



## Hardwood Swamps

**T**hese swamps are dominated by trees with deciduous leaves. Red maple is a component of all the hardwood swamp types that are currently recognized, but black ash, green ash, yellow birch, silver maple, American elm, and swamp white oak are other common hardwoods that may be abundant or dominant in specific community types. Softwoods, or conifers, may constitute a significant proportion of the canopy in some of these swamps, but as long as hardwood species are dominant, mixed canopy swamps are classified as hardwood swamps. The broad category of hardwood swamps includes primarily forested communities with greater than 60 percent canopy closure, but, woodland (canopy closure of 25 to 60 percent) examples of these communities are also included here.

Hardwood swamps are most common in the lower elevations and the warmer regions of Vermont. Although present, hardwood swamps are much less common in the Northeastern Highlands and in the Northern and Southern Green Mountain biophysical regions. In these regions, most of the swamps are dominated by softwoods.

Hardwood canopies allow significantly more light to filter down to the forest floor than softwood canopies do. The higher light levels in hardwood swamp interiors are responsible for their generally well-developed shrub and herbaceous layers. The tall shrub layers are particularly dense in Red Maple-Black Ash Swamps, Red or Silver Maple-Green Ash Swamps, Calcareous Red Maple-Tamarack Swamps, and Red Maple-Black Gum Swamps. The low shrub layer is very dense in Red Maple-White Pine-Huckleberry Swamps.

The hydrologic regime and the water and soil chemistry are particularly important factors affecting hardwood swamps. The duration and frequency of flooding has a strong influence on which trees dominate. A study by Teskey and Hinkley (1978) showed that green ash, cottonwood, and black willow are very tolerant of flooding, while red maple, silver maple, and swamp white oak are somewhat less tolerant, and yellow birch and white pine are even less tolerant. This sequence of flood tolerance matches well with the dominant and associated tree species found in Vermont's hardwood-dominated wetlands: green ash, cottonwood, and black willow are trees found in several floodplain communities that flood for long periods; silver maple, red maple, and swamp white oak are found in floodplain forests and in Red or Silver Maple-Green Ash Swamps that flood less frequently; yellow birch and white pine are found on hummocks or in several swamp types that experience less flooding.

The development of hummock and hollow microtopography has also been associated with hydrologic regime. It is common to find the largest hummocks and the largest hollows in the wettest swamps. This may be explained by the susceptibility to windthrow of the very shallow rooted trees found in the wettest swamps, thereby creating large wet hollows. The large root mounds formed by windthrow become excellent microhabitat for tree germination and growth.

Soil development is strongly influenced by hydrology. Swamps that are permanently saturated tend to develop deep organic soils over time because the anaerobic conditions slow decomposition. Swamps that are flooded or saturated only seasonally and become drier in the summer have well-aerated soils with rapid organic matter decomposition. These swamps have primarily mineral soils, with only thin surface organic layers.

In hardwood swamps as in other wetland types, water and soil chemistry can greatly affect species composition. Red Maple-Black Gum Swamps typically occur in isolated basins and receive most of their water from surface runoff and have slight water table fluctuations. These acidic swamps are generally poor in dissolved minerals and have low species richness. Calcareous Red Maple-Tamarack Swamps receive calcium-rich groundwater discharge, are rich in species, and have many species that are characteristic of fens. The extensive Red Maple-Northern White Cedar Swamps of the Otter Creek valley have mineral-enriched surface waters, even though they occur in large basins with very deep organic soil deposits. This enrichment may be explained by the annual flooding of Otter Creek, which deposits small amounts of very fine-textured, calcareous alluvium across wide areas of the swamps.

## ▶ HOW TO IDENTIFY

### Hardwood Swamp Natural Communities

Read the short descriptions that follow and choose the community that fits best. Then go to the page indicated and read the full community profile to confirm your decision.

**Red Maple-Black Ash Swamp:** Red maple and/or black ash dominate these swamps. Soils are saturated but typically do not experience long periods of flooding. Occurs throughout the state and has much variability. Go to page 265.

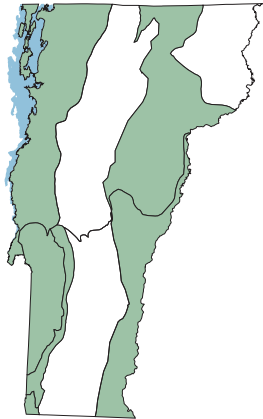
**Red or Silver Maple-Green Ash Swamp:** These swamps of red or silver maple and green ash are found primarily in the Champlain Valley and are associated with the lake or large rivers. They experience extended periods of spring flooding and typically have organic soils. Go to page 269.

**Calcareous Red Maple-Tamarack Swamp:** These rare swamps are found in areas of calcareous bedrock and groundwater seepage is evident at their margins. Red maple, tamarack, black ash, and hemlock may all be present. Shrubs, herbs, and bryophytes are present that reflect the mineral-rich waters, including alder-leaved buckthorn, water avens, and shaggy moss. Go to page 273.

**Red Maple-Black Gum Swamp:** This rare swamp dominated by red maple, black gum, and often hemlock is restricted to the southeastern part of Vermont. Highbush blueberry, cinnamon fern, and sphagnum moss are common. These swamps typically occur in isolated depressions with organic soil accumulations. Go to page 277.

**Red Maple-Northern White Cedar Swamp:** This uncommon swamp type occurs primarily in the Champlain Valley but also in other areas with calcareous bedrock. Northern white cedar is a consistent component of the canopy. Extensive examples of this community type are found along Otter Creek. Go to page 280.

**Red Maple-White Pine-Huckleberry Swamp:** This rare swamp type is only found in the center of large wetland complexes in the Champlain Valley. Dense, low huckleberry shrubs form a nearly complete cover over sphagnum moss. Soils are deep, permanently saturated woody mucks. Flooding is unlikely. Go to page 284.



## DISTRIBUTION/ABUNDANCE

Red Maple-Black Ash Swamps are common throughout Vermont at lower to moderate elevations, except in the Northeastern Highlands. Similar communities are found across the Northeast, with closely related communities occurring in the Midwest.

## ECOLOGY AND PHYSICAL SETTING

Red Maple-Black Ash Swamps are widespread in Vermont and are one of our most common wetland types. This is a broadly defined community type that includes much variability. Ongoing study of this and other forested and woodland swamps dominated by deciduous trees is likely to lead to a refinement in the classification of these important wetland types. Red Maple-Black Ash Swamps are more common at lower elevations and in the warmer regions of the state. In the Northeastern Highlands and the Green Mountains they are largely replaced by softwood swamps. Golet et al. (1993) provide an excellent overview of the ecology of red maple swamps of the glaciated northeast. The description here is based in part on their work.

Red Maple-Black Ash Swamps occur in a wide variety of geologic, topographic, and hydrologic settings. They occur in perched depressions, which receive surface water runoff but are isolated from the regional groundwater table. They also occur in depressions where the groundwater table meets the ground surface causing seasonal inundation or saturation, as well as on slopes where groundwater seeps to the surface and along rivers and streams that are seasonally flooded. The degree of groundwater influence, the concentration of dissolved minerals in the groundwater, and the frequency and duration of flooding therefore vary considerably. These factors all have significant effects on the composition of vegetation growing in particular swamps.

Soils in Red Maple-Black Ash Swamps are as variable as their geologic, topographic, and hydrologic characteristics. Mineral soils predominate in some swamps, especially those with better drainage and the shortest duration of soil inundation or saturation. In other swamps, organic soils fill the basin floor and range in thickness from less than two

# RED MAPLE-BLACK ASH SWAMP

feet to over eleven feet. The organic soils of Red Maple-Black Ash Swamps are primarily well-decomposed mucks. Although many Red Maple-Black Ash Swamps have shallow standing water in the spring, water levels typically drop during the drier summer months. The lower summer groundwater levels result in the surface horizons of the organic soils becoming aerated, a condition that allows decomposition to proceed. In contrast, the fibric peat soils of many peatlands are the result of permanent soil saturation and anaerobic conditions, which greatly limit decomposition activity.

Wind is the primary form of natural disturbance in Red Maple-Black Ash Swamps. The shallow-rooted trees are relatively easily blown over by strong winds, especially when they are growing on saturated organic soils. This disturbance results in canopy gaps and also creates the microtopographic relief of hummocks and hollows that is characteristic of many swamps. Because Red Maple-Black Ash Swamps are frequently associated with streams, beavers are also a common form of natural disturbance.

## VEGETATION

Red Maple-Black Ash Swamps generally have closed canopies dominated by red maple and/or black ash. There are, however, woodland swamps dominated by these two species that have more open canopies (less than 60 percent cover) that are currently included within the broad definition of this community type. Other common canopy associates present in varying amounts are yellow birch, American elm, white pine, and hemlock. American elm was a more prominent component of these swamps prior to its decline from Dutch elm disease.

The tall shrub layer is typically well developed in Red Maple-Black Ash Swamps, with most of the shrubs growing from the tops of hummocks. Common tall shrubs include winterberry holly, mountain-holly, and wild raisin. In warmer regions of the state, highbush blueberry, poison sumac, northern arrowwood, maleberry, and spicebush may be present as well.

The variety of herbaceous plants can be great and is likely related to differences in hydrology, degree of mineral enrichment, and microtopographic relief between and within swamps. Many swamps are dominated by tall ferns, especially cinnamon fern. Other common ferns include royal fern, sensitive fern, marsh fern, and crested wood fern. Graminoids may be very abundant, especially tussock sedge, lakeshore sedge, bluejoint grass, slender mannagrass, and fowl mannagrass. Other common herbaceous plants include false hellebore, spotted touch-me-not, water-horehounds, and in warmer climate regions, skunk cabbage. Like almost all swamps, common northern upland herbs like Canada mayflower, starflower, bunchberry, and bluebead lily occur frequently on the drier hummocks but are absent from hollows. The bryophyte component of Red Maple-Black Ash Swamps needs additional study; however, several common mosses are found in these swamps. Species commonly growing on hummocks include *Sphagnum centrale*, *Sphagnum russowii*, tree moss, and *Hypnum lindbergii*. Species of the moss genera *Calliergon* and *Mnium* are found in moist and wet hollows.

## ANIMALS

Breeding birds of Red Maple-Black Ash Swamps and other hardwood swamps include great-crested flycatcher, brown creeper, veery, red-eyed vireo, northern waterthrush, and red-shouldered hawk. Wood ducks may also breed in these swamps if they are associated with streams and lakes. Some amphibians of hardwood and mixed swamps include blue-spotted salamander, four-toed salamander, and wood frog. Mink and beaver are commonly found in this community. The invertebrates in this and other swamps are poorly understood, but the abundant water in hollows undoubtedly provides habitat for many species.

## VARIANTS

Additional study of hardwood-dominated swamps throughout the state and the region is needed to identify variants or other community types within the broadly

# RED MAPLE-BLACK ASH SWAMP

defined Red Maple-Black Ash Swamp community type. Swamps co-dominated by hemlock, red maple, black ash, and/or yellow birch are currently considered a variant of Hemlock Swamp.

## RELATED COMMUNITIES

### *Red or Silver Maple-Green Ash*

**Swamp:** These swamps are found in the Champlain Valley on mineral and organic soil. They are flooded for longer periods than Red Maple-Black Ash Swamps, and they are dominated by red or silver maple and green ash and commonly include some swamp white oak.

### *Calcareous Red Maple-Tamarack*

**Swamp:** These swamps receive mineral-rich groundwater seepage, occur on organic soils, and have an open canopy dominated by red maple and tamarack. They commonly intergrade with open fens and share many shrub and herbaceous species with these calcium-enriched peatlands.

### *Red Maple-Black Gum*

**Swamp:** These swamps are found only in the southeastern part of the state, typically in small basins with organic soil accumulations. Red maple shares the canopy with black gum and hemlock and there is a dense carpet of sphagnum moss.

## CONSERVATION STATUS AND MANAGEMENT CONSIDERATIONS

Although this is a common natural community in Vermont, there are currently few documented high quality examples with little human disturbance. Most of the known examples have seen significant past logging. In addition, because most of these swamps occur at lower elevations, development has occurred adjacent to many

swamps. There are currently no documented examples located entirely on public or conservation lands, although it is expected that some will be identified by an ongoing statewide inventory of hardwood swamps. Heavy logging in Red Maple-Black Ash Swamps can lead to a shrub-dominated wetland. However, because red maple is a prolific sprouter, these trees can reclaim the canopy over a relatively short time. As in other swamps with organic soil, it is critical that logging with heavy machinery be done when soils are thoroughly frozen in order to minimize compaction and rutting that can lead to hydrologic alterations. Repeated cutting in individual swamps is likely to restrict the development of micro-

topography, which in turn will alter natural species composition of these swamps.

## PLACES TO VISIT

Mud Creek Wildlife Management Area, Alburg, Vermont Department of Fish and Wildlife (VDFW) Alburg Dunes State Park, Alburg, Vermont Department of Forest,

Parks, and Recreation  
Cornwall Swamp Wildlife Management Area at Whiting Swamp, Whiting, VDFW  
Les Newell Wildlife Management Area, Barnard, VDFW

## SELECTED REFERENCES AND FURTHER READING

Golet, F., A. Calhoun, W. DeRagon, D. Lowry, and A. Gold, 1993. Ecology of Red Maple Swamps in the Glaciated Northeast: A Community Profile. U.S. Fish and Wildlife Service Biological Report 12.



*Fall color in a Champlain Valley Red Maple-Black Ash Swamp.*

## CHARACTERISTIC PLANTS

### TREES

#### Abundant Species

- Red maple – *Acer rubrum*  
Black ash – *Fraxinus nigra*

#### Occasional to Locally Abundant Species

- Yellow birch – *Betula alleghaniensis*  
American elm – *Ulmus americana*  
White pine – *Pinus strobus*  
Eastern hemlock – *Tsuga canadensis*

### SHRUBS

#### Occasional to Locally Abundant Species

- Winterberry holly – *Ilex verticillata*  
Mountain-holly – *Nemopanthus mucronatus*  
Wild raisin – *Viburnum nudum* var. *cassinoides*  
Highbush blueberry – *Vaccinium corymbosum*  
Poison sumac – *Toxicodendron vernix*  
Northern arrowwood – *Viburnum dentatum* var. *lucidulum*  
Maleberry – *Lyonia ligustrina*  
Spicebush – *Lindera bezoin*

### INVASIVE EXOTIC PLANTS

- European buckthorn – *Rhamnus frangula*

### HERBS

#### Abundant Species

- Tussock sedge – *Carex stricta*  
Lakeshore sedge – *Carex lacustris*  
Cinnamon fern – *Osmunda cinnamomea*

#### Occasional to Locally Abundant Species

- Royal fern – *Osmunda regalis*  
Sensitive fern – *Onoclea sensibilis*  
Marsh fern – *Thelypteris palustris*  
Crested wood fern – *Dryopteris cristata*  
Drooping sedge – *Carex crinita*  
Bluejoint grass – *Calamagrostis canadensis*  
Slender mannagrass – *Glyceria melicaria*  
Fowl mannagrass – *Glyceria striata*

- False hellebore – *Veratrum viride*  
Spotted touch-me-not – *Impatiens capensis*  
Northern bugleweed – *Lycopus uniflorus*  
American water horehound – *Lycopus americanus*  
Marsh marigold – *Caltha palustris*  
Swamp saxifrage – *Saxifraga pensylvanica*  
Skunk cabbage – *Symplocarpus foetidus*  
Bunchberry – *Cornus canadensis*  
Canada mayflower – *Maianthemum canadensis*  
Starflower – *Trientalis borealis*  
Bluebead lily – *Clintonia borealis*

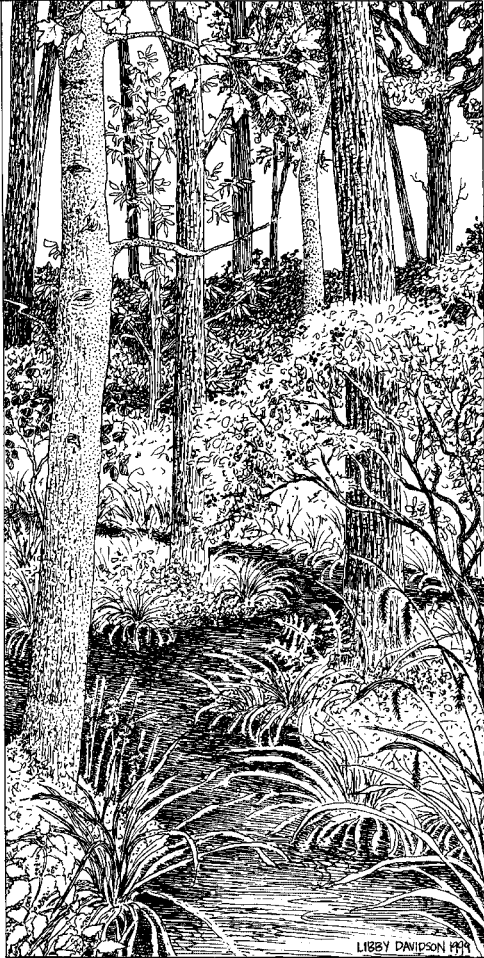
### BRYOPHYTES

#### Occasional to Locally Abundant Species

- Moss – *Sphagnum centrale*  
Moss – *Sphagnum russowii*  
Tree moss – *Climacium dendroides*  
Moss – *Hypnum lindbergii*  
Moss – *Calliergon cordifolium*  
Moss – *Calliergon giganteum*  
Moss – *Mnium cuspidatum*

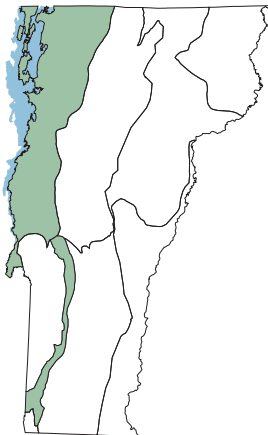
### RARE AND UNCOMMON PLANTS

- Yellow water-crowfoot – *Ranunculus flabellaris*  
Yellow bartonia – *Bartonia virginica*  
Short-awn foxtail – *Alopecurus aequalis*  
Cyperus-like sedge – *Carex pseudocyperus*  
Green adder's mouth – *Malaxis unifolia*  
White adder's mouth – *Malaxis monophyllos*  
Nodding trillium – *Trillium cernuum*  
Black gum – *Nyssa sylvatica*  
Massachusetts fern – *Thelypteris simulata*



## DISTRIBUTION AND ABUNDANCE

Red or Silver Maple-Green Ash Swamps are known primarily from the Champlain Valley, with similar communities described from New York. Closely related communities occur in the southern part of New England.



## ECOLOGY AND PHYSICAL SETTING

Red or Silver Maple-Green Ash Swamps share characteristics with both Red Maple-Black Ash Swamps and Lakeside Floodplain Forests and may be viewed as transitional between these two types. Most Red or Silver Maple-Green Ash Swamps are found in the Champlain Valley, where they occur primarily adjacent to Lake Champlain but also in the floodplains of rivers like Otter Creek and in isolated depressions. The common hydrologic characteristics of these varied physical settings are a long period of spring flooding and saturated soils during the remainder of the growing season. The soils of Red or Silver Maple-Green Ash Swamps are typically well-decomposed organic deposits of substantial depth, but shallow organic and mineral soils are present in some swamps. The ground surface in some of these swamps has distinct hummocks and water-filled hollows but in others the surface is relatively flat.

Red or Silver Maple-Green Ash Swamps adjacent to Lake Champlain are typically located in former bays of the lake that are filled with organic soil deposits and are now separated from the lake by sand or shale berms. In these settings, deepwater marshes commonly occur lakeward of the forested swamp and may include scattered young trees. These pioneering young trees, as well as the larger, well-established trees on the lakeward side of the swamp may be killed by especially long duration spring or early summer flooding. It is common to see dead trees at the lower, lakeward limits of these swamps. Lakeside Floodplain Forests are commonly present on the slightly higher elevations and mineral soils landward of the swamps.

Along Otter Creek, Red or Silver Maple-Green Ash Swamps occur on deep organic soils that are within the active floodplain of the river. These swamps are adjacent to riverine floodplain forests, which occur on the alluvial soils of the

# RED OR SILVER MAPLE-GREEN ASH SWAMP

river levees. Farther away from the river and at elevations that are flooded for shorter periods, the Red or Silver Maple-Green Ash Swamps may grade into Red Maple-Black Ash or Red Maple-Northern White Cedar Swamps. Finally, Red or Silver Maple-Green Ash Swamps also occur in isolated depressions in areas with fine-textured mineral soil substrates that drain slowly. In such basins, spring runoff accumulates and standing water may be present for significant periods of the spring, creating a flooding regime similar to that found in swamps adjacent to Lake Champlain or Otter Creek. These basins may have organic or mineral soils, depending on the duration of soil saturation.

## VEGETATION

The forest structure of Red or Silver Maple-Green Ash Swamps can resemble that of floodplain forests, especially when silver maple is the dominant tree and forms a high canopy of spreading crowns.

In other cases, the canopy may be dominated by red maple and/or the hybrid between the two soft maples. Green ash is an important component of the canopy in all sites and may dominate in some. Other trees include cottonwood, swamp white oak, yellow birch, slippery elm, American elm, and, occasionally, black ash.

The shrub layer is typically well developed. Along with seedlings and saplings of the overstory tree species, shrubs include winterberry holly, American black currant, silky dogwood, red-osier dogwood, poison sumac, highbush blueberry, and nannyberry. The herb layer is diverse and varies with the amount of microtopographic relief. The most common herbs are sensitive fern, drooping sedge, Tuckerman's sedge, and hop sedge.

Bryophytes are abundant and may form nearly continuous cover on hummocks, with sphagnum moss especially abundant. Additional work is needed to describe the bryophyte component of this community and to contrast it with that of other hardwood swamps.

## ANIMALS

Breeding birds of Red or Silver Maple-Green Ash Swamps and other hardwood swamps include great-crested flycatcher, brown creeper, veery, red-eyed vireo, northern waterthrush, and red-shouldered hawk. Wood ducks may also breed in swamps that are associated with streams and lakes. Some amphibians of hardwood and mixed swamps include blue-spotted salamander, four-toed salamander, and wood frog.



*The bright red fruits of winterberry holly remain on the shrub through the winter.*



## VARIANTS

None recognized at this time.

## RELATED COMMUNITIES

**Red Maple-Black Ash Swamp:** This community is dominated by red maple and black ash, and typically lacks the silver maple and green ash found in Red or Silver Maple-Green Ash Swamps. The duration of spring flooding is typically shorter in Red Maple-Black Ash Swamps.

**Lakeside Floodplain Forest:** This community typically occurs at a slightly higher elevation than the closely associated Red or Silver Maple-Green Ash Swamp. Lakeside Floodplain Forests have mineral soils because the soils are not saturated throughout the growing season.

## CONSERVATION STATUS AND MANAGEMENT CONSIDERATIONS

Most known examples of this rare community type are associated with Lake Champlain, with a few examples along Otter Creek. The natural fluctuations of these water bodies cause flooding regimes that are critical for maintaining the species composition and ecological characteristics of these swamps. In order to maintain natural hydrologic regimes, it is critical that beach berms along the lake and levees along the river be maintained or restored to their natural condition. Additional study of this community type is needed.

## PLACES TO VISIT

Mud Creek Wildlife Management Area,  
Alburt, Vermont Department of Fish and  
Wildlife (VDFW)  
Alburt Dunes State Park, Alburt, Vermont  
Department of Forest, Parks, and  
Recreation (VDFPR)  
North Hero State Park, North Hero, VDFPR  
Cornwall Swamp Wildlife Management  
Area at Whiting Swamp, Whiting, VDFW

## SELECTED REFERENCES AND FURTHER READING

- Thompson, E., 1994. Ecologically significant wetlands of Grand Isle County. Vermont Nongame and Natural Heritage Program.
- Golet, F., A. Calhoun, W. DeRagon, D. Lowry, and A. Gold. 1993. Ecology of Red Maple Swamps in the Glaciated Northeast: A Community Profile. U.S. Fish and Wildlife Service Biological Report 12.

## CHARACTERISTIC PLANTS

### TREES

#### Abundant Species

Red maple – *Acer rubrum*  
 Silver maple – *Acer saccharinum*  
 Green ash – *Fraxinus pennsylvanica*

#### Occasional to Locally Abundant Species

Cottonwood – *Populus deltoides*  
 Yellow birch – *Betula alleghaniensis*  
 Slippery elm – *Ulmus rubra*  
 American elm – *Ulmus americana*  
 Swamp white oak – *Quercus bicolor*  
 Black ash – *Fraxinus nigra*  
 Eastern hemlock – *Tsuga canadensis*  
 Bur Oak – *Quercus macrocarpa*

### SHRUBS AND VINES

#### Abundant Species

Winterberry holly – *Ilex verticillata*

#### Occasional to Locally Abundant Species

American black currant – *Ribes americanum*  
 Silky dogwood – *Cornus amomum*  
 Red-osier dogwood – *Cornus sericea*  
 Poison sumac – *Toxicodendron vernix*  
 Highbush blueberry – *Vaccinium corymbosum*  
 Nannyberry – *Viburnum lentago*  
 Riverbank grape – *Vitis riparia*  
 Common elderberry – *Sambucus canadensis*  
 Canada yew – *Taxus canadensis*

### HERBS

#### Abundant Species

Sensitive fern – *Onoclea sensibilis*  
 Drooping sedge – *Carex crinita*

#### Occasional to Locally Abundant Species

Spotted touch-me-not – *Impatiens capensis*  
 Retrorse sedge – *Carex retrorsa*  
 Hop sedge – *Carex lupulina*  
 Tuckerman's sedge – *Carex tuckermanii*  
 False nettle – *Boehmeria cylindrica*  
 Common nightshade – *Solanum dulcamara*  
 Tall meadow rue – *Thalictrum pubescens*  
 Marsh fern – *Thelypteris palustris*  
 Cinnamon fern – *Osmunda cinnamomea*  
 Bluejoint grass – *Calamagrostis canadensis*  
 Tufted loosestrife – *Lysimachia thyrsoiflora*  
 Frondose beggar's ticks – *Bidens frondosa*  
 Nodding bur marigold – *Bidens cernua*  
 American water horehound – *Lycopus americanus*  
 Northern bugleweed – *Lycopus uniflorus*

### INVASIVE EXOTIC PLANTS

European buckthorn – *Rhamnus frangula*

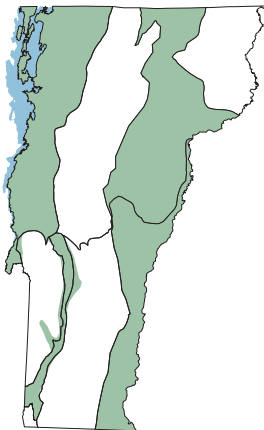
### RARE AND UNCOMMON PLANTS

Yellow water-crowfoot – *Ranunculus flabellaris*  
 Nodding trillium – *Trillium cernuum*  
 Gray's sedge – *Carex grayi*  
 False hop sedge – *Carex lupuliformis*  
 Cyperus-like sedge – *Carex pseudocyperus*  
 Loesel's twayblade – *Liparis loeselii*  
 Stout woodreed – *Cinna arundinacea*  
 Drooping bulrush – *Scirpus pendulus*



## DISTRIBUTION AND ABUNDANCE

Calcareous seepage swamps of this type are rare in Vermont. Closely related communities are found throughout southern New England, New York, and south to Pennsylvania and New Jersey.



## ECOLOGY AND PHYSICAL SETTING

Calcareous Red Maple-Tamarack Swamps are a rare forested wetland type associated with calcium-rich groundwater seepage. This community occurs along the margins of stream valleys and in poorly drained depressions, often at stream headwaters. In both settings, groundwater seepage is common. The organic soils vary from peat to muck and are permanently saturated, leading to substantial accumulations. Some of these swamps have relatively flat surfaces, while others have more developed hummocks and hollows.

This community is found only in warmer regions of the state with carbonate-rich bedrock such as limestone, dolomite, and marble. Although carbonate-rich bedrock occurs in the cooler regions of the state as well, most of the seepage swamps in these areas are Northern White Cedar Swamps.

When they occur in headwater basins, Calcareous Red Maple-Tamarack Swamps may be the only community present. In streamside valley settings, examples of this community type are often part of larger wetland complexes and are commonly associated with fens, sometimes intergrading with these open peatlands. Calcareous Red Maple-Tamarack Swamps may also grade into Northern White Cedar Swamps in areas of the state where both communities occur. The successional patterns of this community are poorly understood. Tamarack is very shade intolerant and would therefore not be expected to persist in closed canopy swamps unless there are regular disturbances that create canopy gaps.

## VEGETATION

Red maple and tamarack are the dominant trees in most examples of this community and form a canopy that varies from open to nearly closed. Currently, both woodland (25 to 60 percent cover) and forested (60 to 100 percent cover) expressions are included under the Calcareous Red Maple-Tamarack Swamp type. This variation in canopy closure can be expressed within individual swamps as patchy openings with fen-like characteristics, or as a more gradual transition from closed canopy to open peatland. Other trees that may be present in the canopy include black ash, yellow birch, red spruce, hemlock, and white pine. Characteristic shrubs that reflect the calcium-rich groundwater include alder-leaved buckthorn, shrubby cinquefoil, hoary willow, red-osier dogwood, and poison sumac. Other shrubs that can be present in varying amounts include highbush blueberry, mountain-holly, winterberry holly, black chokeberry, and maleberry. Regeneration of the tree species can also account for considerable low woody cover.

The herbaceous layer is typically rich in species, a feature common to many calcareous wetland types. Characteristic species that are indicative of these calcium-rich conditions include water avens, rough-leaved goldenrod, swamp saxifrage, blue flag, bog-candles, tall meadow rue, inland sedge, delicate-stemmed sedge, and lakeshore sedge. Ferns may be abundant or dominant, among them cinnamon fern, sensitive fern, marsh fern, and crested wood fern. Bryophyte cover may be as high as 75 percent, including several species that are characteristic of fens, especially *Calliergonella cuspidata*, *Sphagnum warnstorffii*, and the rare *Meesia triquetra*. Shaggy moss, a characteristic species of cedar swamps, is also present in this community. Several species of sphagnum moss may dominate low hummocks. *Calliergon giganteum* has been observed on the margin of pools in several swamps.

## ANIMALS

Additional study is needed to determine if there are animals that rely specifically on Calcareous Red Maple-Tamarack Swamps as necessary habitat. There is some indication that the rare bog turtle may use the mossy hummocks in swamps of this type for its nests. Some amphibians of hardwood and mixed swamps include blue-spotted salamander, four-toed salamander, and wood frog. Breeding birds of hardwood swamps include great-crested flycatcher, brown creeper, veery, red-eyed vireo, northern waterthrush, and red-shouldered hawk. Wood ducks may also breed in examples of these swamps that are associated with streams and lakes.

## VARIANTS

None recognized at this time.

## RELATED COMMUNITIES

**Red Maple-Black Ash Swamp:** This community is generally more acid and lacks the species indicative of calcium-rich groundwater seepage that are found in Calcareous Red Maple-Tamarack Swamps.

**Intermediate and Rich Fens:** These open peatland communities have less than 25 percent tree cover, receive calcium-rich groundwater seepage, and are dominated by sedges and brown mosses.

## CONSERVATION STATUS AND MANAGEMENT CONSIDERATIONS

Ongoing study of Calcareous Red Maple-Tamarack Swamps will provide better description of the ecological variation and the plant and animal components of this community type. As with fens and other wetland communities that are closely associated with calcareous groundwater seepage, protection of individual Calcareous Red Maple-Tamarack Swamps will require study of regional groundwater hydrology. In order to maintain the quality and quantity

of water supplies reaching these wetlands, it will be necessary to conserve lands both in the immediate surface watershed and in the area of groundwater recharge and flow. Development that involves construction of significant areas of impervious surface or repeated heavy logging in the watershed could have negative effects on this rare community type.

## PLACES TO VISIT

Les Newell Wildlife Management Area,  
Barnard, Vermont Department of Fish  
and Wildlife (VDFW)  
Otter Creek Wildlife Management Area,  
Mount Tabor, VDFW

## SELECTED REFERENCES AND FURTHER READING

Golet, F., A. Calhoun, W. DeRagon,  
D. Lowry, and A. Gold. 1993. Ecology  
of Red Maple Swamps in the Glaciated  
Northeast: A Community Profile.  
U.S. Fish and Wildlife Service Biological  
Report 12.

Alder-leaved buckthorn – *Rhamnus alnifolia*



## CHARACTERISTIC PLANTS

### TREES

#### Abundant Species

- Red maple – *Acer rubrum*  
Tamarack – *Larix laricina*

#### Occasional to Locally Abundant Species

- Black ash – *Fraxinus nigra*  
Yellow birch – *Betula alleghaniensis*  
Red spruce – *Picea rubens*  
Eastern hemlock – *Tsuga canadensis*  
White pine – *Pinus strobus*

### SHRUBS

#### Occasional to Locally Abundant Species

- Alder-leaved buckthorn – *Rhamnus alnifolia*  
Shrubby cinquefoil – *Potentilla fruticosa*  
Hoary willow – *Salix candida*  
Red-osier dogwood – *Cornus sericea*  
Poison sumac – *Toxicodendron vernix*  
Highbush blueberry – *Vaccinium corymbosum*  
Mountain-holly – *Nemopanthus mucronatus*  
Winterberry holly – *Ilex verticillata*  
Maleberry – *Lyonia ligustrina*  
Black chokeberry – *Aronia melanocarpa*

### HERBS

#### Abundant Species

- Cinnamon fern – *Osmunda cinnamomea*  
Sensitive fern – *Onoclea sensibilis*

#### Occasional to Locally Abundant Species

- Water avens – *Geum rivale*  
Yellow sedge – *Carex flava*  
Rough-leaved goldenrod – *Solidago patula*  
Swamp saxifrage – *Saxifraga pensylvanica*  
Blue flag – *Iris versicolor*  
Bog-candles – *Habenaria dilatata*  
Tall meadow rue – *Thalictrum pubescens*  
Inland sedge – *Carex interior*  
Delicate-stemmed sedge – *Carex leptalea*  
Lakeshore sedge – *Carex lacustris*  
Marsh fern – *Thelypteris palustris*  
Crested wood fern – *Dryopteris cristata*  
Marsh marigold – *Caltha palustris*

### BRYOPHYTES

#### Abundant Species

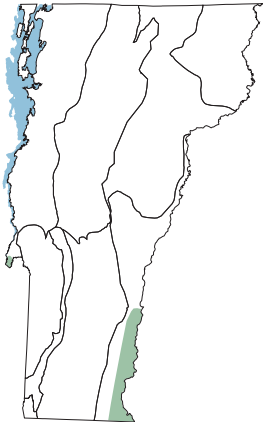
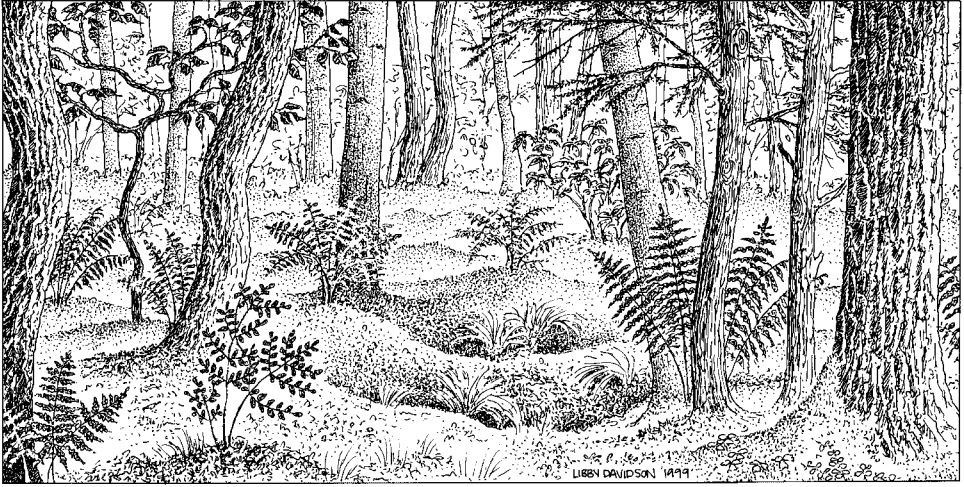
- Moss – *Sphagnum centrale*

#### Occasional to Locally Abundant Species

- Moss – *Calliergonella cuspidata*  
Moss – *Sphagnum warnstorffii*  
Shaggy moss – *Rhytidiadelphus triquetrus*  
Moss – *Sphagnum palustre*  
Moss – *Sphagnum angustifolium*  
Moss – *Sphagnum teres*  
Moss – *Calliergon giganteum*

### RARE AND UNCOMMON PLANTS

- Showy lady's slipper – *Cypripedium reginae*  
Pink pyrola – *Pyrola asarifolia*  
Rough-leaved goldenrod – *Solidago patula*  
Green adder's mouth – *Malaxis unifolia*  
Moss – *Meesia triquetra*



## DISTRIBUTION/ABUNDANCE

Red Maple-Black Gum Swamps occur throughout southern New England and New York, with closely related communities found as far south as Virginia. They occur in the southeastern and western portions of Vermont.

## ECOLOGY AND PHYSICAL SETTING

These intriguing wetlands, often simply called Black Gum Swamps, are more common to our south and are found only in the warmer climate areas of Vermont. They occur within small watersheds in small but sometimes deep basins lacking inlet streams. Outlet streams from these basins may flow seasonally. Red Maple-Black Gum Swamp typically occupies the entire basin, which is surrounded by upland forests. The water table in these wetland basins appears to be relatively stable, and the deep organic soils are saturated throughout the growing season. Surface and near-surface waters in these swamps are very acidic. The underlying substrate is typically bedrock. Hummocks and hollows are well developed, with the wettest hollows often containing shallow standing water.

Black gum is a rare tree in Vermont, with a southern distribution extending from southern Maine to southern Michigan and south to Florida and eastern Texas. In Vermont, black gum occurs in Red Maple-Black Gum Swamps in the southeastern and western parts of the state and is rarely associated with wet shorelines in the Champlain Valley. Black gum is a very long-lived tree, reaching ages older than most deciduous trees.

## VEGETATION

Mature black gum trees emerging from the damp, mossy floor of these deep basin swamps is an amazing sight. The old trees may be two to three feet in diameter and have bark that is thick and deeply fissured into large rectangular blocks. The branching of these beautiful trees is also unique. The larger branches of the tree droop and become very crooked with many short twigs at their ends.

# RED MAPLE-BLACK GUM SWAMP

Red Maple-Black Gum Swamps have a fairly open canopy dominated by red maple and black gum. In some swamps, especially tall black gum trees extend above the canopy. Hemlock is a common canopy associate that can be abundant in some areas. Other trees that may be present include yellow birch, white pine, and red spruce. Downed and standing dead trees in various stages of decay are common. Dead and weakly rooted trees may remain standing longer in these swamps than in some other swamp types due to the wind-sheltered nature of their isolated basins.

The tall shrub layer is well developed and typically dominated by highbush blueberry and winterberry holly. Mountain-holly and mountain laurel, as well as saplings of the overstory trees are also common. The understory is heavily shaded, and ferns thrive in the low-light conditions. Cinnamon fern is frequently dominant on the mossy hummocks, with lesser amounts of royal fern and marsh fern. The rare Massachusetts fern and Virginia chain fern are also associated with this community in Vermont. Growing under the ferns is a sparse cover of low herbs, including three-seeded sedge, goldthread, partridgeberry, Canada mannagrass, and sarsaparilla.

Bryophyte cover may be as high as 95 percent in areas with moist hollows, but is somewhat lower in areas where the hollows have permanent standing water. The tall hummocks are dominated by several species of sphagnum moss, especially *Sphagnum palustre*, *Sphagnum magellanicum*, and *Sphagnum subtile*.

Lower hummocks may be covered by *Sphagnum girgensohnii*, and moist hollow species include *Sphagnum angustifolium*, *Sphagnum fimbriatum*, and *Sphagnum squarrosum*. The leafy liverwort *Bazzania trilobata* is common on tall hummocks and well-rotted stumps.

## ANIMALS

Little is known about the specific animal inhabitants of Red Maple-Black Gum Swamps. In general, hardwood swamps can be important breeding habitat for great-crested flycatcher, brown creeper, veery, and red-eyed vireo. Some amphibians of hardwood and mixed swamps include blue-spotted salamander, four-toed salamander, and wood frog.

## VARIANTS

None recognized at this time.

## RELATED COMMUNITIES

**Red Maple-Black Ash Swamp:** This broadly defined swamp type usually has black ash as a significant component of the canopy. Examples of this community that occur

in isolated basins with acidic, organic soils may be quite similar to Red Maple-Black Gum Swamps.

**Hemlock Swamp:** This community and especially its Hemlock-Hardwood variant have many similarities to Red Maple-Black Gum Swamp. Hemlock is dominant in this community, along with a variable amount of deciduous trees. Sphagnum moss cover is high, and there are well-developed hummocks and hollows with standing water.



The deeply fissured bark of a mature black gum.



## CONSERVATION STATUS AND MANAGEMENT CONSIDERATIONS

This is an extremely rare natural community in the state because black gum reaches the northern limit of its range in Vermont. Red Maple-Black Gum Swamps are known only from the southeastern and western portions of the state where the climate is warm. In order to assure protection of the few examples in Vermont, it may be necessary to conserve the entire watershed in which each swamp is located. Development and heavy logging within the watershed of a Red Maple-Black Gum Swamp would alter the quantity and quality of surface water runoff, which could have significant effects on the integrity of the swamps. Several fine examples of this community have been conserved in the J. Maynard Miller Town Forest in Vernon. One example is also protected at The Nature Conservancy's Helen W. Buckner Memorial Preserve at Bald Mountain in West Haven.

## PLACES TO VISIT

J. Maynard Miller Town Forest, Vernon  
Skitchewaugh Wildlife Management Area,  
Springfield, Vermont Department of Fish  
and Wildlife

Helen W. Buckner Memorial Preserve at  
Bald Mountain, West Haven, The Nature  
Conservancy

## SELECTED REFERENCES AND FURTHER READING

Golet, F., A. Calhoun, W. DeRagon, D. Lowry, and A. Gold. 1993. Ecology of Red Maple Swamps in the Glaciated Northeast: A Community Profile. U.S. Fish and Wildlife Service Biological Report 12.

## CHARACTERISTIC PLANTS

### TREES

#### Abundant Species

Red maple – *Acer rubrum*  
Black gum – *Nyssa sylvatica*

#### Occasional to Locally Abundant Species

Eastern hemlock – *Tsuga canadensis*  
Yellow birch – *Betula alleghaniensis*  
White pine – *Pinus strobus*  
Red spruce – *Picea rubens*

### SHRUBS

#### Abundant Species

Highbush blueberry – *Vaccinium corymbosum*  
Winterberry holly – *Ilex verticillata*

#### Occasional to Locally Abundant Species

Mountain-holly – *Nemopanthus mucronatus*  
Mountain laurel – *Kalmia latifolia*  
Buttonbush – *Cephalanthus occidentalis*

### HERBS

#### Abundant Species

Cinnamon fern – *Osmunda cinnamomea*

#### Occasional to Locally Abundant Species

Royal fern – *Osmunda regalis*  
Marsh fern – *Thelypteris palustris*  
Three-seeded sedge – *Carex trisperma*  
Goldthread – *Coptis trifolia*  
Partridgeberry – *Mitchella repens*  
Canada mannagrass – *Glyceria canadensis*  
Sarsaparilla – *Aralia nudicaulis*  
Massachusetts fern – *Thelypteris simulata*  
Virginia chain fern – *Woodwardia virginica*

### BRYOPHYTES

#### Abundant Species

Moss – *Sphagnum palustre*  
Moss – *Sphagnum magellanicum*

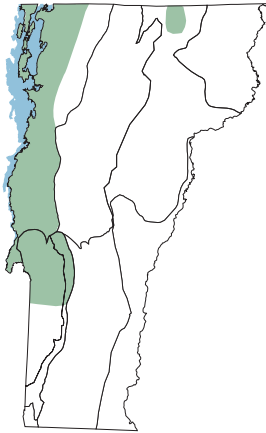
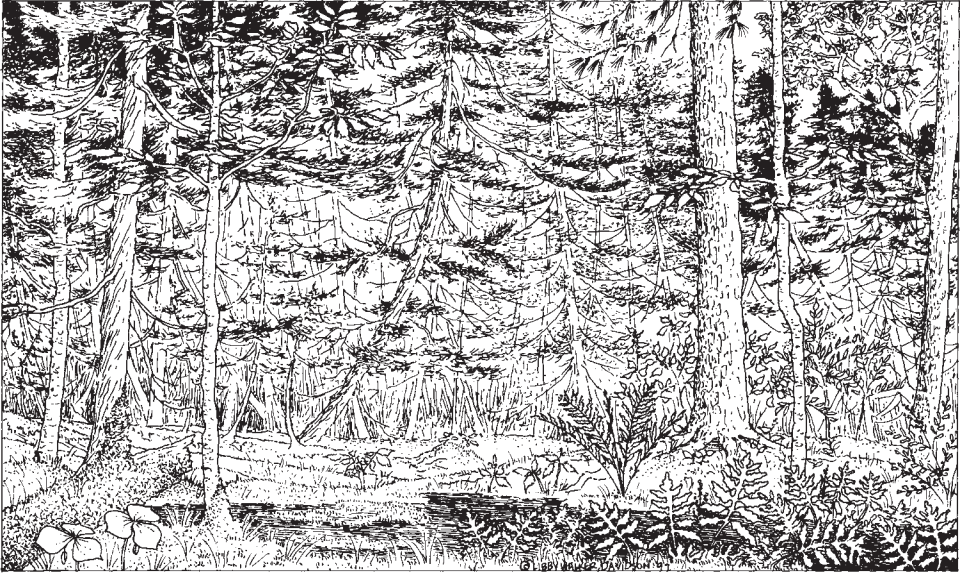
#### Occasional to Locally Abundant Species

Moss – *Sphagnum subtile*  
Moss – *Sphagnum girgensobnii*  
Moss – *Sphagnum angustifolium*  
Moss – *Sphagnum fimbriatum*  
Moss – *Sphagnum squarrosum*  
Liverwort – *Bazzania trilobata*  
Moss – *Amblystegium riparium*  
Moss – *Hypnum imponens*

### RARE AND UNCOMMON PLANTS

Massachusetts fern – *Thelypteris simulata*  
Virginia chain fern – *Woodwardia virginica*  
Yellow bartonia – *Bartonia virginica*  
Black gum – *Nyssa sylvatica*

# RED MAPLE-NORTHERN WHITE CEDAR SWAMP



## DISTRIBUTION/ABUNDANCE

Swamp communities of northern white cedar and hardwoods occur from northern Michigan to Maine and south to Connecticut, but their similarity to the extensive swamps in Vermont is not well known. Red Maple-Northern White Cedar Swamps occur primarily in the lowlands of western Vermont, although several examples have been identified in the northeastern portion of the state.

## ECOLOGY AND PHYSICAL SETTING

Red Maple-Northern White Cedar Swamps are one Vermont's wetland treasures. Nowhere else do the quality and size of this natural community type compare with the examples found in Cornwall Swamp, Salisbury Swamp, and the other swamp complexes of the Otter Creek floodplain. Red Maple-Northern White Cedar Swamp occupies about 1,700 acres of Cornwall Swamp alone.

Red Maple-Northern White Cedar Swamps generally occur in areas of calcareous bedrock, a condition greatly affecting the distribution of northern white cedar at the southern portion of its range in Vermont. Red Maple-Northern White Cedar Swamps are primarily associated with the floodplains of larger rivers in the Champlain Valley, although examples also occur adjacent to Lake Champlain and the Lower Black and Barton Rivers, as well as in isolated basin wetlands. This natural community often occurs as part of a larger wetland complex and may grade into typical Northern White Cedar Swamp, Red Maple-Black Ash Swamp, or Red or Silver Maple-Green Ash Swamp.

Northern white cedar is not well adapted to extended periods of flooding and generally occurs near the limits of flooding or in portions of swamp complexes that are flooded for shorter periods. Seasonal flooding may play a role in mineral enrichment of the large Red Maple-Northern White Cedar Swamps of river floodplains by depositing fine-textured alluvium rich in calcium. Groundwater discharge may also be responsible for providing mineral-rich water to these wetlands.

# RED MAPLE-NORTHERN WHITE CEDAR SWAMP

The organic soils of Red Maple-Northern White Cedar Swamps are permanently saturated, well decomposed mucks with depths from five to over 16 feet. The shallow-rooted trees are susceptible to windthrow, which creates small canopy openings and formation of micro-topography. The resulting hummocks and hollows are well developed, with hollows often large and water filled, and hummocks equally large and supporting most of the woody plant growth.

## VEGETATION

The Red Maple-Northern White Cedar Swamp is characterized by a tall, emergent tree layer of red maple and occasional white pine that extends above a shorter and more closed canopy dominated by northern white cedar, black ash, and red maple. Other tree species that vary in their abundance from swamp to swamp include yellow birch, paper birch, balsam fir, swamp white oak, red and black spruce, and tamarack. American elm is an occasional species and was likely much more common before Dutch elm disease became prevalent.

The tall and short shrub layers are both generally sparse. Sapling regeneration of cedar, red maple, and black ash can be common. Poison sumac is highly characteristic of Red Maple-Northern White Cedar Swamps, as is the rare swamp fly honeysuckle in the Champlain Valley. The most frequently occurring shrubs are winterberry holly, dwarf raspberry, speckled alder, and alder-leaved buckthorn.

Herbaceous plant cover is also generally sparse because of the dense forest canopy and the abundance of water-filled hollows. Ferns are a common component of the herbaceous layer, especially in the drier hollows. Typical species include royal fern, sensitive fern, cinnamon fern, and marsh fern. Other common herbs include Canada mayflower, northern bugleweed, fowl mannagrass, sarsaparilla, starflower, naked miterwort, peduncled sedge, goldthread, and bunchberry. The rare nodding trillium is characteristic of this community, although it is never abundant.

Bryophytes carpet large areas of the hummocks, but the hollows generally contain too much standing water to support bryophyte growth. The most abundant species on the hummocks are common fern moss, shaggy moss, and stair-step moss. Tree moss is also abundant and is characteristic of this community. This moss occurs much less frequently in the closely related Northern White Cedar Swamps. On the edges of wet hollows, the mosses *Calliergon cordifolium*, *Calliergon giganteum*, and *Mnium punctatum* are common.

## ANIMALS

There are several species of birds that are known to use Red Maple-Northern White Cedar Swamps during the spring breeding season, including northern waterthrush, great-crested flycatcher, winter wren, veery, hermit thrush, white-throated sparrow, black-capped chickadee, common yellowthroat, Canada warbler, black and white warbler, eastern wood-pewee, and brown creeper. Examples of these swamps that are flooded in the spring, such as the extensive swamps of the Otter Creek floodplain, provide important staging areas for many species of migrating waterfowl. Red Maple-Northern White Cedar Swamps provide important winter cover and food source for white-tailed deer. Deer mice, masked shrew, and short-tailed shrew have all been shown to use Red Maple-Northern White Cedar Swamps in Vermont. Red Maple-Northern White Cedar Swamps also provide habitat for several amphibians, including blue-spotted salamander, four-toed salamander, eastern newt, wood frog, and northern leopard frog. The adjacent uplands are also an important part of these amphibians' habitat.

## VARIANTS

None recognized at this time.

## RELATED COMMUNITIES

**Northern White Cedar Swamp:** These swamps have a closed canopy dominated by northern white cedar with few or no hardwood species present. Northern White Cedar Swamps are closely associated with calcium-rich groundwater.

## CONSERVATION STATUS AND MANAGEMENT CONSIDERATIONS

Most Red Maple-Northern White Cedar Swamps in Vermont occur in the Champlain Valley. This region of the state has been highly developed for agricultural use, and, consequently, most Red Maple-Northern White Cedar Swamps have narrow upland forest buffers, if any. Runoff from agricultural land may carry large amounts of nutrients from fertilizers that can alter the species composition of the wetlands.

Logging has been a historical and sustainable use of many Red Maple-Northern White Cedar Swamps in the Champlain Valley, both for cedar posts and for firewood. However, sustained heavy logging can alter surface water hydrology and stop the formation of hummocks and hollows associated with blowdowns of individual trees. Alterations to the flooding regimes of these swamps could dramatically alter the composition of species. The effect on the large Otter Creek swamps from dams on this river is unknown. There are currently no examples of Red Maple-Northern White Cedar Swamps that are wholly included on public or private



*Red Maple-Northern White Cedar Swamp and Red or Silver Maple-Green Ash Swamp along the flooding Leicester River in Salisbury.*

conservation lands, though large areas of Cornwall Swamp are owned by Vermont Department of Fish and Wildlife and The Nature Conservancy.

## PLACES TO VISIT

Cornwall Swamp Wildlife Management Area, Cornwall, Vermont Department of Fish and Wildlife (VDFW)  
Leicester Junction and Brandon Swamps, Brandon Swamp Wildlife Management Area, Brandon, VDFW  
Tinmouth Channel Wildlife Management Area, Tinmouth, VDFW  
South Alburg Swamp, Alburg Dunes State Park, Vermont Department of Forests, Parks, and Recreation  
South Bay Wildlife Management Area, Coventry, VDFW

## SELECTED REFERENCES AND FURTHER READING

Sorenson, E., B. Engstrom, M. Lapin, R. Popp, and S. Parren. 1998. Northern white cedar swamps and red maple-northern white cedar swamps of Vermont.

Vermont Nongame and Natural Heritage Program.  
Golet, F., A. Calhoun, W. DeRagon, D. Lowry, and A. Gold. 1993. Ecology of Red Maple Swamps in the Glaciated Northeast: A Community Profile. U.S. Fish and Wildlife Service Biological Report 12.

## CHARACTERISTIC PLANTS

### TREES

#### Abundant Species

- Red maple – *Acer rubrum*  
 Northern white cedar – *Thuja occidentalis*  
 Black ash – *Fraxinus nigra*

#### Occasional to Locally Abundant Species

- Yellow birch – *Betula alleghaniensis*  
 White pine – *Pinus strobus*  
 Paper birch – *Betula papyrifera*  
 Balsam fir – *Abies balsamea*  
 Swamp white oak – *Quercus bicolor*  
 Red spruce – *Picea rubens*  
 Black spruce – *Picea mariana*  
 Tamarack – *Larix laricina*  
 American elm – *Ulmus americana*

### SHRUBS AND VINES

#### Abundant Species

- Winterberry holly – *Ilex verticillata*  
 Dwarf raspberry – *Rubus pubescens*  
 Speckled alder – *Alnus incana*  
 Alder-leaved buckthorn – *Rhamnus alnifolia*  
 Poison sumac – *Toxicodendron vernix*

#### Occasional to Locally Abundant Species

- Poison ivy – *Toxicodendron radicans*  
 Red-osier dogwood – *Cornus sericea*  
 Wild raisin – *Viburnum nudum* var. *cassinoides*  
 Labrador tea – *Ledum groenlandicum*  
 Highbush blueberry – *Vaccinium corymbosum*

### HERBS

#### Abundant Species

- Royal fern – *Osmunda regalis*  
 Sensitive fern – *Onoclea sensibilis*  
 Cinnamon fern – *Osmunda cinnamomea*  
 Marsh fern – *Thelypteris palustris*  
 Canada mayflower – *Maianthemum canadensis*  
 Northern bugleweed – *Lycopus uniflorus*  
 Fowl mannagrass – *Glyceria striata*  
 Naked miterwort – *Mitella nuda*  
 Peduncled sedge – *Carex pedunculata*  
 Goldthread – *Coptis trifolia*  
 Bunchberry – *Cornus canadensis*

#### Occasional to Locally Abundant Species

- Crested wood fern – *Dryopteris cristata*  
 Tall meadow rue – *Thalictrum pubescens*  
 White turtlehead – *Chelone glabra*  
 Marsh bedstraw – *Galium palustre*  
 Three-seeded sedge – *Carex trisperma*  
 Delicate-stemmed sedge – *Carex leptalea*  
 Two-seeded sedge – *Carex disperma*  
 Starflower – *Trientalis borealis*  
 Sarsaparilla – *Aralia nudicaulis*  
 One-sided pyrola – *Pyrola secunda*  
 Hog-peanut – *Amphicarpaea bracteata*

### BRYOPHYTES

#### Abundant Species

- Common fern moss – *Thuidium delicatulum*  
 Stair-step moss – *Hylocomnium splendens*  
 Shaggy moss – *Rhytidiadelphus triquetrus*  
 Tree moss – *Climacium dendroideum*  
 Moss – *Calliergon cordifolium*  
 Moss – *Calliergon giganteum*  
 Moss – *Mnium punctatum*

#### Occasional to Locally Abundant Species

- Moss – Schreber's moss – *Pleurozium schreberii*  
 Moss – *Sphagnum warnstorffii*  
 Moss – *Sphagnum centrale*  
 Moss – *Sphagnum girgensohnii*  
 Liverwort – *Bazzania trilobata*  
 Liverwort – *Plagiochila asplenoides*

### RARE AND UNCOMMON PLANTS

- Lily-leaved twayblade – *Liparis lilifolia*  
 White adder's mouth – *Malaxis monophyllos*  
 Ram's head lady's-slipper – *Cypripedium arietinum*  
 Wild Jacob's ladder – *Polemonium van-bruntiae*  
 Nodding trillium – *Trillium cernuum*  
 Swamp fly honeysuckle – *Lonicera oblongifolia*  
 Mountain fly honeysuckle – *Lonicera caerulea* (*L. villosa*)  
 Thin-flowered sedge – *Carex tenuiflora*  
 Green adder's mouth – *Malaxis unifolia*  
 Yellow bartonia – *Bartonia virginica*  
 Small yellow lady's slipper – *Cypripedium calceolus* var. *parviflorum*  
 Showy lady's slipper – *Cypripedium reginae*  
 Loesel's twayblade – *Liparis loeselii*  
 Yellow water-crowfoot – *Ranunculus flabellaris*



## ECOLOGY AND PHYSICAL SETTING

Red Maple-White Pine-Huckleberry Swamps are currently considered rare in Vermont, as only three examples are currently known. In these cases, the Red Maple-White Pine-Huckleberry Swamps occur as central components of much larger wetland complexes including Red Maple-Black Ash Swamps and Red Maple-Northern White Cedar Swamps. The soils in these swamps are deep – exceeding 11 feet in South Alburg Swamp – organic mucks commonly containing wood fragments. It is likely that the Red Maple-White Pine-Huckleberry Swamp communities occur on the deepest organic soils in their respective basins, resulting in a slightly raised condition relative to adjacent wetland communities. Additional study is needed to confirm this hypothesis.

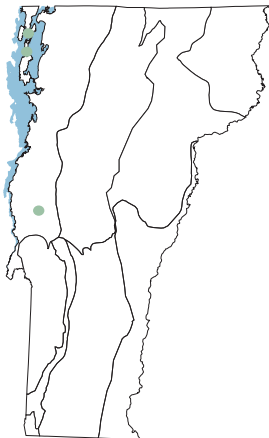
An interesting feature of this swamp type is its relatively flat surface. Although there may be low hummocks, they seldom exceed ten inches in height. The organic soils are permanently saturated, but there are no pools with standing water, and there is no evidence of seasonal flooding. The water near the surface of these wetlands is very acidic, with a pH of 3.5 at South Alburg Swamp.

## VEGETATION

Our three known examples of Red Maple-White Pine-Huckleberry Swamp have a distinct forest structure. Red maple dominates the canopy, which varies from 70 to 90 percent closure. White pine, black spruce, and tamarack are all important components but are much less abundant than red maple. Tall, scattered white pines rise above the red maple-dominated canopy. The tall shrub zone is notably sparse, with scattered individuals of highbush blueberry, mountain-holly, and primarily red maple saplings. The low shrub layer is dense and of uniform height of nearly one meter. Black huckleberry is a clear dominant, with lesser amounts of Labrador tea, highbush blueberry, and regeneration of the overstory tree species.

## DISTRIBUTION/ ABUNDANCE

Only three examples of Red Maple-White Pine-Huckleberry Swamps are known from Vermont, all in the Champlain Valley. The regional distribution of this natural community type is poorly understood.



Herbaceous plant cover is sparse (25 percent cover), with cinnamon fern as the most abundant species. Boreal herbs are common, including goldthread, bluebead lily, Canada mayflower, and starflower. Sarsaparilla and pink lady's slipper are also present. Three-seeded sedge has a patchy distribution and is found primarily under areas of forest with more black spruce. Bryophyte cover is very high and is strongly dominated by several species of *Sphagnum*, especially *Sphagnum centrale*, with lesser amounts of *Sphagnum capillifolium*.

## ANIMALS

Little is known about the specific animals that use this rare wetland natural community. In general, hardwood swamps can be important breeding habitat for great-crested flycatcher, brown creeper, veery, and red-eyed vireo. There are abundant trails of whitetail deer in the known examples of this community type.

## VARIANTS

None recognized at this time.

## RELATED COMMUNITIES

**Red Maple-Black Ash Swamp:** This broadly defined community type is less acidic and lacks the distinctive black huckleberry low shrub layer and high sphagnum moss cover that is characteristic of the Red Maple-White Pine-Huckleberry Swamp.

## CONSERVATION STATUS AND MANAGEMENT CONSIDERATIONS

This is a rare natural community in Vermont. Additional study is needed to better understand its ecology and to identify other examples in Vermont and the region. The known examples have seen selective logging in the past but do not appear to have been significantly altered by this activity. Repeated heavy logging would threaten the long term integrity of the swamps. Only the example in South Alburg Swamp is on public property. Public acquisition or conservation easements may be desirable in order to assure long term protection of the example at Cornwall Swamp, which is currently in good condition.

## PLACES TO VISIT

South Alburg Swamp, Alburg Dunes State Park, Vermont Department of Forests, Parks, and Recreation

## CHARACTERISTIC PLANTS

### TREES

#### Abundant Species

Red maple – *Acer rubrum*

#### Occasional to Locally Abundant Species

White pine – *Pinus strobus*

Black spruce – *Picea mariana*

Tamarack – *Larix laricina*

Yellow birch – *Betula alleghaniensis*

Gray birch – *Betula populifolia*

### SHRUBS

#### Abundant Species

Black huckleberry – *Gaylussacia baccata*

#### Occasional to Locally Abundant Species

Highbush blueberry – *Vaccinium corymbosum*

Labrador tea – *Ledum groenlandicum*

Mountain-holly – *Nemopanthus mucronatus*

Low sweet blueberry – *Vaccinium angustifolium*

### HERBS

#### Abundant Species

Cinnamon fern – *Osmunda cinnamomea*

#### Occasional to Locally Abundant Species

Goldthread – *Coptis trifolia*

Bluebead lily – *Clintonia borealis*

Canada mayflower – *Maianthemum canadensis*

Starflower – *Trientalis borealis*

Three-seeded sedge – *Carex trisperma*

Sarsaparilla – *Aralia nudicaulis*

Pink lady's slipper – *Cypripedium acaule*

### BRYOPHYTES

#### Abundant Species

Moss – *Sphagnum centrale*

#### Occasional to Locally Abundant Species

Moss – *Sphagnum capillifolium*

Moss – *Sphagnum angustifolium*

Moss – *Sphagnum magellanicum*

Moss – *Sphagnum fimbriatum*

Moss – *Polytrichum strictum*

Moss – *Aulacomnium palustre*

Liverwort – *Bazzania trilobata*