Native Vegetation for Lakeshores, Streamsides, and Wetland Buffers

What you need to know to re-establish or enhance a buffer strip along water and wetlands in Vermont.

Vermont Department of Environmental Conservation
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Foreward

Along many lakes, rivers and wetlands in Vermont, the vegetation that used to grow on the shorelines has been removed for access, views, location of houses and lawns, farming, roads and other human activities. We are learning more and more, however, about the importance of this vegetation in protecting the quality of our waters, maintaining the stability of our land and soils, and providing unique and essential habitat for numerous members of the natural community. As we learn more about the valuable communities we have been losing, many people have become interested in trying to restore these special features of our landscape. This booklet has been prepared to help those of you interested in re-establishing a buffer strip of natural vegetation along a river, lake or wetland. Following short discussions of the values and widths of buffer strips and how to plan and plant trees and shrubs, there is the heart of this guide - the trees, shrubs, ferns, flowering plants and other herbaceous species that could transform eroding, slumping shorelines to stable, vegetated, dynamic communities that protect our soil and water.

Acknowledgements

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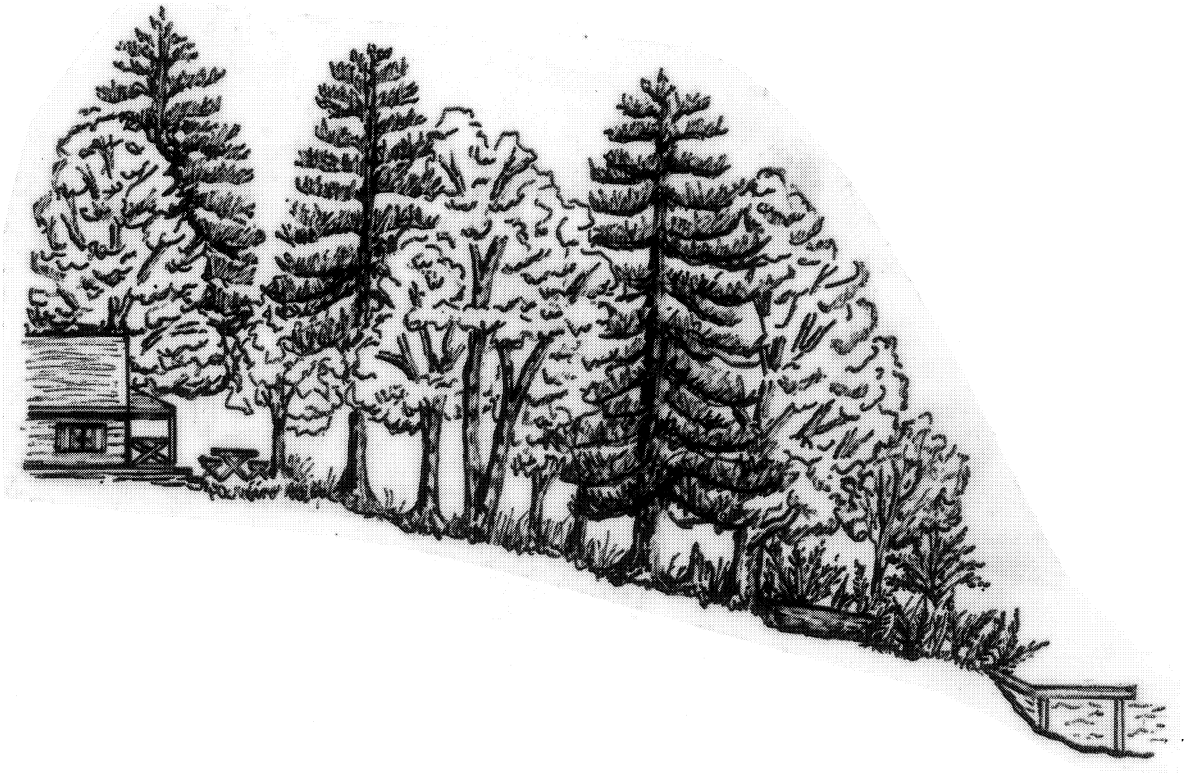
What is a Buffer Strip or Zone ?

A buffer strip is a band of native vegetation that may include trees, shrubs and groundcover species. It is a transition zone between a lake, stream or wetland and human activity or land disturbance. Ideally the soil of the buffer has a good layer of organic matter and the naturally uneven ground surface has not been compacted or graded. A buffer strip has some of the values and functions described on the following page.



Why are Buffer Strips Important ?

Filtration of Suspended Sediments

Buffer strips filter soil particles from runoff before it enters lakes, rivers or wetlands. The stems and branches from trees, shrubs and small herbaceous plants as well as the fallen leaves and the uneven ground surface all slow runoff from upslope areas. This allows sediment to settle out in the buffer, thereby protecting lake, stream and wetland water quality as well as the ecological integrity of these communities. Sediments that settle on the bottom of streams can harm or kill aquatic insects. Sediments suspended in water can harm fish and affect natural plant growth in wetlands or surface waters. They also fill in shallow areas of lakes and wetlands.

Nutrient Removal

The plants and soils of buffer areas also help remove nutrients, such as phosphorus, from surface runoff. Nutrients attached to sediments stay in the buffer when the sediment is filtered out. Nutrients that are dissolved in runoff water are used by plants and microorganisms or remain in the soils of the buffer. This removal process protects wetlands and surface waters from nutrient overloads. Too many nutrients can result in nuisance plant growth, such as algae blooms, which change the natural balance in lakes, rivers and wetlands. Excessive plant growth can also interfere with swimming, boating and other recreation activities.

Wildlife Habitat

The trees and shrubs of a buffer zone provide important food, cover and nesting sites for large and small mammals, songbirds, reptiles and amphibians. The vegetation also screens wildlife from noise, light and other human activities in adjacent uplands.

Other Functions

The plants in buffer zones reduce erosion and stabilize banks by binding the soil with their roots. Along small streams, the trees and shrubs provide shade that can moderate water temperature which is important for some fish species. The overhanging vegetation provides cover as well as food supplies (leaves, twigs, insects) for fish and aquatic insects.

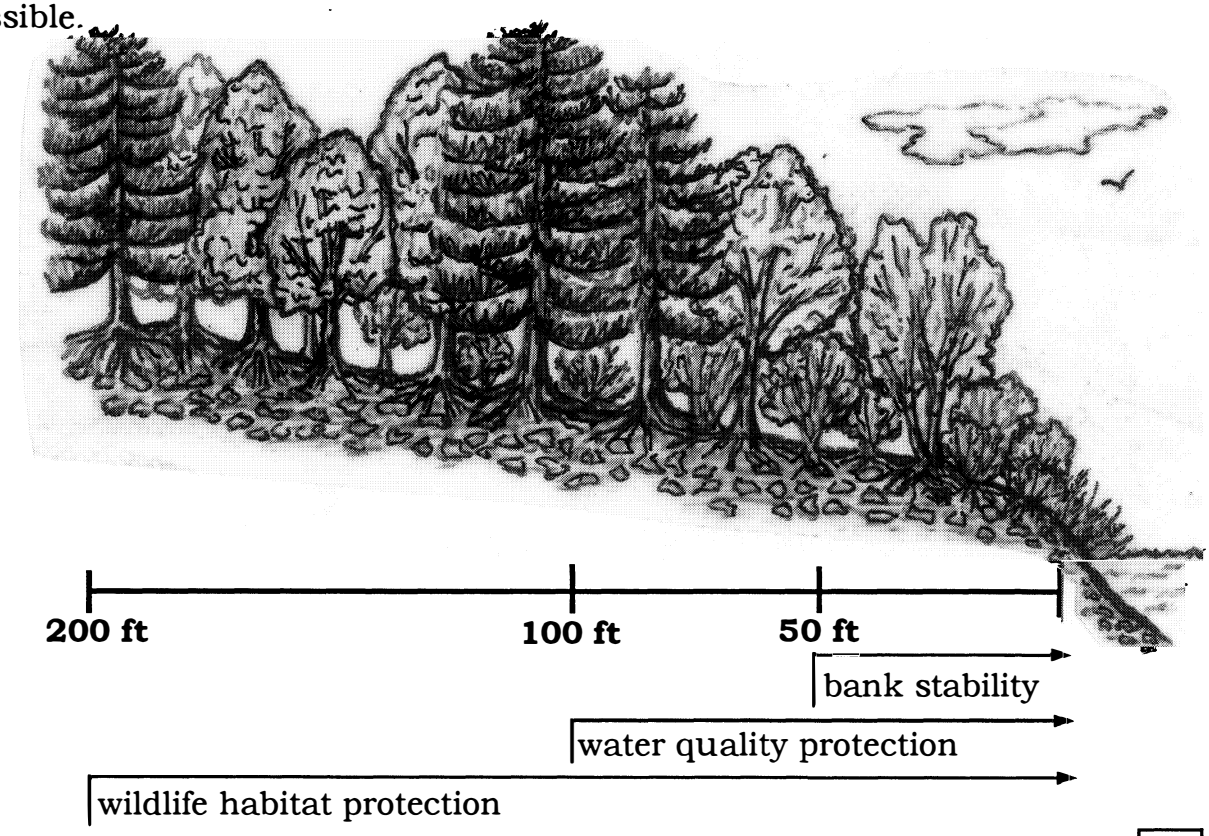
Buffers also have a number of social and economic values including flood control, recreation uses and protection of privacy.

Buffer Strip Widths

The optimal width of your buffer strip will depend on the reasons for which it is being established. You might be designing a buffer for water quality protection, aesthetics, wildlife enhancement or privacy. The necessary buffer strip width for water quality protection or wildlife habitat depends a lot on the individual situation but some qualified generalizations are possible and given below.

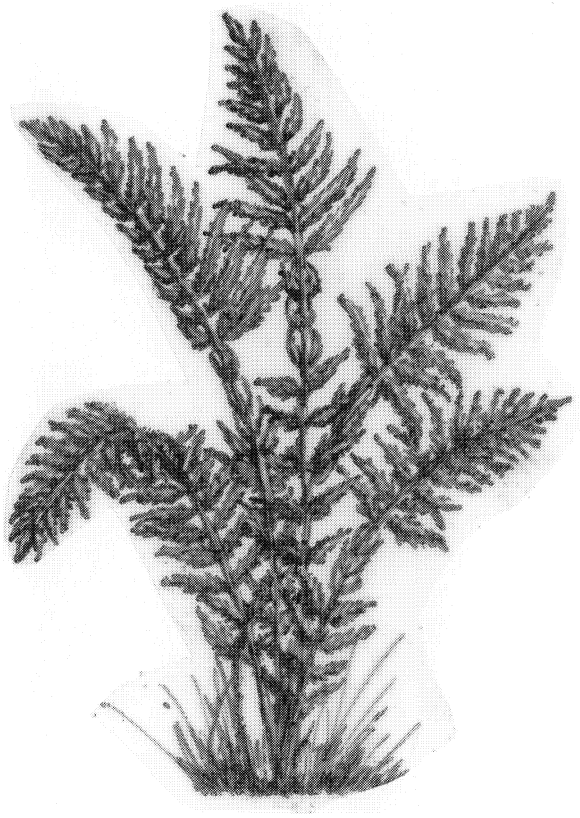
A number of studies suggest that buffers of 100 feet (30 meters) are effective at removing suspended sediment in runoff when there is not channelized flow. Nutrient removal in buffer strips is closely related to sediment removal because most of the available phosphorus is attached to sediment particles: a buffer that slows and filters sediment will also help keep excess nutrients out of wetlands and surface waters. Wider buffer strips for water quality protection may be necessary where there are steep slopes, large volumes of runoff and highly erodible slopes. A minimum of at least 50 feet (15 meters) seems to be needed for streambank stability and protection of aquatic habitat.

Buffer strips for wildlife protection and enhancement need to be much wider than those that serve a water quality protection function. Two New England studies have found that a buffer of approximately 575 feet (175 meters) is needed to preserve the diversity of local bird communities. Suggested buffer widths for small and large mammals are from 200 feet up to 600+ feet. These widths cited in the literature may be difficult for individual landowners to achieve on already developed lots, but a buffer for wildlife should be as wide as possible.



General Considerations in Buffer Re-establishment

Native species



Establishment or enhancement of a buffer strip along Vermont's rivers, lakes and wetlands should involve use of plant species native to the state. Many trees, shrubs and herbaceous species used in landscaping are exotic or non-native species from Europe or Asia. A number of these plants have escaped from cultivation and threaten native species and biological diversity. Native trees and shrubs are resistant to most diseases and insects, are adapted to the local climate, can provide good food and habitat for wildlife, have all of the landscape values that introduced species have and are available from Vermont nurseries.

In this booklet, native species mean those plants for which we have no evidence that they have an exotic origin or were introduced and that can be shown to have been present in the region for at least 100 years. The "region" includes Vermont, the rest of New England, New York and eastern Canada. The sources for verification purposes are Jenkins 1987 and Gleason and Cronquist 1991.

An important issue concerning the use of native plants for buffer strip establishment or any home landscaping is the issue of wild collected versus propagated plants. It is a good practice for consumers to ask about the source of the plant material before purchasing it and to buy plants the nursery propagates. This is especially important when considering purchase of less common plants: collection from wild populations could threaten their survival. Some species in Vermont are listed as threatened or endangered and their propagation would require a permit.

Site conditions

Be sure that you know the site conditions for which your plants are suited. The last section of this booklet has some of that information on specific trees, shrubs and herbaceous species. Your local nursery or source of plants should be able to give additional advice on planting techniques and conditions.

Planting scheme

For an effective as well as aesthetically pleasing buffer strip, the mature planting (which you have to visualize knowing a little about the plants' growth rates and forms) would be a diverse, multi-layered community that is wide enough to provide water quality protection and that reproduces itself naturally. Some considerations when thinking about the species to plant:

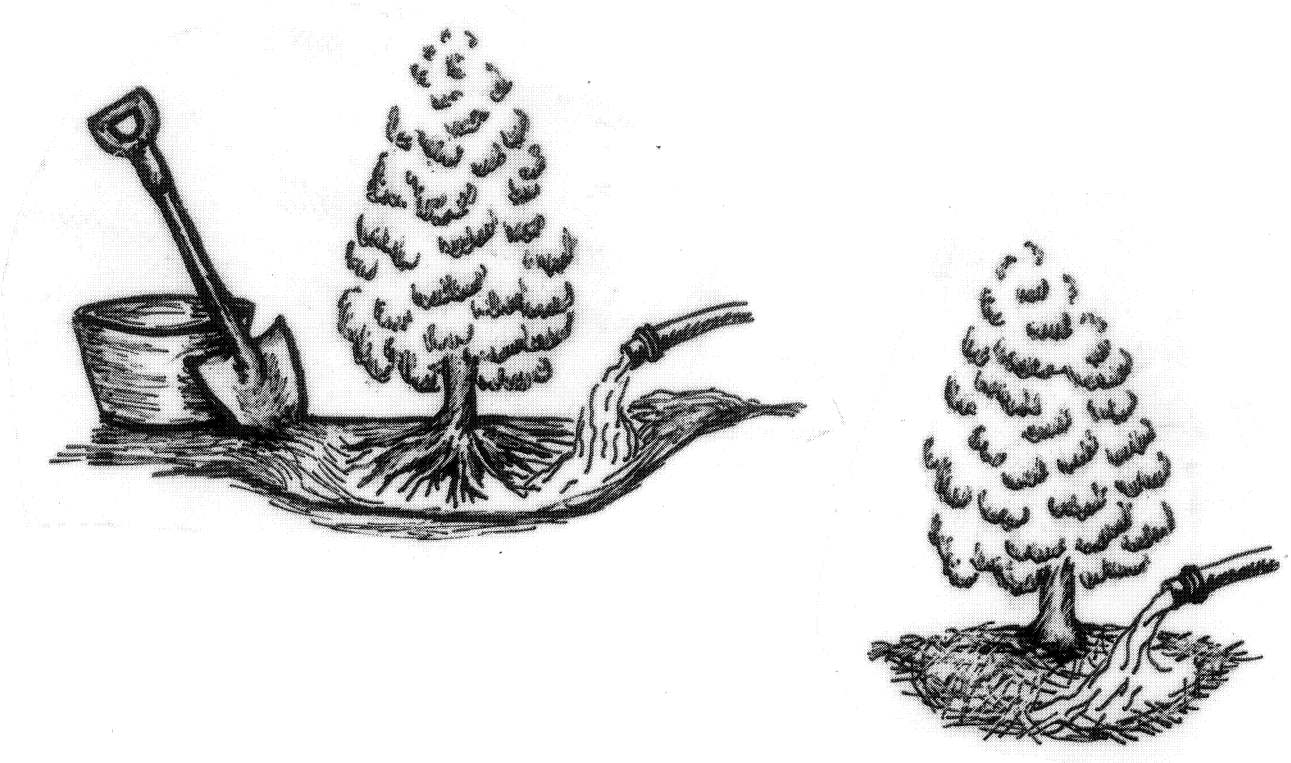
- The larger the plant material used, the faster you will have a mature community (however, larger plants are more expensive and sometimes harder to get established, which are other important considerations).
- Planting several of the same shrubs or small trees together can result in a grouping that stands out well. Another attractive combination is a mix of evergreens and deciduous shrubs and trees of varying heights.
- Trees planted 35 feet apart, small trees planted 15 feet apart, shrubs planted 5 feet apart and groundcovers planted 1-3 feet apart will result in a dense buffer at maturity. Larger spacing distances could still provide water quality protection but would allow better views to the lake, stream or wetland.
- It is important to choose plants suited for the hardiness zone in which you are working. A map of the hardiness zones and sub zones for Vermont is on page 41 and the coldest zone in which a plant can grow is given in the tables at the end of the booklet.

Planting technique

The best time to plant trees and shrubs is when they are dormant, either in early spring before budbreak or in autumn after leaf fall. However, as long as the plant is healthy and is given adequate care, it can be planted throughout the growing season. Following are some specific guidelines for planting and initial care of the tree or shrub.

- **Dig a large hole.** A hole should be dug that is two to three times as wide as the root ball of the plant. Loosen the sides of the hole. Dig only to the depth of the rootball and leave the bottom of the space firm.
- **Prune damaged roots.** Plants may come balled and burlapped, in containers, or as bare root stock. Containers, burlap, plastics or anything holding the root ball should be removed. The roots in a tight ball should be carefully freed and any broken roots should be cut off above the point of damage.
- **Plant at the proper depth.** The tree or shrub should be set in the hole such that the point where the stem emerged from the soil originally (which appears as a dark stain on the stem) is at soil level in its new location. Planting too deeply is one of the most common reasons for death or slow recovery from transplanting.

- **Fill the hole gently but firmly.** After ensuring that the plant is at the proper depth, fill in around the roots with the original soil. It is usually not necessary to add compost, topsoil or other soil amendments. The soil should be firmed around the plant to eliminate air holes but it shouldn't be compacted so much that root spread is inhibited. Watering to settle the soil around the roots, backfilling some more and watering again is the best method of eliminating air holes and settling the soil.



- **Water regularly.** The tree or shrub should be watered well right after planting to settle the soil around the rootlets. Then, unless there is regular rainfall, the plant should be watered well once a week throughout the first growing season.
- **Mulching is beneficial.** Mulch with wood chips, bark mulch or leaves to a depth not to exceed 3 inches. Mulching helps prevent water loss, control weed growth and add organic matter.
- **Do not fertilize.** Fertilizing at planting time can damage the roots and should be avoided. The original soil should be adequate if the hole is dug wide enough however, soil amended with compost or rich native soil would be more than adequate if the original soil is poor. Fertilizer is best avoided in a buffer zone generally as the nutrients could reach wetlands or surface waters.

Planning a Buffer Strip

Planning for re-establishment of a buffer strip will depend on the amount of shoreline de-stabilization that has occurred, if any, and the amount of planting and active management or establishment of a buffer you want to do. Following are three options for re-creating a buffer along your lake, river or wetland shoreline.

Natural Regeneration of Vegetation

If the land along the shoreline does not have significant erosion problems and you have a lawn, old pasture, former hayfield or other situation with some herbaceous vegetation, there is an opportunity to create a 'no-mow' zone along the shore. This no-mow area would provide the opportunity for natural regeneration of trees and shrubs: seeds in the soil or deposited onto the land with high water as well as roots and rhizomes of woody plants from adjacent land can start the re-establishment of a diverse, vegetated buffer for you. Over time you could selectively remove non-native or unhealthy plants and add a few other species you want thus creating a buffer relatively easily and inexpensively.

Some of the plants you might expect to see come in on upland sites include blackberries or raspberries, chokecherry, sumac, gray dogwood or quaking aspen. On wetter soils, alder, red-osier dogwood, spiraea, willows and larch might be the pioneer species in an area left to revegetate naturally.

Soil Bioengineering

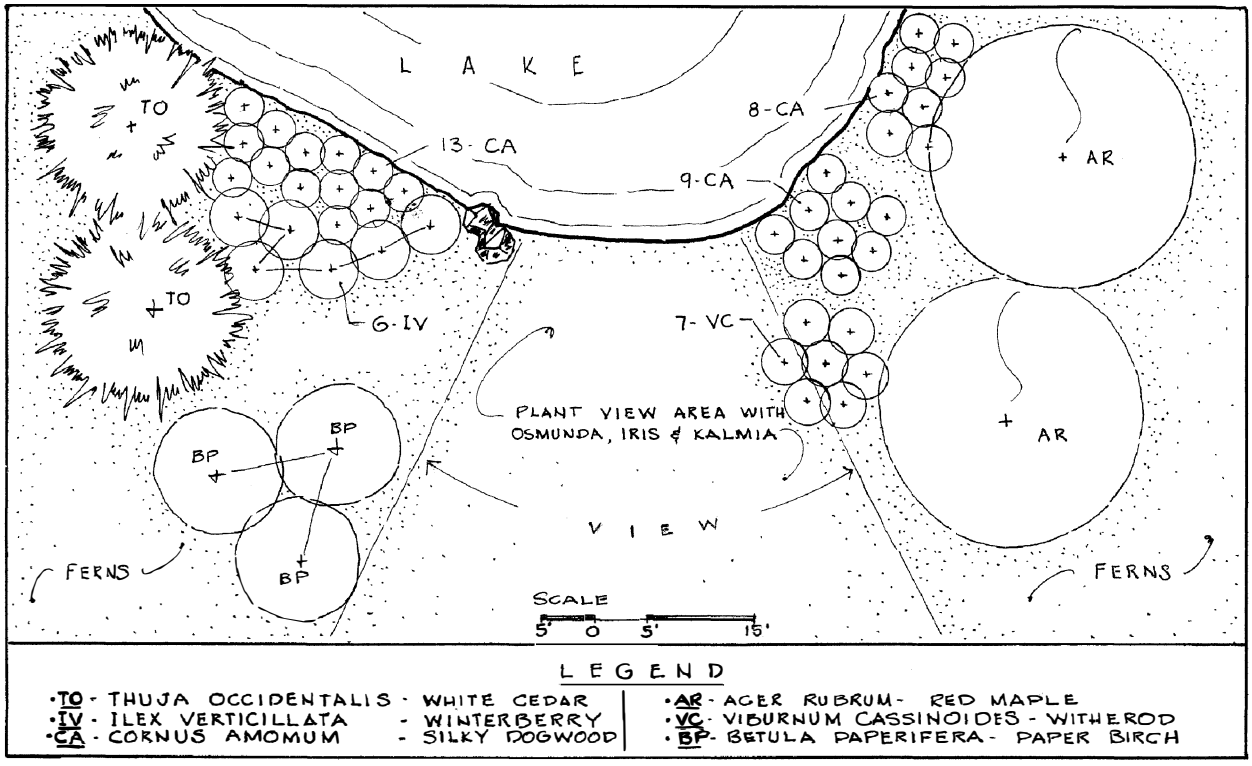
In shoreline areas where it is necessary to stop and prevent bank erosion, there are techniques that use living plant stems to stabilize soils called soil bioengineering. There are a number of different ways of using living shrub and tree stems for soil stabilization and erosion control but one method being used more often in Vermont is called "live fascine" or "wattle" planting. Cuttings are taken from those species that root easily from stem cuttings, such as willows, shrub dogwoods, elderberry and viburnums, and tied together into bundles. These bundles are placed in trenches parallel to the shoreline contour and as they sprout roots and shoots they stabilize the bank and cover the exposed soil with vegetation. More information on this and related methods can be obtained from the U.S. Soil Conservation Service or the Vermont Agency of Natural Resources, Division of Water Quality.

Vegetation Plantings

In situations where the erosion problems are less severe or, for example, you have a lawn sloping to the lake, buffers can be re-created by planting native trees, shrubs and herbaceous plants suitable for the soil moisture conditions and hardiness zone. The more densely the groundcover, shrubs and trees are planted, the more effective they will be at slowing runoff and filtering sediments. However, scattered trees, shrubs and groundcover can also be effective especially if the ground between your plantings is not maintained. Grasses, wildflowers and the deposit of leaves, branches, seeds and needles will eventually re-establish a natural, uneven ground surface that would help slow and filter runoff.

One caution when planting trees along shorelines in areas where there are beavers: beavers may welcome your efforts to provide them food. To prevent removal of saplings and young trees, chickenwire or tin foil around their trunks has been found to be successful at discouraging hungry visitors.

Example: Lakeshore Buffer Planting on Wet to Moist Soils



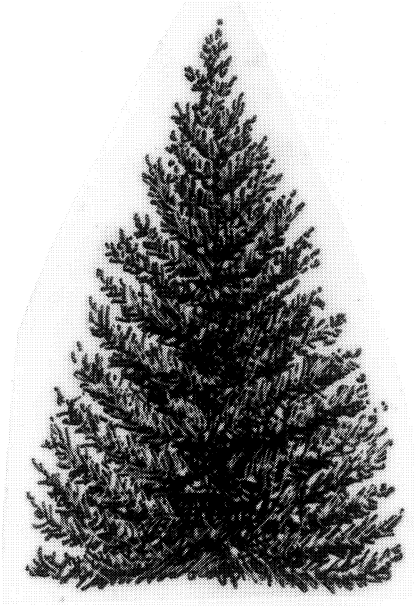
Plant Descriptions

Following this section are brief descriptions of 28 native tree species, 30 native shrubs and 24 species of ferns, wildflowers or other groundcover plants that could be used for bufferstrip re-establishment or enhancement. The descriptions include the site conditions generally needed, the mature height and growth rates of the species and some commonly recognized aesthetic and/or wildlife values. A slow growth rate is defined as 12 inches or less per year, a medium rate is growth of 13 to 24 inches per year and a rapid growth rate is more than 25 inches of growth per year.

In addition to the individual descriptions per species, there are two tables beginning on page 37 that summarize the site conditions needed for each tree and shrub.

Balsam fir (*Abies balsamea*)

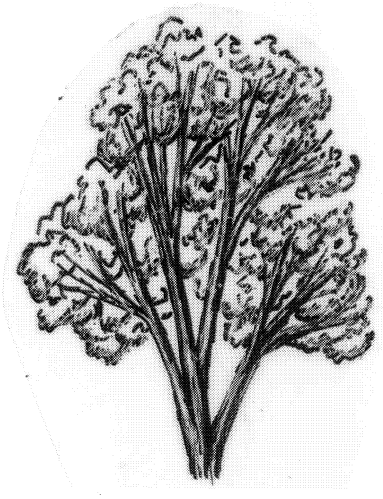
Site conditions: Moist cool conditions hence its northern range. Prefers well-drained but moist upland soils but can tolerate wet soils.
Growth: Mature height of 40-70 feet. Spread 20-25 feet. Slow growth.
Values: Evergreen so there is year round color and screening. Useful for birds for roosting and nesting. Seeds are eaten by chickadees, red-breasted nuthatches and evening grosbeaks among others. Pruning the branches gives you fragrant greens for indoors in winter.



Balsam fir

Box elder (*Acer negundo*)

Site conditions: Prefers moist, fertile soils but is also found on poorer sites.
Growth: Mature height of 50-70 feet. Fast growth rate. Relatively short-lived.
Values: Hardy tree that would be good in early shoreline vegetation establishment. Songbirds and squirrels eat the seeds.
Notes: Moderately deep, spreading roots. Poor-fair ability to root from cuttings.

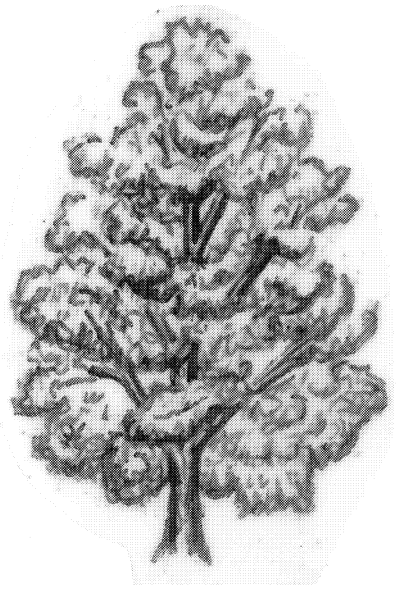


Striped maple

Striped maple (*Acer pennsylvanicum*)

Site conditions: Prefers partial shade. Does best on edges of wooded areas or in clearings in well-drained, cool, moist soils. It will tolerate deeper shade and will also tolerate full sun if a cool, moist root zone is provided.
Growth: Mature height up to 20-35 feet. Growth rate slow.
Values: Bark has distinctive white stripes on green which is attractive in all seasons. Good understory small tree.

Trees (cont.)



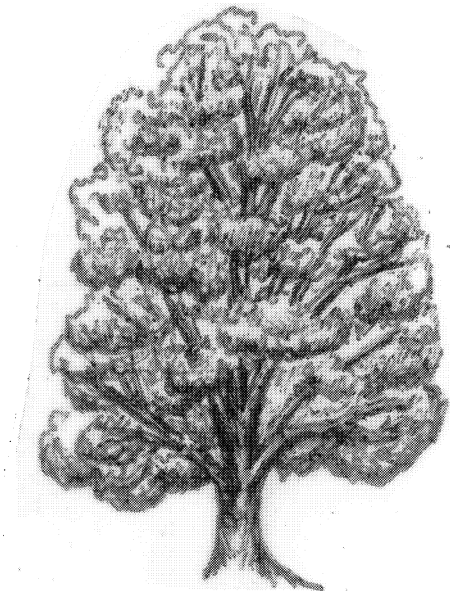
Red maple

Red maple (*Acer rubrum*)

Site conditions: Sun. Tolerates a wide range of soil textures and moisture conditions. Often found in wet soil because of its higher tolerance for poorly drained situations than other species.
Growth: Mature height typically 40-70 feet. Medium to fast growth rate.
Values: Large numbers of red, delicate flowers in early spring before other vegetation shows much change. Flowers are noticeable for some distance. Bright red fall foliage.

Silver maple (*Acer saccharinum*)

Site conditions: Grows best on well drained, moist sites and is commonly found on river floodplains. Will tolerate several weeks of flooding.
Growth: Mature height 50-80 feet generally with a maximum of 120 feet. Fastest growing maple species.
Values: Maples provide food and/or cover for a number of birds and animals. Graceful, arching branches. Bright green leaves with silvery undersides that turn yellow in fall.
Notes: Wood is brittle.



Sugar maple

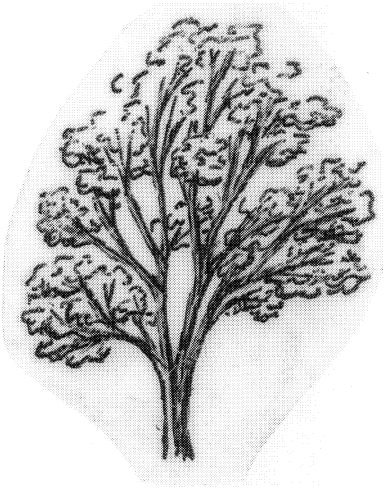
Sugar maple (*Acer saccharum*)

Site conditions: Thrives on fertile, moist, well-drained soils. Does not tolerate wet or compacted soils. Shade tolerant.
Growth: Mature stands of sugar maple can reach 300-400 years old (although unusual), 60-100+ feet high. Slow growth rate.
Values: Good shade tree and classic shape if open grown. Beautiful autumn colors range from yellow to red.

Serviceberries

(*Amelanchier arborea, A. laevis*)

Site conditions: Occurs in moist to dry woods depending on the species. Sun to shade.
Growth: Small trees or tall shrubs that reach 15-35 feet high.
Value: Early flowering trees or shrubs that stand out as a cloud of white against the brown of other species not yet in flower or leaf. They blend in well on the edges of woodlands near pond and streambanks. The early fruits are sought out by thrushes and other songbirds as well as mammals. The leaves turn brilliant orange-red in the fall. Multi-stem plants are effective for screening.



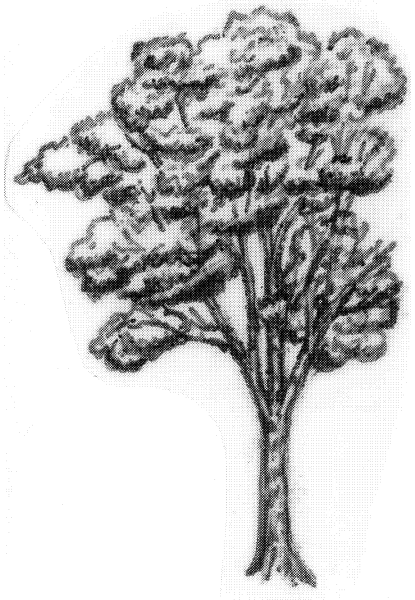
Downy serviceberry

Yellow birch (*Betula alleghaniensis*)

Site conditions: Grows best on moderately well-drained soils but tolerates poorly drained soils also. Cool summer temperatures are needed.
Growth: Mature height 60-75 feet. Slow growth.
Value: Attractive golden, peeling bark on older trees. Its seeds are eaten by many birds and it is a preferred nest tree for red-shouldered hawks.

Paper birch (*Betula papyrifera*)

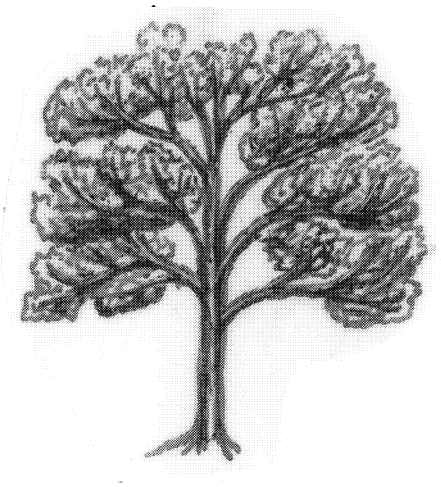
Site conditions: Grows best on well-drained soils but will do well in moist conditions too.
Growth: Mature height 50-75+ feet. Full sun.
Value: White peeling bark that is aesthetically pleasing. The catkins, buds and seeds are an important food source for grouse. The seeds are a common food source for a number of small birds such as pine siskins and goldfinches.
Notes: May not be good for public places as people often harm this tree by peeling off the bark. The roots are fibrous, shallow.



Paper birch

Trees (cont.)

American hornbeam
(*Carpinus caroliniana*)

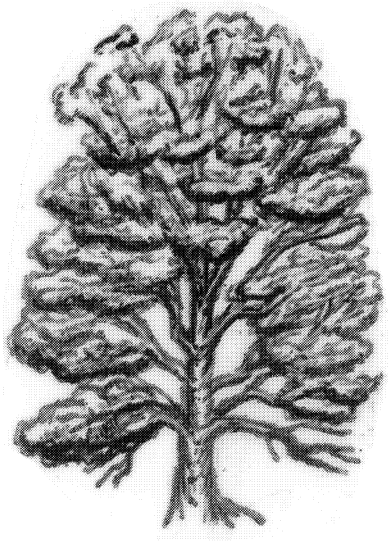


Pagoda dogwood

Site conditions: Sun to shade. Prefers deep, rich, moist soils but also does well in drier and wetter situations. Common understory tree in hardwood forests.
Growth: Mature height from 20-30 feet generally. Slow growth rate.
Values: Attractive, interesting fruits; gray, muscle-like bark; orange-red autumn foliage. Seeds eaten by some birds and squirrels.
Notes: Also known as musclewood or blue beech.

Pagoda dogwood (*Cornus alternifolia*)

Site conditions: Sun to shade. Prefers rich, moist soils.
Growth: Mature height can reach 20 feet but it is generally smaller.
Values: Beautiful, white clusters of flowers in June. Fruits eaten by many birds including ruffed grouse. Has an elegant, interesting form.
Notes: Alternate-leaf dogwood is another common name.



American beech

American beech (*Fagus grandifolia*)

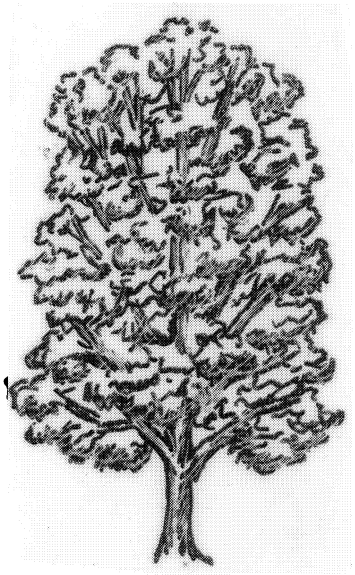
Site conditions: Full sun. Needs well-drained, uncompacted soils. Prefers pH 5.0 to 6.5.
Growth: Mature height of 70-90 feet. Slow to medium growth rate. Long-lived.
Values: Beautiful tree with wide, grand crown when open grown and smooth gray bark. Yellow to bronze foliage in autumn. The fruit is a preferred food of many birds including flickers, woodpeckers and grouse.
Notes: Difficult for any other plant to grow under this tree due to the dense shade it creates.

White ash (*Fraxinus americana*)

Site conditions: Best growth on moderately well-drained soils. Shade tolerant as a seedling but more intolerant as it gets older.
Growth: Mature height of 70-100 feet. Grows rapidly in full sun.
Value: A tall slender tree with yellow or purple fall foliage. Seeds eaten by birds and mammals.
Notes: Quickly seeds in over a large area where a mature tree grows.

Green ash (*Fraxinus pennsylvanica*)

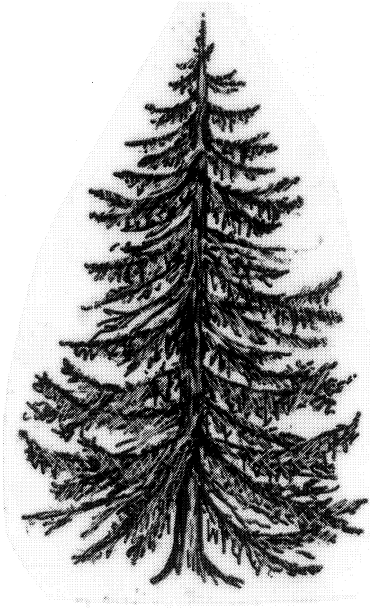
Site conditions: Most commonly found along rivers and brooks as it does well in moist soils. Will tolerate periodic flooding. Full sun to partial shade.
Growth: Mature height 50-60 feet. Rapid growth in good conditions.
Value: Attractive shade tree. Yellow fall foliage.



Green ash

Larch (*Larix laricina*)

Site conditions: Best growth on rich, moist, well-drained soils along streams, lakes and swamps but tolerant of wetter soil and thus common in wetlands.
Growth: Mature height 40-80 feet. Rapid growth on well drained sites, slow growth in wetter areas.
Values: The pale green, delicate new spring growth and golden needles in fall provide some of the earliest and latest color in the landscape. Good nest tree for birds and its seed is the preferred food of crossbills and purple finches.

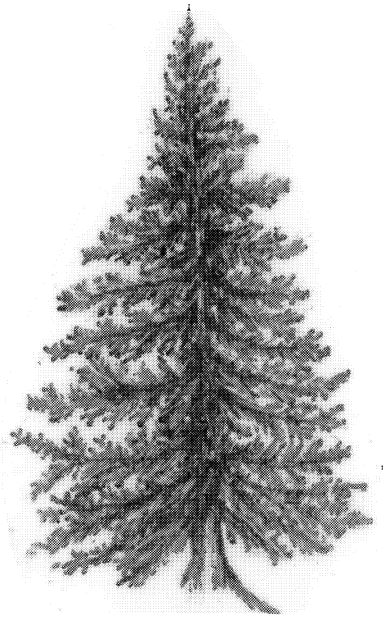


Larch

Hop hornbeam (*Ostrya virginiana*)

Site conditions: Full sun to partial shade. Does best in cool, moist, well-drained soil but is found in rocky, drier soils in the wild.
Growth: Mature height 25-50 feet. Slow growth.
Values: Yellow autumn foliage. Distinctive reddish-brown, flaking bark.

Trees (cont.)



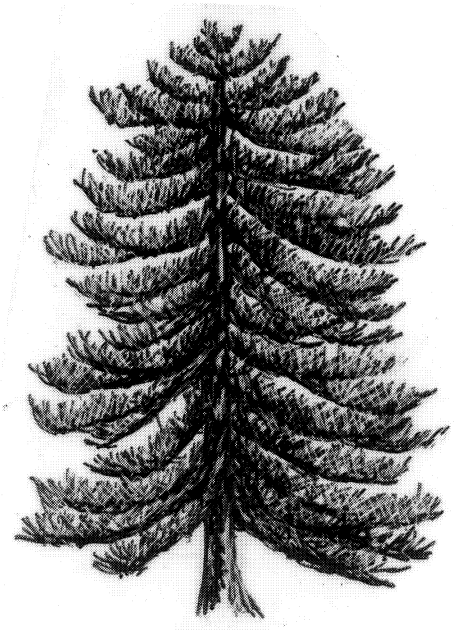
White spruce

White spruce (*Picea glauca*)

Site conditions: Prefers moist, well-drained or fairly well-drained soils. Typical of lakeshores, streambanks and adjacent slopes. Prefers full sun but tolerant of some shade as well as wind, crowding, heat and cold.
Growth: Mature height of 40-70 feet. Medium growth rate.
Values: Tall, narrow, dense evergreen. Tolerant of a range of conditions. Good for windbreaks or screens.

Red pine (*Pinus resinosa*)

Site conditions: Does well on dry, exposed, sandy or gravelly soils. Needs full sun. Very cold tolerant.
Growth: Mature height of 50 - 80 feet. Medium growth rate.
Values: Attractive orange-red then reddish-brown bark. Good on exposed, sterile soils.



White pine

White pine (*Pinus strobus*)

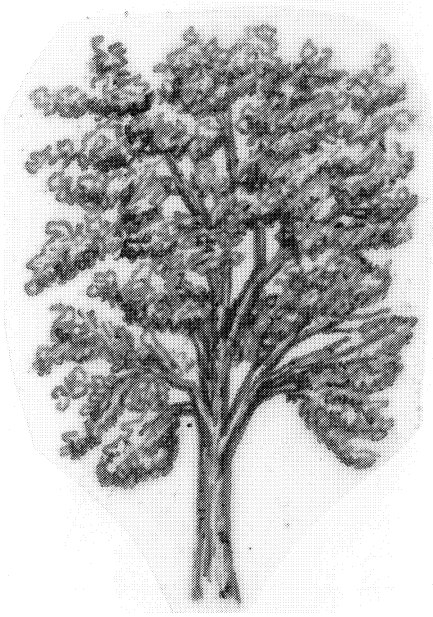
Site conditions: Prefers moderately well-drained soils. It has moderate drought tolerance but will not tolerate flooding. Prefers full sun but is moderately shade tolerant.
Growth: Mature height can be 100+ feet but generally to 75-100 feet. Medium growth rate.
Values: Evergreen with soft green foliage. Excellent food and cover for songbirds, upland ground birds, small mammals and deer.

Balsam poplar (*Populus balsamifera*)

Site conditions: Commonly found along moist bottomlands and streambanks. Prefers full sun.
Growth: Mature height 60-80 feet. Fast growth .
Values: Terminal buds have a fragrant resin on them. Leaves have a golden resin on the back that contrasts nicely with dark green color above.

Cottonwood (*Populus deltoides*)

Site conditions: Prefers moist soils growing naturally along river banks and in low woods.
Growth: Mature height 80-100 feet. Rapid growth rate once established.
Values: Hardy plant. Buds and catkins are a preferred food of grouse.
Notes: Have brittle limbs that can break off in storms.



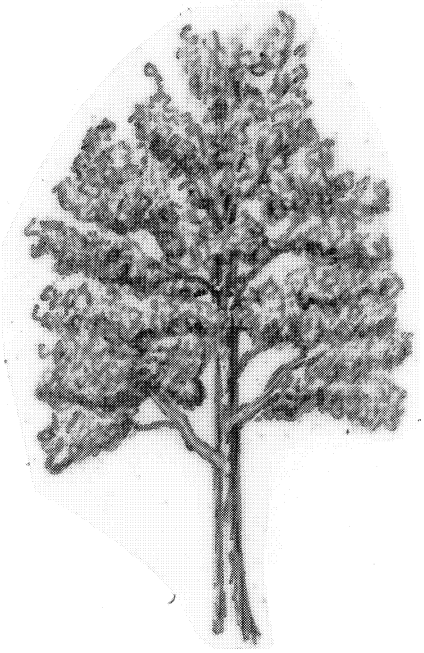
Cottonwood

Big-toothed aspen
(*Populus grandidentata*)

Site conditions: Tolerates a range of soil conditions. Found in drier soils than most of the other poplars. Prefers full sun.
Growth: Mature height 60-70 feet. Fast growth rate.
Values: Leaves flutter in the wind as do those of quaking aspen. Bright yellow or orange-yellow autumn color. Cover and nesting sites for woodpeckers and the yellow-bellied sapsucker. Buds and catkins are a preferred food for grouse.

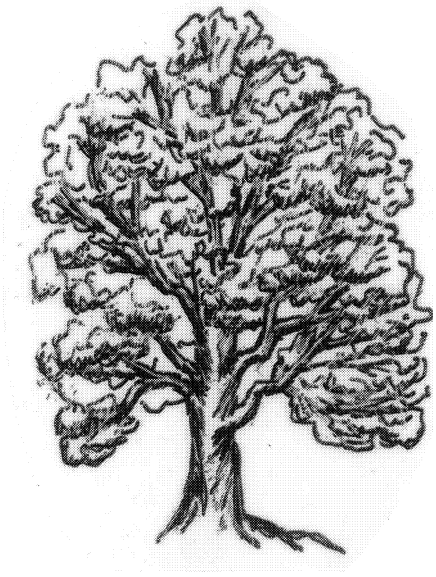
Quaking aspen (*Populus tremuloides*)

Site conditions: Grows on a wide range of soil types and moisture conditions. Full sun.
Growth: Mature height of 40-60 feet. Fast growth rate but relatively short-lived.
Values: A fast-growing tree with leaves that flutter pleasantly in the slightest breeze. It has attractive greenish bark. The buds and catkins are good food for grouse.
Notes: A pioneer species that will often come in quickly after a disturbed sites is left to re-grow. Not good to plant near active beaver areas as it is a choice food. The roots are shallow. It has a fair ability to root from cuttings.



Quaking aspen

Trees (cont.)



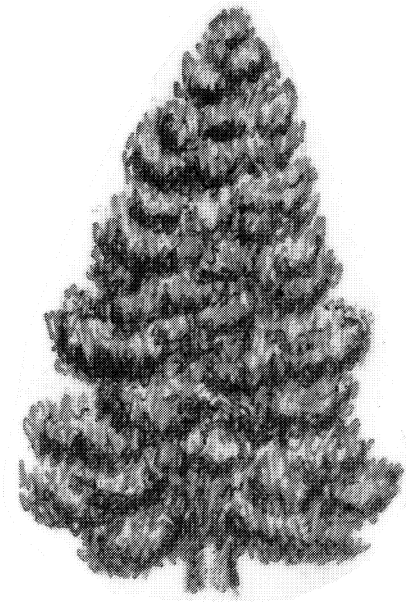
Red oak

Canada plum (*Prunus nigra*)

Site conditions: Prefers moist soils. Sun to shade. Naturally grows in thickets and hedgerows.
Growth: Small tree up to 25 feet.
Values: A profusion of white flowers appear early before the leaves. The black bark with prominent lenticels is attractive in winter.

Red oak (*Quercus rubra*)

Site conditions: Prefers moist, well-drained soils and full sun. Intolerant of high pH soils.
Growth: Mature height of 60-80 feet with a spread of 60-75 feet in open situations. Moderate growth rate.
Values: Stately and attractive, wide-spreading tree when grown in the open. The acorns are a staple for a number of mammals and birds.



White cedar

White cedar (*Thuja occidentalis*)

Site conditions: Prefers moist, deep, well-drained soils but also tolerates wetter conditions. Grows in swamps naturally. Often indicative of higher pH soils in the wild. Needs full sun.
Growth: Mature height under cultivation 25-50 feet with a 10-15 foot spread. Slow to medium growth rate.
Values: Used often as a screen or hedge. Provides winter cover for many songbirds.

Basswood (*Tilia americana*)

Site conditions: Sun to shade. Prefers moist, loamy soils.
Growth: Mature height 70 - 80 feet. Medium growth rate. Deep but widespreading root system.
Values: Large leaves give the tree a dense, lush appearance.
Notes: Also called Linden.

Eastern hemlock (*Tsuga canadensis*)

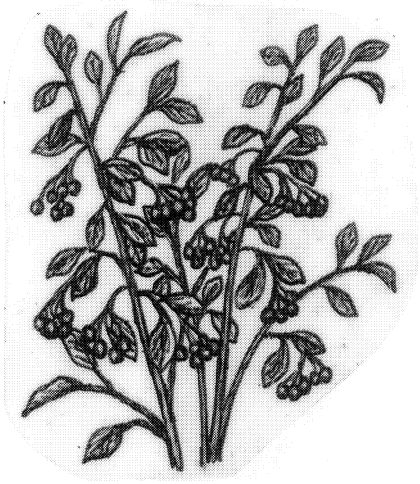
Site conditions: Good on moist, well-drained acid soils, rocky ledges or sandy soils. Shade tolerant. Not drought, wind or pollution tolerant.
Growth: Grows 40-70 feet high with a spread of 25-35 feet. Medium growth rate.
Values: Dark green, graceful evergreen. Makes a good screen but also is attractive planted as a contrast to deciduous trees and shrubs. It is a preferred nesting site for wood thrushes, robins and other birds. The seed is eaten by chickadees, pine siskins and goldfinches.

Eastern hemlock

Shrubs

Speckled alder (*Alnus rugosa*)

Site conditions: Grows in moist to wet soils. Good for stream banks, wetland soils. Prefers full sun.
Growth: Mature height can be 15-25 feet with a spread of 20 feet.
Values: Good shoreline shrub. Good food and cover for gamebirds and some songbirds. A good shrub in poor soil conditions as this is a nitrogen-fixing species.



Black chokeberry

Black chokeberry (*Aronia melanocarpa*)

Site conditions: Grows in a wide range of situations from wet to dry. Full to partial sun.
Growth: Grows up to 10 feet tall. It tends to form large colonies as it spreads well vegetatively.
Values: Rich red to purplish fall leaf color with dark purple fruit. Hardy. Eaten by chickadees, grouse, catbirds, cedar waxwings and others.

Buttonbush

Buttonbush (*Cephalanthus occidentalis*)

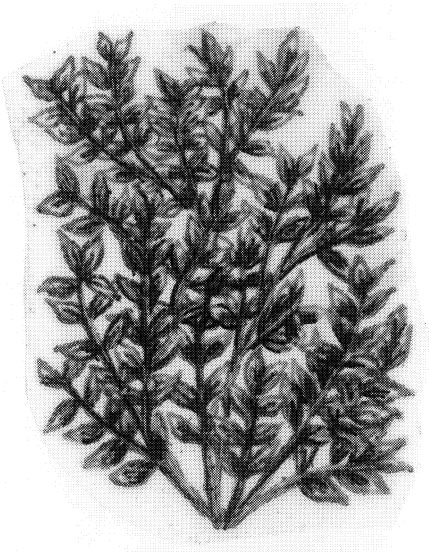
Site conditions: Grows in water up to 3 feet deep as well as flooded areas. Full or partial sun.
Growth: Height of 6-12 feet.
Values: Attractive white pompom-like flowers. Glossy foliage. Seed eaten by mallard, wigeon, shoveller, wood duck and teals. Nectar used by ruby-throated hummingbird. Used for nesting by red-winged blackbird and Virginia rail.

Sweetfern (*Comptonia peregrina*)

Site conditions: Grows in sandy, sterile, acid soils. Full or partial sun.
Growth: Mature height of 2-4 feet. It spreads with stolons thus forming dark green, dense clusters. Slow to medium growth.
Values: Gray-green aromatic leaves. Good shrub for dry, sterile situations. Very hardy.

Silky dogwood (*Cornus amomum*)

Site conditions: Prefers full sun but tolerates partial shade. Grows well in wet or dry soils.
Growth: Multi-stem shrub with a mature height of 6-10 feet. Fast growth rate. Provides effective streambank protection in 3 to 5 years.
Values: Food and cover for many songbirds, gamebirds and mammals. Good plant for lower streambank or lakeshore protection.
Notes: Will fruit within 3 to 5 years. Roots are shallow, fibrous. Very good ability to root from cuttings.



Red-osier dogwood

Red-osier dogwood (*Cornus stolonifera*)

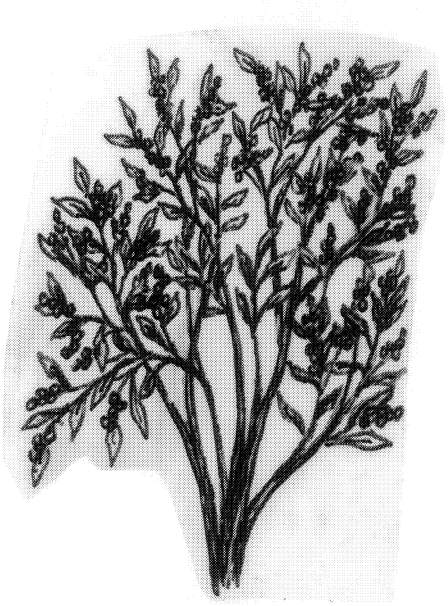
Site conditions: Prefers full sun but tolerates partial shade. Grows well in moist to wet soils.
Growth: Mature height of 4-8 feet. Fast growth rate. Spreads rapidly by underground stems.
Values: Bright red stems that are distinct especially in winter. Clusters of white flowers in early June. Good plant for lake and stream edges, wet meadows, sites with poor drainage. Fruits are eaten by numerous birds including turkey, grouse, woodpeckers, bluebirds and others. Preferred nest site for goldfinches.
Notes: Easily propagated from cuttings. Shallow root system.

Beaked hazelnut

Beaked hazelnut (*Corylus cornuta*)

Site conditions: Grows naturally in thickets and in open woods and does well in sun to shade.
Growth: Erect clonal shrub with mature height of 6-10 feet.
Values: Long, pendulous male catkins in early spring. Useful for cover and as nesting sites. Mammals feed on the interesting beaked fruit as do jays, grouse and hairy woodpeckers. Good for dense clumps or hedgerows.
Notes: More common in Vermont than the American hazelnut.

Shrubs (cont.)



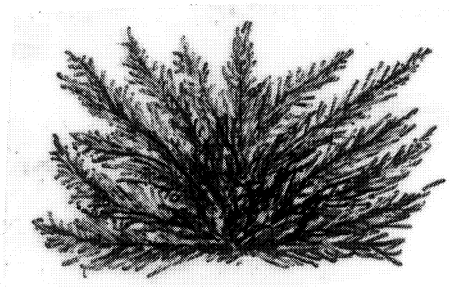
Winterberry

Witch hazel (*Hamamelis virginiana*)

Site conditions: Prefers sun but is somewhat shade tolerant. Prefers moist soils.
Growth: Large, spreading shrub or small tree 20-30 feet tall with a spread of 20-25 feet. Slow growing and hardy.
Values: Small, delicate clusters of yellow flowers in fall after leaves. Good for moist slopes or lake or stream margins as an understory species.

Winterberry (*Ilex verticillata*)

Site conditions: Full or partial sun. Moist to wet soils of many soil types.
Growth: Mature height of 6-10 feet. Matures in 6-7 years.
Values: Attractive red berries that persist into winter. Good food for songbirds. Good shrub for wet soils.
Note: Male and female flowers are on separate plants, so both are needed for pollination and berry production.



Pasture juniper

Pasture juniper (*Juniperus communis)*

Site conditions: Open sunny sites. Does well in dry, sandy soils.
Growth: Mature height 1-4 feet with a spread of 8-12 feet.
Values: Good ground cover especially in dry, sterile situations.

Sheep laurel (*Kalmia angustifolia*)

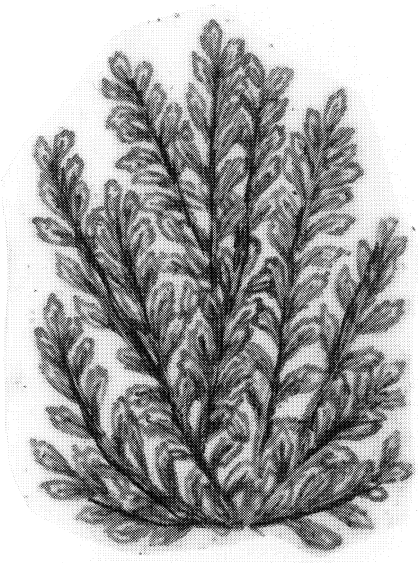
Site conditions: Prefers acid soils near or in wet situations and tolerates periodic flooding. Will tolerate drier sites. Full to partial sun.
Growth: Mature height generally up to 4 feet.
Values: Showy clusters of pink-red flowers along stem.
Note: This shrub is poisonous to livestock.

Spicebush (*Lindera benzoin*)

Site conditions: Commonly grows in moist to wet soils as an understory species.
Growth: Grows to 12 feet. Spreading.
Values: Tiny clustered yellow flowers that appear before the leaves. Leaves and flowers have a spicy, aromatic smell when crushed. Shiny red fruits are eaten by birds especially thrushes.

Sweet gale (*Myrica gale*)

Site conditions: Moist to wet soils. Full sun preferred. Grows naturally at the edges of streams and lakes and in wetlands.
Growth: Two to four feet high.
Values: Dark green attractive foliage with a fragrant odor similar to that of its relatives bayberry and sweetfern. It is a nitrogen-fixing shrub.



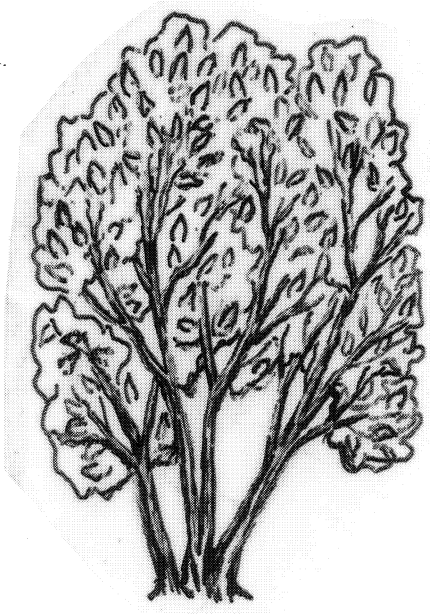
Sweet gale

Shrubby cinquefoil (*Potentilla fruticosa*)

Site conditions: Wet or dry soils that are calcium-rich. Full sun preferred but tolerates partial shade.
Growth: Mature height up to 4 feet. Slow growth.
Values: Attractive, feather-shaped leaves. Yellow flowers in summer.

Chokecherry (*Prunus virginiana*)

Site conditions: Requires sun or partial sun. Commonly found on moist soils in open situations such as along fencelines, fields, woods edges.
Growth: Up to 20-30 feet tall. Spreads with suckers to form dense clusters.
Values: Dense growth provides good cover for songbirds. Important food for game and songbirds.



Chokecherry

Shrubs (cont.)

Smooth sumac

Rhodora (*Rhododendron canadense*)

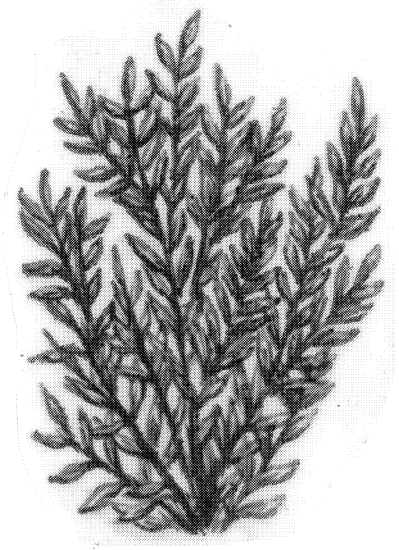
Site conditions: Moist, acid soil. Full sun.
Growth: 3 to 4 feet.
Values: Beautiful rosy purple flowers in spring before leaves emerge.

Smooth sumac (*Rhus glabra*)

Site conditions: Grows in well-drained soils and dry situations. Naturally it grows as an old field pioneer species or as a roadside or field border shrub.
Growth: Grows 9-15 feet high. Spreads by suckers.
Values: Good for mass plantings. Leaves turn orange-red in the fall.

Staghorn sumac (*Rhus typhina*)

Site conditions: Sun or shade. Well-drained soils. Also does well in low nutrient soils.
Growth: Mature height up to 20 feet.
Values: Red fall foliage and attractive crimson fruit. Fruit important for spring and fall migrating robins, thrushes, catbirds, thrashers and others.



Pussy willow

Pussy willow (*Salix discolor*)

Site conditions: Prefers full sun. Typically found in wetlands or along streamsides but will tolerate somewhat drier sites. Cold hardy.
Growth: To 20 feet. Will form large clumps.
Values: Furry staminate catkins are an early sign of spring. Catkins turn yellow at maturity. Foliage is bluish-green. Buds eaten by grouse. The twigs are a common nest site for goldfinches.
Notes: Willows are the most common shrub species in Vermont. There are a number of other native willows. Willows are easily propagated by cuttings planted directly into the ground.

Elderberry (*Sambucus canadensis*)

Site conditions: Full or partial sun. Does well in moist or wet soils on pond and stream shores.
Growth: To 12 feet. Coarsely spreading in a vase-like form.
Values: Showy white flower clusters. Small blue berries in late summer which can be used for jelly or wine. The berries are also an important summer food for many songbirds. A hardy plant which tolerates severe pruning.

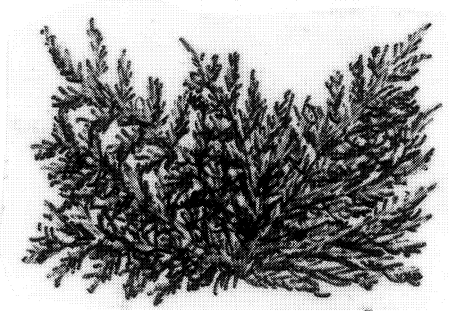
Steeplebush (*Spiraea tomentosa*)

Site conditions: Full sun. Grows in wet soils. Prefers acid conditions.
Growth: To 4 feet. Will also spread clonally.
Values: Clusters of spire-shaped pink-purple flowers. Wooly twigs and leaf undersides.
Notes: Dense, shallow root system. Fair ability to root from cuttings.

Steeplebush

American yew (*Taxus canadensis*)

Site conditions: Needs moist soils and shade. Not tolerant of heat or drought.
Growth: From 3-6 feet high by 6-8 feet wide. Grows slowly in a prostrate fashion.
Value: Good groundcover in cool, shaded situations. Provides food, cover and nesting sites for several of our common songbird species.

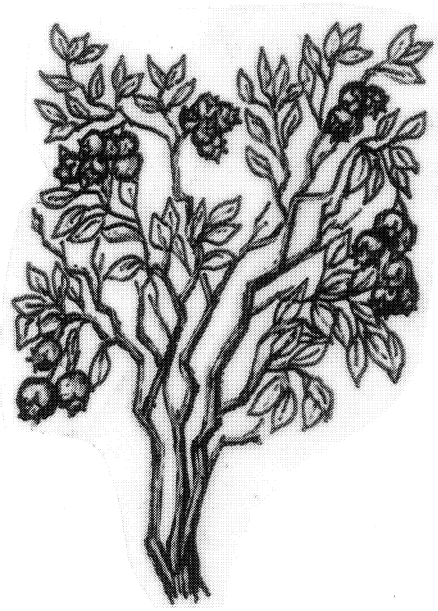


American yew

Lowbush blueberry (*Vaccinium angustifolium*)

Site conditions: Sun or shade. Grows best in poor, acid, peaty soil.
Growth: Low growing plant 1/2 to 2 feet. Spreads by underground stems.
Value: Good groundcover. Delicious berries. Scarlet foliage in fall.

Shrubs (cont.)



Highbush blueberry

Highbush blueberry
(*Vaccinium corymbosum*)

Site conditions: Sun or shade. Grows well in acid, peaty wetland soils but will also grow in drier situations.
Growth: Mature height from 6-12 feet. Branches twist and angle naturally suggesting bonsai. Overall has an oval, upright form.
Value: Has attractive features each season - small, white bell-shaped flowers, blueberries, bright red fall foliage and red winter twigs. Good food source for songbirds and small mammals.

Mapleleaf viburnum
(*Viburnum acerifolium*)

Site conditions: Full shade to sun. Grows as an understory shrub in dry woods.
Growth: Low growing to 3-6 feet. Forms clones.
Value: Three-lobed leaves that turn dusky purplish in fall. Blue-black fruits eaten by birds.

Witherod

Hobblebush (*Viburnum alnifolium*)

Site conditions: Shade to partial shade. Moist soils.
Growth: Up to 10 feet.
Value: Showy flower clusters, large heart-shaped leaves. A graceful, erect shrub.
Notes: Shallow, fibrous roots. Roots well from cuttings.

Witherod (*Viburnum cassinoides*)

Site conditions: Prefers moist, shady sites but tolerates more sun and drier conditions.
Growth: Mature height of 6-10+ feet. Medium growth rate.
Value: Prominent white flower clusters in early summer. Blue-black fruit that attract grouse, pheasant and songbirds. Red fall foliage.

Nannyberry (*Viburnum lentago*)

Site conditions: Sun or shade. Prefers rich, moist sites but also can grow well in drier soils.
Growth: To 20 feet. Spreads relatively aggressively.
Value: Retains berries late into winter and thus good for birds. Very attractive on woodland edges.
Notes: Shallow roots. Fairly good ability to root from cuttings.

Northern arrowwood

Northern arrowwood (*Viburnum recognitum*)

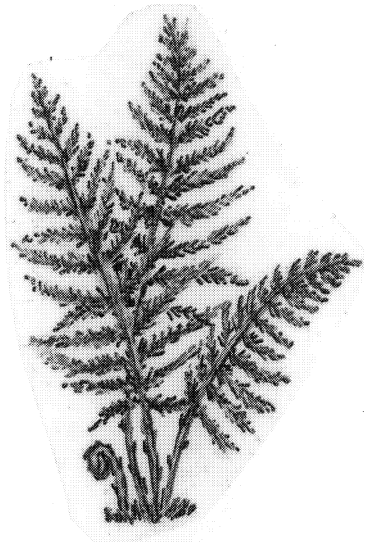
Site conditions: Sun or partial shade. Does best in moist soil.
Growth: Mature height 10-15 feet. Medium growth rate.
Value: Good cover and nest sites because it forms clumps or thickets. Attractive red fall foliage. Blue fruits eaten by many songbirds.

Highbush cranberry

Highbush cranberry (*Viburnum trilobum*)

Site conditions: Full or partial sun. Prefers moist, well-drained soils but also does well in poorly drained soil or drier situations.
Growth: Mature height of 10+ feet. Slow growth in first two years.
Values: Beautiful clusters of white flowers in early summer that are visible from a distance. Edible scarlet fruits that remain into winter. Winter food for grouse, songbirds and squirrels. Good shrubs for wet soils where a hedge or border is desired. The berries are good for preserves.

Herbaceous plants



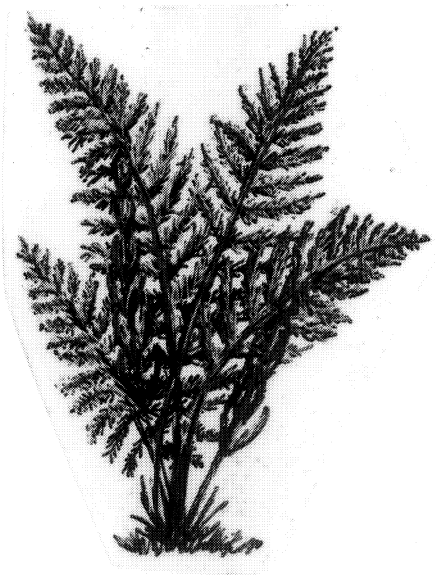
Lady fern

Lady fern (*Athyrium felix-femina*)

A medium to large, hardy, lacy-cut fern that will grow 2-3 feet tall. Typically grows in moist, partly shady areas.

Cinnamon fern (*Osmunda cinnamomea*)

A large fern that grows in vase-shaped clumps generally in wet areas. The infertile fronds have a cinnamon-colored fuzz on the stems. The fertile frond is a separate brown stalk containing the spores.



Cinnamon fern

Interrupted fern (*Osmunda claytoniana*)

A large fern that also grows in vase-shaped groups. It gets its name from the fertile portion of the fronds alternating with the infertile part.

Royal fern (*Osmunda regalis*)

A large, beautiful fern of wet soils. It can grow to 6 feet tall. It is translucent pale green in full sun and brighter green where the light is filtered.

Christmas fern
(*Polystichum acrostichoides*)

These ferns grow naturally as groundcover in wooded areas and so are shade tolerant. They do best in areas with high organic matter content. Common on rocky, wooded slopes, or along forested streambanks. Shade or partial shade.

Christmas fern

New England aster (*Aster novae-angliae*)

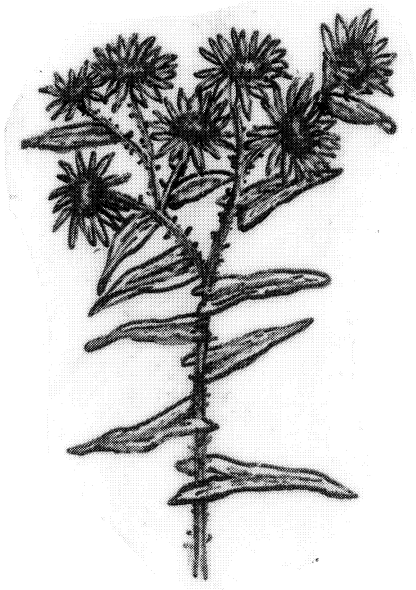
A tall, pretty, purple aster with a yellow center that will reach 4 feet high. Needs fertile soil with adequate moisture. Can reproduce by seed or rhizome.

Reed grass (*Calamagrostis canadensis*)

A tall, attractive grass up to five feet high that grows in wet soils. It forms clumps and stabilizes soil well. Its spreads slowly by rhizome.

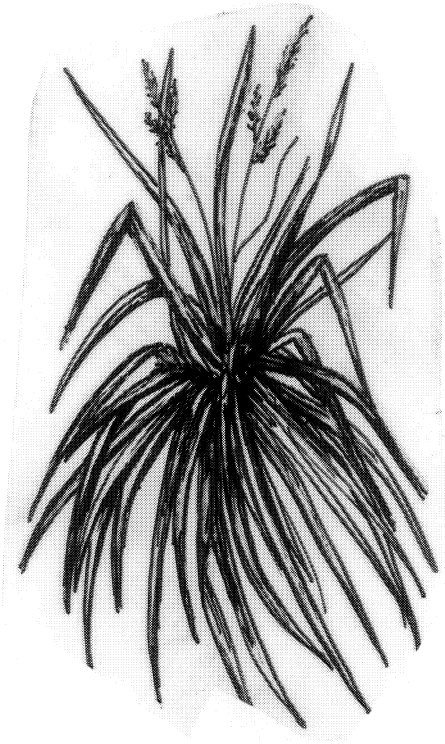
Harebell (*Campanula rotundifolia*)

A delicate wildflower with blue-lavender bell-shaped flowers. It occurs naturally in partially shaded situations usually among rocks or on ledges.



New England aster

Herbaceous plants (cont.)



Tussock sedge

Pennsylvania sedge (*Carex pensylvanica*)

This sedge is adapted to dry soils and grows in full sun to partial shade. It spreads by rhizomes and will form a low turf on sunny, dry soils.

Tussock sedge (*Carex stricta)*

A sedge that grows in wet soils and tolerates acid soils. It requires full sun. It forms clumps or tussocks. This plant provides food for a number of birds including rails, sparrows, grouse, snipe, and others.

Bunchberry

Bunchberry (*Cornus canadensis*)

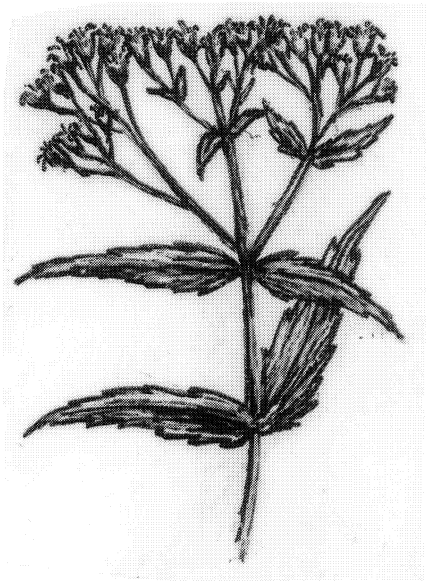
An evergreen groundcover that grows up to about 6 inches tall. It grows naturally in shady locations and needs cool, moist locations as well as acid soil. It has pretty white 'flowers' in early summer and bunches of bright red berries in late summer and fall.

Joe Pye Weed (*Eupatorium maculatum*)

An attractive plant of wet meadows with a large flat-topped cluster of fuzzy purple flowers. Prefers full sun. Will grow to 5 or 6 feet high.

Boneset (*Eupatorium perfoliatum*)

This pretty white flower often grows with Joe Pye Weed in wet meadows but it will tolerate somewhat drier soils as well. It grows 4 to 6 feet tall.



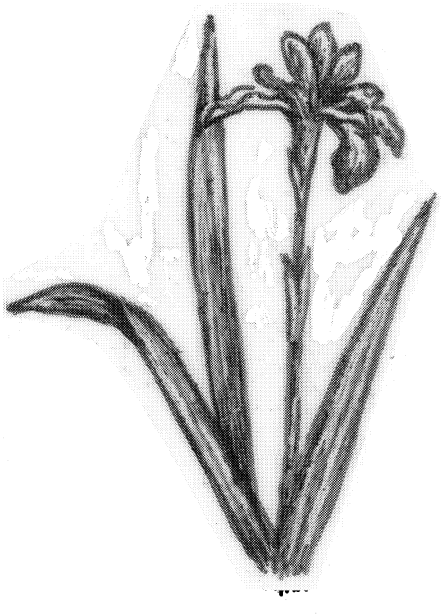
Boneset

Rattle snake mannagrass
(*Glyceria canadensis*)

A grass with a delicate but distinctive inflorescence. It will grow up to 3 1/2 feet tall and spreads at a moderate rate by rhizome. It should be planted in clusters where it has no competition from other species.

Blue flag iris (*Iris versicolor*)

This 1 to 3 foot high plant has showy flowers in late spring. It needs moist or wet soils and full sun.

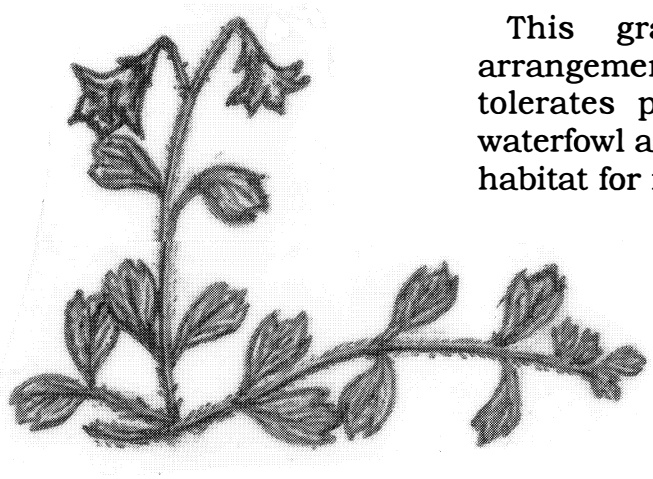


Blue flag iris

Jewelweed (*Impatiens capensis*)

Also called touch-me-not, this plant will grow on nutrient poor soils in wet to moist conditions. It will spread rapidly where there is little competion. In summer it has pretty orange flowers. In early fall the seed capsules ripen and will burst when touched.

Herbaceous plants (cont.)



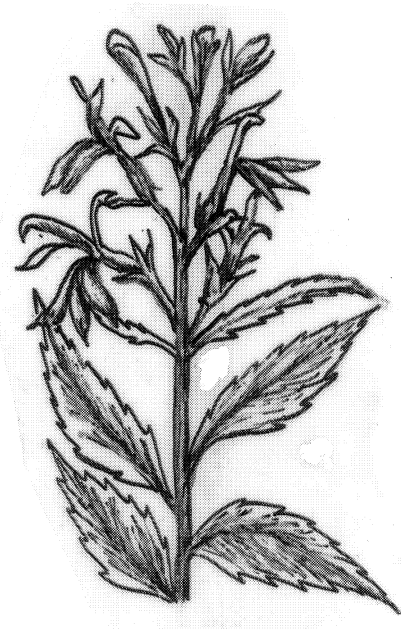
Rice cutgrass (*Leersia oryzoides*)

This grass, which has an attractive arrangement of seeds, grows in wet soils and tolerates partial shade. It provides food for waterfowl and a number of other birds as well as habitat for fish, reptiles and amphibians.

Twinflower

Twinflower (*Linnaea borealis*)

This barely woody, trailing plant has rounded evergreen leaves and beautiful, white and pink paired flowers. It needs cool, shady, moist situations.



Cardinal flower

Cardinal flower (*Lobelia cardinalis*)

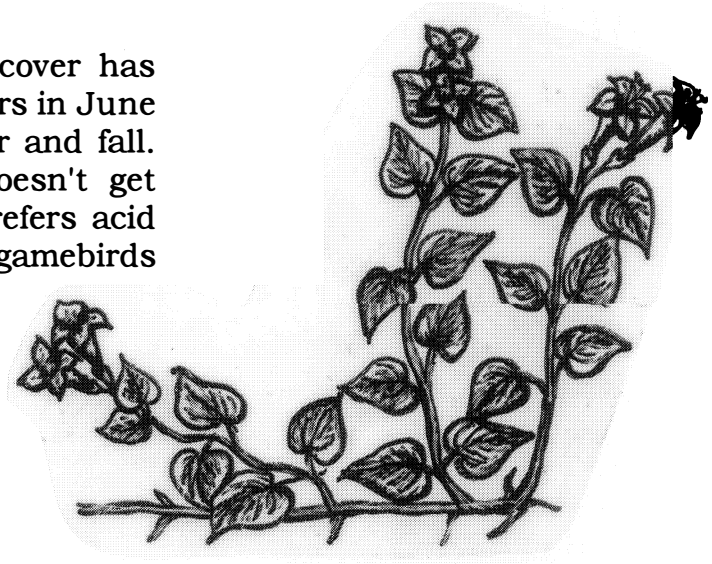
This brilliant red-flowered perennial grows 2 to 4 feet tall in wet to moist soils. It occurs naturally along streambanks and in wetlands. Hummingbirds are attracted to the flowers.

Whorled loosestrife (*Lysimachia quadrifolia*)

A pretty plant with most leaves and flowers in whorls of four. The flowers are yellow with red around the center. It grows in moist to dry upland soil and does well in partial shade.

Partridgeberry (*Mitchella repens*)

This dark green, evergreen groundcover has small leaves, pretty, paired white flowers in June and bright red berries in late summer and fall. This barely woody, trailing plant doesn't get much more than an inch high. It prefers acid soils. The fruits are eaten by some gamebirds and mammals.



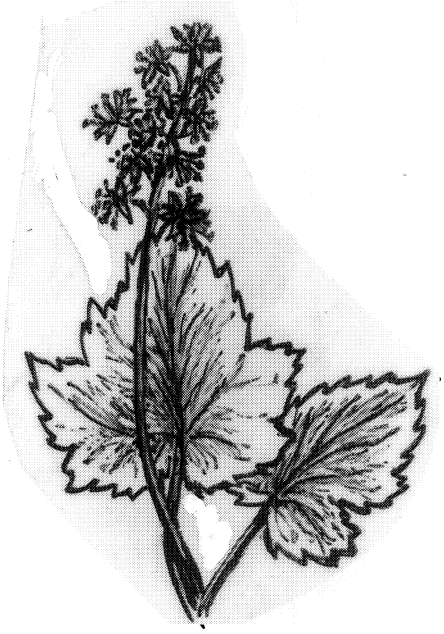
Partridgeberry

Black-eyed Susan (*Rudbeckia hirta*)

This self-seeding biennial tolerates a wide range of soil conditions. Full sun is preferred. It is easy to grow and the vivid golden color with a dark brown center would enhance any planted area.

Gray goldenrod (*Solidago nemoralis*)

A one to three foot tall goldenrod with a graceful, arching flower stalk. One of the first goldenrods to bloom. Does best on dry to medium-dry, poor soils.



Foamflower

Foamflower (*Tiarella cordifolia*)

A good flowering plant for shady, wooded sites. It prefers rich soils. The flowers are small and star-like in a loose spike.

Site Conditions for Buffer Vegetation

The two tables on the following pages contain site information for all the trees and shrubs described previously. The hope is that the tables can be used as a means of initially selecting plants that may do well on a landowners specific shoreline. Explanation of the information in the tables follows.

Column 1 - whether the species is *evergreen or deciduous.*

Column 2 - the coldest *zone* in Vermont which that plant can tolerate. A map showing the zones is on page 41.

Column 3 - the *light conditions* in which the tree or shrub will grow. The light conditions range from shade (SH) to partial shade (PS) to sun (S).

Column 4 - the *moisture conditions* in which the plant will grow including wet (W), moist (M) and dry (D).

Column 5 - the *National Wetland Indicator Status.* This status can be used to pick out the species found most often in wet situations, those that tolerate a fairly wide range of soil moisture situations (FAC plants) or those needing upland situations. A summary of these abbreviations is given below.

OBL - *Obligate Wetland Species* - occur almost always (estimated probability >99%) under natural conditions in wetlands.

FACW - *Facultative Wetland Species* - usually occurs in wetlands (estimated probability 67% - 99%) but occasionally found in nonwetlands.

FAC - *Facultative Species* - equally likely to occur in wetlands or nonwetlands (estimated probability 34% - 66%).

FACU - *Facultative Upland Species* - usually occur in nonwetlands (estimated probability 67% - 99%) but occasionally found in wetlands (estimated probability 1% -33%).

upland - *Obligate Upland Species* - either occur in wetlands in another region but occur almost always (estimated probability >99%) under natural conditions in nonwetlands in our region or a species does not occur in wetlands in any region.

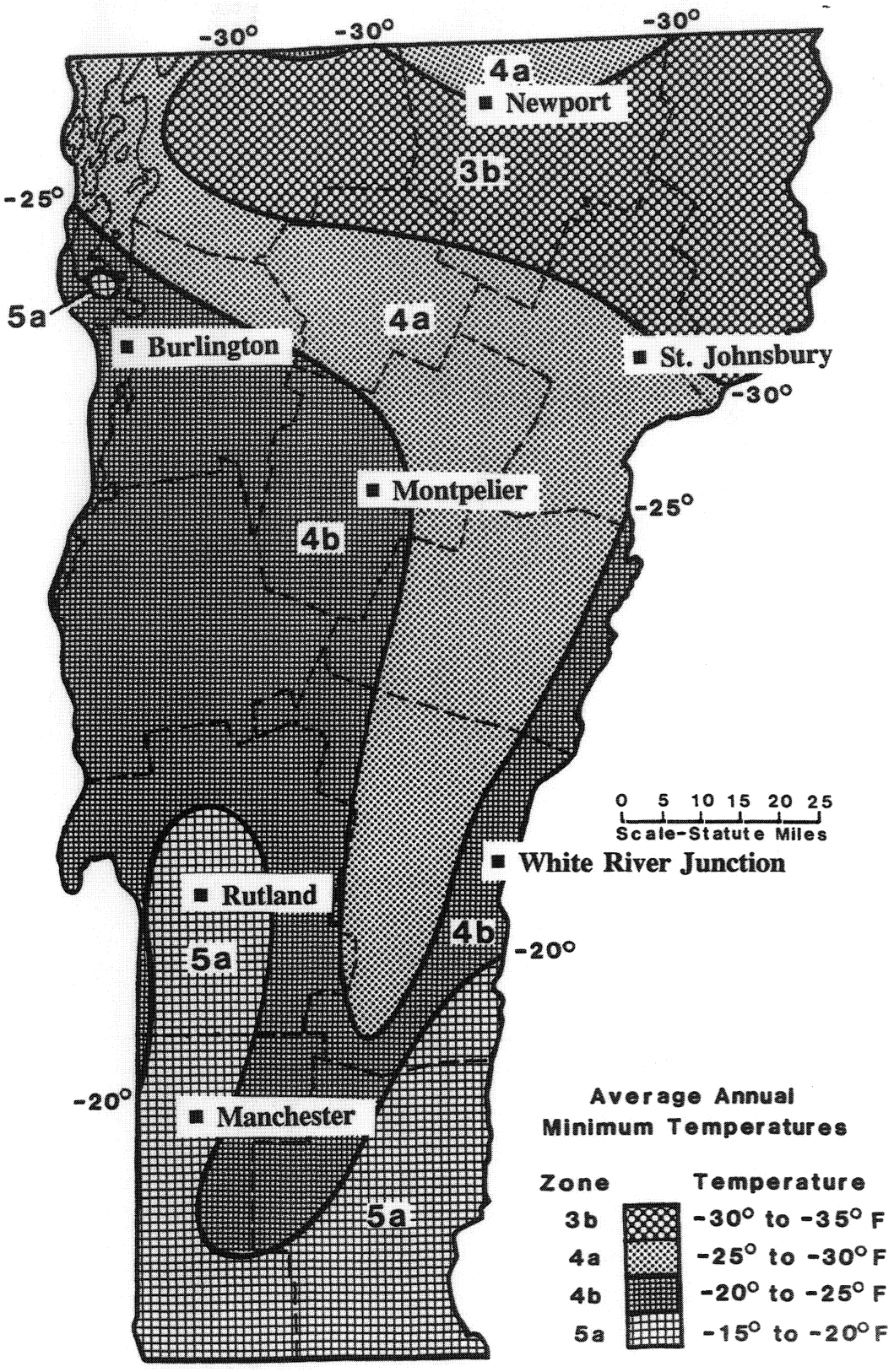
Table 1. Site Conditions for Buffer Vegetation - Trees

Plant species	Evergreen or deciduous	Vermont hardiness zone	Light	Soil moisture	Wetland indicator status
Balsam fir	E	3B	S,PS	W,M	FAC
Box elder	D	3B	S,PS	W,M,D	FAC
Striped maple	D	3B	PS	M	FACU
Red maple	D	3B	S	W,M,D	FAC
Silver maple	D	4A	S	W,M	FACW
Sugar maple	D	3B	S	M	FACU
Serviceberries	D	4A	S,PS	M	—
Yellow birch	D	3B	PS,SH	M	FAC
Paper birch	D	3B	S	M,D	FACU
American hornbeam	D	3B	S-SH	W,M,D	FAC
Pagoda dogwood	D	3B	S-SH	M	upland
American beech	D	3B	S	M,D	FACU
White ash	D	3B	S	M	FACU
Green ash	D	3B	S,PS	W,M	FACW
Larch	D	3B	S	W,M	FACW
Hop hornbeam	D	4B	S,PS	M,D	FACU
White spruce	E	3B	S,PS	M	FACU
Red pine	E	3B	S	D	FACU
White pine	E	3B	S,PS	M,D	FACU
Balsam poplar	D	3B	S	W,M	FACW
Cottonwood	D	3B	S	M	FAC
Bigtooth aspen	D	4A	S	M,D	FACU
Quaking aspen	D	3B	S	M,D	FACU
Canada plum	D	3B	S-SH	M,D	upland
Northern red oak	D	3B	S,PS	M,D	FACU
White cedar	E	3B	S	W,M	FACW
Basswood	D	3B	S-SH	M	FACU
Eastern hemlock	E	3B	S-SH	W,M	FACU

Table 2. Site Conditions for Buffer Vegetation - Shrubs

Plant species	Evergreen or deciduous	Vermont hardiness zone	Light	Soil moisture	Wetland indicator status
Speckled alder	D	3B	S-SH	W,M	FACW
Black chokeberry	D	4B	S,PS	W,M,D	FAC
Buttonbush	D	4B	S,PS	W	OBL
Sweet fern	D	3B	S,PS	D	upland
Beaked hazelnut	D	5A	S,SH	M,D	FACU
Silky dogwood	D	4A	S,PS	W,M	FACW
Red-osier dogwood	D	3B	S,PS	W,M	FACW
Witch-hazel	D	4A	S-SH	M	FAC
Winterberry	D	3B	S,PS	W,M	FACW
Pasture juniper	D	3B	S	D	upland
Sheep laurel	semi-E	3B	S,PS	W,M,D	FAC
Spicebush	D	5A	S-SH	W,M	FACW
Sweet gale	D	3B	S	W	OBL
Shrubby cinquefoil	D	3B	S,PS	W,M,D	FACW
Chokecherry	D	3B	S,PS	M	FACU
Rhodora	D	3B	S,PS	W,M	FACW
Smooth sumac	D	3B	S	D	upland
Staghorn sumac	D	3B	S-SH	D	upland
Willow	D	3B	S	W,M	FACW
Elderberry	D	3B	S,PS	W,M	FACW
Steeplebush	D	3B	S	W,M	FACW
American yew	E	3B	SH	M	FAC
Lowbush blueberry	D	3B	S	M,D	FACU
Highbush blueberry	D	3B	S-SH	W,M,D	FACW
Maple-leaf viburnum	D	3B	S-SH	D	upland
Hobblebush	D	4A	SH	M,D	FAC
Witherod	D	3B/4A	PS,SH	W,M	FACW
Northern arrowwood	D	3B	S,PS	M	FACW
Nannyberry	D	3B	S-SH	M,D	FAC
Highbush cranberry	D	3B	S,PS	W,M	FACW

PLANT HARDINESS ZONES IN VERMONT



Source: University of Vermont Extension Service

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