically red to the base of the plant; the white pith on both old and young stems; and the white fruits. Silky dogwood, which often grows with it, is darker red and often grey or brown on the older stems, and has brown pith, denser hairs on the twig tips, and blue berries.













CHAMAECYPARIS

Thuja

THE CYPRESS FAMILY includes evergreens with opposite or whorled scale leaves or needle leaves. Juniperus, junipers and cedars, is found throughout the NFR and has square or round shoots, fleshy fruits, and needle leaves on the young shoots. Chamaecyparis, Atlantic white cedar, and Thuja, White cedar have strongly flattened shoots. Chamaecyparis is found along the Atlantic coast, mostly south of the NFR, and has fruits whose scales are attached at the center and meet along their edges. Thuja is found throughout the NFR, and has fruits whose scales are attached at their lower ends and overlap the scales above them.

CHAMAECYPARIS THYOIDES (ATLANTIC WHITE CEDAR, *CUPRESSACEAE*): Tree with sprays of flattened twigs covered by scale leaves; scale leaves often with white edges or needle points; fruit a ball-shaped cone with the scales attached by their centers.





ATLANTIC WHITE CEDAR is a species of the central Atlantic, commonly dominant in acid swamps near the shore. It is rare in the extreme southeastern NFR, absent elsewhere. It resembles *Thuja*—the common northern and inland white cedar—but has somewhat narrow branches with more prominent white edges to the scale leaves and less prominent resin glands. The best way to separate them is by the cones, ballshaped with centrally attached scales in Chamaecyparis, oval with conventionally attached scales in Thuja.





















HORIZONTALIS



VIRGINIANA







JUNIPERUS includes three common northern trees and shrubs with opposite or whorled evergreen leaves and fleshy fruits. Red cedar is a tree of dry habitats, common in the southern NFR. Common juniper is a transcontinental northern species of barren and rocky soils. Creeping juniper is transcontinental in the subarctic and locally common on rocky shores and in flat-rock barrens in our area.









COMMON JUNIPER is a wide-ranging species of open sandy or rocky soils, found in old fields, successional woods, shrubby prairies, barrens and on rocky shores, dunes, and rocky hills throughout the NFR. The whorled needles with the white band (stomatal band) facing up are immediately distinctive.











CREEPING JUNIPER is a wideranging subarctic species that is locally common on rocky headlands, on limy cliffs, and in alvars (flat-rock barrens) in the NFR. It resembles red cedar, but grows flat to the ground and often forms low, dense cushions. The fruit stalks are longer than those of red cedar, and have a bend near the stem.









Stems of creeping juniper in a pool in an alvar (flat-rock barren on dolomite), near the Mississagi Lighthouse, Manitoulin Island, Lake Huron. The turf-forming sedge is *Eleocharis compressa*, and the moss in the pool the rare *Scorpidium turgescens*.







RED CEDAR is the common treesized cedar of the south eastern United States where it grows on all sorts of soils and in all sorts of forests. It is reasonably common in the southern parts of the NFR, where it grows on dune sands and in dry oak hickory in the west, and on dry limy hills in the east. Its marks are the needle leaves on the young growth, and the squarish shoots with short scale leaves on the older growth. Usually it is a small or medium-sized tree. Near the coast it may be prostrate, but it never really creeps like creeping juniper, and its fruit stalks are short and straight.





Red cedar seedling, with needle leaves.

THUJA OCCIDENTALIS (WHITE CEDAR, CUPRESSACEAE): Tree with strongly flattened twigs in sprays; leaves on the tops of the twigs with conspicuous resin glands in the middle; cones oblong, with overlapping scales.







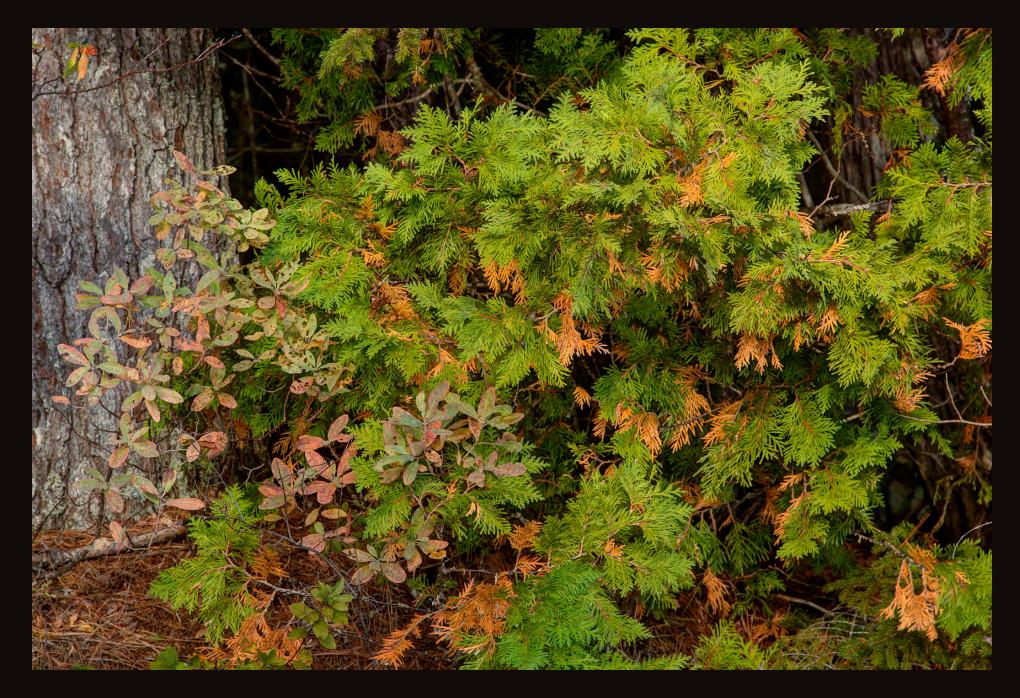
WHITE CEDAR is an Appalachian-Great Lakes species, found in forests, swamps, fens, and on lake shores and rocky hills throughout the NFR. Its marks are the flattened shoots with scale leaves, the cones with overlapping scales, and the prominent glands in the center of the scale leaves on the upper side of the shoots.















White cedar, red spruce, and white birch on dolomite ledges; shore of Lake Huron, Mississagi Lighthouse, Manitoulin Island, Ontario.





species of the arctic and subarctic which comes south to the alpine summits of the eastern NFR. In the north it likes open, barren, rocky or gravelly ground. In the NFR it makes small, tight mats over exposed rocks and soil. The rosettes of thick strap-like leaves and solitary white flowers are immediately distinctive.





A turf of rosettes of Diapensia, with (left) a small plant of *Carex bigelowii*, from the alpine zone of Algonquin Peak, Adirondacks, New York.





SHEPHERDIA CANADENSIS

THE OLEASTER FAMILY has two NFR species, both with scaly twigs and leaves. *Elaegnus umbellata* is an escaped cultivar with alternate leaves, common in thickets and young woods. *Shepherdia* is a native shrub with opposite leaves, rare overall but locally common on limy ledges and limy pavement barrens.







RUSSIAN OLIVE is a small tree, originally native to Asia, that has escaped from cultivation and is now common on roadsides and in second-growth thickets and woods throughout much of the NFR. The alternate buds and leaves and scaly twigs, flowers, leaf bottoms, and fruits are immediately distinctive.

SHEPHERDIA CANADENSIS (BUFFALOBERRY, *ELAEGNACEAE*): Opposite leaves, whitened below, with scales on both sides; tip buds flattened; fruits red.



ERICACEAE (HEATH FAMILY): Shrubs and creepers with alternate, often evergreen leaves, mostly without teeth; leaf scars with a single bundle scar; flowers mostly cup shaped or saucer shaped, with united petals.







THE HEATHS are shrubs or small trees, mostly with evergreen leaves, and mostly with small cup-shaped or flask-shaped flowers. The flowers typically have fused petals and stamens that open by pores or tubes.

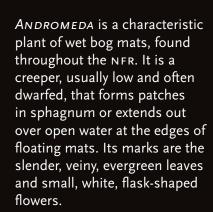
We have 18 genera in the NFR. Fourteen are evergreen and four (Rhododendron, Gaylussacia, Lyonia, and Vaccinium) are deciduous or mostly deciduous. Our heaths are mostly small—the rare Rhododendron maximum gets to tree size—and acidiphiles, found commonly in bogs, fens, boreal forests, and alpine tundra and on rocky shores and hills.





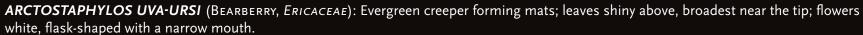




















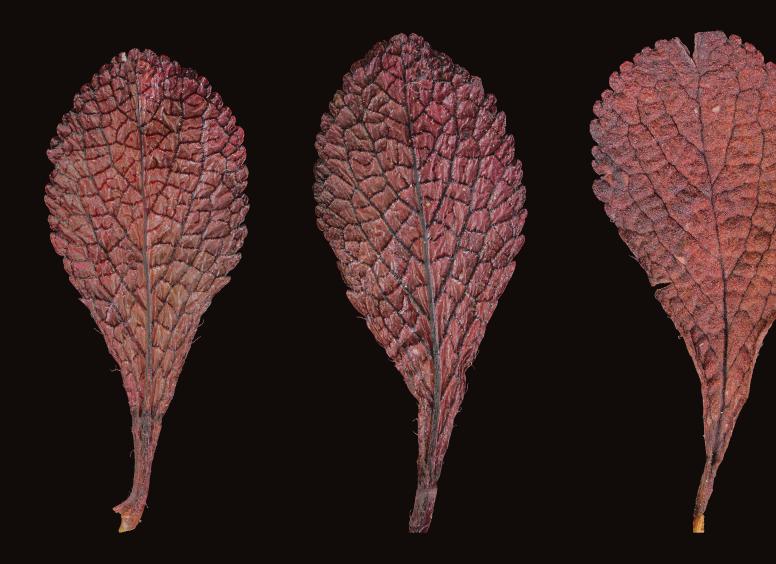


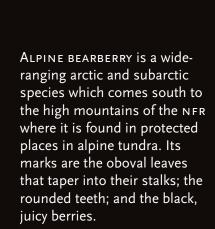
BEARBERRY is a transcontinental species, found from the temperate zone to the arctic, and common throughout the NFR in dry, open, rocky or sandy places—barrens, dunes, shores, ledge-tops, dry woods. It occurs regularly in alvars on limestone and dolomite near the Great Lakes. It is an evergreen creeper that can grow erect or form mats. Its marks are the shiny leaves that are widest near the tip, small white flask-shaped flowers, and almost tasteless berries.





ARCTOUS ALPINA (ALPINE BEARBERRY, *ERICACEAE*): Dwarf alpine creeper with veiny, oval leaves with rounded teeth, tapering to a winged base; not evergreen, but leaves often persist.





CASSIOPE (HARRIMANELLA) HYPNOIDES (Moss HEATHER, *ERICACEAE*): Dwarf alpine creeper; leaves needlelike, flattened and toothed; flowers white, cup shaped, with red sepals.







MOSS HEATHER is an arctic-subarctic species of eastern North America and Europe which is found in the alpine zones of the high mountains of the eastern NFR. It grows in moist protected places, especially snowbeds. The slender leaves with a fringe of minute hairs or teeth on the edges, and the long stalked flowers and fruits are distinctive.

















MACULATA

CHIMAPHILA contains two small, evergreen creepers; one or the other can be found in forest understories throughout the NFR. Their marks are the thick, coarsely-toothed leaves; their creeping habit; and the white, saucer-shaped flowers whose anthers open by tubes. They may be found in all sorts of places, but are most characteristic of dry, open woods.













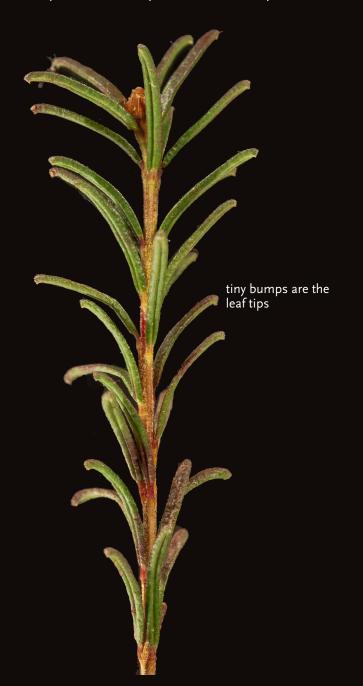




Colony of pipsissewa with *Pleurozium schreberi* and *Hypnum imponens* on the floor of an old-growth hemlock stand, Kejimkujik Nation Park, Nova Scotia.

COREMA CONRADII (BROOM CROWBERRY, *ERICACEAE*): Dwarf, colonial, patch-forming, needle-leaved shrub; leaves somewhat flattened, down-curved, with a small bump on the lower side at the tip. Flowers wind pollinated, without petal.



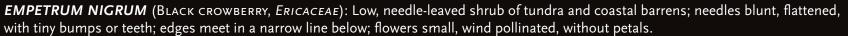




BROOM CROWBERRY is an Atlantic endemic, found on dunes and in sandy flats near the coast from Nova Scotia to New Jersey. It is a colonial plant, resembling black crowberry but lower and less woody, with slender, grooved needles that arch outwards and have their tips pointing down. Like crowberry, the flowers are small and wind pollinated.















THE CROWBERRIES form a circumpolar complex with multiple chromosome levels. Nigrum, with black berries and smooth branches, is diploid, triploid and tetraploid, and is the common crowberry of mountain summits and coastal and shoreline ledges in the NFR. Eamesii is a northern coastal diploid, atropurpureum a northern tetraploid. Both have red or purple berries and woolly shoots. Common characters of the crowberries are the thick, relatively short leaves that are spaced out along the young stems. Corema has slenderer leaves with tiny down-turned tips and is restricted to sand. Phyllodoce, also with longer leaves, has better developed teeth and is a snowbed plant of the alpine zone.











Black crowberry, with large cranberry and mountain cranberry on a coastal ledge at Quoddy Head, Maine. The fruits are large cranberry.

EPIGAEA REPENS (TRAILING ARBUTUS, *ERICACEAE*): Evergreen creeper with broad, oblong leaves with rounded bases; flowers pink, tubular with spreading lobes.









HISPIDULA



GAULTHERIA contains two common NFR species. Both have evergreen leaves with a wintergreen scent when crushed. Creeping snowberry is a low creeper with small round leaves. Wintergreen is a dwarf shrub that forms small colonies.









CREEPING SNOWBERRY is a low, small-leaved creeping, wideranging in the boreal zone and common on bog hummocks and old stumps and logs in openings in boreal forests throughout the NFR. Its marks are the small, almost round leaves with coarse brown hairs and the (tasty) white berries.

















GAYLUSSACIA has three NFR species, all deciduous and with yellow resin dots or resintipped hairs on the leaves, inner bud scales, and often flowers. Baccata is widespread and common; bigeloviana is common along the north Atlantic coast; frondosa is a southern species that barely reaches the southeastern NFR. The blueberries and bilberries, Vaccinium, are generally similar but lack the resin dots and have smaller and more numerous seeds in their fruits.







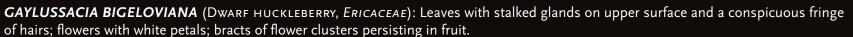
















DWARF HUCKLEBERRY is a north Atlantic endemic, common near coast in bogs, heaths, and barrens. It is a small huckleberry, similar to black huckleberry and often growing with it. When both are dwarfed on an Atlantic headland, they can look quite similar. Its best marks are the glandular hairs (which appear as streaks rather than as dots in the photos) on the leaves, fruits, and fruit stalks; the conspicuous fringe of white hairs around the leaves; the bell-shaped white flowers with flaring lobes; and the leafy-bracted flower cluster.









Flowers white, bell-shaped, in leafy clusters. Stalked glands on flowers and fruits.









GAYLUSSACIA FRONDOSA (DANGLEBERRY, *ERICACEAE*): Leaves broad above the middle, whitened below; twigs multi-colored, whitened; flower clusters exceeding leaves.





DANGLEBERRY is a common tall huckleberry of moist woods and cedar swamps on the Atlantic coastal plain. It barely reaches the southeastern edge of the NFR. Its marks are the whitened leaves which are widest above the middle and have yellow glands below; the hairless multicolored twigs with a white bloom; and the short rounded buds.









POLIFOLIA

KALMIA, used in the traditional sense here, includes broad-leaved evergreen shrubs with showy, saucer-shaped flowers with spring-loaded stamens: the anthers are held in pockets in the corolla and released by insects. There are three NFR species: angustifolia, a northern generalist; polifolia, a bog species; and latifolia, an Appalachian species of dry woods.







laurel of the Northeast, found in dry forests, rocky or sandy barrens, on shores, and in heaths and bogs. It is disjunct in Michigan and otherwise absent from the western NFR. The whorled evergreen leaves are distinctive.





















MOUNTAIN LAUREL is the common laurel of the central Appalachians and Atlantic coastal plain, entering the NFR in southern New York and New England. It is a forest species, common in open, dry, sandy or rocky woods, and also in thickets around ponds. The broad, smooth, shiny, alternate leaves are distinctive.













BOG LAUREL is the common laurel of open sphagnum bogs, found throughout the NFR. It is low and skinny, with paired leaves which are whitened below and have the edges rolled under. The only other heath with opposite leaves is alpine azalea, *Loiseluria procumbens*, which has recently been moved to *Kalmia*. It is an alpine species with thick, fleshy leaves and cup-shaped flowers with distinct lobes.







LABRADOR TEA is a characteristic shrub of bogs, muskegs, conifer swamps and thickets, and mountain slopes, transcontinental in boreal and subarctic Canada and found throughout the NFR. Its marks are the veiny leaves with furry lower surfaces and the edges turned under; and the white flowers in a terminal cluster. The fur is white when the leaves first come out and then turns cinnamon. Labrador tea is close to some of the rhododendrons with scaly leaves, and is treated as Rhododendron groenlandicum in the Flora of North America.









LOISELURIA (KALMIA) PROCUMBENS (ALPINE AZALEA, *ERICACEAE*): Dwarf alpine shrub with thick, smooth, blunt, opposite leaves with a groove down the middle and edges rolled under.







LYONIA LIGUSTRINA (MALEBERRY, ERICACEAE): Tall deciduous shrub; leaves oval, fine-toothed, tapered at both ends; buds red, sharp-pointed, with a single cap-like scale; flowers small and white, in clusters at the branch tips; fruit a small pod.





MALEBERRY is a common shrub of the Atlantic coastal plain and Appalachian foothills that is common in old fields, successional woods and swamps in the eastern NFR and absent from the west. It is a tall shrub with finely-toothed oval leaves and small white flowers. The buds are red, with the scales fused to a single, sharp-pointed scale; the fruits are small fiveparted pods. Highbush blueberry is similar; its twigs are bumpy, its buds have several scales, and its fruits are berries rather than pods.

PHYLLODOCE CAERULEA (PURPLE MOUNTAIN HEATHER, *ERICACEAE*): Dwarf, needle-leaved shrub of alpine snow beds; leaves with blunt tips, small sharp teeth, and the edges rolled under; flowers purple, cup shaped.



These pictures are placeholders. They are *Phyllodoce glanduliflora*, a western species that is vegetatively close to the eastern *caerulea*.



Purple mountain heather is a multi-continental arctic species that comes south to the high mountains of the NFR where it typically occurs as part of the snowbed community in alpine tundra. It is a dwarf, needle-leaved shrub with flattened leaves whose edges are rolled under, leaving a fuzzy band exposed down the middle of the leaf. The flowers are purple, and showy; the fruits are small pods. The crowberries, which are similar, have shorter, straighter leaves with less prominent teeth; small wind-pollinated flowers; and fleshy fruits.

RHODODENDRON (RHODODENDRON, AZALEA, LAUREL, *ERICACEAE*): Shrubs and small trees with deciduous or evergreen leaves; buds clustered at twig tips, leaf scars with a single bundle scar; flowers large, pink or white, tubular and flaring, with the stamens and style sticking out.











WE COUNT five Rhododendrons in the NFR, or six if Labrador tea is moved from *Ledum* to *Rhododendron*. *Rhododendron periclymenoides*, distinguished from *prionophyllum* by more glandular sepals and capsules, may or may not be a species and may or may not reach the NFR.

The three species in the top line are deciduous shrubs. *Canadense* is a northeastern species of bogs and rocky barrens, common along the northern Atlantic coast. *Prionophyllum* is as an Appalachian species of dry rocky woods in the oak zone. *Viscosum*, with white flowers, is a tall shrub of coastal-plain swamps. The two species in the lower lines are evergreen. *Maximum* is a tall Appalachian shrub, dominant and close to impenetrable on steep rocky slopes. *Lapponicum* is a small arctic-alpine cushion plant, rare in the high eastern mountains, weirdly disjunct on sandstone cliffs in Wisconsin.

RHODODENDRON CANADENSE (RHODORA, *ERICACEAE*): Leaves narrow, rounded at the tip, often whitened below, with sparse stiff hairs; bud scales whitened; flowers deeply lobed.



RHODODENDRON LAPPONICUM (LAPLAND ROSEBAY, *ERICACEAE*): Dwarf alpine shrub, forming cushions; leaves evergreen; whole plant covered with scales.









SECTION PHAESTOGLOCHIN

RHODODENDRON PRIONOPHYLLUM (JUNE PINK, *ERICACEAE*): Shrub with soft hairs on twigs and leaves; flowers pink; ovaries with glandular hairs.



RHODODENDRON VISCOSUM (WHITE AZALEA, *ERICACEAE*): Tall shrub with white flowers; leaves broad above the middle and tapering to base, with stiff hairs on the edges and midveins; bud scales with white fringes; twigs with stiff hairs.





VACCINIUM (Blueberry, Bilberry, Cranberry, *Ericaceae*): Deciduous shrubs and evergreen creepers producing fleshy fruits with many small seeds; flowers cuplike with shallowly five-lobed corollas in the shrubs and spreading with deeply four-lobed corollas in the creepers.



Mountain cranberry; evergreen leaves, cuplike flowers, red fruits.

CORYMBOSUM



True cranberries; evergreen leaves, flowers with four reflexed

Bilberries: twigs without bumps; bud scales without needle tips; fruits solitary from leaf axils.

MYRTILLOIDES

PALLIDUM



tent leafy bracts.

STAMINEUM

VITIS-IDEA

Deerberry; flowers bell-shaped,

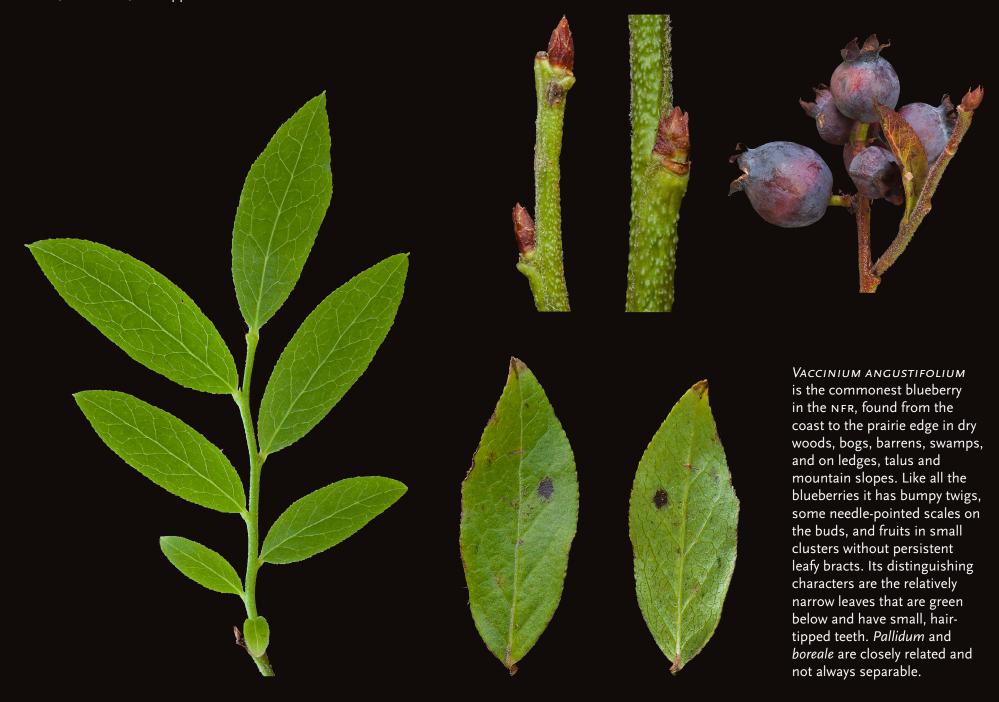
fruits in a cluster with persis-

VACCINIUM, blueberries, bilberries, cranberries, and deerberry, is a large common NFR genus. It divides into three groups and an outlier. The blueberries, with five species, are widespread and common, genetically complex, and sometimes hard to name. The two true cranberries are also widespread, and also sometimes hard to name. The bilberries, with four species, are northern and uncommon overall, though locally common in the mountains and near Lake Superior. The mountain cranberry is alpine and coastal, and the deerberry rare at the south edge of the NFR.

BOREALE

ANGUSTIFOLIUM









VACCINIUM BOREALE (BOREAL BLUEBERRY, *ERICACEAE*): Dwarf alpine species, close to *angustifolium*; bumpy twigs; leaves small and slender, green below, with tiny teeth.





VACCINIUM BOREALE is a diploid relative or ancestor of angustifolium, found in barrens and tundra in northern Quebec, Labrador, and Newfoundland, and coming south in small quantities to alpine zones in the NFR. It is separated, weakly, from angustifolium, by its small size and narrow leaves.

VACCINIUM CESPITOSUM (DWARF BILBERRY, *ERICACEAE*): Low plants with finely furry twigs; buds with two clamshell scales; leaves small, widest above the middle, sharp-toothed; flowers white, single in the leaf axils, the corolla narrowed to its mouth.



















VACCINIUM MACROCARPON is the common large cranberry of the NFR, found in wet sandy thickets, dune hollows, shrub swamps, and on river and lake shores and in floating bogs and (especially) fens. It is an evergreen creeper with erect stems that can make extended colonies. Its best marks are the blunt-tipped leaves and the small leafy bracts on the fruit stalks.









VACCINIUM MEMBRANACEUM (TALL BILBERRY, *ERICACEAE*): Colonial shrub with smooth, angled twigs; buds with two clamshell scales; leaves light yellow-green, with rounded teeth with tiny needle tips; fruits large, solitary in the leaf axils.











VACCINIUM OVALIFOLIUM (OVAL-LEAVED BILBERRY, *ERICACEAE*): Tall shrub with glossy, angled twigs; buds with two clamshell scales; leaves blue green, untoothed or toothed only at base; fruits solitary in the leaf axils.

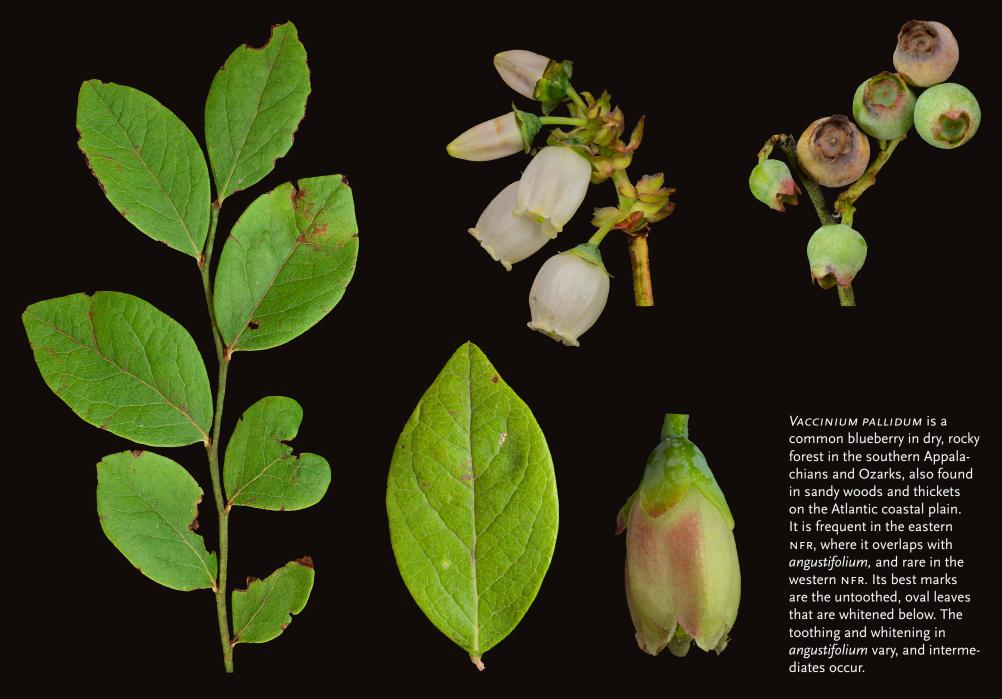








VACCINIUM PALLIDUM (LATE LOWBUSH OR HILLSIDE BLUEBERRY, *ERICACEAE*): Deciduous shrub with oval, untoothed leaves, usually under 3 cm long and less than twice as long as wide; usually whitened below; twigs bumpy, flowers in small terminal clusters.







Vaccinium pallidum in dry oak-hickory woods above the cliffs of Snake Den Bay, Split Rock Mountain, Westport, New York.

VACCINIUM STAMINEUM (LATE LOWBUSH OR HILLSIDE BLUEBERRY, *ERICACEAE*): Deciduous shrub with oval, untoothed leaves that are whitened below; twigs finely hairy; buds short and rounded; bud scales without needle tips; flowers on long stalks from the axils of leafy bracts.



VACCINIUM ULIGINOSUM (MOUNTAIN BILBERRY, *ERICACEAE*): Low shrub with short-oval or rounded, veiny, untoothed leaves; twigs finely furry, buds rounded, bud scales without needle points; flowers solitary from the leaf axils.





VACCINIUM ULIGINOSUM, the common bilberry of the alpine zones of the NFR, is a transcontinental species of the sub arctics, found in tundra, taiga, and muskeg. In the NFR it forms lows thickets, either alone or with other shrubs, in krummholz or in protected places in the alpine zone. The small, round, veiny, bluegreen leaves are distinctive. Vaccinium cespitosum, which can grow with it, is very small and has toothed leaves that are widest above the middle.





Mountain bilberry, with Labrador tea, balsam fir, the clubmoss *Huperzia appressa*, and a birch we are better off not trying to name, in the alpine zone of Whiteface Mountain, Adirondacks, New York.







VACCINIUM VITIS-IDAEA is a common plant of arctic and boreal North America, found in the north in barrens, tundra, taiga, and peatlands and in the NFR in alpine zones, coastal barrens, and heaths, and on the rocky shores of Lake Superior. The blunt oval leaves with a notch at the tip and black dots beneath; cup-shaped white flowers with red sepals; and red fruits are distinctive.







ROBINIA PSEUDOACACIA

THE BEANS are a large family of plants with (mostly) compound leaves, bilateral flowers that produce pods. We have two woody beans in the NFR. Both are native to the south or southwest of the NFR but introduced here. Amorpha frutescens, leadplant, has glandular-dotted leaflets and spineless twigs. Robinia pseudoacacia lacks glands and has spines at the nodes.











BLACK LOCUST is a common tree of dry forests in the southeastern United States, introduced and spread from cultivation northwards. It is a reasonably common farmyard and thicket tree in the southern NFR, and weedy and invasive in sand plains and other post-fire habitats. Its marks are the eglandular leaflets; the buds hidden below the leaf scars; and the paired thorns on the lower branches.









THE OAK FAMILY contains three genera of trees and shrubs with toothed or pinnately lobed leaves, scaly buds, male flowers in catkins, and fruits with a spiny husk or scaly cup. The oaks, Quercus, are common in all but the most boreal parts of the NFR. Fagus, the beech, is common from the Atlantic to central Wisconsin and absent west of there. Castanea, the chestnut, was formerly a common Appalachian tree. It is much diminished by the blight and now rare in the southern parts of the NFR.







AMERICAN CHESTNUT was formerly a common forest tree in the southern NFR from Lake Erie east. It was much reduced by the chestnut blight in the early twentieth century and now persists as root sprouts and occasional trees. Its marks are the long-tipped leaves with sharp, curved teeth; the blunt, lop-sided buds with two or three scales; and the oval leaf scars with five or more bundle scars.



small, separated teeth; the long scaly buds; and the triangular nuts enclosed in a spiny husk.















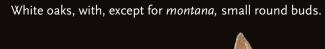




Oaks are common throughout all but the coldest and highest parts of the NFR. We have twelve species, counting palustris, the pin oak, which barely reaches the southern NFR, and ellipsoidalis, Hill's oak, p. 271, a midwestern relative of coccinea. They divide into two natural groups. The white oaks have teeth or lobes without bristle tips, and acorn caps with bumpy scales; the red oaks have bristle tips and flat scales.















MUEHLENBERGII PRINOIDES

Red oaks, with either sharp or rounded buds.







ILICIFOLIA



PALUSTRIS



RUBRA



VELUTINA

OAK BUDS are useful for identification but only rarely sufficient by themselves. The white oaks generally have small and round buds and the red oaks larger and more pointed ones. But there are obvious exceptions to this, and it gets worse from there.







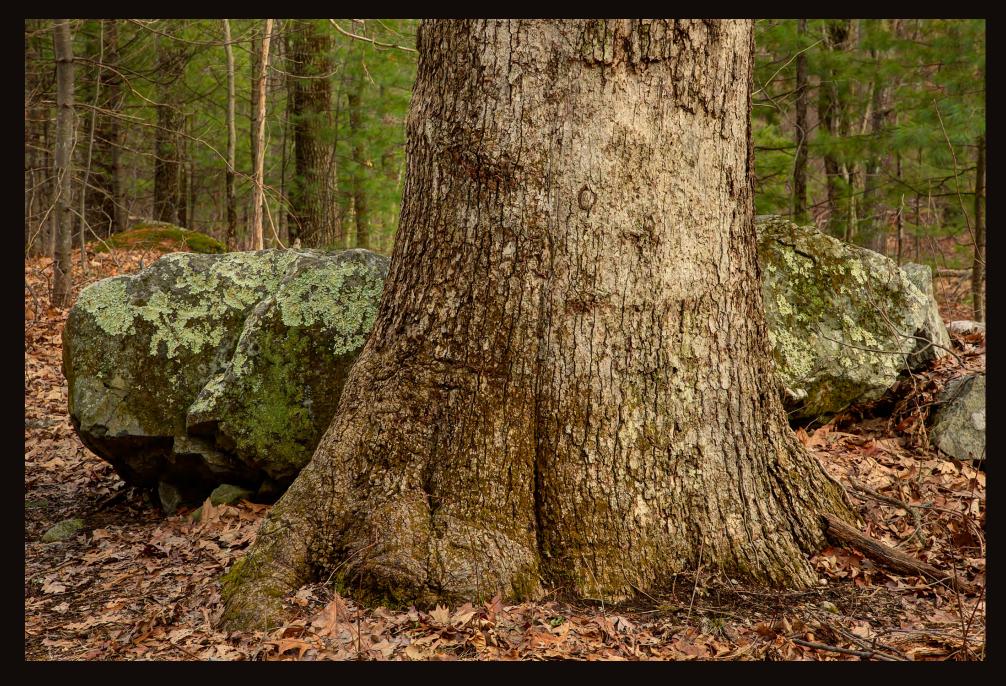




















C

QUERCUS BICOLOR (SWAMP WHITE OAK, *FAGACEAE*): Leaves with shallow lobes, some veins running to notches; lower surface covered with minute stellate hairs, mixed with some longer ones; acorns on long stalks.





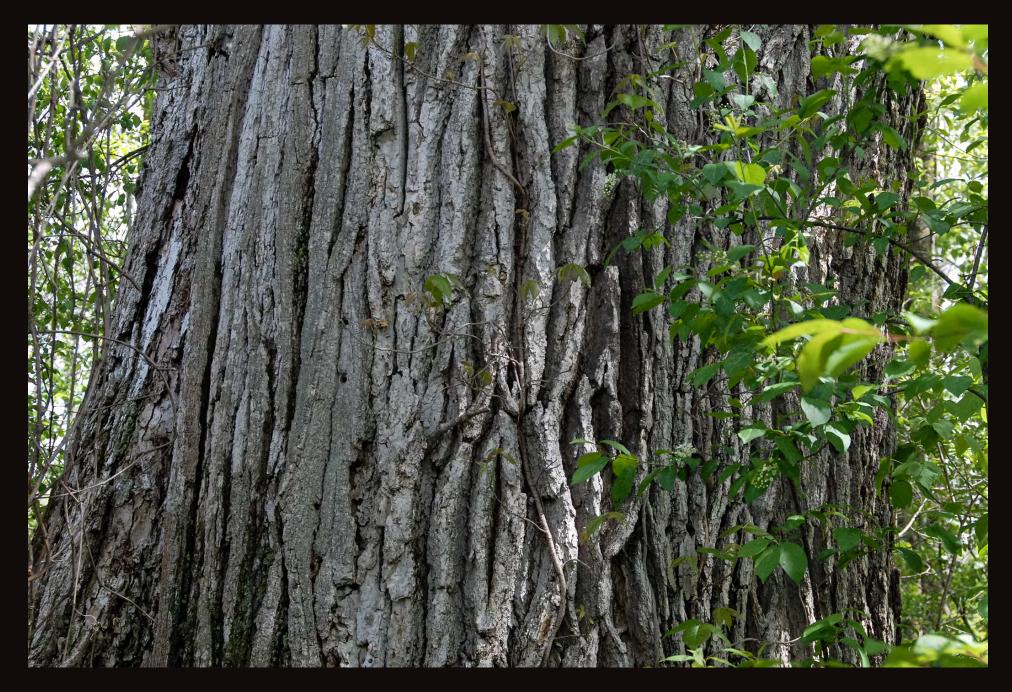
SWAMP WHITE OAK is a species of the east-central United States, abundant in the upper Mississippi and Ohio valleys, that reaches the NFR locally in floodplain swamps and alluvial forests in southern New England and the eastern Great Lakes. Its best marks are the shallowly-lobed leaves with some veins running to the notches and minute stellate hairs on the lower surfaces; and the long-stalked acorns. The twigs are generic white-oak group twigs, without much to distinguish them.





Swamp white oak leafing out, alluvial woods along Otter Creek, Cornwall, Vermont.





Swamp white oak, alluvial woods along Otter Creek, Cornwall, Vermont.

QUERCUS COCCINEA (SCARLET OAK, *FAGACEAE*): Leaves with deep sinuses and bristle-tipped lobes, smooth or sparsely furry below; tip of acorn surrounded by rings of tiny pits.







SCARLET OAK is a common oak of dry sandy and rocky woods in the eastern United States. Its main range is south of the NFR, but it is found, reasonably commonly, on dry sand-plains in southern New England and near the eastern Great Lakes. Its marks are the deeply cut leaves with narrow lobes whose sinuses extend two thirds or more of the way to the midrib, with largely hairless undersides; and, especially, the ring of shallow pits surrounding the tips of the acorns. The buds run a bit hairier at their tips than those of red oak, but this is not consistent.







Bark typically tighter and less deeply ridged than red oak, but quite variable.









HILL'S OAK is a close relative of scarlet oak that replaces it in the northern Midwest, and seems to be the common deep-sinus oak of the northern and western Great Lakes. It is said to have smaller buds, leaves, and acorns than scarlet oak, and to lack the ring of pits at the acorn tip.





QUERCUS MACROCARPA (Bur Oak, *Fagaceae*): Leaves with rounded lobes and deeper sinuses below the middle; lower surface with minute stellate hairs; acorn cups large, with a fringe of pointed scales; young branches with corky ridges.



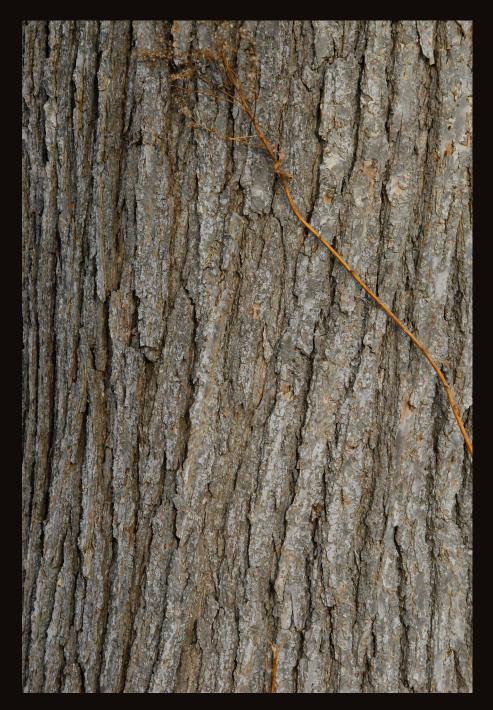




BUR OAK is the iconic oak of the northern prairies, where it forms savannas on sand hills and grows along lakes and streams in bottomlands. It is abundant in the western Great Lakes and comes east locally, likely in remnants from an older Hypsithermal distribution, to Maine. Its marks are the symmetrically lobed leaves with minutely hairy undersides; the corky ridges on the young branches; and the large acorn caps with a loose fringe of pointed scales.











QUERCUS MONTANA (CHESTNUT OAK, FAGACEAE): Leaves with low, rounded teeth; asymmetrical stellate hairs on lower surface, with longer hairs in the axils of the main veins; acorns and acorn caps long.





CHESTNUT OAK is a forest tree of the central and southern Appalachians, thick-barked and slow-growing, that enters the NFR in central New York and New England. It is common on the rocky western slopes of the Taconic Mountains here, but absent from the eastern slopes and most of the Green Mountains. Its marks are the leaves with even, rounded teeth or shallow lobes in which all the main veins run to teeth and the lower surface has scattered stellate hairs and larger simple ones in the vein axils; the smooth, pointed buds; and the long acorns with thin-walled caps.





U

QUERCUS MUEHLENBERGII (YELLOW OAK, FAGACEAE): Tree with regularly toothed leaves without bristle tips and minute stellate hairs below; all veins run to teeth.









YELLOW OAK is a tree of the southern Appalachians and Mississippi, reaching the NFR on rocky calcareous hills in southern New York, the Champlain Valley, and southern New England. It is best recognized by the evenly toothed leaves in which the veins run to the teeth and the lower surface which has minute, symmetrical, stellate hairs. It does not have the longer tufts of hairs in the vein axils of chestnut oak or the irregular lower lobes and long-stalked acorns of swamp white oak.









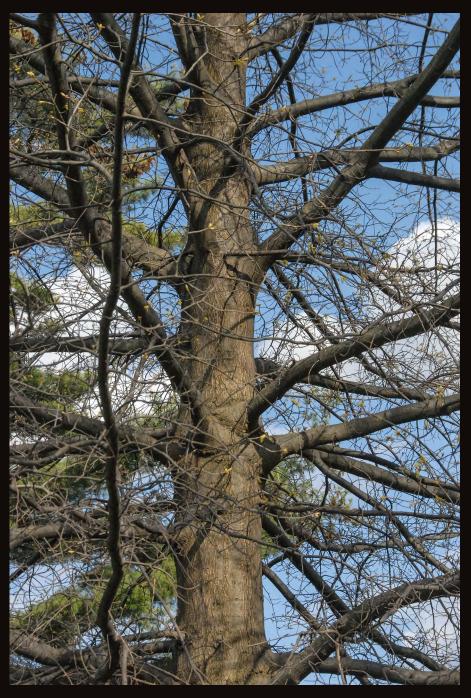




PIN OAK is a small-leaved swamp oak of the central eastern United States, commonly planted in the NFR but native only in alluvial swamps in southern New York and New England. Its marks are the small, deeply lobed leaves; straight, slender branches; and small buds and acorns.

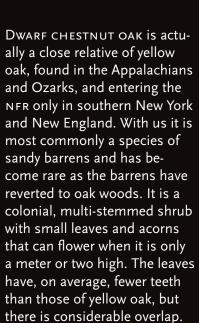




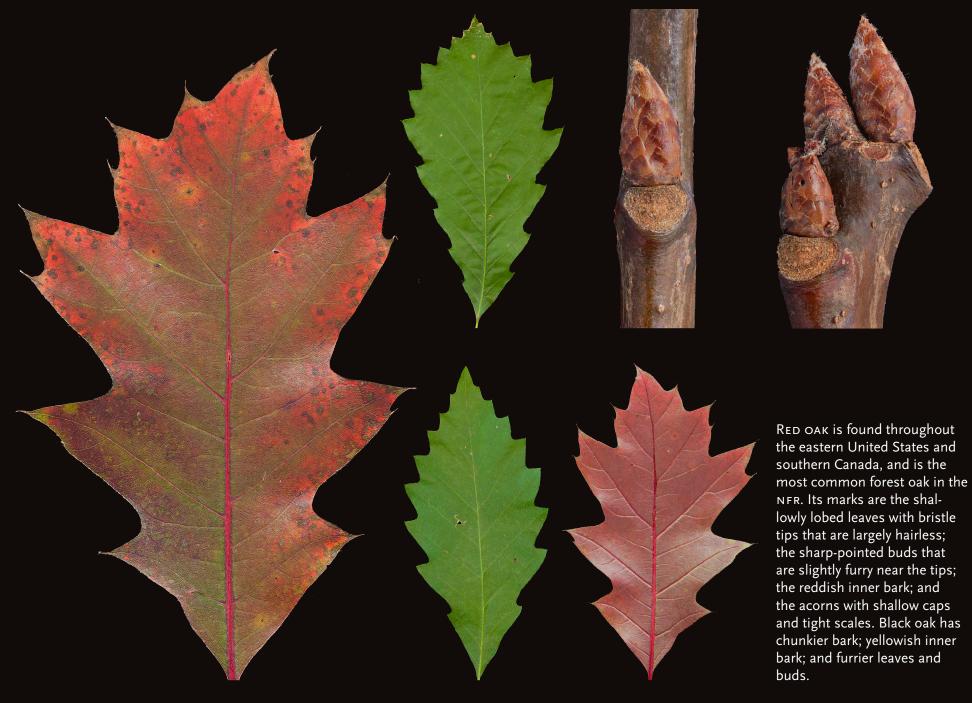


Planted pin oak in the cemetery of the Old First Church, North Bennington, Vermont.



























BLACK OAK is one of the commonest forest oaks of the eastern United States and, after burr oak, the commonest oak in the savannas and oak-openings of the eastern prairies. It is less common, but ecologically characteristic, in dry rocky or sandy woods along the southern edge of the NFR. It is close to both scarlet and red oaks, and intermediate populations occurs. Its best marks are the leaves that are persistently furry on the veins below; the large, densely furry, angled buds; and the acorns with a fringe of loose scales.







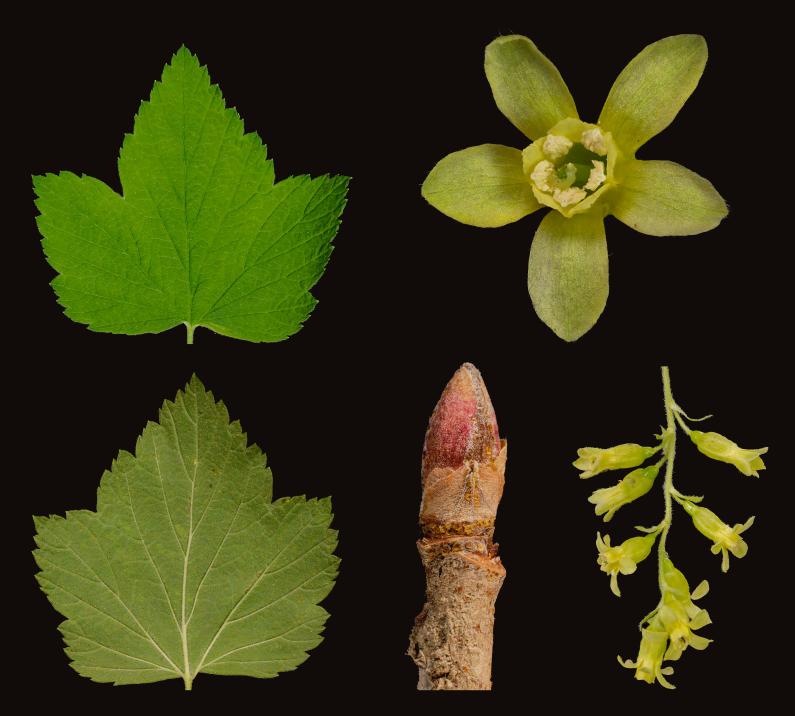
RIBES (Currants, Gooseberries, *Grossulariaceae*): Shrubs with alternate, palmately lobed leaves; flowers small, tubular or saucer-like; fruits fleshy; stems may have prickles.





CURRANTS AND GOOSEBERRIES are small bushes, growing mostly in wetlands and forest understories, with palmately lobed leaves, flowers with an inferior ovary and a hypanthium, and fleshy fruits which may be glandular or bristly. The gooseberries, top row, typically have spiny twigs, flowers in small clusters, and cuplike hypanthia. Their leaves are very similar and flowers or fruits are needed for ID. The currants, lower row, are more varied, but always have flower in racemes. In addition to the species shown, Ribes hudsonianum of the northern Great Lakes has not been photographed yet, and Ribes odoratum and rubrum are cultivated and escape casually near settlements.







AMERICAN BLACK CURRANT is a wide-ranging species of wetlands and shores, common in the western NFR and uncommon and mostly restricted to river shores and alluvial forests in the east. It usually has glands on the buds and upper and lower leaf surfaces. The flowers are yellow and subtended by bracts that are longer than the flower stalks. Ribes hudsonianum, not photographed yet, is similar but has whitish flowers with the flower stalks longer than the bracts and glands.









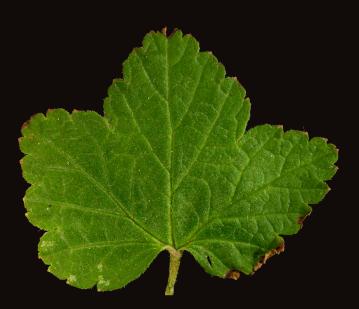
RIBES GLANDULOSUM (SKUNK CURRANT, *GROSSULARIACEAE*): Low shrub, partly creeping; large, bright-red buds; nice skunky smell; leaves with broadly rounded lobes.













SKUNK CURRANT is the commonest currant of boreal North America, transcontinental in the north and found in swamps, cold moist woods, rocky slopes, and on river and lake shores throughout the NFR. It is a low, partly creeping plant with broad leaves which resemble those of Ribes triste, another wetland creeper. The best marks are large, sharppointed red buds, the skunk smell of the crushed twigs and berries, and the glandular hairs on the ovary and fruit.

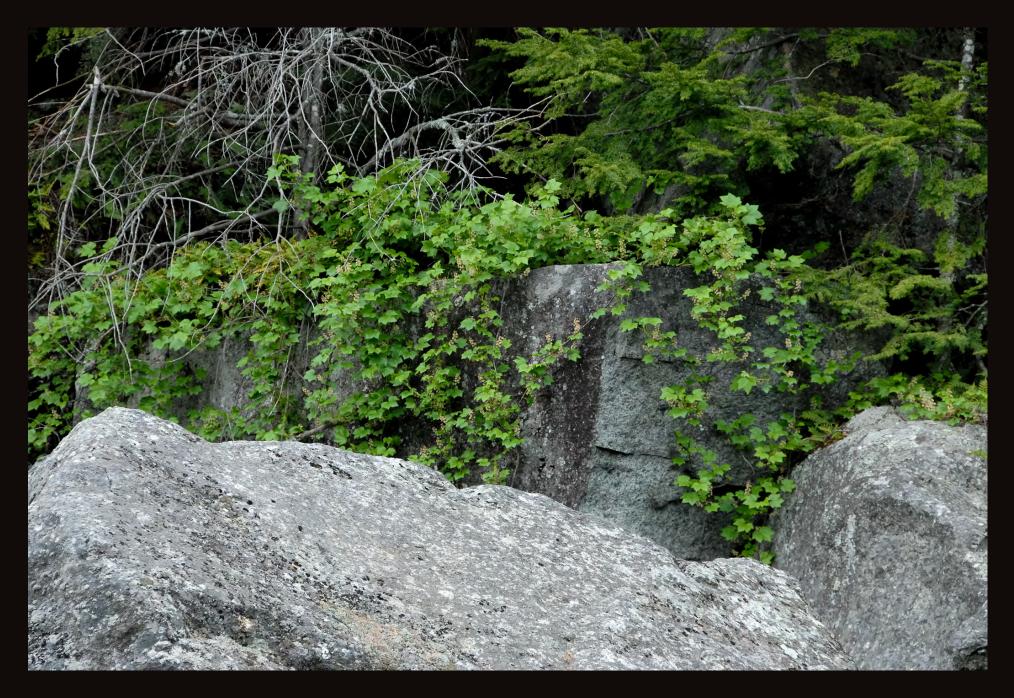














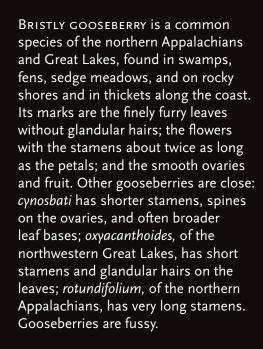




























SWAMP BLACK CURRANT is a species of boreal and mountain forests, transcontinental in the north, locally common in cold, fertile, rocky woods in the northern NFR, absent from the south. Its marks are the deeply cut leaves; yellow-tan twigs which are bristly both at and between the nodes; and saucer-shaped flowers marked with pink which are bristly on the ovaries.





U

long as the petals.

RIBES OXYACANTHOIDES (NORTHERN GOOSEBERRY, *GROSSULARIACEAE*): Leaves rounded or v-shaped at base, hairy and often glandular below; fruits smooth; stamens about as long as petals.



RIBES ROTUNDIFOLIUM (ROUND-LEAVED GOOSEBERRY, *GROSSULARIACEAE*): Leaves rounded or v-shaped at base, sparsely hairy; fruits smooth; stamens 3× or more as long as petals.



ROUND-LEAVED GOOSEBERRY is a species of the central Appalachians that enters the NFR, very locally, in eastern New York and western New England. We see it both on fertile rocky hills and, occasionally, in rich fens. It is very similar to bristly gooseberry, *Ribes hirtellum*. The only good differentiation seems to be the extremely long stamens in *rotundifolium*.













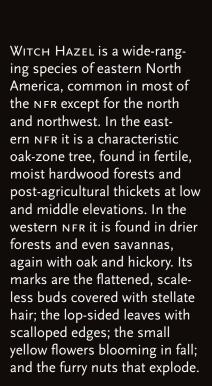




SWAMP RED CURRANT IS A transcontinental, boreal and subarctic species of forests, swamps, and fens that is uncommon but widespread in the northern parts of the NFR. We see it most commonly in limy conifer swamps and in wet hollows, often with seepage, in rocky fertile woods. Its marks are its creeping habit; the broad leaves with rounded lobes; the dark buds; and the white saucer-shaped flowers, marked with pink, with smooth ovaries and glandular hairs on their stalks.



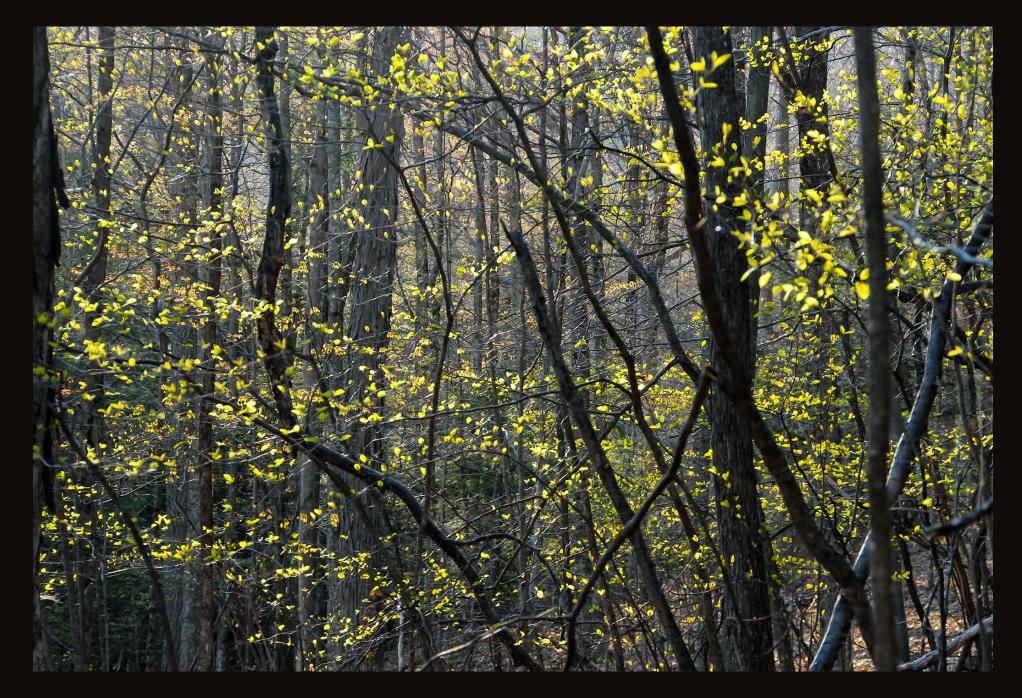












JUGLANDACEAE (WALNUT FAMILY): Alternate compound leaves with large lobed or rounded leaf scars, male flowers in catkins, large







JUGLANS CINEREA









JUGLANS CINEREA

THE WALNUT FAMILY contains two genera of trees with alternate compound leaves with low teeth. The male flowers are in catkins; the female flowers are solitary and produce large nuts in husks. Juglans cinerea, the butternut, has leaflets with glandular fur, oblong, gray-furry buds, and lobed leaf scars. Carya, the hickories, have large terminal leaflets, oval or slender buds that are smooth or have silky hairs on the inner scales, and rounded or heart-shaped leaf scars. Both genera are common throughout the cold temperate parts of the NFR, but absent from the boreal.

CARYA (HICKORY, *JUGLANDACEAE*): Trees with alternate compound leaves and large rounded or heart-shaped leaf scars; terminal leaflets large.



intermediates between ovata

and glabra occur.

TOMENTOSA



OVATA

GLABRA

315

CORDIFORMIS

















Furrowed older bark, with sharp-edged, braided ridges.







SLENDER TRUNKS, BRANCHES AND TWIGS, the main branches relatively straight and erect in young trees. The black lumps are *Phomopsis* galls, caused by one or more species of ascomycete fungi. Twigs similar in thickness and density to sugar maple, but more angular and irregular; the slender buds make the twigs appear sharppointed.





Buds covered by two thick scales, their surfaces dotted with tiny yellow scales. Leaf scars rounded triangular, the bud notched into the top.

CARYA GLABRA (PIGNUT HICKORY, *JUGLANDACEAE*): Leaflet without hairs on teeth; winter buds mostly under 10 mm long, without elongate tips on outer scales.





A COMMON HICKORY of the Southeast, local on dry rocky hills and in sand plains in the southeastern NFR. Generally similar to shagbark hickory but with smaller buds whose outer scales fall early and lack long tips; leaves with no more than five leaflets; leaflets without tiny hairs on their teeth; and often with tight bark on mature trees. The nuts run a bit smaller than those of shagbark and have thinner husks, but there is overlap. Forms with shaggy bark and husks that split to the base, formerly called C. ovalis, are now included in glabra. They can look transitional to shagbark.











Buds rounded, outer scales dark and papery, inner scales with silky hairs.





Nuts a bit smaller than those of shagbark, the husks usually thinner, splitting to the middle or all the way to the base.







THE COMMON SHAGGY-BARKED HICKORY of the eastern NFR, found in open oak-hickory woods in sand plains and on dry, fertile rocky hills. White pine, pitch pine, and red and white oaks are common associates. Close to pignut hickory, which also may have shaggy bark. Separated, approximately, by the larger winter buds with long points on the outer scales; the somewhat larger fruits with thicker husks; and by the presence, at least in early summer, of tiny hairs near the tips of the teeth on the leaflets. None of these are wholly reliable; the boundary between shagbark and pignut is fuzzy, and interpreted differently by different authors.





Large nuts with thick husks that split to the base; the nuts somewhat ridged or angled, thick-walled, often opened neatly by mice and flying squirrels, broken into pieces by gray squirrels.











Outer bud scales with slender points; inner bud scales silky, expanding greatly as the buds open.

















Old trees with massive spreading crooked limbs and loose curling strips of bark.









A SOUTHEASTERN SPECIES, barely entering the NFR in New York and Massachusetts. Rare on dry rocky hills and sand plains, often with black oak or scarlet oak. Leaves densely furry on the veins below; young twigs often furry; winter buds large and broadly rounded, the outer scales falling early; bark tight.



JUGLANS CINEREA (BUTTERNUT, JUGLANDACEAE): Tree with glandular-furry compound leaves with 10 or more leaflets, the terminal leaflet small; buds large, gray-furry; leaf scars like goat faces, with a furry upper edge.



FORMERLY A COMMON TREE of fertile mesic forests and successional woods, found throughout the eastern NFR. Much reduced in abundance by the butternut canker, *Ophiognomonia clavigignentijuglandacearum*, which was first described in 1979 and may be a recently arrived alien. Easily recognized long leaves with sticky fur, the gray-furry buds, the lobed leaf scars with a pad of fur along the upper edge, and the chambered pith.







Bark light gray, darkening with age, divided by stretch-marks into flat-topped braiding ridges.











Buds densely furry, the terminal ones oblong, the side ones rounded. Leaf scars lobed, the upper edge with a pad of fur. Pith chambered. The buds nearest the leaf scars in these photos are flower buds, the buds farthest up are leaf buds.









Male flowers in thick catkins; foliage glandular hairy.





LAURACEAE (LAUREL FAMILY): Tree or shrubs with aromatic twigs, leaves without teeth, and unisexual flowers with superior ovaries and yellow sepals.













TWO GENERA WITH AROMATIC









Sassafras



without teeth.















AN AROMATIC WETLAND SHRUB, found in wooded minerotrophic swamps and on pond shores and stream banks. Widespread and common in the Southeast, locally common along the southern and eastern edge of the NFR. Absent from the mountains and the lowland boreal. Often associated with skunk cabbage and highbush blueberry. The untoothed leaves, aromatic twigs, large leaf scars, ball-shaped flower buds, and yellow flowers in early spring are distinctive.

SASSAFRAS ALBIDUM (SASSAFRAS, LAURACEAE): Tree with aromatic twigs with large end buds, variably lobed leaves without teeth, and

leaf scars with a single bundle scar.













SASSAFRAS is a common forest and successional tree southwards, found on both sterile and fertile soils, spreading by root sprouts and forming clones in openings. It reaches its northern range limits in central New England and New York. The untoothed mittenlobed leaves and aromatic green twigs with large end buds are distinctive.







Mature bark with ridges and sharp, deep crevices, gradually breaking into chunks.











YELLOW CLUSTERED UNISEXUAL FLOWERS with six tepals and a superior ovary. These are pistillate flowers in which the stamens are nonfunctional.







TILIA AMERICANA (BASSWOOD, MALVACEAE): Large heart-shaped leaves; oval, lopsided, bright red or green buds; flowers and fruits dangling from a leafy bract.











sided, bright red or green, with pale cream, perfect, with separate petals and sepals, dangling from a stalk that is partly fused to a leafy bract; fruits round and hard, remaining attached to the leafy bract. Only recently placed in the Malvaceae and not resembling our other members of the family.







Mature bark light gray, relatively soft, often with rows of sapsucker holes, breaking into shallow flat-topped ridges separated by sharp grooves; right-angle cross cracks usually present, generating puzzle-piece edges.















MENISPERMUM CANADENSE (MOONSEED, *MENISPERMACEAE*): Twining vine with large, untoothed leaves with rounded lobes and raised, circular leaf scars.





TWINING VINE with large leaves with rounded lobes, high-climbing on trees in swamps, fertile woods, and thickets on rich soil. Twigs ridged, buds hidden below raised circular scars. Reasonably common south of the NFR, local and uncommon along our southern and western borders.

MORACEAE (MULBERRY FAMILY): Trees or shrubs with toothed, lopsided leaves with three strong veins at the base, bud with scales in two rows, oval or rounded leaf scars with three or more bundle scars, and small unisexual flowers in clusters or catkins.



CELTIS OCCIDENTALIS





CELTIS OCCIDENTALIS



MORUS RUBRA



CELTIS OCCIDENTALIS



MORUS RUBRA

TREES OR SHRUBS of fertile soil, restricted to the southern parts of the NFR. Celtis occidentalis, hackberry, is a large tree of riverbanks and fertile hills with distinctive, rounded-triangular leaves and striking corky ridges on the bark. Morus rubra, red mulberry, is a small tree, found in the same habitats, with leaves that resemble basswood but are often lobed, and oval leaf scars with a ring of bundle scars. Hackberry flowers are in loose clusters, and make drupes. Mulberry flowers are in heads or catkins; each cluster combines to make a single fruit.













A TREE, OCCASIONALLY SHRUBBY, of fertile soils, locally common on fertile rocky hills and on river banks in the southern NFR. Also placed in the Cannabaceae and the Ulmaceae. The leaves, flowers, fruit, and bark are distinctive. The twigs resemble those of elm but have the tips of the terminal buds curved and the bundle scars often obscure. Never a major forest dominant but often easy to find, mixed with other streambank trees, along major rivers in the eastern and southern NFR.









Bark with sharp wavy corky ridges, separated by broad furrows.













Flowers unisexual, males and females on the same tree, with a single circle of tepals. Males (left) have long filaments; females (above) have what look to me like functional stamens on short filaments. These are old pictures, taken without stacking.





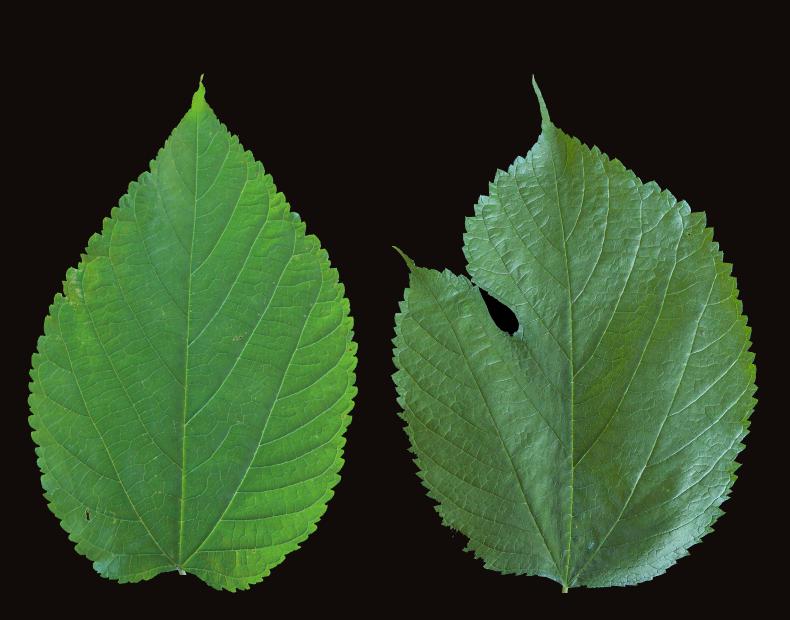






Twigs slender, dark, hairy; buds flattened against the twigs, their scales in two rows; Tips of uppermost buds curved towards the aborted twig tip; bundle scars often obscure.

MORUS RUBRA (RED MULBERRY, MORACEAE): Leaves large, often lobed, with rounded teeth and needle tips; leaf scars oval, with a ring of bundle scars; bark flaking off twigs; flowers unisexual, in catkins.





SHRUB OR SMALL TREE of moist fertile woods and thickets, widespread in the southeastern United States, rare and local along the southern edge of the NFR in New York and New England. The large leaves with occasional lobes, small flowers in catkins, and glossy twigs with delaminating bark are distinctive.









Tight gray bark with fine layers and cracks; glossy buds with the scales in two rows; oval leaf scars with bundles in a ring; bark flakes off young twigs.





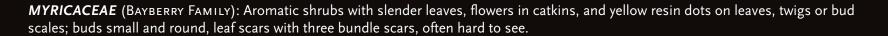


Unisexual flowers in catkins, the male and female on separate plants.



















MYRICA GALE







MYRICA PENSYLVANICA



THREE SPECIES OF LOW OR TALL SHRUBS, common in suitable habitats throughout much of the NFR. Comptonia peregrina, sweet fern, has lobed leaves and grows in sandy barrens. Myrica gale, sweet gale, has leaves that are toothed near the tip and is a plant of wet bogs and peaty shores. Myrica pensylvanica, bayberry, has untoothed leaves and grows in sandy and rocky shores and barrens along the Atlantic coast and eastern Great Lakes. All have unisexual flowers, mostly on separate plants, and small hard fruits. Sweet gale has the fruits in small cones, bayberry has them in clusters, and sweet fern has solitary fruits with crazy involucres that look like sea urchins.













SWEET FERN is a common shrub of sandy thickets, barrens, and shores, throughout the NFR. The lobed leaves, bayberry smell, and hairy buds, twigs and catkins are distinctive.



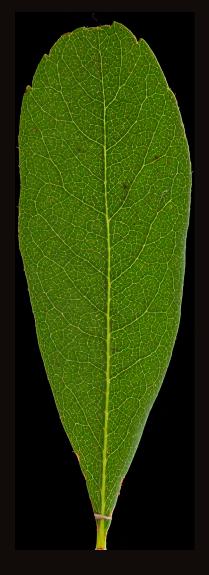


Long hair on twigs; round buds; leaf scars with three obscure bundle scars; catkins in a cluster; fruits surrounded by an involucre of skinny bracts.



















SWEET GALE is one of our commonest wetland shrubs, found on shores, floating mats, and in bogs and fens, often making large colonies. It likes wet peaty places and tolerates flooding well, but can grow in drier sites as well. Its marks are the bluegreen leaves with low teeth near the tip; dark twigs; dark shining bud scales with white edges; small hard fruits in spikes; and the bayberry smell of the leaves, buds, and fruits.

















Leaves, fruits, inner parts of bud scales with resin dots; female flowers with red stigmas.

















BAYBERRY IS COMMON in shoreline thickets and rocky and sandy barrens near the Atlantic coast, and occasional inland to the eastern Great Lakes. It is a dense, twiggy shrub, mostly less than 2 meters high, with slender aromatic dark green leaves that persist into winter. The bayberry smell, small hard waxy fruits, gland-dotted twigs, and small round buds are distinctive.







Male flowers in small catkins; fruits in clusters, bumpy and covered with wax.









NYSSA SYLVATICA (BLACK GUM, TUPELO, *NYSSACEAE*): Large trees with chunky bark, untoothed leaves, abundant short shoots, and small blue or black fruits; buds conical, bundle scars clear.









BLACK GUM IS A LARGE TREE of swamps and moist upland forests, common in the southeastern United States, locally common, usually in swamps, the major river valleys of the eastern NFR. The chunky bark, twigs with right-angle branching and short shoots, short conical buds, and oval, untoothed leaves are distinctive. Flowers are unisexual, or functionally unisexual, the ales and females on separate trees; fruits are small drupes, in clusters of two or tree on long stalks.







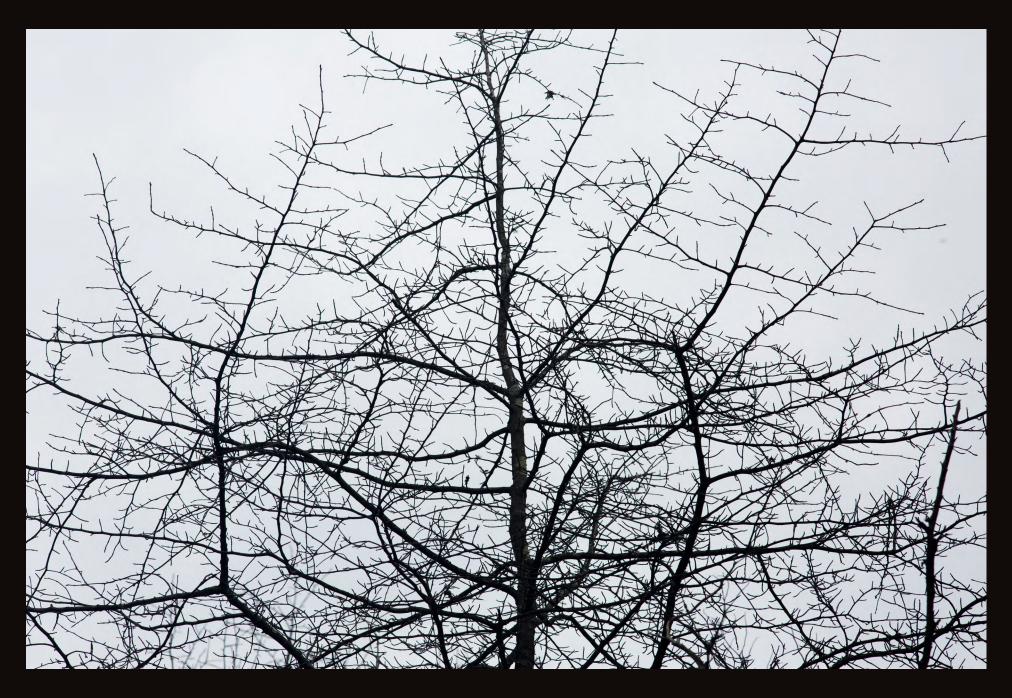
Bark deeply furrowed, relatively soft, with ridges that break into chunks.





Easy diagnostics: short shoots at right angles; tan twigs with conical end buds, relatively few side buds, and clear leaf scars and bundle scars; oval untoothed leaves; green fruits, turning blue or black.



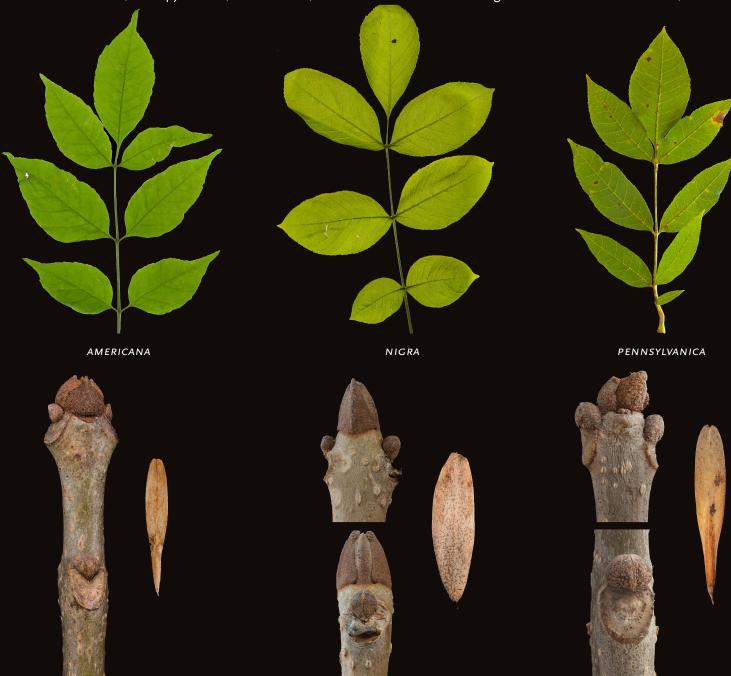








FRAXINUS (ASH, OLEACEAE): Large trees with opposite compound leaves; leaflets smooth or with low undulations; twigs stout, with oval or half-round leaf scars; buds pyramidal, dark-colored, the surface of the bud scales granular or with minute scales; fruits elongate samaras.



OUR THREE ASHES are common trees throughout much of the temperate NFR. White ash is the standard upland forest ash, with smooth twigs and leaf-stalks, leaflets whitened beneath and stalkless or barely stalked, and buds notched into the upper edge of the leaf scars. Red ash, with leaflets green below, more often stalked or furry, is common in lake plains and along the big upland rivers. It is close to white ash and not always sharply separable. Black ash, a distinctive species with broadly oval leaflets and broad flattened samaras, is restricted to fertile swamps and stream bottoms.







WHITE ASH is a common dominant in fertile temperate upland forests, often with sugar maple and red oak. It is close to red ash, from which it is separated by the smooth, long-stalked leaflets that are whitened beneath; the side buds that are deeply notched into the leaf scar; and allegedly by the wing of the samaras that does not extend below the middle of the seeds. All of these are gradational, and sometimes easier to say than see.









Twigs smooth, gray or greenish; leaf scars heart shaped or shield shaped, the side buds notched into their top edge; bundles in a curved line; buds squat, brown, and, like all ashes, minutely granular or scaly.







Bark light or dark gray, cracking into sharp-edged braiding ridges.





Flowers small and unisexual, appearing as or before the buds open, the males and females on different trees. The flowers of white and red ash have a reduced calyx; those of black ash do not.







Branches paired and upswept, making nested parallels; twigs stout, widely spaced.



















BLACK ASH is a tree of fertile wetlands and river bottoms. Swamp and stream-side trees are usually small; river-shore trees may be large. It is locally common throughout the NFR. Good field marks are the broad stalkless leaflets; the soft scaly bark that flakes off when you rub it; the broad flat fruits; and the twigs with oval leaf scars and a gap between the terminal bud and the first pair of lateral buds.







Bark gray, scaly or ridged, soft and flaking off when rubbed.















In alluvial thickets by the Musquacook Deadwater of the Allagash River, Maine.







RED ASH is the common ash of alluvial forests, lake plains, and low wet valley bottoms. It is a tall tree, often less spreading and with the side branches more crooked and less upswept than white ash. The lower leaflets are usually stalked, but less so than in white ash; the leaflets are not whitened below; the leaves and twigs are usually hairy. Buds and samaras are very similar to those of white ash; the leaf scars are supposed to be less notched and the wings of the samaras a bit longer. Sometimes they are, sometimes they aren't.







Bark cracking into sharp-edged ridges, not separable from white ash.







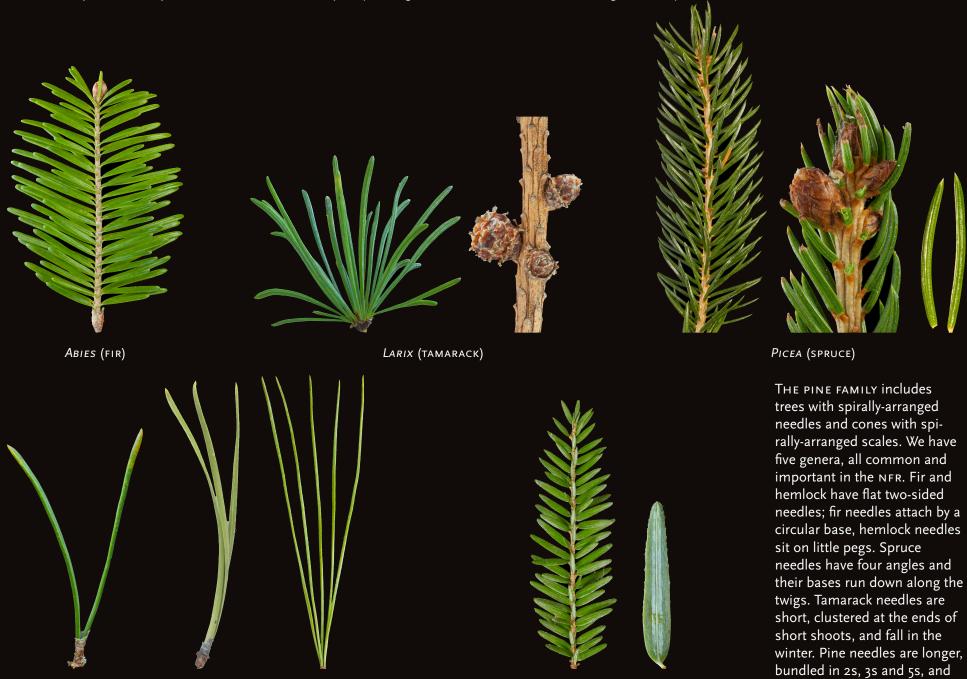






Red ash silhouettes from the Lake Champlain shore at Ticonderoga, New York. Compared to white ash, the crown branches are more crooked and less upcurved, and the side branches more strongly outcurved and downcurved.





TSUGA (HEMLOCK)

stay on in the winter.

PINUS (PINE)







BALSAM FIR is a northern transcontinental species and the only native fir in the NFR. It is common and locally dominant on the upper slopes of mountains, in successional woods at middle elevations, and in all sorts of conifer wetlands. The flattened needles with small stalks that end in round bases, and the circular scars these bases leave on the twigs, are good field marks.







Bark smooth, with resin-filled blisters and resin stains where the blisters have broken.









Flat, blunt needle, with circular attachments; buds covered with resin.



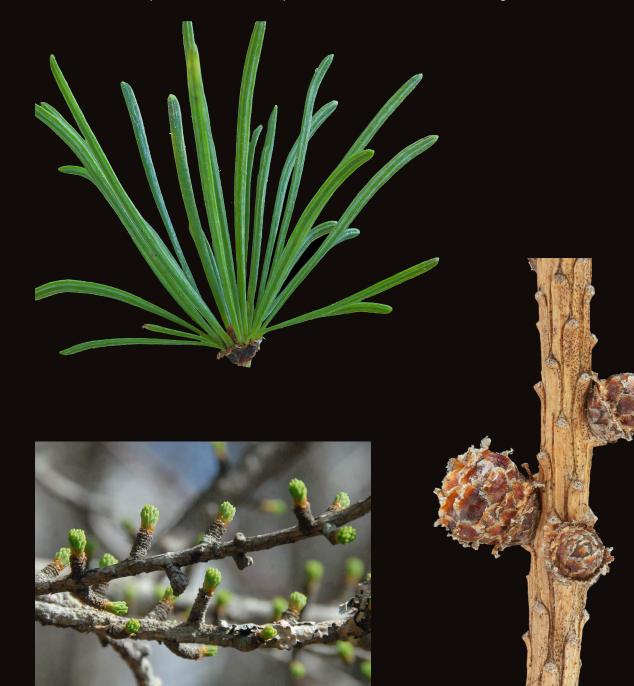






Large firs in the floodplain of the North Branch of the Ausable, Lake Placid, New York.







TAMARACK is a northern tree or shrub of wetlands, mountain slopes, and barrens, common in bogs, fens, muskegs, conifer swamps, and subalpine krummholz. In Newfoundland it grows as a creeping shrub in coastal tundra and rocky barrens. The short shoots, rounded buds, and soft clustered needles are distinctive.







Straight or crooked branches with stubby short shoots; small cones along the branches.











Tall trees, with spruce.









WE HAVE THREE SPRUCES IN the NFR, all common and sometimes dominant in the right habitats. Picea rubens, red spruce, the common upland spruce of the eastern NFR, is distinguished by its large size, dark green needles, and twigs with sharp-pointed hairs. Picea mariana, black spruce, is a transcontinental boreal species of wetlands and tundra, distinguished by its blunter, blue-green needles, twigs with glandular hairs, and persistent cones. Picea glauca, white spruce, is a transcontinental species of boreal uplands, distinguished by its smooth twigs and slender elongate cones.

PICEA GLAUCA (WHITE SPRUCE, *PINACEAE*): Smooth light-colored twigs; whitened foliage, often with a pungent smell; slender, elongate cones.











Young foliage whitened, often smelly.















A TRANSCONTINENTAL BOREAL SPECIES, common in bogs, swamps, muskeg, and tundra everywhere in the north. Co-occurs with red spruce in swamps, replaces it in boggy woods, peatlands, and krummholz. Often dwarfed, and often spreads and forms colonies by the rooting of lower branches. Close to red spruce, but usually distinguishable by blue-green foliage, glandular hairs on twigs, purple young cones, and persistent old cones.

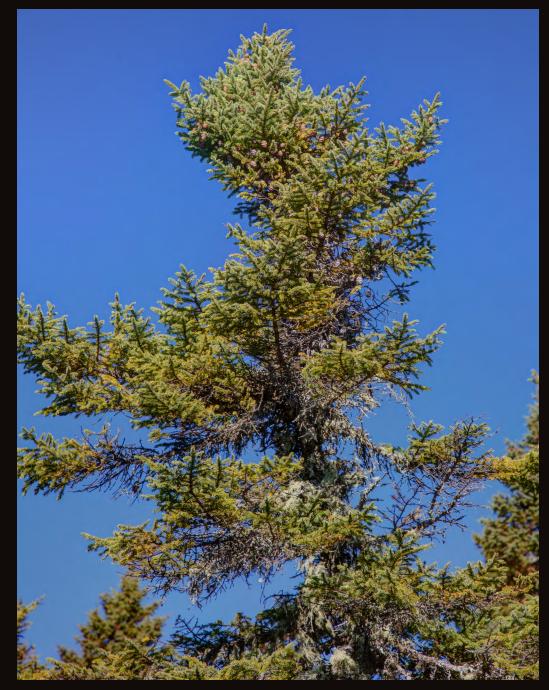








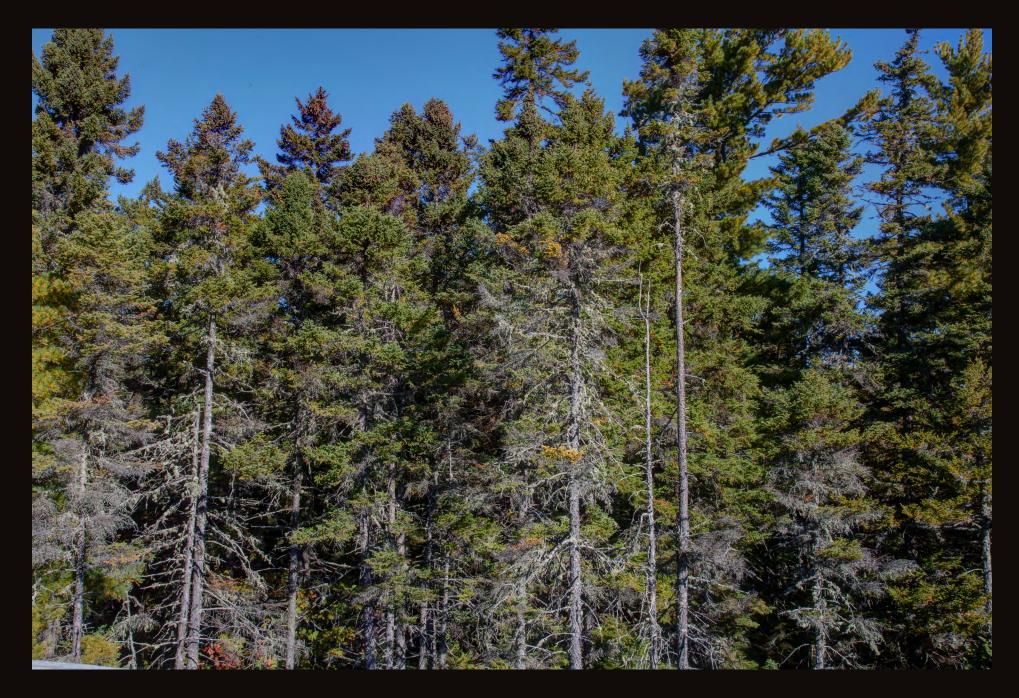






Young cones purple, old cones persist for many years. Young foliage blue-green on healthy trees.















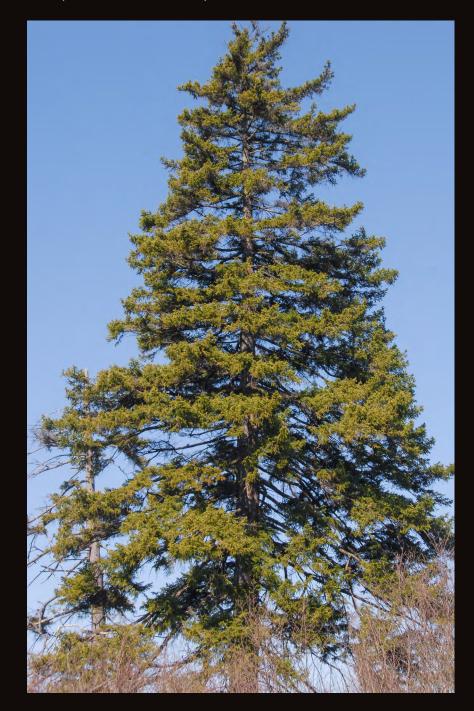


RED SPRUCE is the common upland spruce of the eastern NFR, found in forests, swamps, and wetlands. It may be over 1 m in diameter and 30 m high in old or small and stunted in wetlands and on mountain slopes. It is a north-Appalachian species, largely absent north of Montreal and west of Lake Erie. It is close to black spruce, though often much larger, and can hybridize with it. Its best marks are the dark-green, consistently sharp-pointed needles; the sharp-pointed hairs on the twigs; and the cones which fall in abundance and do not persist on the branches.











Large red spruces in the middle marsh of the Oswegatchie and in old growth on Partlow Mountain, Adirondacks, New York.

RIGIDA





RESINOSA

STROBUS

NFR. Pitch pine, *Pinus rigida*, is a northern Appalachian and coastal plain species with three needles per bundle and needle-tipped cone scales. Red pine, *P. resinosa*, is a northern Appalachian-Great Lakes species with three long needles per bundle. White pine, *P. strobus*, is a northern Appalachian-Great Lakes species with five soft needles per bundle and slender cones. Jack pine, *P. banksiana*, is a transcontinental boreal species with two flattened needles per bundle. Jack and pitch pines are fire dependent: some of their cones are serotinous, sealed by resin and only opening after fires.

BANKSIANA

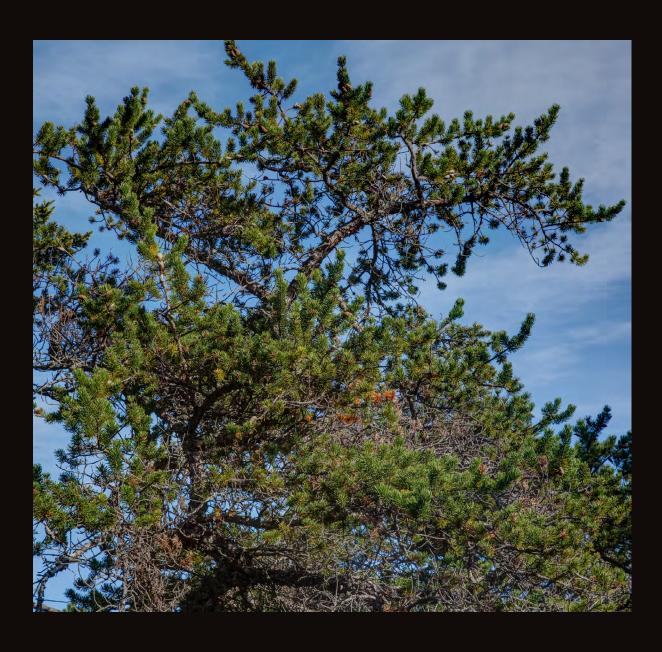
















With bayberry and sheep laurel in rocky barrens, Great Wass Island, Maine.















RED PINE is an upland species of the northern Appalachians and Great Lakes, common on dry rocky and sandy soils. We see it most commonly on rocky hills, lake shores, sandy terraces and eskers, and islands in bogs. It is not as fire-dependent as pitch and jack pines, but is commonest on sites where there is a history of fire. The best marks are the long, stiff needles in bundles of two and the oval cones without prickles.







Young bark red beneath scales; needles form thick brushes at the tips of branches.

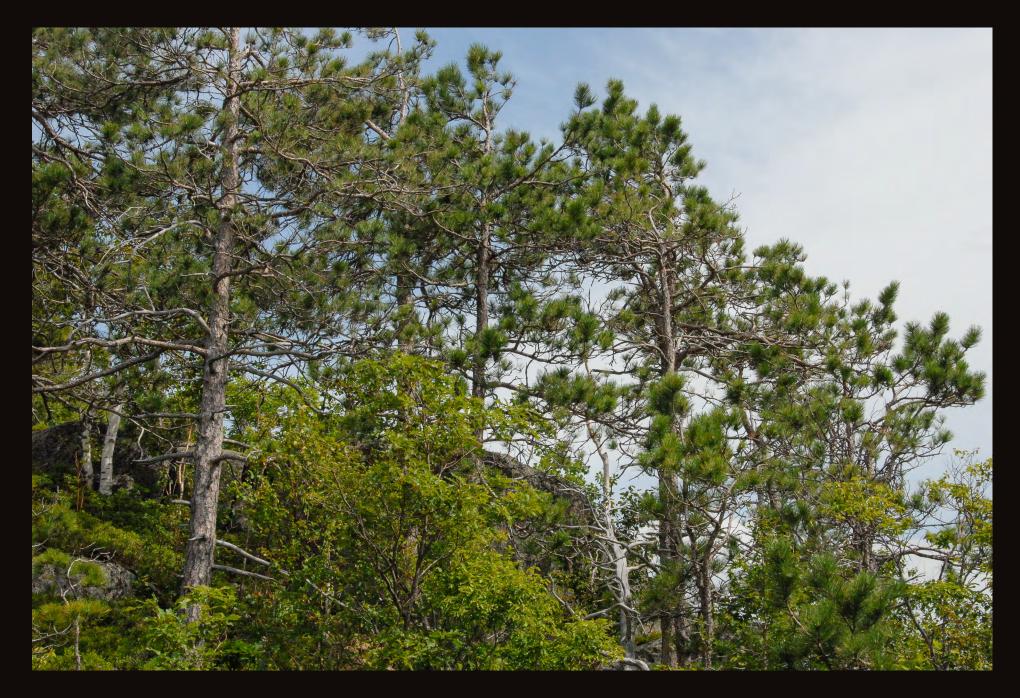












On Owls Head, Keene, New York, a rocky hill of medium fertility anorthosite.













PITCH PINE is a northern Appalachian species, locally common on rocky hills and sand plains in the eastern NFR, also but more rarely in open peatlands. Its inland populations reach their northern limits near the St. Lawrence River, and the coastal populations in Maine. It is our only pine with three needles in a bundle and persistent cones with sharp spines on the cone scales.







Bark gray, broken into coarse plates, often with tufts of needles or short branches from the sides of the trunk.











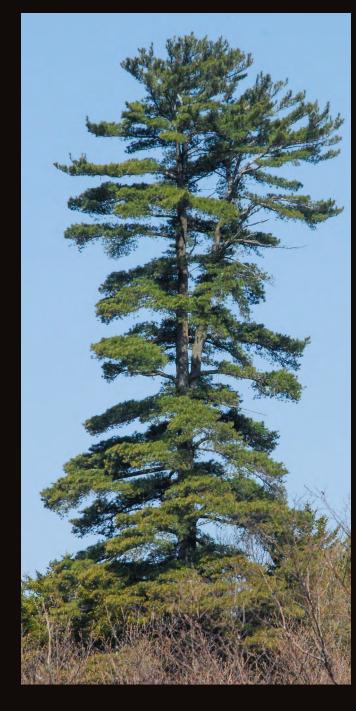


Round-topped, cylindrical or spreading, with crooked branches and patchy foliage.













A COMMON PINE OF GREAT ECOLOGICAL RANGE, found throughout the NFR, from boreal forests, through the northern hardwoods zone, and well into the oak zone. Often codominant with hemlock and northern hardwoods in successional forests; also found on rocky hills, in bogs and swamps, in boreal forests, and on sand plains and dunes. The thick platy bark, large slender cones, and needles in bundles of five are distinctive.







Bark warm gray-brown, cracking into plates.







Young shoots columnar, cones long and slender.



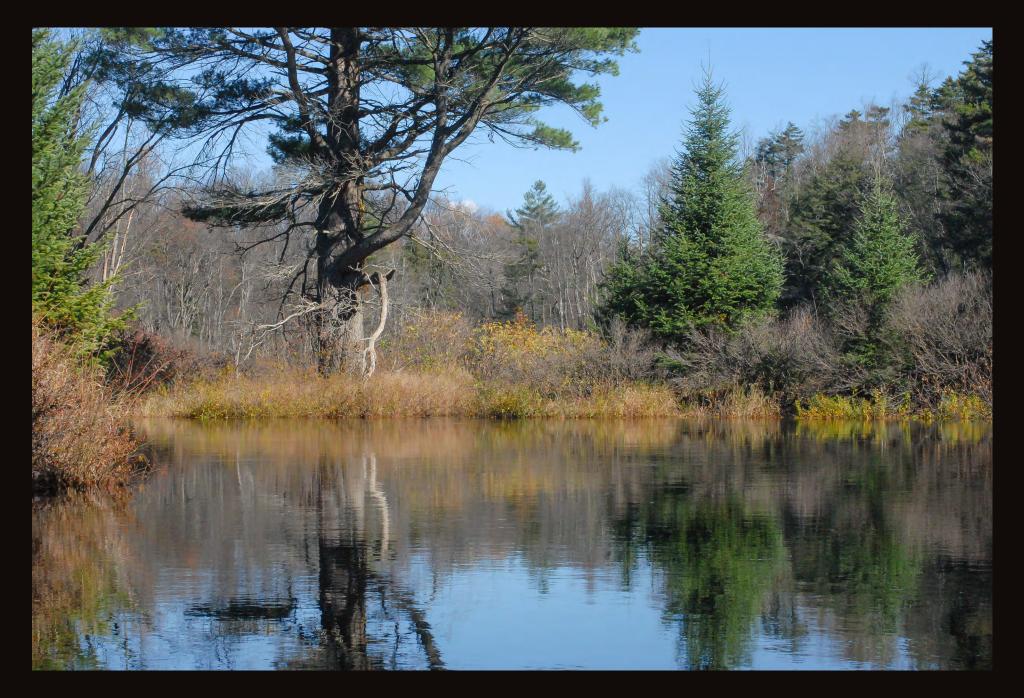












Large pine by the Oswegatchie River, Adirondacks, New York.

TSUGA CANADENSIS (HEMLOCK, *PINACEAE*): Blunt, flattened needles on small; stalks; small downside-up needles along twigs; tips of branches curve.









HEMLOCK is a late-successional, Appalachian-Great Lakes species, common throughout the NFR at low and middle elevations, absent from higher elevations and boreal forests. It is common with spruce and pine in mixed northern hardwood forests, often dominant in ravines and swamps, and often present, in smaller quantities on rocky hills and in sand plains. Unlike our other conifers, it rarely if ever occurs in bogs.







Needles blunt, on short stalks from raised bases on twigs. Male flowers in small clusters.





Cones small, 1-2 cm, with blunt, grooved scales. Tamarack cones are similar but often lighter in color, more strongly grooved, and with the scales almost square across the tips.











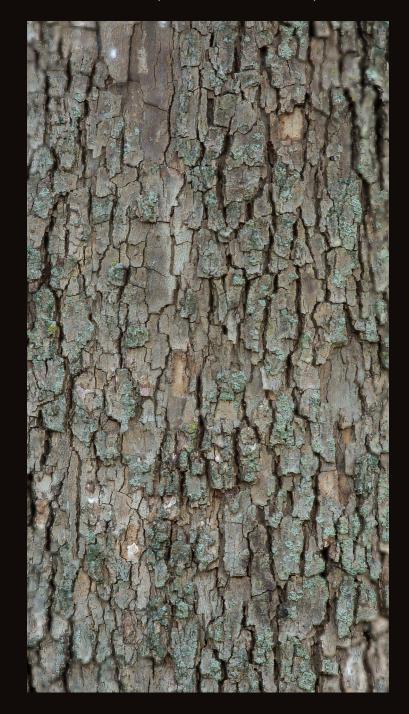






Young outer bark brown and green, flaking off in thin scales, exposing the white inner bark.







Older bark gray or brown, broken into small chunks.





Female flowers in ball, maturing to balls of fruits.









Crowns broadly rounded; branches upcurved; fruits abundant.



CLEMATIS (CLEMATIS, RANUNCULACEAE): Vines with opposite compound leaves that climb by twining leafstalks; flowers white or purple, with multiple ovaries and perianth in one circle; fruits with long plumose hairs on the styles.



OCCIDENTALIS





VIRGINIANA



Two climbing vines with compound leaves, twining leafstalks, and pretty flowers. Virginiana, virgin's bower, with white flowers, is a common, barely woody species found throughout the NFR in moist thickets. Occidentalis, purple clematis, has purple flowers and is rarer and more northern, found most commonly on rocky fertile hills and in river shores.

CLEMATIS OCCIDENTALIS (PURPLE CLEMATIS, *RANUNCULACEAE*): Vine with opposite compound leaves that climbs by twining leafstalks; leaf and flower buds large, flowers large, solitary, pale purple.









AN UNCOMMON SPECIES, local and scarce even in the right habitat. Mostly commonly found in openings on dry fertile rocky hills. Also, more rarely, on riverbanks, in river gorges, and on burns. Populations are small, but at least sometimes long persistent. Differs from virginiana in the larger buds, woodier stems that don't die back in the winter, and the large solitary purple flowers.









Our common species, growing over shrubs and herbs on riverbanks, in wet thickets, in hedgerows, and at the edges of forests in swamps. Found throughout the NFR, mostly at low elevations and in temperate rather than boreal settings. The flowering stems, and many of the vegetative ones, often die back to near the base and don't have buds. Farther south it may be more woody.









RHAMNACEAE (BUCKTHORN FAMILY): Shrubs and small trees with alternate or subopposite leaves, with veins that curve forward, untoothed or with low teeth; small white or greenish flowers with a single ovary and petals and sepals attached to a cup or disk below the ovary.











THREE GENERA OF SHRUBS AND SMALL TREES, similar in the construction of their flowers but not in their leaves and buds. Ceanothus is a large western genus; americanus, New Jersey tea, is the common NFR species. Herbaceous, red root, is a prairie species that reaches the Great Lakes; we have not photographed it. Frangula alnus, glossy buckthorn, is an invasive alien, now common in many parts of the NFR. Rhamnus has two NFR species: alnifolia, alder-leaved buckthorn, is a native shrub of limy soil; *cathartica*, common buckthorn, is an invasive alien.





С

FRANGULA ALNUS (GLOSSY BUCKTHORN, *RHAMNACEAE*): Shrub or small tree, clonal and aggressive, with untoothed leaves whose veins curve forward, furry buds without scales, and small five-parted flower with white sepals from a green cup; fruit a drupe, first red, then turning black.





RHAMNUS (BUCKTHORN, *RHAMNACEAE*): Shrubs or small trees with alternate or irregularly opposite leaves with low teeth and veins that curve forward; flowers mostly unisexual, with four or five sepals; fruit a black drupe.









WE HAVE TWO SPECIES OF BUCKTHORN, both widespread in the NFR. Alnifolia is a native calciphile, common in fens and cedar swamps, also found on shores, in seeps, and on limy outcrops. Its leaves are all alternate, and the twigs aren't spiny. Cathartica is a European introduction, used extensively for hedges, and now invasive and sometimes locally dominant in hedgerows, alluvial woods, and on river shores and limy hills.







ALDER BUCKTHORN is a native wetland shrub, common throughout the NFR in fens and fertile swamps, occasionally seen on limestone outcrops or in fertile woods. It is a low creeper, mostly less than a meter tall, often forming patches. Its marks are the pleated leaves with low rounded teeth; dark buds that sit on shelves; and small green flowers with 4 sepals and no petals.

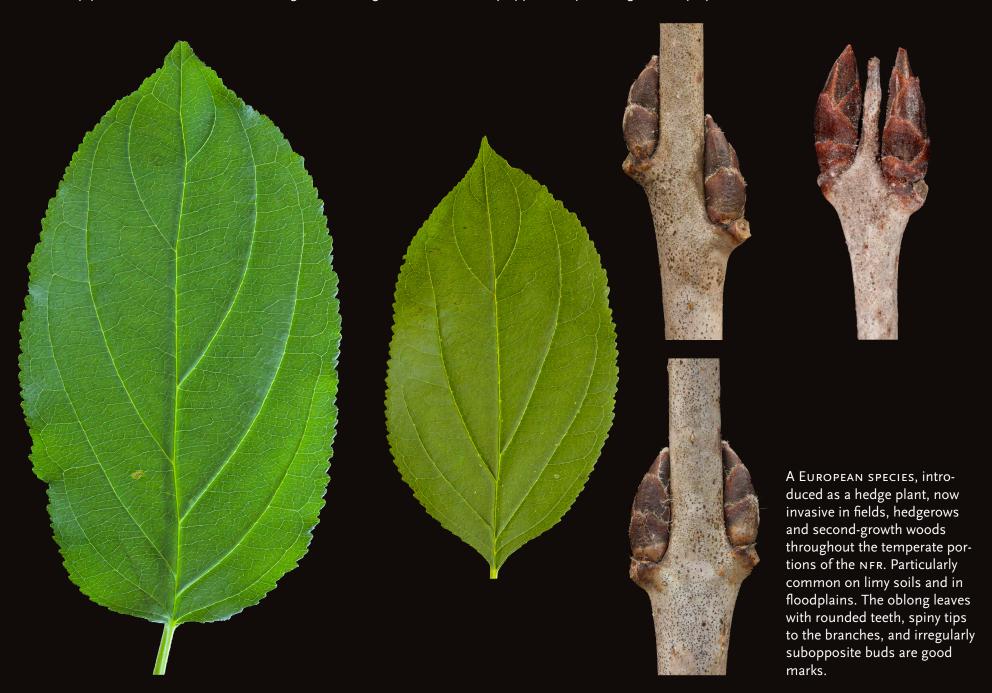










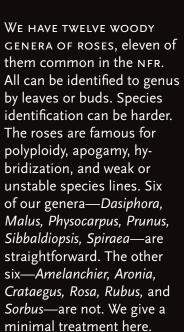




Malus

ROSACEAE (ROSE FAMILY): Trees and shrubs with alternate simple or compound leaves, often toothed; stipules usually present, sometimes persistent; thorns or prickles often present. Flowers bisexual, with petals and sepals attached to a disk or cup that may be fused to the ovary; fruits berries, drupes, pomes, or capsules.







AMELANCHIER (SHADBUSH, ROSACEAE): Shrubs or trees with smooth gray bark, showing darker stretch marks; buds sharp-pointed, with long scales with fringed edges, sometimes red, sometimes curved; leaves oval, finely or coarsely single-toothed; flowers white, early in spring, petals and sepals attached to a cup which is fused to the ovary; fruit a pome.











COMMON TREES AND SHRUBS, found throughout the NFR in forest, thickets, barrens, and wetlands, with handsome flowers and weak species lines. I treat four species and one group here, which is about as few as possible. All are mixtures of diploids and polyploids, and thus at least partially of hybrid origin. Some, perhaps many, can reproduce asexually. The result is lots of variability, both in individuals and local populations. It is easy, and actually fascinating, to find interesting shadbushes which don't fit into the standard species. It is hard, and often impossible, to name them.

SPICATA GROUP

Our species divide into two small trees (arborea, laevis) with finely-toothed leaves; a tall shrub (canadensis) with finely-toothed leaves; a lower shrub, also with finely-toothed leaves (bartramiana) and few-flowered clusters; and a group of shrubs (spicata group) with rounded leaves with coarse teeth.









BARTRAM'S SHAD is a common, but somewhat local species of bogs, swamps, shores, and barrens in the northern NFR. IF you travel the northern rivers and mountains, this is a species you will see. On good soil it is a tall shrub; on rocks and dry sands a low one. Typical plants are well marked by the finely-toothed leaves that are pointed at both ends, solitary flowers from the axils, petals less than twice as long as wide, and tops of ovaries hairy. In the field, the leaves look something like a spiraea and the flowers something like a cherry. Intermediates with other northern shads, particularly laevis and the spicata group, occur frequently.







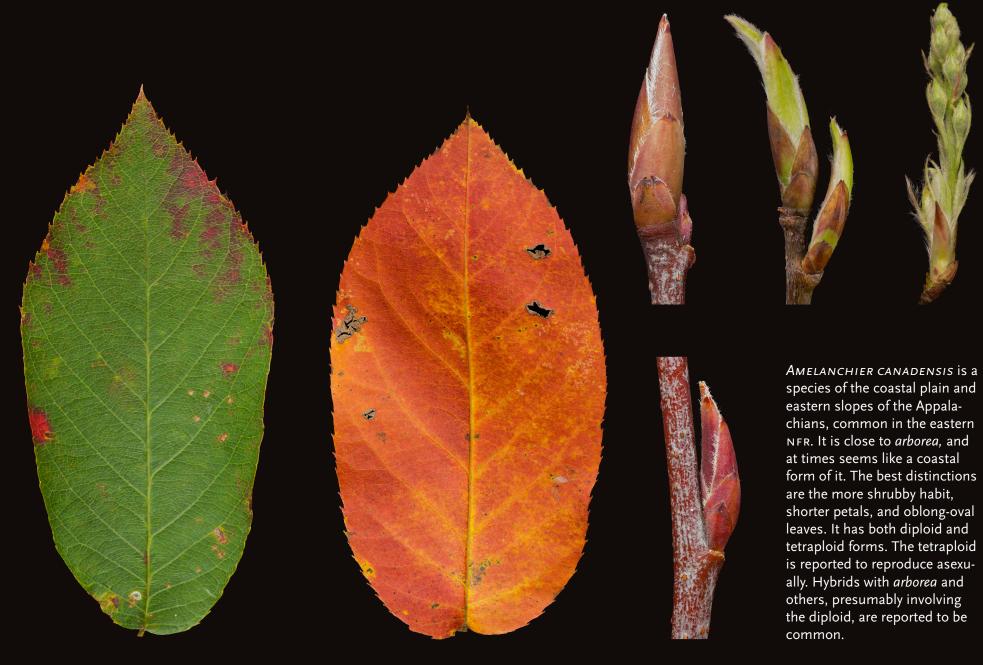


Finely-toothed leaves with tapering bases, short leafstalks, short petals, flowers and fruits solitary or in small clusters.





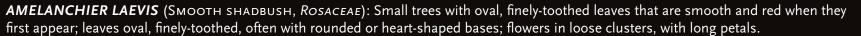








Buds with sharp-tipped scales with hairy edges, similar to other shads. Young leaves hairy, like arborea.



















AMELANCHIER LAEVIS is perhaps our commonest shadbush, found in forests, thickets, barrens, and hedgerows; also on shores, and rocky hills. It is also one of our most complicated, including diploids and tetraploids, sexual and asexual populations, and hybrids with most of our other shads. Its typical form with the young leaves smooth, finetoothed, and red, and the flowers long petaled and in loose clusters, is seen everywhere and easily recognized. Its nontypical forms can vary in any of the characters and are not.







Gray bark with darker stretch marks, much like other shads; young leaves smooth and reddish; petals several times as long as wide.









In bloom with red maple, aspen, white pine, and sugar maple on Johnson farm, Shaftsbury, Vermont.





THE SPICATA GROUP includes the common small shads with woolly ovaries and coarsely toothed leaves found on open rocky or sandy sites—hills, sand plains, barrens, shores throughout the NFR. We are supposed to have two widespread forms, sanguinea (strong veins right into the teeth, calciphile, not a creeper) and spicata (veins arching, branches from arches into teeth, acidophile and creeper). They, and things like humilis and intermedia, don't run true enough to type for me to distinguish them reliably. The pictures here of are the spicata form, with arching veins.





ARONIA ARBUTIFOLIA (RED CHOKEBERRY, *Rosaceae*): Oval leaves with rounded teeth and dark glands on the upper side of midrib; buds red, the edges of the scales hairless; leaves and twigs densely furry with matted hairs; fruits red.





RED CHOKEBERRY is a tall, furry shrub of the coastal plain, recognized as a chokeberry by the rounded teeth and small black glands on the midrib, and as the red chokeberry by the red fruits and matted hairs on leaves and twigs. It grades into the black chokeberry inland. Pure black chokeberries, if they exist, are supposed to have hairless twigs and leaves and black fruits. Most inland plants have some hairs, and some have purple fruits. We call them all melanocarpa, black chokeberry, here, and don't try to distinguish levels of intermediacy.

them and have quite trying.

ARONIA MELANOCARPA (Purple Chokeberry, *Rosaceae*): Oval leaves with rounded teeth and dark glands on the upper side of midrib; buds red, the edges of the scales hairless; leaves and twigs smooth or sparsely with matted hairs; fruits black or purple.

















Bark gray, cracking into thin ridges, then becoming scaly.





Buds and twigs glossy, buds reddish, rounded,m with short scales. Young leaf teeth glandular; leaves sharp-toothed and lobed; fruits red, small, hard. The line of aphids is a single aphid, photographed Muybridge-style while shooting a focus stack.





Hedge-row hawthorn, perhaps *C. macrosperma*, at bud break; Shaftsbury, Vermont.

CRATAEGUS MACROSPERMA (Eastern Hawthorn, *Rosaceae*): Leaves oval, their lobes sharp-toothed and spreading, their bases wide; stamens less than 10, calyx lobes glandular; nutlets not pitted.







Less than 10 stamens,; anthers red; calyx lobes glandular; flower stalks smooth.











DASIPHORA, formerly Potentilla, is a distinctive shrub: small silver-hairy compound leaves, light lemon-yellow flowers, buds covered by loose papery scales with long white hairs. It is northern and transcontinental, common throughout the NFR, and very wide-ranging in the mountain west. We see it in calcareous sites: fens, seeps, alvars, limy meadows.





On a marble outcrop on Mt. Equinox, Manchester, Vermont.











Bark gray, cracking into thin rectangular plates.





Large flowers, white or pink petals, inferior ovaries, five styles.





Ascending young branches, arching older ones, stubby short shoots bearing flowers and fruits.





Upswept twigs with short shoots, main branches either vertical or arching to horizontal; wide forks.



knows for sure.



PRUNUS (CHERRY, PLUM, ROSACEAE): Trees and shrubs with alternate toothed leaves and white or pink flowers with the petals and sepals attached to the rim of a cup and a single superior ovary with one style; fruits single-seeded drupes; twigs often have a cherry or almond smell.







PRUNUS IS LARGE GENUS, both world wide and in North America. We have seven native species in the NFR, three plums and four cherries, plus some escaped cultivars that are not shown here. Most are common in the proper habitats. Starting with the cherries, serotina is a large temperate-forest tree; pensylvanica a successional tree associated with forest disturbance; virginiana a shrub or small tree that is ubiquitous in thickets, on shores, and along edges; and pumila, with several growth forms: a low shrub or creeper of shores, sandy barrens, and prairies. The plums are more local with us. Americana is widely distributed, but mostly south and west of the NFR. Maritima is restricted to the sandy coast, and only enters the southeastern NFR. Nigra is widespread in the NFR, but mostly found on edges and in post-agricultural habitats.

are from a cultivated plant.

PRUNUS AMERICANA (AMERICAN WILD PLUM, ROSACEAE): Small tree or tall shrub with leaves with long tips and sharp teeth without glands; twigs often thorny; terminal buds present; fruits red or yellow, with a groove.



PRUNUS MARITIMA (BEACH PLUM, ROSACEAE): Low or tall shrubs of coastal sands with furry twigs and true terminal buds; flowers small; leaves oval or oboval, with blunt tips and low, sharp teeth, hairy on the lower side; fruits purple.







Twigs finely furry; leaf scars raised, bundle scars obscure; twig tips fat, the aborted tip conspicuous but not thorny.





Fruits red to purple, with a groove on the side; fruit stalks and young twigs hairy.













Twigs slender, gray; buds sharp-pointed; leaf-scars oval, bundle scars obscure; outer scales gray to black, with lighter edges; twig tips abort and leave a scar; no cherry smell.











Bark gray, red-gray, or black, with large horizontal lenticels.











Small trees with straight, slender twigs, generated by clustered buds and spreading widely at the nodes.









VARIETY SUSQUEHANAE, shown here, is found in sand plains and sandy barrens, also through much of the NFR but less common than variety depressa in the east. Its leaves are broader and taper less to their bases than depressa and the twigs are minutely furry.

PRUNUS SEROTINA (BLACK CHERRY, ROSACEAE): Tall forest trees with dark scaly bark; leaves oval, with rounded teeth and hairs along the midrib below; buds rounded, red-brown, the scales often with dark edges; flowers in racemes; fruits dark.







THE COMMON FOREST CHERRY of the NFR, found throughout the eastern United States and southern Canada, mostly south of the boreal. Common in deciduous and mixed forests at low and medium elevations, also in old fields, hedgerows, thickets, and on rocky hills and in barrens. A large tree in old forests on good soil, smaller and sometimes shrubby on poor soil. Similar to choke cherry in its racemose flowers and oval leaves; differing in its browner buds, leaves with blunter teeth and hairs on the midribs, and dark fruits.







Bark dark gray brown, cracking into curved scales, surface dull.







Open-grown trees with rounded crowns and straight sides, trunks and main branches segmental and crooked, crowns twiggy, looking tangled.





sepals; and the red fruits.

PRUNUS VIRGINIANA (CHOKE CHERRY, ROSACEAE): Shrub or small tree with dark bark, sharp-toothed smooth leaves that are often oboval, small flowers with glandular-toothed sepals in racemes, and gray-brown, pointed buds with pale edges to the scales.







Twigs gray with a strong cherry smell; buds sharp-pointed, outer scales gray-brown with lighter edges; leaves often red when expanding, with sharp, upcurved teeth.





ROSA (ROSE, *ROSACEAE*): Prickly shrubs with alternate, pinnately compound leaves with stipules fused to the petioles; flowers pink or white, fragrant, with inferior ovaries; buds slender, with tight scales; fruit a rose hip.







WILD ROSES are common in hedgerows, thickets, swamps, and successional woods, and on rocky hills and shores throughout the NFR. They are easily identified to genus, and often quite hard to place to species. The characters are variable, the species lines weak, and hybridization and polyploidy are rampant. The introduced species—multiflora, rugosa—are distinct, and the diploids—blanda, palustre, nitida reasonably distinct. The two common tetraploids—carolina, virginiana—are hybrids themselves and backcross with the diploids, producing numerous intermediate, and unnameable, populations.







THE BRISTLY ROSE is a western species, common in the western NFR and the mountain west, and found on shores, dunes, rocky hills, and in savannahs and prairies. It is a mixture of tetraploids and hexaploids and fairly distinct. Good marks are the rounded leaf teeth, glandular stipules, abundant straight prickles, and smooth fruits. Smooth rose, its closest relative, has teeth with concave edges and the second year branches smooth.

ROSA BLANDA (SMOOTH ROSE, *ROSACEAE*): Lower stems with straight prickles or smooth, flowering branches smooth; leaves with concave teeth; stipules broad, often glandular; hypanthia and fruits smooth, the sepals glandular above, erect in fruit, and often persistent.







Hypanthia smooth; sepals glandular, remaining attached in fruit.









CAROLINA ROSE is a common eastern North American species or species complex, found on rocky hills and in open fields, dunes, and plains, and savannahs throughout the NFR. It is an allotetraploid, believed to have originated from a cross between Rosa blanda and Rosa palustris or nitida. Its best marks are the slender straight thorns, glandular hypanthia and fruits, and relatively coarse teeth on the leaflets. These all vary independently; as a result, it is hard to tell, in practice, where carolina ends and virginiana or palustris begins.

ROSA MULTIFLORA (MULTIFLORA ROSE, *ROSACEAE*); Plants tall, with long arching canes and stout, down-curved prickles on large bases; leaflets oval, with sharp teeth; stipules fringed; flowers and fruit small, in clusters.









ROSA NITIDA (Shining rose, *Rosaceae*): Stems with many slender straight prickles, with or without longer prickles by the leaf scars; hypanthia, sepals and fruit stalks glandular; sepals spreading at maturity.



ROSA PALUSTRIS (SWAMP ROSE, ROSACEAE): Low or tall roses with hooked prickles by the leaf scars, glandular hypanthia, and, ideally but not reliably, finely-toothed leaves with slender, inrolled stipules.





SWAMP ROSE is an eastern North American diploid with strongly hooked prickles, glandular hypanthia and fruit stalks, and sepals that spread at maturity. It, or things roughly like it, are common throughout the NFR in bogs, swamps, sedge meadows, and shores. They are fairly variable: straight and hooked prickles and both finely and coarsely toothed leaves occur, sometimes within the same population. Palustris is a diploid progenitor of the tetraploids virginiana and carolina, and some of the variability may be back crossing.















VIRGINIA ROSE is a common coastal species, believed to be a tetraploid version of the swamp rose, Rosa palustris. Like palustris, it has strongly hooked prickles and glandular fruits; it differs, though not consistently, in its coarser teeth and broader stipules. Virginiana and palustris are both variable and the two are not always separable from each other or from carolina, another tetraploid with palustris as a parent. The photo here, for example, shows a virginiana-type plant with relatively straight thorns. In practice, we usually call the big nasty plants on dry soils near the coast virginiana, the smaller wetland ones inland palustris, and ignore the in-betweens.







RUBUS (Blackberry, Dewberry, Raspberry, Rosaceae): Arching shrubs with compound leaves with three to seven leaflets; stems often, but not always bristly or prickly; buds with loose scales, the leaf scars obscured by petiole remnants; flowers white or purple, with multiple ovaries and petals and sepals attached to a disk or cup below the ovaries; fruits sweet and juicy, solid in the blackberries and dewberries, hollow in the raspberries and thimbleberries.



SETOSUS

The two raspberries and the two thimbleberries are quite distinct. The five blackberries (including Rubus pensilvanicus, not pictured here) are muddled by polyploidy, apomixis, and hybridization. We divide them into species groups by height,

pluckiness, and glandularity. Hispidus and flagellaris are low; setosus is mid-height; alleghaniensis, pensylvanicus, and canadensis are tall. The plants that don't fit can be named something else—there are a few hundred unused names available—or just stuck

ALLEGHANIENSIS, CANADENSIS





OUR COMMON TALL PRICKLY BLACKBERRY, found in fields, thickets, hedgerows and forest gaps throughout the NFR. Similar plants without the glands are Rubus pensilvanicus. Lower plants that are partly arching and partly creeping may be placed here or in Rubus flagellaris. No one will care.

















THE FLAGELLARIS GROUP includes all the creeping and low arching blackberries with prickles big enough to cut you. It is found through the NFR in fields, barrens, open woods, and on dunes and shores. Its flowers are, for its size, fairly large. They make a pretty show on northern river shores in the spring. The leaflets are typically thin and pointed; Rubus hispidus, our other creeper, has thicker leaves that are often rounded and partly evergreen, and soft bristles instead of prickles.





RUBUS HISPIDUS (Bristly Dewberry, *Rosaceae*): Low creeping blackberry with stiff bristles but no prickles; leaves with three leaflets; leaflets obovate, relatively thick, persistent or subevergreen, often rounded at the tip.







Variation in leaflet shape and texture; leaf stalks with stiff bristles, which could also be called tiny prickles.





Winter leaves on a moist forest floor.



RUBUS IDAEUS (RED RASPBERRY, ROSACEAE): Tall, arching canes, often whitened, with slender prickles; leaves pinnately compound, whitened below, with five leaflets on first-year canes; flowers with inconspicuous petals; fruit stalks with glandular bristles; fruits red, hollow.





ONE OF THE COMMONEST NORTH AMERICAN SHRUBS, transcontinental in Canada and the United States. Found throughout the NFR in fields, hedgerows, thickets, wetlands, and openings in woods. Common in the boreal zone, replacing blackberries there. Recognized by the arching canes, often whitened, with slender bristles; pinnately compound leaves that are whitened below; and red fruits on glandular stalks. Rubus occidentalis, the black raspberry, is similar but has broader prickles, canes that root at the tips, and black fruits on glandless stalks.







Leaves on flowering branches usually with three leaflets.









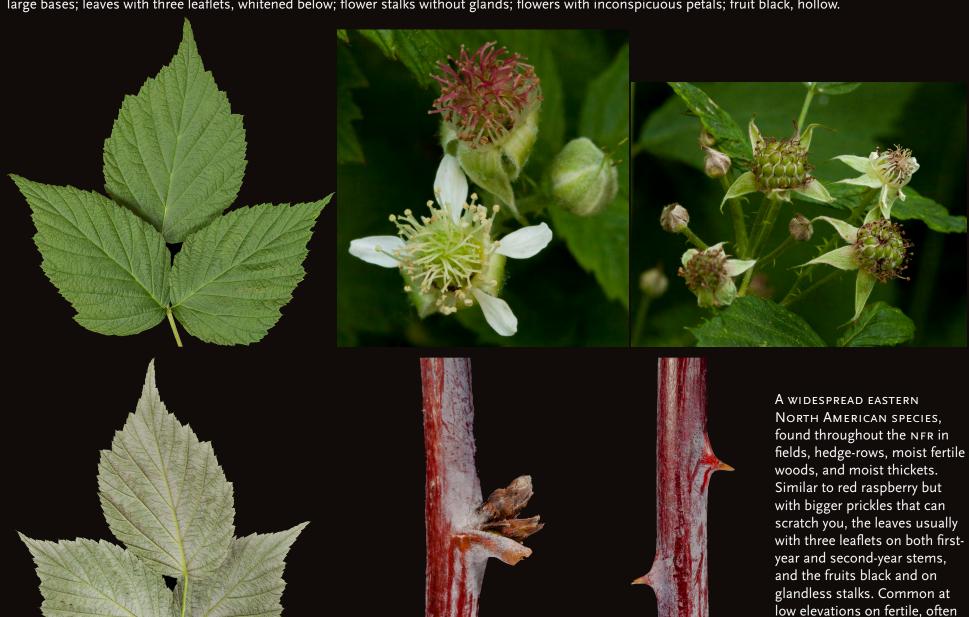




heavy soils; drops out at midelevations where red raspberry is common; and scarce in the

boreal.

RUBUS OCCIDENTALIS (BLACK RASPBERRY, ROSACEAE): Canes arching, strongly whitened, often rooting at tips, with serious prickles with large bases; leaves with three leaflets, whitened below; flower stalks without glands; flowers with inconspicuous petals; fruit black, hollow.







With white spruce in fertile floodplain thickets, Lake Placid, New York. Whitened canes, rooting at their tips; leaves with three leaflets.





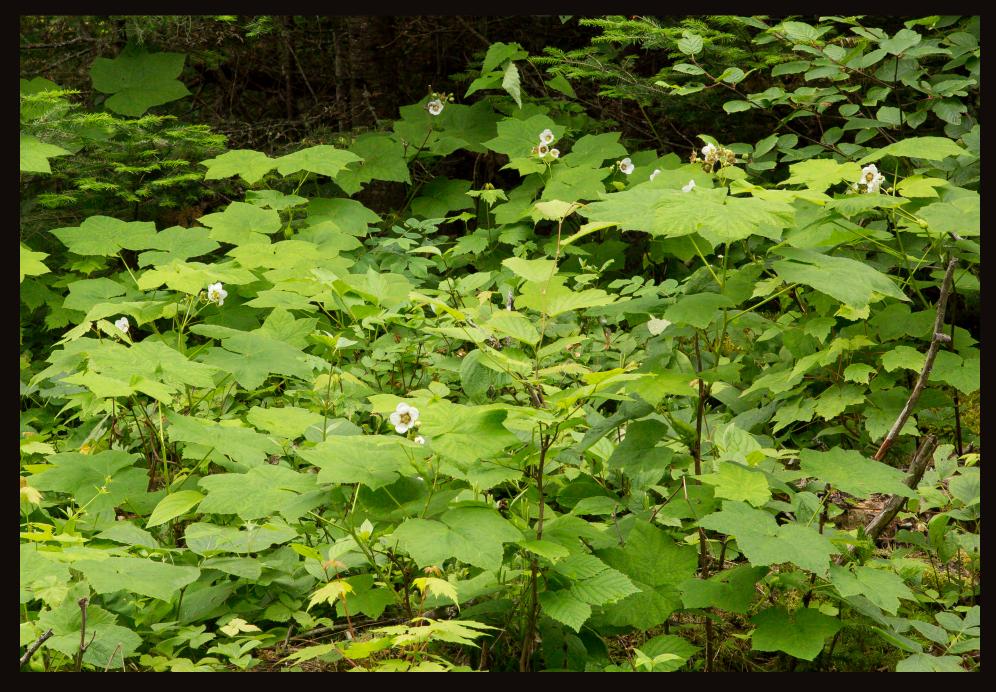




RUBUS PARVIFLORUS (THIMBLEBERRY, ROSACEAE): Low colonial shrub with large lobed leaves; stems without prickles, flowers white, leaves, sepals and flower stalks with short-stalked glandular hairs.







In fertile mixed woods near Lake Superior; Sleeping Giant National Park, Ontario.





In fertile mixed woods near Lake Superior; Sleeping Giant National Park, Ontario.



RUBUS SETOSUS (Setose blackberry, *Rosaceae*): A variable collection of low blackberries that creep or arch and have bristly stems without large prickles. Leaves thin, non persistent, often with five leaflets; leaflets pointed at their tips.



RUBUS SETOSUS is a northern species, or species group, with bristly stems like Rubus hispidus but larger, arching or erect rather than creeping, and often with five leaflets rather than three. It is found throughout the NFR but doesn't seem common anywhere. I have found it, in small quantities and often mixed with hispidus or flagellaris, on shores, in fields, and in beaver flows. I never see it regularly or in a large population. It is variable in height, leaf shape, and in how much it arches or creeps. It could be a rare species, a series of hybrids, or a rare form of a common species.

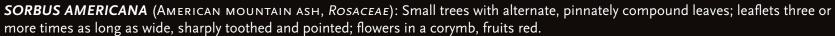




A WIDE-RANGING NORTHERN SPECIES, found from the subarctic to the Great Lakes and Appalachians, locally common in rocky, open, acid sites in the NFR. In the eastern NFR it is found on open summits from about 2000 feet to timberlines, and on shoreline ledges and barrens near the coast. Near Lake Superior it is found in jack pine barrens and on rocky summits and lake shores. The evergreen leaves with rounded lobes are distinctive.









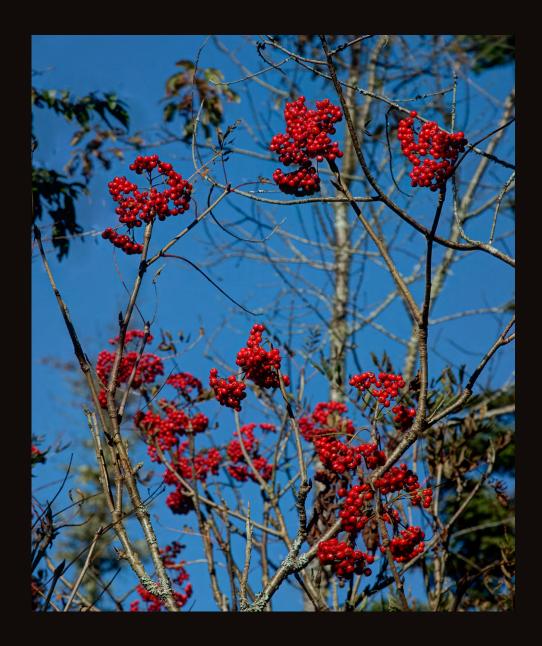






A WIDE-RANGING SPECIES of northeastern North America, found from the Appalachians and Great Lakes north to James Bay and southern Labrador. Common in mountain woods and swamps in the eastern NFR, and in swamps, forests and on outcrops along the northern Atlantic coast and the northern Great Lakes. The typical form, shown here, has long tapering leaflets. Forms with shorter leaflets, shown on p. 540, are common in Maine and Maritimes, and seem transitional to Sorbus decora.













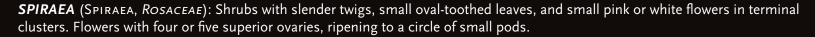
At the edge of a beaver flow, with balsam fir, mountain holly and somewhat heart-leaved birch.















ALBA





TOMENTOSA

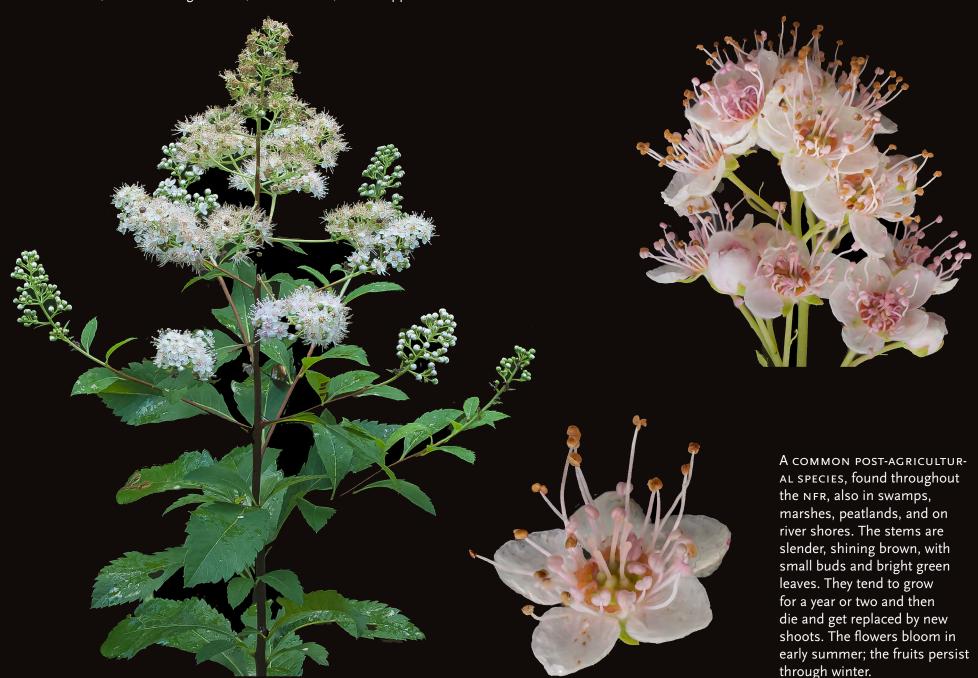
hill pastures but have become scarcer as the pastures have returned to woods. *Spiraea alba*, meadowsweet, has smooth leaves and twigs, white or pale pink flowers, and rounded flower clusters. *Spiraea tomentosa*, steeplebush has furny stems

TWO FAMILIAR SHRUBS of fields, shores, swamps, peatlands, and wet meadows, often occurring together. Both were formerly common in abandoned

steeplebush, has furry stems and leaves and pink flowers in

conical clusters.









Leaves elliptical, with sharp even teeth; buds small, oval, with dark scales; pods (follicles) in clusters of five, subtended by the calyx, in cylindrical or conical clusters.





Buds beginning to open, 18 April, 2020. Twigs brown, shiny, largely hairless, with indistinct ridges; leaf scars triangular, slightly raised, with bundle scars in a single line; buds small, oval, with many hairy dark-brown scales.

















MITCHELLA REPENS

Two common shrubs, both opposite-leaved and with tubular flowers but otherwise very unlike one another. Cephalanthus occidentalis, buttonbush, is a tall shrub of fertile wetlands and pond shores, often where the water table varies seasonally. It is southern, and commonest in the southeastern NFR. Mitchella repens, partridgeberry, is an evergreen forest-floor creeper, common in hardwood and mixed forests throughout the NFR.













BUTTONBUSH IS A COMMON TALL SHRUB of pond shores, woodland pools, and shrub swamps, usually in mineral soil or mucky, and often in places where the water levels vary seasonally. It is southern, commonest in the oak zone, and absent from mid-elevations and the lowland boreal. The large leaves, often whorled, and fruits in balls are distinctive.









Large shiny leaves, fruits in ball. On the shores of Lily Pond, a variable-level pond in Vernon, Vermont.









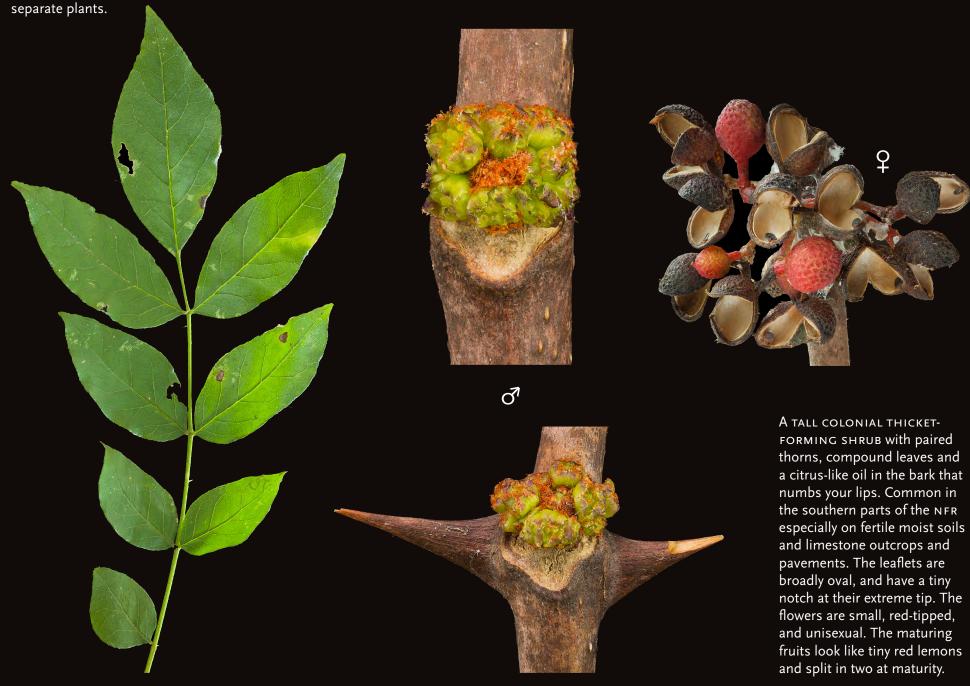


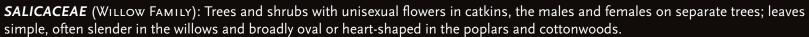


With Pleurozium schreberi and Polytrichum, on the floor of a hemlock-hardwoods forest.



ZANTHOXYLUM AMERICANUM (PRICKLY ASH, *RUTACEAE*): Tall shrubs with paired thorns, oval or lobed leaf scars, small furry buds, and pinnately compound leaves. Flowers small and unisexual, surrounded by a perianth with a red furry edge, males and females on

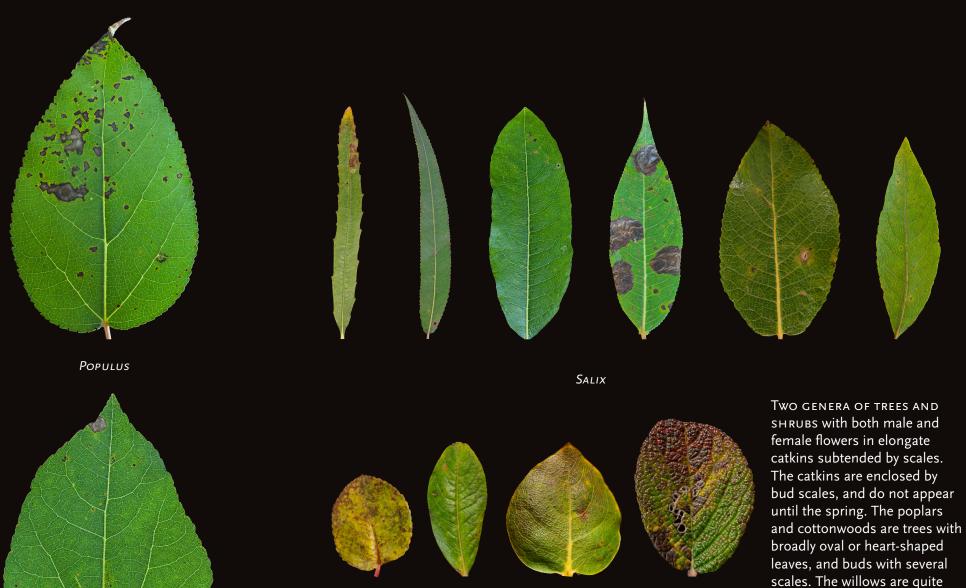






varied: trees, shrubs, or creepers; narrow, oblong, oval or rounded leaves. Their buds are always covered by a single

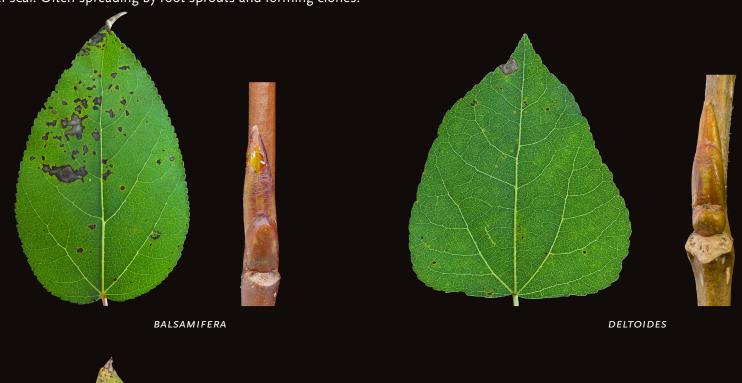
scale.



565



POPULUS (ASPEN, COTTONWOOD, POPLAR, SALICACEAE): Fast-growing trees of open successional habitats with oval or heart-shaped leaves, smooth young bark that breaks into ridges, wind-pollinated flowers that appear in spring, and buds with the lowest scale centered over the leaf scar. Often spreading by root sprouts and forming clones.





GRANDIDENTATA



FOUR COMMON NFR SPE-CIES: quaking and bigtoothed aspens are upland species with heart-shaped leaves with flattened petioles that quake when the wind blows. Cottonwood and balsam poplar are alluvial species with large resinous buds; balsam poplar has a round petiole, cottonwood a flattened one. All bloom in spring and have dangling male and female catkins and fluffy seeds with parachute hairs.

POPULUS BALSAMIFERA (BALSAM POPLAR, *Salicaceae*): Large tree with upswept branches; sharp-pointed, resinous buds on zigzag twigs; leaves oval, resinous and fragrant when young, with a rounded petiole.











Bark gray, cracking into sharp ridges that deepen and develop dislocations.







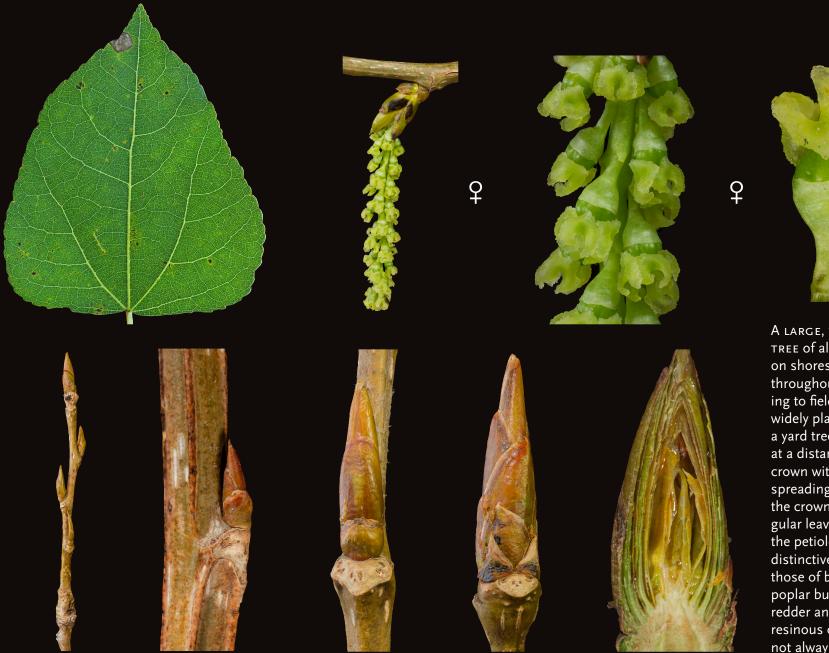
Upswept crown branches forming coat hooks; strong outer crown branches; zigzag twigs with large sharp buds.







POPULUS DELTOIDES (COTTONWOOD, SALICACEAE): Large tree with resinous buds; rounded triangular leaves with flattened petioles and glands where the petiole meets the leaf; young branches often with corky ridges; crown broad, multi-trunked, with upswept branches and widely spreading vertical trunks which become arching in age.





A LARGE, WIDE-RANGING TREE of alluvial soils, found on shores and valley bottoms throughout the NFR, spreading to field and roadsides, also widely planted or tolerated as a yard tree. Often recognized at a distance by the flat-topped crown with strong trunks spreading into the corners of the crown. The rounded triangular leaves with glands where the petiole meets the blade are distinctive. The buds resemble those of balsam poplar. Balsam poplar buds are sometimes redder and sharper, and more resinous on the outside. But not always.







Young bark with corky ridges; older bark with large deep main ridges interconnected with smaller subsidiary ones.









Female tree in fruit. Broad crown with strong, straight or arching ascending laterals to edges of crown; secondary verticals from broken limb.



POPULUS GRANDIDENTATA (BIG-TOOTHED ASPEN, SALICACEAE): A large forest tree with a spreading crown; young bark yellow-green, sometimes tinged with orange, photosynthetic; older bark deeply ridged; leaves with flattened petioles and large rounded teeth, white-furry when they first appear; buds with fine white hairs.







Young bark smooth, photosynthetic, yellow-green; older bark with deep sharp-edged ridges.









Large big-toothed aspen, White Creek, New York. Left, male buds opening, April 1, 2015; Right, new leaves, May 11, 2016.





Big-toothed aspens, White Creek, New York. Clockwise from top left: April 7, 2015; March 27, 2016; May 29, 2016; November 8, 2016.







THE COMMON NORTHERN ASPEN, transcontinental in the northern United States and Canada, found on every sort of soil, throughout the northern and western mountains, and nearly to treeline in subarctic Canada. A clonal disturbance species, colonizing after fire and logging, often dominating after conifers have been harvested. Generally similar to the big-toothed aspen but a smaller and shorter-lived tree overall, with dark shiny buds and leaves that are green and smooth when they first come out.







Young bark yellow-green, smooth and photosynthetic, developing diamond stretch marks, turning grayer, and breaking into sharp ridges.





Female catkins in bloom, and going to fruit. From the ground the female catkins look like males that haven't elongated, and so are easy to miss.





Female flowers and young fruits. The female flowers consist of a cup that surrounds an ovary with red styles, all subtended by a lobed bract with long hairs.





Male catkins and flowers. The male flowers consist of a cup containing stamens, subtended by a lobed bract with long hairs.







Left, flowering crown with upswept branches making coat hooks, staircase verticals, pitchfork leaders, clusters of male buds on short shoots. Right, young tree with pitchfork leaders and strong nodal sprays.

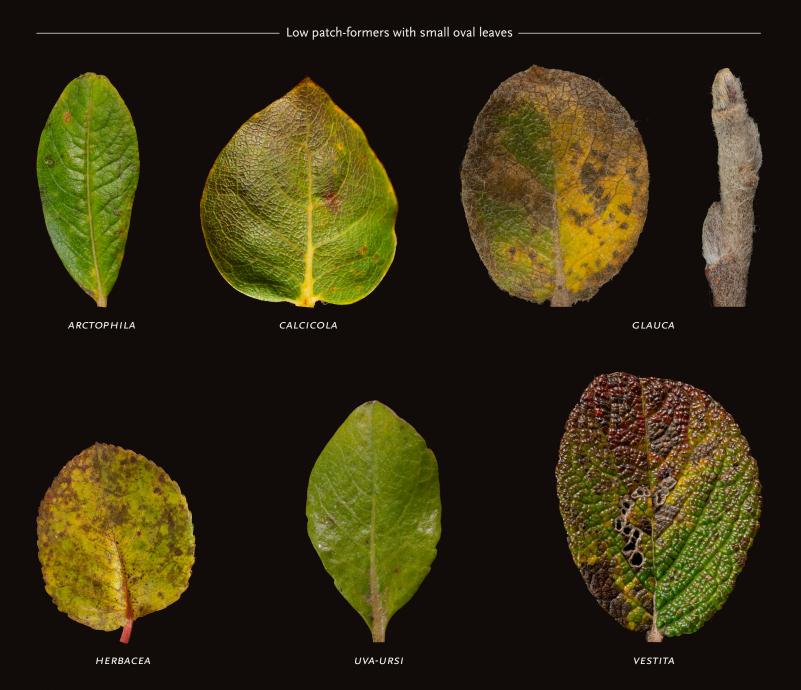












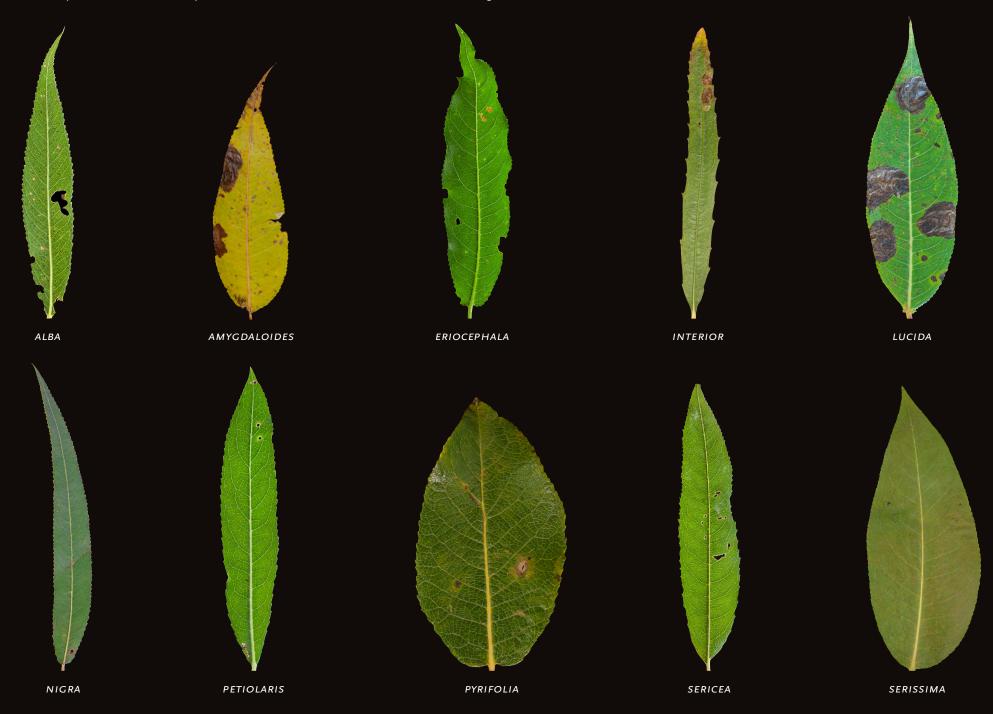
THE WILLOWS are our largest woody plant genus and one of our most diverse. We have about 25 NFR species, including trees, shrubs, and creepers. The ecological range is similarly broad: there are willows on roadsides, on lake and river shores, in alluvial forests, in swamps, bog, and fens, on rocky hills, in limestone and serpentine barrens, and in coastal and alpine tundra. Their common features are simple alternate leaves, buds with a single scale, and both male and female flowers in catkins.

Willow species are closely defined, and the species lines often obscured by variation and hybridization. We identify the typical forms of most species by mature leaves, with help from the pistillate flowers for the atypical ones and the difficult species. In the winter, we try to find old leaves under the plants. Buds are interesting, but rarely sufficient for identification. Some plants, on the better-safe-than-sorry principle, we don't identify at all.











SALIX ALBA AND HYBRIDS (WHITE WILLOW, *Salicaceae*): Introduced trees with ridged bark; slender toothed leaves that are whitened and often silky beneath; summit of the petiole sometimes glandular; catkin scales yellowish, with long hairs, falling as the fruit ripens; ovaries slender, smooth.











SALIX AMYGDALOIDES (PEACH-LEAVED WILLOW, *SALICACEAE*): Trees with oval or lanceolate, long-pointed leaves; leaves toothed, somewhat whitened below, the fine network of veins on the lower sides clear. Stamens about 5 per flower, ovaries smooth, female scales yellowish, falling as the fruit ripens.







THE COMMON NATIVE TREE-SIZED WILLOW of the plains, coming east, somewhat sporadically, in the Ohio Valley and Lake States, but mostly south and west of the NFR. Our pictures, from a disjunct tree in Vermont, may not be typical. Good characters are the smooth leaves, whited below, without stipules with the vein network visible; supple twigs; pale deciduous female scales; three or more stamens per flower.

SALIX ARCTOPHILA (NORTHERN WILLOW, *SALICACEAE*): Dwarf creeper with smooth, oval or oboval leaves, glossy above, whitened below, without teeth; twigs glossy, few hairs or none. Buds small.









relative to its width and have the veins less prominent below,

but neither is reliable.

SALIX BEBBIANA (Bebb's Willow, Salicaceae): Shrub or small bushy tree; bark with diamond-shaped stretch marks; twigs finely furry, dull; leaves oval, with at most low irregular teeth, with matted or crinkly hairs, the veins in grooves above and prominent below; scales of catkins elongate, pale brown; ovaries furry, slender, on long stalks.









Softy furry oval leaves, furry ovaries on long stalks, yellow or pale brown scales.





SALIX CALCICOLA (LIMESTONE WILLOW, *SALICACEAE*): Low creeper or very low shrub with large yellow or red buds and thick shiny toothless broad-based leaves; stipules conspicuous and persistent, like small leaves.









Heavy stems, big buds, whitened lower sides; with *Dryas integrifolia*, L'Anse aux Meadows, Newfoundland.



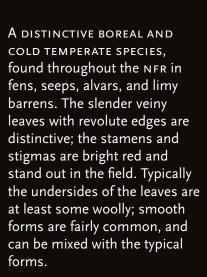
SALIX CANDIDA (HOARY WILLOW, *Salicaceae*): Shrub with slender, oblanceolate leaves, veiny above, usually matted hairy below, edges rolled under; twigs often with matted hairs; anthers bright red, filaments pale lavender, ovaries with matted white hairs and bright red stigmas.

















Catkins with white woolly scales, pink filaments, red stigmas.





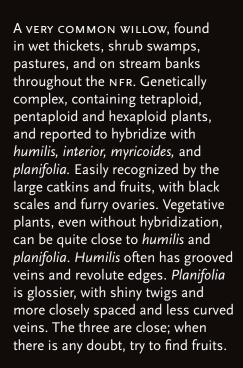
Anthers bright red, ovaries white woolly.



SALIX DISCOLOR (Pussy Willow, Salicaceae): Shrub or small tree with oblong oval leaves with low irregular teeth; leaves and twigs hairy or smooth; flowering catkins large, scales black with long hairs, fruits 6 to 10 mm long, on stalks 2 mm long or more.





















SALIX ERIOCEPHALA (WOOLLY-HEADED WILLOW, *SALICACEAE*): Tall shrub with dark, often furry twigs; smooth leaves, whitened beneath, with sharp even teeth and rounded bases, often red when young; conspicuous persistent stipules; catkins with dark scales with long hairs; and smooth ovaries.











ONE OF OUR COMMONEST SPECIES, found throughout the NFR in wet meadows, thickets, ditches, swamps, dune hollows, and on shores, stream banks, and gravel bars. Almost always in wet or intermittently wet sites. Its marks are the smooth leaves, red when young, with rounded bases, whitened lower sides, and sharp even teeth; the persistent stipules; and the catkins with dark scales and smooth, often red ovaries. It is reported to hybridize with candida, humilis, interior, petiolaris, and sericea. Diploids can have more fun than you might think.





Young ovaries red, catkins on leafy shoots, stipules conspicuous.









Young anthers red, turning yellow. Young stigmas red, ripening ovaries turn red.

edges near the margins.

SALIX GLAUCA VAR. CORDIFOLIA (GRAY-LEAVED WILLOW, *SALICACEAE*): Low creeper with densely hairy twigs and buds and broadly oval leaves that are veiny above, whitened below, and have long silky hairs on the edges and surface when young.



SALIX HERBACEA (Snowbed willow, Salicaceae): Dwarf creeper with small, broadly oval, hairless leaves that are under 2 cm long, untoothed, green on both sides, and have no teeth.





A SMALL ARCTIC-SUBARCTIC SPECIES, entering our area in the mountains of New England, Quebec, and Newfoundland, where it is grows in protected, moist hollows—snowbeds—in acid alpine tundra. It is about the size of the bearberry willow and can hybridize with it; the best marks are the broad-based leaves that are green below and have no teeth at all. The pictures are of a plant from Mt. Washington, New Hampshire.





Broad-based leaves with low rounded teeth; lower sides not whitened; large buds.

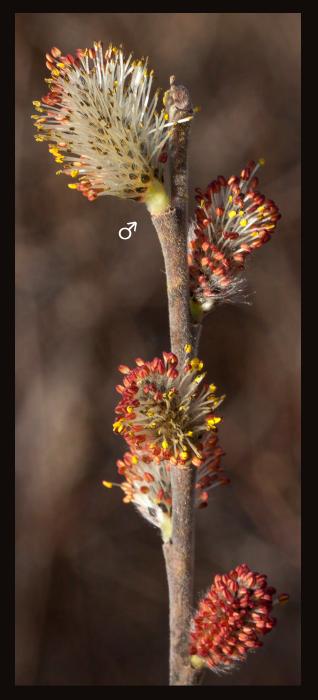


seeing them together.









Catkins short, scales dark, with silky hairs, ovaries furry, styles short.





SALIX HUMILIS VAR. **TRISTIS** (DWARF PRAIRIE WILLOW, *SALICACEAE*): Plants under 1 meter tall, with leaves under 5 cm long and catkins under 2 cm long; stems and leaves persistently furry, stipules absent.









A SLENDER-LEAVED WILLOW of river shores and bars, wideranging in North America and found throughout the NFR. The narrow leaves with small sharp remote teeth are distinctive. The catkins are loosely flowered with inconspicuous green scales; the ovaries have some long hairs but are not strongly whitened. Salix exigua, found from the Rockies west, is similar but hairier; our plants may also be called Salix exigua var. interior.

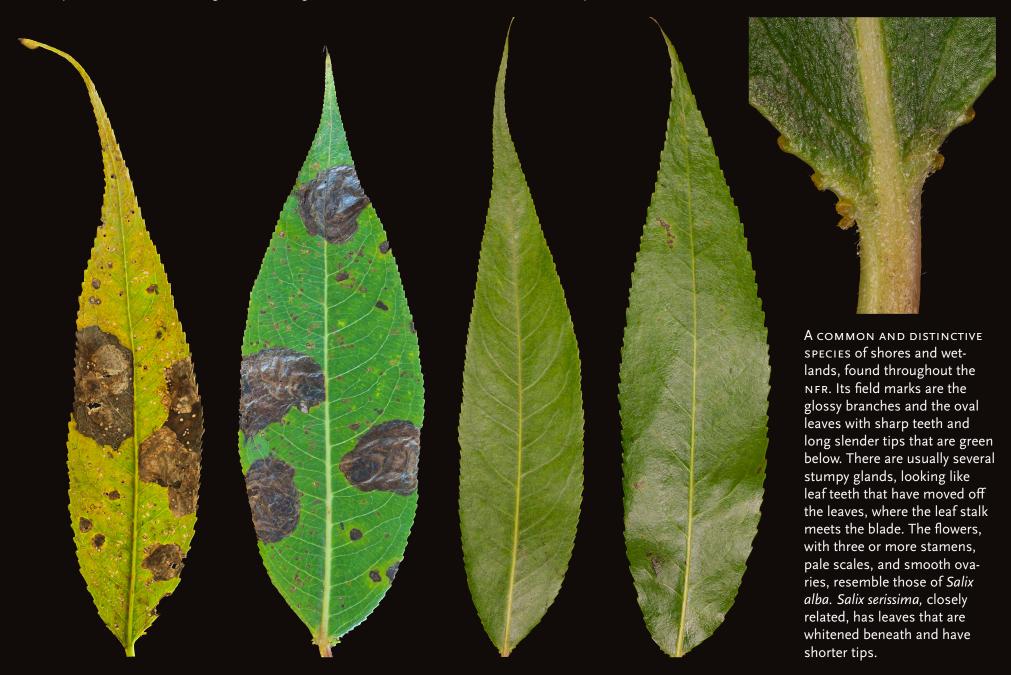




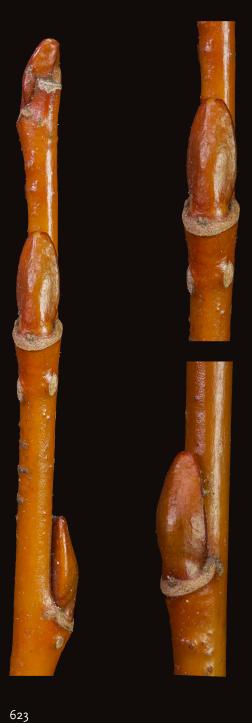
Buds short and rounded; leaves with widely spaced sharp teeth; scales of female catkins green and narrower, falling as the fruit ripens.



SALIX LUCIDA (Shining willow, Salicaceae): Shrub or small tree; twigs and buds glossy yellow or reddish; leaves oval, with long tapering tips, sharply toothed with glandular teeth that extend down to the junction with the petiole, not whitened below; stipules conspicuous on sprouts; scales of catkins greenish, falling before fruits mature; stamens three or more per flower; ovaries smooth.









Glossy twigs and leaves, long tips, sharp teeth.



SALIX NIGRA (BLACK WILLOW, SALICACEAE): Trees with slender branches; buds short, oval, the scale edges overlapping rather than fused; leaves long, slender, sharply toothed, green below, with conspicuous stipules; catkins with greenish scales; ovaries smooth, three or more stamens per flower.

















A COMMON NATIVE WILLOW of riverbanks, oxbows, and shores, found throughout the NFR. The short oval buds, shaggy bark in loose plates, and slender, sharp-toothed leaves that are green below are all distinctive. Often multi-trunked along rivers and small and shrubby on lake beaches.









Slender, light green leaves; straight brittle branches that break off; often shrubby on exposed shores. Pictures from the Ausable Delta, Otter Creek, and Button Bay State Park, all on or near Lake Champlain.

SALIX PEDICELLARIS (Bog WILLOW, *Salicaceae*): Small shrub with glossy twigs, smooth oval untoothed leaves, usually whitened below, and short catkins with yellowish flowers and scales.





A SMALL SPECIES, typically a meter high, found in open, peaty wetlands: sedge meadows, floating mats, fens, bog edges, openings in swamps. It is transcontinental in the north and found throughout the NFR. Recognized in summer by the smooth untoothed oval leaves, often whitened beneath; and in winter, with more difficulty, by the glossy, light-colored twigs and short smooth buds.







Twigs glossy, buds short; young leaves nearly hairless, whitened below; young flowers surrounded by leaves.

SALIX PELLITA (SATINY WILLOW, SALICACEAE): Tall shrub with whitened twigs and narrow leaves with wavy edges but not real teeth. Upper surface of the leaves smooth, with the veins in grooves; lower surface covered with dense, silky, very shiny hairs.



AN UNCOMMON WILLOW of northern river and lake shores with a scattered distribution in the NFR. The long untoothed leaves that are white-silky below are distinctive.

SALIX PETIOLARIS (SLENDER WILLOW, *Salicaceae*): Year-old branches usually smooth; leaves narrow, evenly toothed, usually tapering to the base, hairless below at maturity; lateral veins not prominent below; capsules 5 mm long or more, tapering to tip.







ONE OF THE COMMON SHRUBBY WILLOWS with sharp even teeth and leaves strongly whitened below. Close to sericea and eriocephala and forms intermediates with both of them. Within the group its distinguishing characters are its leaves with tapering bases that are largely hairless below at maturity and often have some reddish hairs when young; stipules either tiny or not persisting; and hairy ovaries and capsules that are 5 mm or more long. Eriocephala has smooth capsules, broader-based leaves and conspicuous stipules. Sericea has leaves that are silky below at maturity, and short oval hairy capsules in between plants are common.









Twigs variably smooth or furry; capsules furry, pointed, on long stalks; catkin scales dark, with silky hairs.

SALIX PLANIFOLIA (TEA-LEAVED WILLOW, *SALICACEAE*): Shrub with glossy red or brown branches and small, glossy, mostly toothless leaves with whitened undersides; catkins with dark scales with silky hairs, capsules less than 6 mm long.







A NORTHERN AND WESTERN SPE-CIES, transcontinental in the north and widespread in the western mountain and eastern arctic and subarctic. Rare in the NFR where it is found in wet subalpine thickets in the eastern mountains, the barrens of Newfoundland and southern Labrador, and the north shore of Lake Superior. A variable polyploid, close to Salix discolor and sometimes grading into it. The best characters for planifolia seem to be the glossy red or purple twigs; the smaller leaves that are toothless and very glossy; the straighter and more closely spaced side veins; and the catkins and capsules which are smaller than those of discolor.





Glossy, oval toothless leaves; veins closely spaced, not strongly curved at the tips.





Catkins with dark silky scales; capsules oval, under 6 mm long, without clear beaks.





nate to opposite are unique

among our willows.

SALIX PURPUREA (Purple willow, *Salicaceae*): Tall shrub with long straight twigs; leaves opposite, almost opposite, or alternate, narrow, barely toothed, smooth, broadest above the middle; catkins paired, the two stamens of each flower united into a single filament with four anthers; ovaries short, fat, densely furry.







Catkins in opposite or almost opposite pairs, with dark scales and long gray hairs.





Flowers appear to have a single stamen with two anthers (four pollen sacks); actually two stamens with one anther each fused together.

SALIX PYRIFOLIA (BALSAM WILLOW, SALICACEAE): Shrub or small tree with slender stems; twigs and buds glossy red and hairless; leaves broad-oval from a rounded or heart-shaped base, with short tips; catkins with delicate pale scales, ovaries smooth.





A WIDE-RANGING SPECIES OF SUBARCTIC CANADA, found, in small quantities and unpredictably, in swamps and along roadsides in the northern NFR. We see it in conifer swamps, bogs, openings in boreal forest, and along the edges of logging roads. The glossy twigs and broad glossy leaves that are whitened and show the network of fine veins clearly are distinctive. It is often said to smell like balsam; I have never smelled this.





С

SALIX SERICEA (SILKY WILLOW, SALICACEAE): Shrub with dull twigs and buds; branches brittle at bases, with stipules on later growth; leaves with sharp even teeth and white silky hairs on the lower side; catkins appearing with the leaves, with black scales with long hairs; ovaries and capsules short oval and blunt, 4 mm long or less, with silky hairs.





SERICEA is one of our commonest willows, found throughout the eastern NFR on river and lake shores, in wet meadows, in shrub swamps, and, abundantly, along roads. It is an eastern temperate species, uncommon in the boreal and absent from the western Great Lakes. It is close to petiolaris and like it has slender leaves with narrow bases and fine teeth that have silky hairs when young, and catkins with dark scales and ovaries with silky hairs. The best characters for sericea are the short, blunt ovaries and fruits, and the long silky hairs on the lower sides of the leaves that persist to maturity. The brittle branches and stipules on mature growth may or may not be good characters.







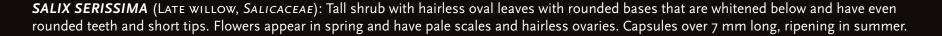


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Female catkins small and compact, flowering before the leaves appear; ovaries oval, short pointed, under 4 mm long.













A NORTHERN RELATIVE OF SALIX LUCIDA, found in fens, cedar swamps, and on stream and river shores, often in limy soil. Commonest near the Great Lakes, rare in eastern New York and very rare in western Vermont, absent from the rest of New England and the Maritimes. Differs from lucida by lacking the glands at the summit of the petiole, having leaves with shorter tips that are whitened below, and having female catkins that don't mature until summer, with capsules over 7 mm long.

SALIX UVA-URSI (BEARBERRY WILLOW, SALICACEAE): Creeping shrub, forming large patches; leaves small, oval, smooth, shiny, tapered to base, whitened below, with low inconspicuous teeth; twigs smooth, buds rounded; catkins erect, with 12 or more flowers; ovaries red, catkin scales







A COMMON MAT-FORMING WILLOW of the eastern arctic and subarctic, found from Greenland and Nunavut south to the mountains of New England and New York. Does not reach the Great Lakes. Common in the barrens of Newfoundland and Labrador; rare in the NFR. Plants small or large, sometimes covering several meters; leaves 2 cm long or less, tapering to their bases, persisting after they senesce, with large teeth. Catkins relatively large. Salix herbacea is similar and can hybridize with uva-ursi. It has underground stems, leaves that are wide at the base, green below, and do not persist, and smaller catkins with fewer flowers. Specimen from Mt. Washington, New Hampshire.





Oval blunt smooth leaves, whitened below, with low teeth. Old leaves wither and persist. Plants from L'Anse aux Meadows, Newfoundland, leaves from Mt. Washington, New Hampshire.





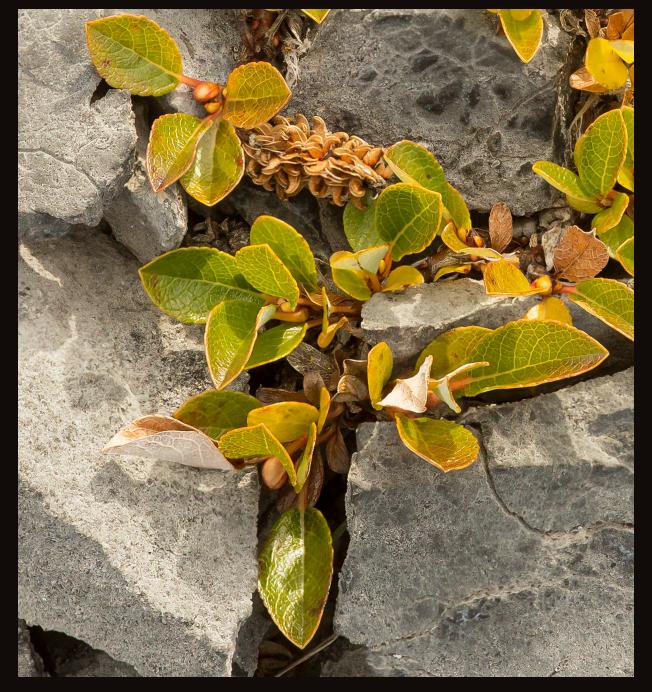


Patch about 1.5 meters across, October 2019, Burnt Cape, Newfoundland.









Clear vein network, low teeth, strongly whitened below; Burnt Cape, Newfoundland.

SALIX VESTITA (ROCK WILLOW, SALICACEAE): Low creeping plants with oval or oblong leaves that are reticulate-veiny, the veins lying in grooves, and glossy above and white silky below. Twigs often with silky hairs, flower buds large, leaves bright yellow in fall.



A SMALL STRIKING WILLOW of calcareous barrens, with rounded leaves that are dark shiny green and deeply grooved-reticulate above, and have the surface covered by long silky white hairs below. It is a Beringian disjunct, found in Russia, Siberia, China and Canada, coming east to Labrador and Newfoundland where it is locally common in calcareous barrens. The southernmost NFR occurrences are in the Gaspe.









ARCEUTHOBIUM PUSILLUM (DWARF MISTLETOE, SANTALACEAE): Dwarf parasite of spruce with paired scale leaves; plants unisexual, the female flowers two-parted, the males three-parted.







A TINY PARASITE, barely woody and often less than 2 cm high, found on spruce twigs in bogs and swamps. Locally common in the boreal parts of the NFR. Usually on black spruce but also reported on white spruce. I have never seen it on red spruce. In bogs it often stunts the trees it grows on, causing yellowed foliage and witch's brooms.





















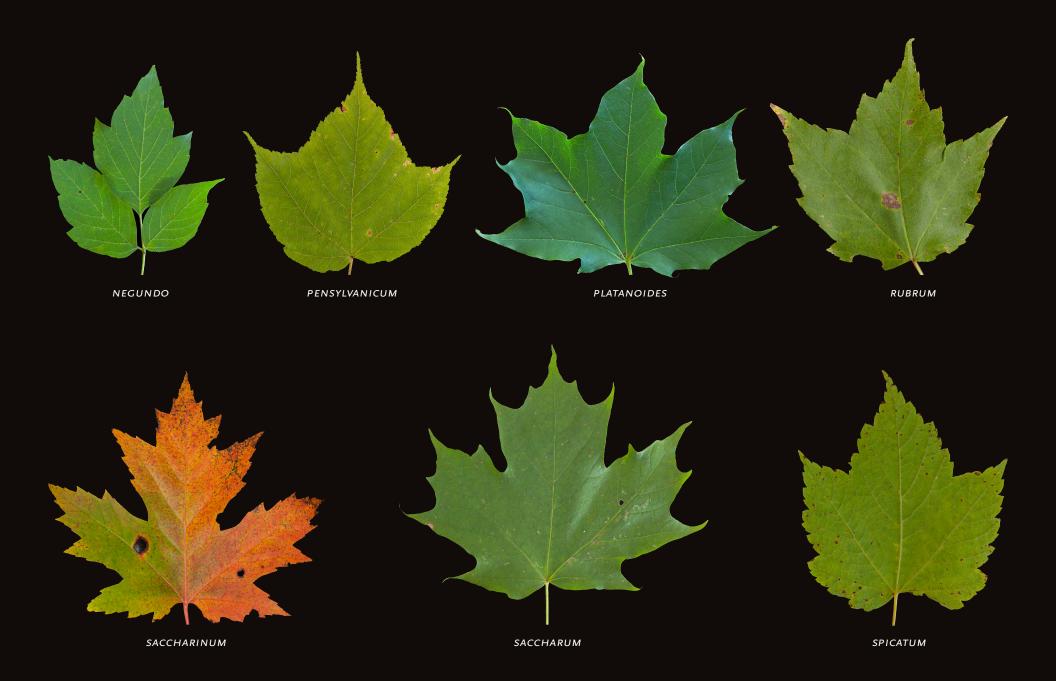
SACCHARUM



SPICATUM

THE NFR HAS SIX NATIVE MAPLES and one naturalized alien. All the native species are widespread in the NFR. Sugar maple, Acer saccharum, is a dominant forest tree on good soils. Red maple, A. rubrum, is principally a tree of swamps and successional woods. Silver maple, A. saccharinum, is a river-shore and alluvial-forest dominant. Striped maple is a small tree of fertile hardwoods, gaps in softwoods, and rocky hills. It is an Appalachian species, common in the eastern NFR and absent from the western Great Lakes. Mountain maple, A. spicatum, is a bushy shrub or small tree of moist thickets and gaps, common on mountain slopes. Norway maple, A. platanoides, is an introduced lawn and street tree that is widely and sometimes aggressively naturalized in second-growth woods.















Box ELDER is a native tree of river shores and floodplains that has been introduced and spread as a street and yard tree and is now found on roadsides, in hedgerows, along roads and railroads, and in all sorts of disturbed waste ground. It is transcontinental in the United States and common throughout the NFR. The bark with sharp dark braiding ridges resembles white ash; the thick whitened twigs, furry purple buds, and trifoliate, compound leaves are distinctive.







Dark gray bark, cracking into shallow, sharp-edged, braiding ridges.

























Bark with white stretch marks; glossy twigs and buds; inner bud scales elongate as buds open.





Leaves broad, with fine sharp teeth and long needle tips; flowers pale yellow, dangling in chains.







Flowers with broad petals; fruits small, with short, rounded wings, in chains.

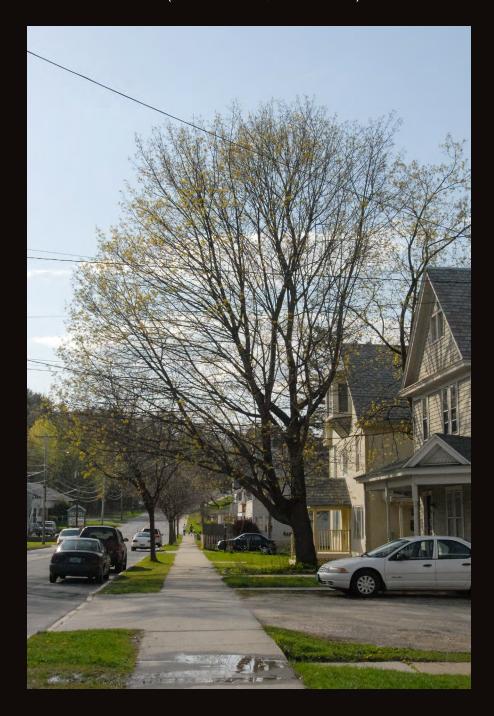


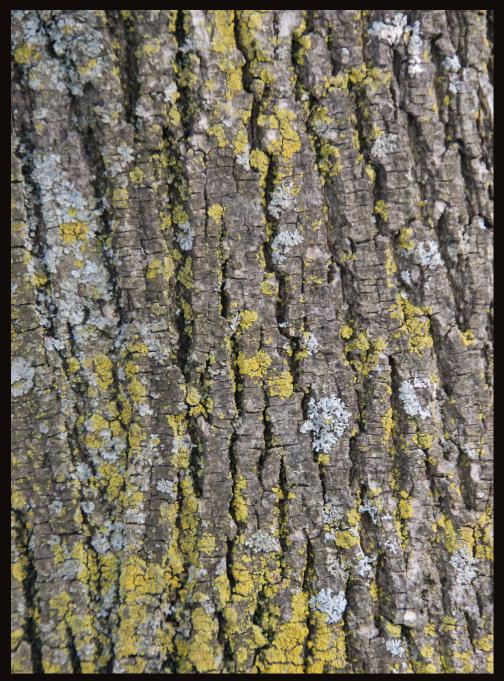












Dark bark with sharp cracks; rounded crown; Bennington, Vermont, April 20, 2010.



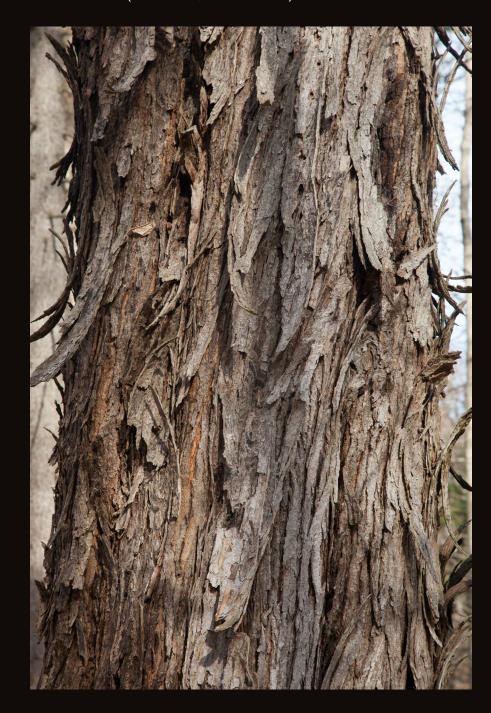




ACER RUBRUM (RED MAPLE, SAPINDACEAE): Tree with three-lobed or five-lobed leaves with rounded lobes, toothed along the edges and whitened below; twigs and buds bright red in winter; buds rounded, the scales with light edges; flowers deep intense red.







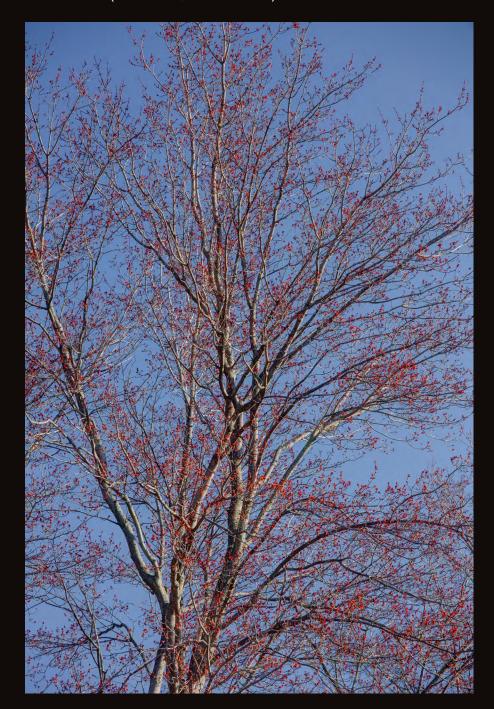


Bark first cracking into concentric scales around branch stubs, then into thin plates.











Male flowers intense red when they first open, lightening as the stamens elongate and the pollen is shed. Trees are predominantly male or female, but not consistently.











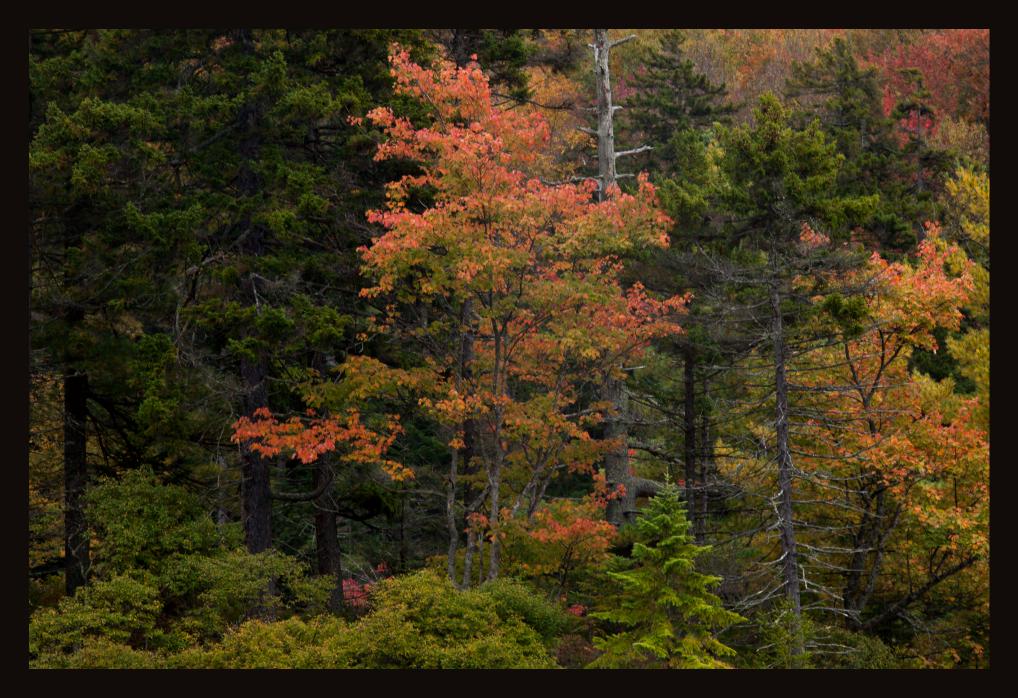
Male buds clustered on short spur branches; flowers with five petals and 5 sepals; inner bud scales, perianth, anthers bright red.





Female flowers with two deep red stigmas, and a red perianth of five petals and five sepals.











ACER SACCHARINUM (SILVER MAPLE, SAPINDACEAE): Tree with sharp-lobed, deeply divided leaves that are toothed between the lobes; bark separating in long loose plates; outer branches often hanging down; buds and flowers like red maple but earlier and browner.









Bark cracking into long undercut plates which can come loose and curl.





Flowers in early spring, with or before the aspens. Fruits develop in May.













In alluvial meadows by the Allagash River near Five-finger Brook, Maine, October 12, 2011.





On the shore on Lake Champlain by the mouth of the Ausable River, Ausable, New York, September 27, 2015.











Tight rough bark with brown stretch marks, developing cracks and undercut plates that curl on one side.









Dark brown, conical buds with sharp points, in threes at the branch tips; inner scales elongate greatly as the buds open.





Dangling yellow-green flowers in clusters from terminal buds, with five sepals; typically stamens and pistils are present but only one or the other is functional.















With male and female red maples, white pine, smooth shadbush; White Creek, New York, April 24, 2019.

ACER SPICATUM (MOUNTAIN MAPLE, SAPINDACEAE): Small tree with dark red twigs with white hairs; buds elongate, covered by two scales; flowers erect in racemes, green white, with slender petals and sepals.













MOUNTAIN MAPLE is a tall shrub or small tree with an Appalachian-Great Lakes distribution, common in cold moist woods and on mountain slopes throughout the NFR. We see it commonly in ravines and stream bottoms, in swamps and mixed forests, on rocky hills, and, often as a dominant, in avalanche gullies and on ice-impacted slopes. The leaves are close to those of red maple but not whitened below. Other good marks are the red twigs with a frosting of velvety white hairs, the duckbill buds with two scales, and the small flowers in erect racemes.







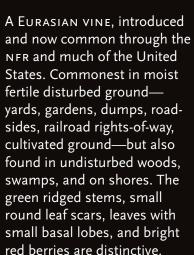






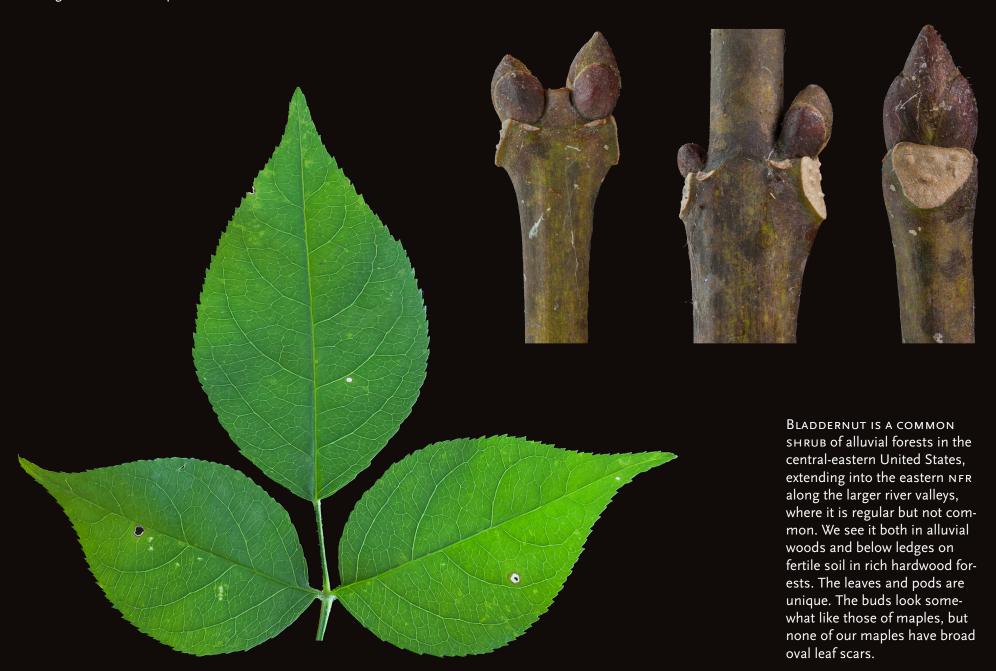
SOLANUM DULCAMARA (BITTERSWEET NIGHTSHADE, SOLANACEAE): Climbing vines with green, ridged, twining stems; leaf scars small and round, raised on pegs; buds small and furry; leaves rounded triangular, lobed at base; flowers purple, with yellow anthers; fruits bright red.







STAPHYLEA TRIFOLIA (BLADDERNUT, *STAPHYLEACEAE*): A tall shrub or small tree, often colonial, with opposite trifoliate leaves and gray bark with white stretch marks; twigs and buds shining brown; leaf scars broad oval; terminal bud often missing; flowers white in small clusters, turning into three-lobed pods.







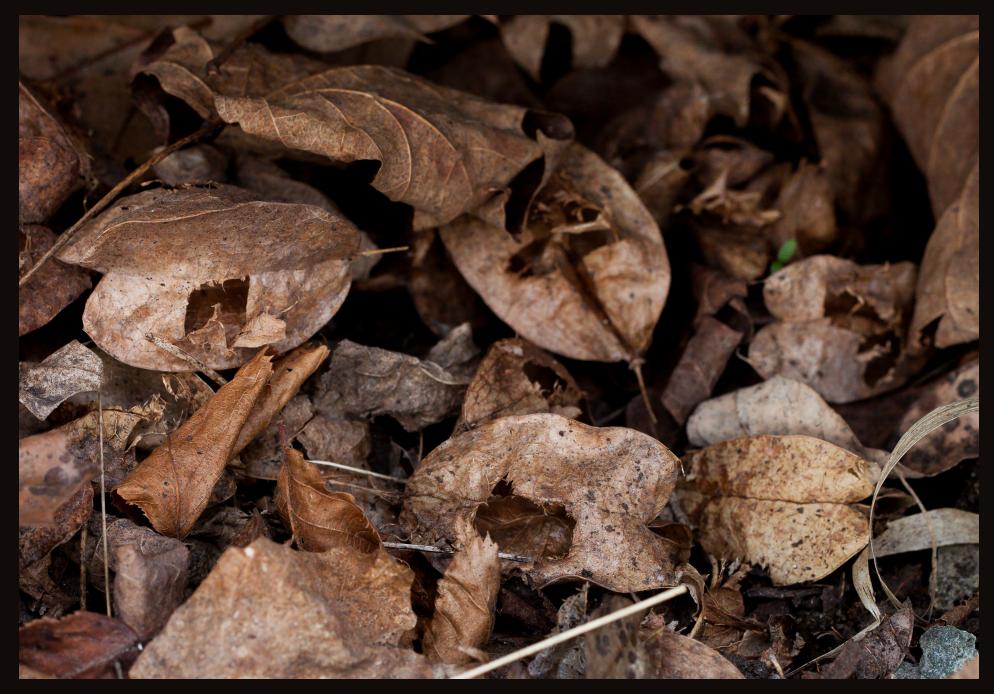


Twigs smooth, green to brown; leaf scars oval, raised, with about 5 bundle scars; side buds paired, the terminal bud usually missing and replaced by a side bud.









Pods opened by rodents, Pownal, Vermont.







TAXUS CANADENSIS (CANADA YEW, *TAXACEAE*): Low, often sprawling evergreen with flat needles with small needle tips; stalks of needles attached to ridges—decurrent bases—on twigs.







A SPRAWLING SHRUB with an Appalachian-Great Lakes distribution, found throughout the NFR in moist, often fertile, woods and swamps. Common in ravines and on rocky slopes. Sometimes on shaded ledge crests. Usually in shade, often associated with seepage, always hammered by deer and moose. The flat sprays and flattened needles look like balsam fir but differ in the needle tips of the needles and the ridges on the twigs.







Dark green, glossy, lighter green below; flattened sprays; needles with needle tips.







A TREE-LIKE SHRUB OR SOME-TIMES A SMALL TREE, with supple twigs and amazingly tough bark, found in fertile woods and sometimes in wetlands. Leaves bright green, with a dull or matt surface. Flowers small and tubular, with long exserted stamens. Fruits green, said to turn yellow.





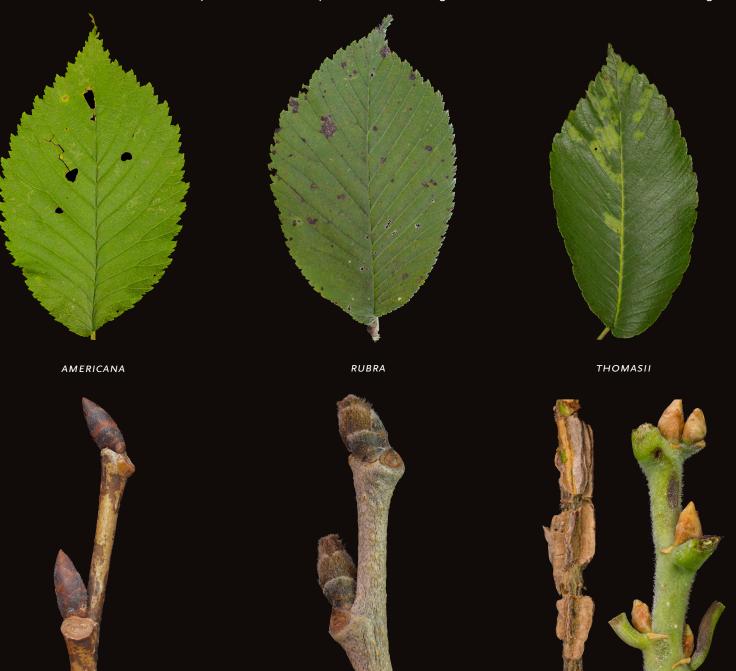
Supple rubbery twigs, furry bud scales, tubular flowers with exserted stamens, green-yellow fruits.





CM

ULMUS (ELM, *ULMACEAE*): Forest trees with flattened branch sprays and zigzag twigs; bud scales in two rows; leaf scars oval, with three clear bundle scars; leaves oval, asymmetrical, coarsely toothed, often rough; flowers bisexual, with stamens and a single ovary in a cup.



THE ELMS were once major forest, yard, and wetland trees. They have been much reduced by the Dutch elm disease but are still common, though neither as common or as important as previously. Ulmus americana, American elm, is the common NFR species, found in swamps, alluvial forests, yards and hedgerows, and successional woods. Ulmus rubra, slippery elm, is more southern and requires fertile soils. Ulmus thomasii, rock elm, is a midwestern species of fertile rocky and bottomland forests, quite rare in the eastern NFR.

ULMUS AMERICANA (AMERICAN ELM, *ULMACEAE*): Bark with alternating light and dark layers; twigs without corky wings; fruits hairy along the edges, smooth on the surfaces; leaves smooth or rough.





THE COMMON ELM OF THE NFR, found in swamps, alluvial forests, successional woods, hedgerows, pastures and, formerly, widely planted as a lawn or street tree. Best identified by the alternating light and dark layers in the bark and the fruits which have smooth sides and hairy edges. Otherwise distinguished by negatives: it lacks the shiny red hairs of the bud scales and flowers of slippery elm, and the corky edges of the twigs of cork elm.







Lopsided, double toothed leaves, generally similar to red elm, which is very rough, and cord elm, which is very smooth.







Bark cracking into shallow scaly braiding ridges that, in cross-section, show alternating light and dark layers.









Flowers bisexual, the stamens and ovary in a shallowly-lobed cup (calyx).













With white spruce, in the floodplain of the North Branch of the Ausable River, August 21, 2014.

C

ULMUS RUBRA (SLIPPERY ELM, *ULMACEAE*): Large tree with dark bark separating into scales and plates, uniformly brown, without white layers, when broken; leaves very rough above; tips of bud scales and sepals of flowers with shiny red hairs; fruits hairy over the seeds, smooth otherwise.









SLIPPERY ELM is a temperatezone tree whose main range is
south of the NFR. It enters the
NFR in Michigan, Wisconsin,
and in the major valleys and
lake plains on New York and
western New England. We see
it frequently on fertile rocky
hills and in flood plains. The
dark bark, cracking into plates
and strips, can be seen from a
distance. Other good marks are
the red hairs on the bud tips
and sepals, and the fruits with
hairs over the seed.





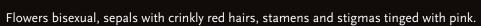




Brown bark with undercut scales or plates; divergent crown branches with wide forks.











Young tree on a fertile cobble, March 27, 2016. It has died since the picture was taken.









CORK ELM is an uncommon elm with a scattered distribution, mostly to the south of the NFR. It enters our range in the southern Great Lakes, southern Ontario, and, quite rarely, in New York and western Vermont. We have seen it in pastures, on rocky hills, and in moist fertile woods. The corky ridges on twigs and branches and fruits that are hairy all over are distinctive. On open-grown trees, the narrow silhouette and crooked side branches are good marks.







Twigs with corky ridges; young twigs furry (twig collected in early June, with immature buds).

VITACEAE (GRAPE FAMILY): Vines climbing with tendrils and (in *Parthenocissus*) rootlets; leaves lobed or compound; flowers small, in open clusters.











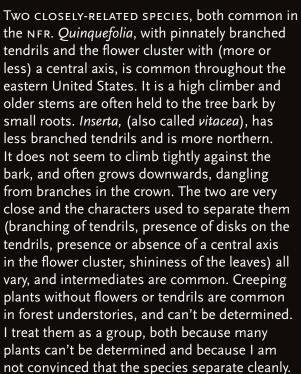
TWO COMMON GENERA OF VINES WITH TENDRILS, found throughout the NFR. The grapes, Vitis, have ridged twigs, shreddy bark on old stems, lobed leaves, and unisexual flowers. The woodbines, Parthenocissus, have smooth twigs with lenticels, bark that doesn't shred, compound leaves, and bisexual flowers. Both are common in low elevation woods and thickets, and very conspicuous on river shores and in floodplains.



PARTHENOCISSUS QUINQUEFOLIA GROUP (VIRGINIA CREEPER, WOODBINE, VITACEAE): Climbing vines with slender tendrils that end in adhesive disks or poke into cracks; stems with lenticels; leaf scars large and round, raised on pegs; leaves pinnately compound; flowers bisexual.













INSERTA: loosely climbing from branch to branch, often dangling.

Quinquefolia: closely attached with short tendrils and adhesive disks.





INSERTA: long, sparsely branched tendrils, the attached ones mostly without adhesive disks.

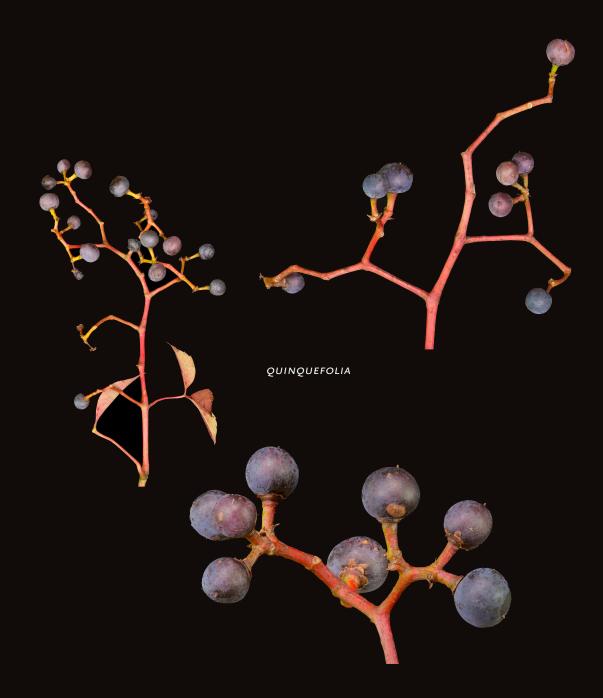
QUINQUEFOLIA: short, pinnately branched tendrils, the attached tendrils mostly with adhesive disks.





INSERTA

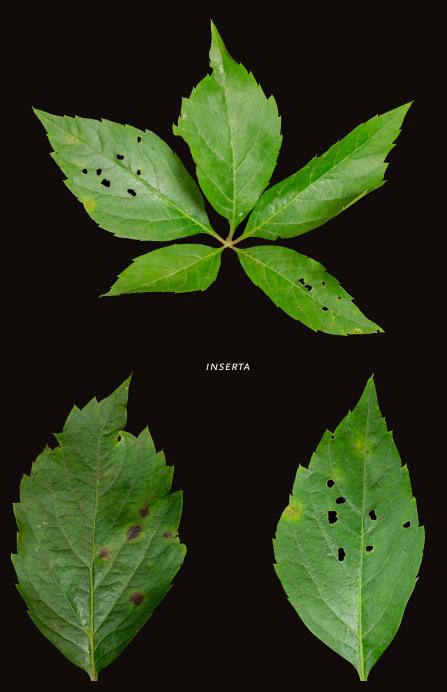




INSERTA: flower cluster with wide main forks, without a central axis.

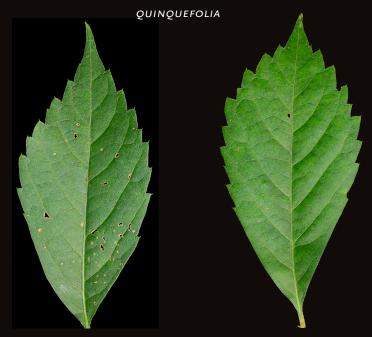
QUINQUEFOLIA: flower clusters with a central axis that is somewhat thicker than the branches.





Upper surfaces of leaflets glossy or dull.

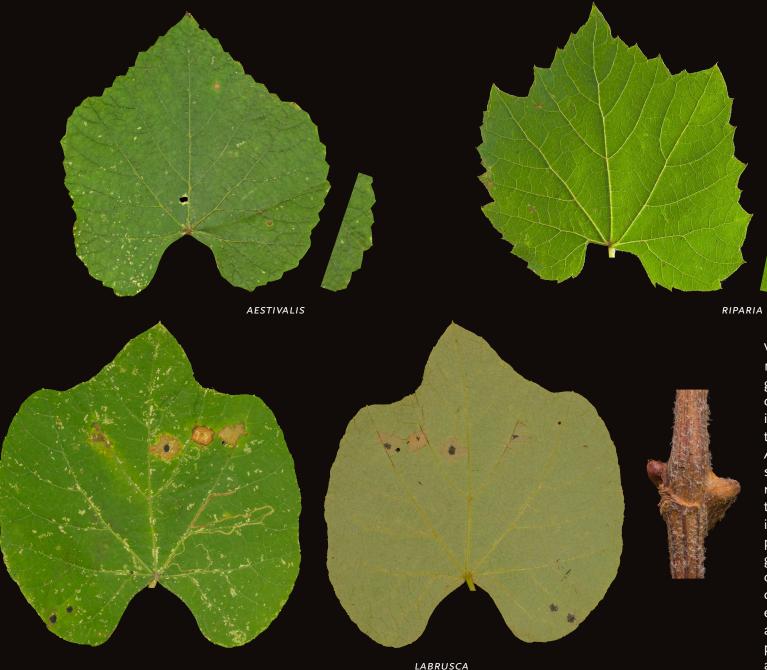




Upper surfaces of leaflets a bit less glossy, but often glossy anyway.

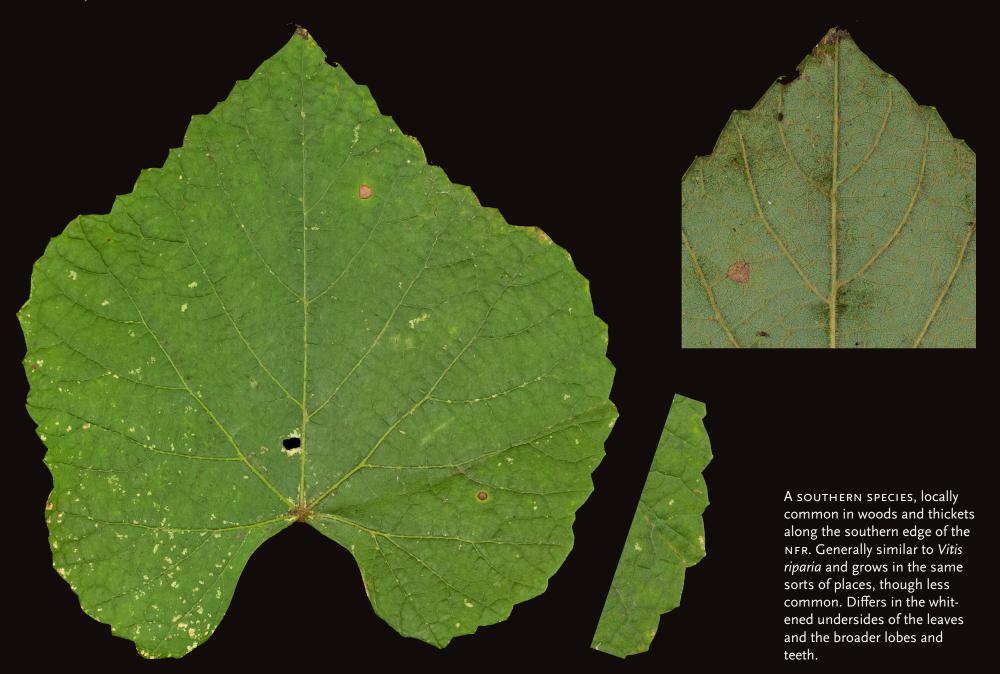
С

VITIS (GRAPE, VITACEAE): Climbing vines with slender tendrils that coil; bark becoming loose and shreddy; leaf scars half-round, only slightly raised; leaves simple, often lobed; flowers unisexual, the petals joined at their tips and falling together.

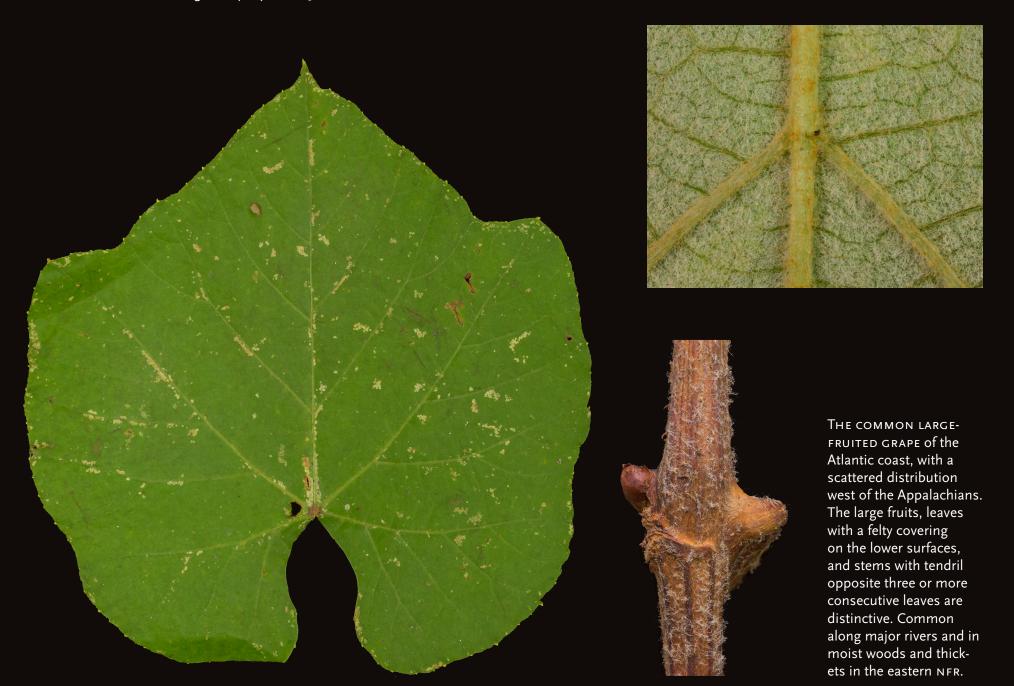


WE HAVE THREE GRAPES in the NFR. Riparia, the river bank grape is common throughout, certainly on riverbanks but also in moist fertile upland woods to about 2000 feet elevation. Aestivalis, summer grape, is a southern species, locally common in woods and thickets in the southeastern NFR, seemingly without strong habitat preferences. Labrusca, fox grape, is principally a species of the Atlantic coastal plain, common in the southern and eastern NFR. It grows in woods and thickets, the usual grape places, and can be abundant along rivers.

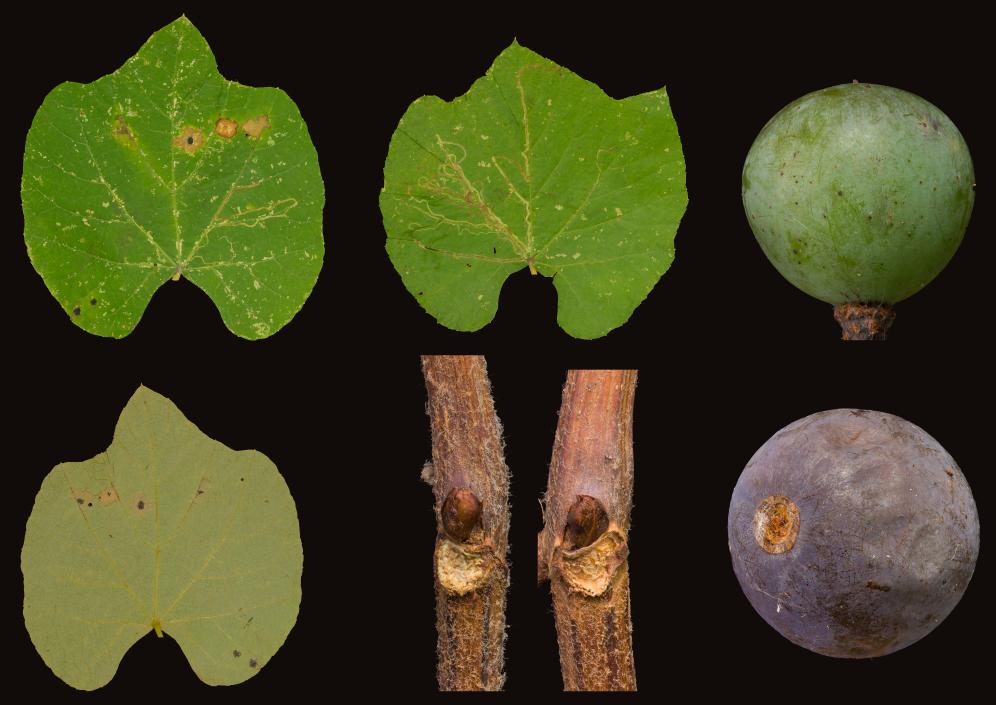
VITIS AESTIVALIS (SUMMER GRAPE, VITACEAE): Leaves whitened beneath, with scattered cobwebby hairs along the veins; sinuses between the lobes shallow and broad, leaf teeth broad, without minute hairs on the margins; stems with the tendrils missing opposite every third leaf; fruits small, under 10 mm.











Leaves with rounded lobes, the lower surface covered with a continuous mat of hairs; fruits large.











