

# Planting Riparian Buffers

*in the Connecticut River Watershed*

*You want a riparian buffer. How do you turn a bare riverbank into a buffer that works for clean water, stable banks, fish habitat, birds, and wildlife? You have two choices: let nature do the work, or give it a hand to speed things up.*

## NATURAL REVEGETATION

Simply ignore your riverbank by creating a no-mow zone, and see what happens. Birds, squirrels, wind, water, and wandering roots from nearby plants will find their way to your streambank, delivering your future forest in the form of seeds, nuts, berries, and runners. Over time you can add plants you want and remove non-native or unhealthy ones. This is the easiest and cheapest way to encourage a buffer, and you won't need a permit, but you'll have to wait awhile and if your bank is poorly vegetated, it may erode in the meantime.

## ACTIVE REVEGETATION

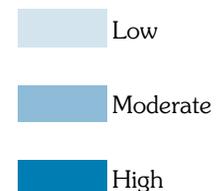
If you want quicker results or wish to encourage certain plants, establish cuttings or nursery grown stock. See the companion sheet No. 10 in this series for sources of advice and financial assistance for installing a riparian buffer.

### DEVELOP A PLANTING PLAN

- ☉ Determine a schedule that gets the plants in the ground when they are ready to grow. Plant trees and shrubs when they are dormant, in early spring before bud break and after the ground thaws or in autumn after leaf fall.
- ☉ Identify the work zone in the field. Consider property boundaries, permit restrictions, utilities, special natural/cultural features, and sensitive habitat.
- ☉ Draw out a design to help you decide how many plants are needed. Be sure there are enough to be effective. Plan on spacing shrubs 3-5' apart, small trees (25' at maturity) 15' apart, large trees 25' apart, and ground covers 1-3' apart. This spacing will result in a dense buffer at maturity, assuming that all plants survive. Wider spacing could still provide water quality protection but would allow more view.
- ☉ Consider soils—are they well drained or saturated? Some plants are used to wet feet.
- ☉ Confirm sources of materials and check their quality.
- ☉ Obtain any necessary permits.

### Effectiveness of Different Vegetation Types for Specific Buffer Benefits

BENEFITS	grass	shrubs	trees
stabilize streambank	Low	Moderate	High
filter sediment and the nutrients, pesticides, & pathogens bound to it	Moderate	Moderate	High
filter nutrients, pesticides, and microbes from surface water	Moderate	Moderate	High
protect groundwater and drinking water supplies	Low	Moderate	High
improve aquatic habitat	Low	Moderate	High
improve wildlife habitat for field animals	High	Moderate	Low
improve wildlife habitat for forest animals	Low	Moderate	High
provide economically valued products	Moderate	Moderate	High
provide visual interest	Low	Moderate	High
protect against flooding	Low	Moderate	High



## Select the Plants

**Natural selection has already chosen the best plants for the Connecticut River watershed.** Visit a streambank near you to see what has proven well suited to this environment. The more natural the buffer vegetation, the more natural it will look and the better it will do its job. Natives may also require less care than non-native plants. Besides, native plants and native birds, butterflies, and wildlife are well matched. The enclosed plant list describes trees, shrubs, groundcovers, and vines native to the Upper Connecticut River Valley of New Hampshire and Vermont, their soil and light preference, rooting traits, bank stabilizing properties, and ornamental and wildlife value. Your county district conservationist or extension agent may have further recommendations.

**Try for a mix of different kinds of plants** to provide more diverse habitat and a prolonged and varied leaf fall to meet the energy and pupation needs of aquatic insects. It will also help avoid trouble with pests that attack specific plants. Be sure to include deciduous plants, since their leaf litter is important for trapping nitrogen.

**Favor plants that have multiple values** such as erosion control, those suited for timber, biomass, nuts, fruit, browse, and nesting. Don't forget aesthetics — consider seasonal foliage color, flowers, fruits, and branching habit. Native perennials provide blooms and attract butterflies. Berry-bearing shrubs attract birds.

**Plant dominant species** or those which are unlikely to colonize the site readily, such as oaks, rather than planting all the possible appropriate species. The height of streamside vegetation should equal or exceed the stream width to provide adequate shade to keep the water cool.

## Understand Natural Succession

Plant communities naturally change over time, and while you may set the stage, nature will take care of putting on the show. Pioneer species adapted to bare soils and lots of light are gradually replaced by longer-lived species that can grow and reproduce under more shaded and protected conditions. If you plant early successional species to stabilize an eroding streambank, expect that longer-lived plants will eventually take over. Where conifers tend to follow riparian hardwoods, generally north of Route 2 in the northern Connecticut River Valley, plant conifers among blocks of pioneer species to speed the transition.

## Sources of Plant Material

The no-cost approach is to move young plants to your buffer from elsewhere on your own property. You can dig or take cuttings of *common* woody plants in the wild using sharp, clean equipment. If you would like to take cuttings or transplant from someone else's property, be sure to ask the landowner's permission.

Willows, which are excellent for stabilizing shorelines, grow readily from cuttings of stems even as thick as your arm. Keep them moist and replant deeply the same day. Do not try to transplant wildflowers from the wild—it is rarely successful and is illegal without the landowner's permission.

For more reliable—but more expensive—plant material, buy nursery-grown bare rooted, potted, or burlap-wrapped plants from a responsible supplier. Bring your plant list with you—your nursery may have it but not know it's native. Ask about the source of any plant material before purchasing it. Collection of uncommon wild plants from wild populations could threaten their survival. The Agency of Natural Resources offers a booklet on sources of native plant materials in Vermont.

## PREPARING THE SITE FOR PLANTING

If you have an unstable bank, deal with this first. Consult *The Challenge of Erosion in the Connecticut River Watershed*, published by the Connecticut River Joint Commissions. Your county Conservation District office has an inventory of erosion sites on the Connecticut River mainstem, and plenty of good advice.

Before planting, control invasives and competing vegetation. Mechanical control of undesirable plants is preferred in riparian buffers because chemicals can quickly enter the water system. Cover bare soil where trees and shrubs are to be planted with less-competitive cool season grasses to hold the soil and discourage weeds until woody plants become established. Otherwise, use properly installed sediment and erosion control such as silt fencing and straw bales. Check its effectiveness after every rain storm.

## Avoid these invasives:

### TREES

Black locust *Robinia pseudoacacia*

Glossy buckthorn  
*Rhamnus frangula*

Norway maple  
*Acer platanoides*

Tree of heaven  
*Ailanthus altissima*

White cottonwood  
*Populus alba*

### SHRUBS

Common buckthorn  
*Rhamnus cathartica*

Common barberry  
*Berberis vulgaris*

Japanese barberry  
*Berberis thunbergii*

Multiflora rose  
*Rosa multiflora*

Autumn olive  
*Eleagnus umbellata*

Russian olive  
*Eleagnus angustifolia*

Privet hedge  
*Ligustrum vulgare*

Blunt-leaved privet  
*Ligustrum obtusifolium*

Burning bush  
*Euonymus alatus*

Tatarian honeysuckle  
*Lonicera tatarica*

Bell's honeysuckle  
*Lonicera X bella*

Bush honeysuckle  
*Lonicera xylosteum*

Japanese honeysuckle  
*Lonicera japonica*

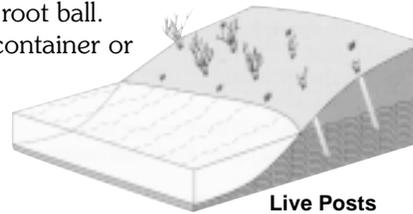
Fly honeysuckle  
*Lonicera morrowii*

Amur honeysuckle  
*Lonicera maackii*

or *L. "Rem Red"*

## PLANTING THE RIPARIAN BUFFER

- ✗ Avoid use of heavy equipment near the stream edge. Where the ground is wet or soft, use light tracking equipment with low pressure tires or rubber tracks.
- ✗ Arrange plantings to create a gradual edge rather than an abrupt one, for a more natural appearance and for blowdown protection.
- ✗ For woody cuttings or live posts, drive them deeply into the soil, allowing a foot or so to remain exposed.
- ✗ For rooted plants, prune any large damaged roots before planting. Set plant in a hole 2-3 times as wide but only as deep as the root ball. Plant at the same depth it was growing in the container or before transplanting. Fill in the hole gently but firmly with the original soil, watering to settle the soil.
- ✗ Plant understory species later, which usually do not tolerate full sun.
- ✗ Water regularly once a week through the first growing season. Take care not to start gullies or erosion.
- ✗ Use only lime or wood ash to fertilize in the buffer zone.
- ✗ Mulching limits surface erosion, suppresses weeds, and retains soil moisture. Use organic mulches such as leaf humus, wood chips, pine mulch, or other shredded bark. Avoid redwood or cedar, since they are toxic to some seedlings and their chemistry interferes with buffer function. Stockpile fresh wood chips for at least 6 months before using, to avoid introducing disease and other troubles. Straw is commonly used but can introduce undesirable seeds.
- ✗ Fencing is useful to control grazers, equipment, onlookers, and vandals. To deter small mammals from girdling saplings, surround individual plants with simple chicken wire or use below-ground collars. Deer require robust fencing only until well-chosen plants are established. Use temporary fences on flood plains; permanent fences can be used elsewhere.



## MAINTENANCE

Inspect plantings and erosion control after rainstorms and regularly every 2 weeks for the first 2 months; then once/month for 6 months, then every 6 months for 2 years. Look for stressed or failed plants, invasives, weed competition, deer or beaver browsing, ineffective erosion control, debris accumulation, and encroachments. For urban plantings, alert neighboring residents on what to look for and whom to call if they see problems such as sediment-laden runoff. Prevention is easier than trying to control active erosion.

Anticipate the need to replant if the buffer is subjected to prolonged high water, drought, or ice damage before plants are fully established.

Leave vegetation undisturbed along the riverbank except for individual trees presenting unusual hazards such as blocking culverts. On a larger river, remove a large leaning tree only if it threatens to pull its root ball and part of the riverbank into the water. On a smaller stream, leave such trees undisturbed to provide fish cover, unless they threaten to cause flooding. Where debris dams must be removed, try to retain useful stable portions, and deposit removed material far enough away so that it will not be refloated by high water.

Manage a wooded buffer as an uneven-aged stand to make sure it provides continuous cover now and in the future. Leave leaf litter and undergrowth undisturbed in the stream-side zone, and as much as possible in the middle zone. Mow grass in the outer zone, and remove clippings to remove the nutrients captured by the plants. Avoid using fertilizers (other than lime or wood ash) or pesticides near the stream.

## USEFUL RESOURCES

*Sources of Native Plant Materials in Vermont*, VT Agency of Natural Resources, Division of Water Quality, 1999.

*Native Vegetation for Lakeshores, Streambanks, and Wetland Buffers*, VT Agency of Natural Resources, Division of Water Quality, 1994.

## Avoid these invasives:

### VINES

Black swallowwort  
*Vincetoxicum nigrum*  
& *V. rossicum*

Kiwi vine  
*Actinidia arguta*

Oriental or Asiatic  
bittersweet

*Celastrus orbiculatus*

Porcelain berry

*Ampelopsis*  
*brevipedunculata*

Silver fleece vine

*Polygonum aubertii*

### HERBACEOUS PERENNIALS

Bishop's weed or  
goutweed

*Aegopodium*  
*podagraria*

Celandine

*Chelidonium majus*

Flowering rush

*Butomus umbellatus*

Garlic mustard

*Alliaria petiolata*

Giant reed

*Phragmites australis*

Japanese bamboo  
or knotweed

*Polygonum cuspidatum*

Purple loosestrife

*Lythrum salicaria*

Yellow iris

*Iris pseudoacacia*

### REFERENCE:

*Connecticut River Watershed/Long Island Sound Invasive Plant Control Initiative Strategic Plan*, 1999.

For more information on invasive plants, contact the Silvio O. Conte National Fish & Wildlife Refuge  
38 Avenue A,  
Turners Falls MA 01376  
413/863-3070  
[www.fws.gov/r5soc](http://www.fws.gov/r5soc)

## BUFFER PLANTS FOR SPECIAL PURPOSES

### **Economically Valuable Crops from the Forested Riparian Buffer**

- ✿ **aromatics:** essential oils from plant leaves, seeds, bark, roots. Cedar oil is especially profitable; balsam pillows are a time-honored product of the northern forest. The smoke from woods such as alder, apple, maple, hickory, and cherry is used as a flavor enhancer, especially in grill cooking.
- ✿ **nuts:** black walnuts, butternuts.
- ✿ **mushrooms:** shiitake mushrooms, grown on culled oak logs, are now the second most important mushroom on the market.
- ✿ **decoratives:** many kinds of cones, from tiny alder to the pine, are used in floral, wreath, and potpourri products, or dipped in wax and sold as firestarters. Club mosses such as ground pine or ground cedar are used for wreaths and enclosed planters. Birch bark is in demand for rustic home furnishings.
- ✿ **weaving and dyeing materials:** black ash splints for baskets, grape vines for wreaths, and bark from alder, birch, hickory, poplar, and willow for dyeing wool.
- ✿ **specialty woods:** burls and crotches of walnut, cherry, maple, birch, and cedar are used for decorations and carvings. Cedar veneer is also in demand.
- ✿ **pharmaceuticals:** the root of ginseng, a forest wildflower, is highly sought as a medicinal plant. \$70 million of ginseng root is exported annually, principally to Asia.

### **Plants for Problem Visitors**

- 🦌 **deer:** non-native plants may attract deer. Use native plants known to be less palatable to them. Plants of low value to deer include alder, spruce, hemlock, tamarack, beech, hornbeam, and viburnum. Dogwoods, willows, ash, and yellow birch will endure heavy browsing, and sprout again. Mixing shade tolerant canopy trees among faster growing trees will reduce deer browsing on future dominant species.
- 🦫 **beaver:** dam building, bank burrowing, tree cutting, and flooding are common challenges for landowners who share their land with beavers. Beaver forage on the bark and twigs of trees such as apple, alder, ash, aspen, birch, cherry, maple, pine, poplar and willow. Less palatable are spruce, white cedar, hemlock, tamarack, beech, red maple, and paper birch. Use chicken wire around stems to discourage them.
- 🦆 **Canada geese:** plant a dense barrier of shrubs to discourage geese from using a lawn—they like a sight line to the stream. Low shrubs are sufficient and will not block the view for human residents.
- 🚶 **Trespassing humans:** living barriers such as blackberry or raspberry can work better than “no trespassing” signs.

### **Fact sheets in the series *Riparian Buffers for the Connecticut River Watershed***

- No. 1 Introduction to Riparian Buffers
- No. 2 Backyard Buffers
- No. 3 Forestland Buffers
- No. 4 Buffers for Habitat
- No. 5 Buffers for Agricultural Land
- No. 6 Urban Buffers
- No. 7 Guidance for Communities
- No. 8 Planting Riparian Buffers (& plant list)
- No. 9 Field Assessment
- No. 10 Sources of Assistance

See also the companion series for land owners:

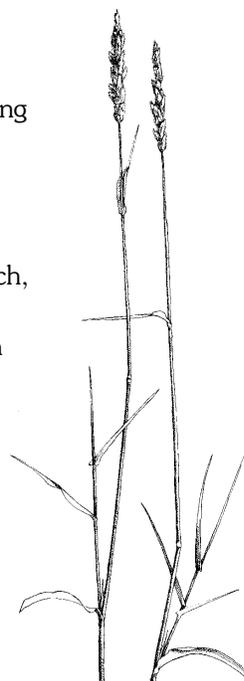
### **The Challenge of Erosion in the Connecticut River Valley**, Connecticut River Joint Commissions, 1998.

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**Reed canary grass**  
*Phalaris arundinacea*

*Plant only where essential for soil stability.*