

Riparian Buffers for Wildlife

Riparian buffers protect water quality by intercepting sediment and pollution from agricultural fields, residential lawns, roadways, and other sources. This improves habitat for aquatic wildlife while providing food, cover, water, and breeding areas for many other kinds of wildlife.

Riparian forests have been severely damaged or removed for many human uses, including agriculture, timber harvesting, development, and recreation. Losing these buffers has negatively affected wildlife habitat and water quality throughout the state.

If you own agricultural fields that border a wide river, a cabin near a large lake, or even a small stream in your backyard, you can improve water quality and wildlife habitat by creating a riparian buffer. Restoring and maintaining riparian buffers may take time, money, and effort, but plenty of assistance is available to help you through the process. This fact sheet provides the information you will need to create an effective riparian buffer for wildlife while protecting water quality for everyone.

Benefits of Riparian Buffers

Riparian buffers offer many benefits for wildlife; but they also improve water quality for humans. In general, the wider and more diversely planted the buffer, the more likely it is to yield positive benefits. A riparian buffer:

■ Traps sediment.

Runoff from agricultural fields, lawns, and roads is deposited in the buffer rather than being allowed to enter the water. Trees and shrubs along a stream bank help to keep moving water from eroding the bank, further reducing sedimentation rates.

■ Traps nutrients and pollutants.

Excessive amounts of pesticides, fertilizers, and animal wastes from farms, lawns, and roadways can seriously disrupt an aquatic system. Fertilizers that make a lawn green and lush and that make corn grow also encourage high levels of plants and algae in a stream, which depletes oxygen levels. A good riparian buffer can remove up to 80 percent of excessive nutrient inputs.

■ Recharges groundwater.

A riparian buffer prevents surface runoff from moving too quickly over the land before it can filter into the soil and recharge groundwater supplies. This also helps to control flooding as well as maintain adequate flow during dry times.

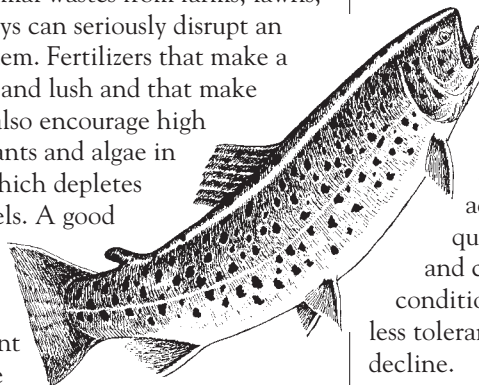
■ Provides better habitat for fish.

Fish depend on a good aquatic habitat, and a stream without a riparian buffer is not likely to support good fish populations. Resident fish such as trout, as well as migratory fish like the American shad, depend on the quality of each “link” in the stream system. A poor or nonexistent riparian buffer can affect fish both directly and indirectly. Too much fine sediment caused by erosion and runoff can be especially damaging to fish by clogging their gills and smothering spawning sites for both fish and aquatic insects. A lack of trees along the riparian zone can cause higher water temperatures, which may ultimately deplete oxygen levels in the water.

A riparian buffer helps to supply organic materials (leaves and woody debris), which provide food for aquatic invertebrates (and these, in turn, provide food for wildlife). A buffer serves as the basis for a more diverse structural habitat for all aquatic life. As a stream system’s quality declines, fish like catfish and carp, more tolerant of poor conditions, begin increasing, and those less tolerant, such as trout, begin to decline.

■ Improves habitat for other wildlife.

A good riparian buffer provides food, shelter, water, and breeding sites for birds, mammals, amphibians, and reptiles. Which species will be found in riparian habitats largely depends on the type and size of the water source (wetland, river, stream, lake, or pond), as well



as the habitat within the riparian buffer (diversity of tree species, availability of nest and perch sites, frequency of flooding, etc.). For example, some smaller mammals such as the eastern cottontail, white-footed mouse, and meadow vole may be found in any riparian buffer as long as some cover is available. Other mammals, like the mink, look for expanses of riparian forest with scattered down trees, which provide shelter near streams and ponds.

Birds like the alder flycatcher are likely to be found only near streams with a thick understory of shrubs, whereas the pileated woodpecker can be found in nearly any type of mature riparian forest, as long as large trees are available for nest cavities. Amphibians like the Eastern hellbender and mudpuppy, which require water throughout their life cycles, need clear, fast-moving streams with snags and an abundance of aquatic insects for food.



Belted kingfisher

Along ponds and lakes, bullfrogs, green frogs, cricket frogs, and American toads lay their eggs in the shallow waters and then use upland riparian areas for foraging and shelter. The wood turtle overwinters in smaller headwater streams but uses adjacent riparian areas to forage and breed; and the Northern watersnake forages for food along stream edges.

Planning Your Riparian Buffer

When planning your buffer, it is best to work with someone who is familiar with riparian restoration. This person can help you consider all that is necessary to make the best decisions given your land, time, and money constraints.

A riparian buffer is usually conceptualized as consisting of three zones. Each zone's basic design and function, along with its possible wildlife benefits, are shown in the diagram on the opposite page. Zone 1 begins at the water's edge, and Zones 2 and 3 move inland. Each zone has a different mixture of trees, shrubs, or grasses; the composition and the width of each depends on the size of the water body, the intensity of upstream land use, the wildlife benefits desired, and other factors.

In addition to wildlife needs, many other factors influence buffer design. Some of the more practical considerations in deciding how to create a riparian buffer are as follows:

■ Buffer width

While wildlife use may be your primary consideration, hydrology, prior land use, slope of the land, and desired water quality benefits are a few of the many considerations in determining zone and total buffer width. For example, a small stream with minimal inputs from adjacent land use may require only a small Zone 1 to improve aquatic habitat, while a larger water body with intense adjacent land use might require larger areas of each of Zones 1–3 to provide water protection and wildlife habitat. If you live near a lake or pond you may simply be able to leave the area adjacent to the water unmowed or planted with wildflowers, especially if fertilizers or

pesticides are not used. In areas with excess sedimentation problems, you may want to consider planting more of your total buffer in grasses (Zone 3), which help to hold the soil.

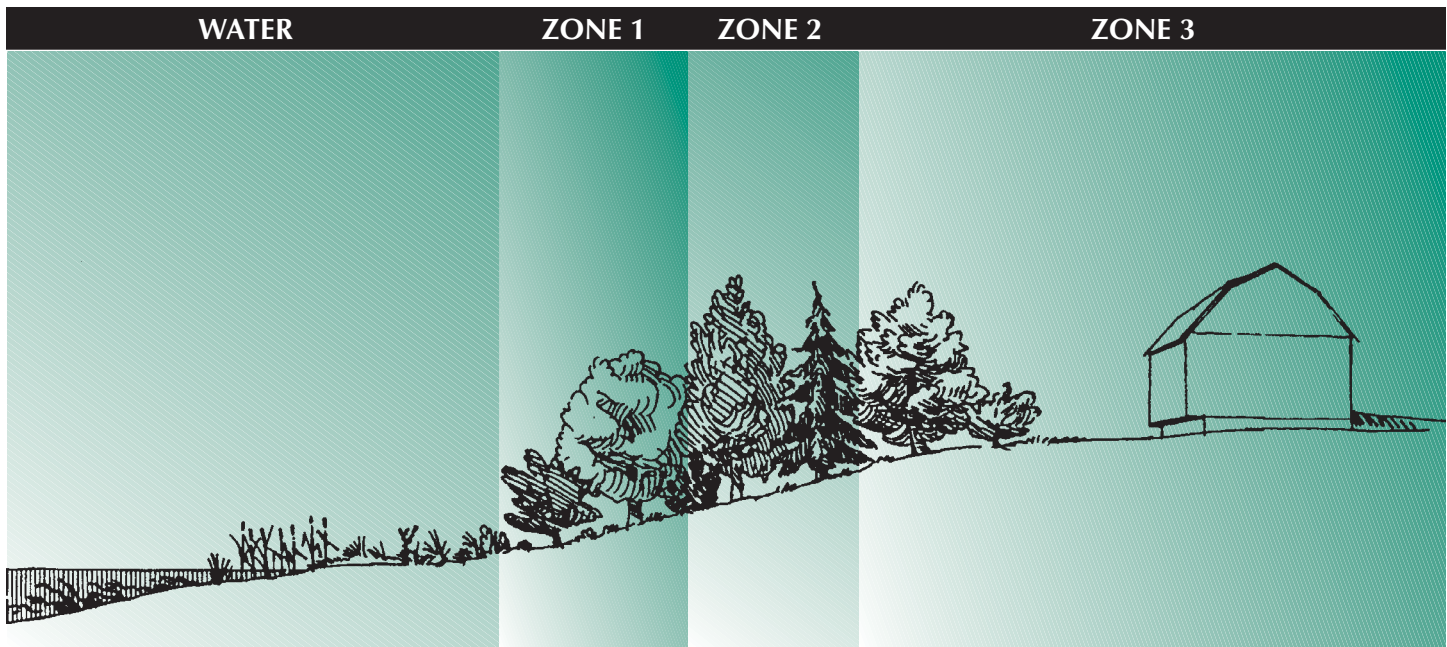
A total width of 25–50 feet from the stream's edge is usually the minimum suggested as an effective buffer for bank stabilization and water quality control, but most wildlife require wider buffer widths. As the size of the buffer increases, the benefits for both wildlife and water quality increase. Providing a very small buffer (less than 25 feet) may not be very useful for wildlife, but it would still have some water quality benefits. Small mammals generally require 20–30 feet of buffer, while amphibians can require anywhere from 10 feet to 300 feet. Birds that prefer edge habitat use almost any size of buffer, but many more area-sensitive species need at least a 100- to 300-foot riparian buffer. If you have only a small area of land to put into a riparian buffer, consider planting species such as fruit-bearing shrubs or trees that will afford the most benefits for wildlife.

■ Current adjacent land uses

The recommended minimum buffer width depends on the adjacent land use. For example, is the land adjacent to the water agricultural, a residence, or in commercial use? If it is agricultural, does the farmer use best management practices, or are there heavy inflows of excess fertilizer, animal waste, or pesticides into the water? Agricultural land that contributes heavy loads of sediment and other pollutants requires a larger buffer than a single residence where no chemical pesticides or fertilizers are used.

■ Creating corridors

A riparian buffer is more valuable to wildlife if it is connected to similar habitat areas. A small patch of riparian forest will not attract the same diversity of wildlife as one made larger by being connected to additional habitat of the same type. Connectivity is especially important for some amphibians, which move to upland habitats after the breeding season and avoid crossing dry, open areas.



ZONE 1

Purpose

- To provide bank stabilization as well as shade and organic inputs for the stream system.

What to plant

- Larger trees and shrubs typically are planted in this zone to increase stability; they should be species that tolerate wet conditions.

Potential wildlife benefits

- Shades water to keep temperatures cooler for fish.
- Organic inputs from trees provide food for aquatic insects, which in turn provide food for fish, amphibians, and birds.
- Branches falling into stream can provide structure as well as hiding places for small fish and insects.
- Bats forage for insects near water.
- The belted kingfisher uses overhanging branches to forage for fish.
- Wood ducks use cavities or nest boxes along larger streams for nesting.
- Trees like the river birch are hosts for butterflies like the tiger swallowtail.

ZONE 2

Purpose

- This zone is usually a managed forest or mixed forest-shrubland. The vegetation here helps to absorb excess nutrients such as nitrogen and phosphorus, preventing them from entering the water. This zone also helps slow runoff and allows it to recharge the groundwater supply.

What to plant

- A diverse array of native trees and shrubs.
- Can also be used for economic benefit (limited timber harvest, nuts, mushrooms, etc.).

Potential wildlife benefits

- Travel corridor for wildlife.
- Migrating birds find insects and fruits on shrubs and trees during stopovers.
- Deer, birds, and other wildlife use evergreen shrubs and trees as winter cover.
- Native shrubs and small trees like American holly, inkberry, persimmon, and gray dogwood provide fruit for many wildlife species throughout the year. Larger trees like red oak supply acorns for mammals and waterfowl during the fall.
- Amphibians use seasonal pools of water within low spots for breeding.

Some salamander species place their eggs on wet logs or rocks.

- Fallen trees can provide dens or shelter for some mammals.
- Bats roost in large standing cavities.

ZONE 3

Purpose

- Planted as grassland or a mix of grasses and wildflowers. In residential areas, gardens or compost piles can be established here. In agricultural areas, this zone can be important for slowing runoff and trapping sediment.

What to plant

- Native grasses, wildflowers, or gardens if being used near agricultural or residential areas. Can also be planted in shrubs or trees where there is not high sediment runoff.

Potential wildlife benefits

- Hummingbirds use certain wildflower species for nectar.
- Butterflies and moths use certain wildflower species for nectar and as host breeding plants.
- Large areas of grassy habitat can attract breeding grassland birds.
- Nest boxes can be used to attract bluebirds and tree swallows.

■ Slope of the land

Where the riparian area has a very steep slope leading to the water, a wider buffer is necessary to slow runoff traveling over the land to the water. Planting more of the total buffer in grasses rather than trees or shrubs can help to spread and slow runoff, allowing it greater infiltration into soil.

■ Current condition of the stream and stream bank

A Stream Visual Assessment (see Sources of Assistance and Additional Information) can help you determine the overall condition of your stream. If the stream bank is very eroded or the stream has been channelized, additional work may be needed before the riparian areas can be replanted. This will likely incur additional costs, and professional assistance may be necessary.

■ Existing soil conditions

The pH of the soil in your riparian buffer and its composition will determine what types of plants to use. In addition, well-drained soils absorb runoff more quickly, requiring a smaller buffer width, while poorly drained soils require a wider buffer.

■ Need for other economic benefits

Some landowners use riparian buffers for supplemental economic benefits as well. Limited timber harvesting can be allowed in Zone 2, as long as some standing snags are left for nesting and perching sites. Other crops you can grow and harvest include black cherry (specialty wood), exotic mushrooms (e.g., shitake), or herbal plants (e.g., ginseng).

■ Technical and financial assistance

Many programs for both farmers and residential landowners can provide monetary assistance, technical advice, and labor for a riparian buffer project. In

addition, many local organizations can furnish volunteers to help replant riparian areas. Before starting any project, check with these sources and with your county extension office and county conservation district office to make sure the project is appropriate for existing zoning regulations.

Enhancing Wildlife Habitat and Water Quality

Once you have assessed current conditions on your land, it is time to figure out your goals for the wildlife that may be using your buffer. You might only be interested in improving stream quality for better fishing, to provide habitat for frogs and toads, or just to provide habitat for as many wildlife species as you can. While it would be hard to create a buffer with a particular species in mind, there are many things you can do to improve the overall quality of your riparian buffer.



There are only general guidelines as to which species will use a buffer of a certain width, and much variation can exist within a particular group of animals. For example, the pileated woodpecker and the scarlet tanager are likely to be found only in large expanses of forested riparian habitat (greater than 500 feet total width), whereas the hairy woodpecker and red-eyed vireo may be found in somewhat smaller forested buffers (150 feet total width). The northern cardinal, brown thrasher, and northern mockingbird will use even the smallest areas of shrubby riparian habitat since they prefer transitional zones. As a general rule, the wider the buffer, the more species it supports. The same holds true for mammals, amphibians, and reptiles.

No matter how large a riparian buffer you can provide, keep in mind the following to improve the design of your buffer so that you attract the greatest diversity of wildlife:

■ **Control excess sediment in water.**

An increase in fine sediment owing to a poor or nonexistent buffer can be extremely detrimental for fish and aquatic insect populations. As you increase the size of your riparian buffer, the more opportunities there are for runoff to be intercepted by trees, grasses, and shrubs, and the benefits generally increase as the total size of the buffer increases (up to around 100 feet). Where sedimentation is a problem, a greater portion of the total buffer may need to be planted in grass, which will more effectively slow and trap sediment.

■ **Keep water temperatures cool.**

Large, flood-tolerant trees like willow or black birch if planted along your stream bank help to shade the water, keeping water temperatures cool. Cooler water temperatures also help to discourage filamentous algae growth, which can deplete oxygen levels and encourage the growth of parasitic bacteria. The stream will likely need to be completely shaded to be effective in providing habitat for fish like trout that prefer cooler waters.



American robin

■ **Provide food for aquatic insects.**

As leaves and branches from a riparian buffer fall into a stream, they eventually become food for aquatic invertebrates (insects). These are, in turn, an important food source for fish and other wildlife. Some evidence suggests that providing such insects with native vegetation rather than exotic plants helps to create a more abundant and diverse aquatic community.

■ **Add structure to water.**

The branches and other woody debris that fall into a stream from a riparian zone afford structure as well as refuge and hunting spots for fish. Some aquatic turtles use logs and other woody debris as “sunning” spots.

■ **Increase structural diversity on land.**

A riparian buffer that has a mix of native vegetation is more likely to attract a greater diversity of wildlife. Therefore, a buffer planted only with pine trees will benefit a few species, but one that combines native tree and shrub species with a border of native grasses or wildflowers will attract a greater assortment of wildlife. See “Planting Your Riparian Buffer” (below) for more details.

■ **Retain large, standing, dead trees (snags).**

Primary cavity-nesting birds (those making their own cavities), such as the downy, hairy, and red-bellied woodpeckers, use snags as nesting sites. Secondary cavity-nesting birds (those using cavities already created), like the bluebird, tufted titmouse, and great-crested flycatcher, may eventually use these sites. Also, many bats prefer to feed on insects in

riparian areas on or near rivers, ponds, and lakes and roost underneath the peeling bark of larger, dying trees.

■ **Provide food for wildlife.**

Providing a natural food source is one of the best ways to attract wildlife to your riparian buffer. Squirrels, turkeys, ducks, and deer take advantage of the acorns from oak trees. Both birds and mammals find shrubs that produce berries, such as holly, dogwood, and viburnum (there are many varieties). A good riparian buffer also serves as a stopover site for migratory birds, which use even small patches of riparian habitat to find food (insects on trees and fruit produced by shrubs) and water during migration.

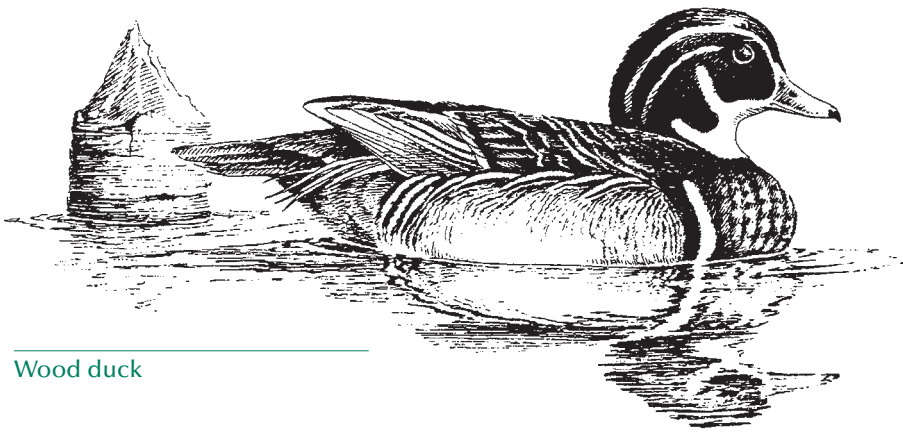
■ **Provide winter cover.**

Resident mammals and birds use small areas of dense, coniferous trees such as Eastern hemlock or white pine for shelter from winds and harsh weather in winter.

■ **Install nesting or roost boxes.**

Many species use artificial nest boxes because they mimic natural cavities. Boxes placed near grassy areas and open fields (they can be near a forested edge) attract both bluebirds and tree swallows. If placed within or near a forested setting, boxes are more likely to attract birds such as the tufted titmouse. Larger nest boxes situated within more mature wooded areas can attract the great-crested flycatcher. Wood ducks, typically found along rivers at least 600 feet wide, nest in large cavities along the river’s edge. Installing appropriate cavity boxes in large trees along a river or lake encourages use by this waterfowl species.

Bats are one of the best wildlife species to have near your farm or home because they help control insect pests. To attract roosting bats to your riparian buffer, place bat boxes in sunny locations near the water. There are fairly specific requirements for the construction and placement of bat houses, and organizations such as Bat Conservation International, Inc. (see below), have more information on this and other topics related to bats.



Wood duck

■ Use native plant species.

Native wildlife and native plants belong together. In particular, many butterflies and moths use certain native tree species as host plants. Other insects use wildflowers planted in a riparian buffer as a nectar source. Beneficial insects such as dragonflies are also attracted to buffers.

■ Leave hollow logs or brush piles.

Many small mammals use downed hollow logs or brush piles for cover or nesting sites. Amphibians also use these structures as cover. Snakes use large rocks as den sites and take cover under large brush piles or logs.

■ Maintain stream bank integrity.

Weasels, otters, and muskrats use burrows within a stream bank as den sites, and rough-winged swallows and belted kingfishers excavate nest tunnels within stream banks. Trampling by livestock and lack of vegetation along a stream bank increases erosion and limits the availability of this type of habitat.

Planting Your Riparian Buffer

While you can leave your riparian buffer alone and allow it to regrow naturally, without additional preparation or plantings a good buffer is likely to take much longer to establish. In addition, many people find that without assistance their riparian habitat gets overtaken with exotic species such as multiflora rose or honeysuckle. Although a buffer with only minimal vegetation is still much better than bare soil, some extra effort can create a much more effective buffer in a shorter time. Many organizations are

willing to donate time, money, seedlings, and expertise toward your project.

If you decide to add vegetation to your buffer, you can plant trees, shrubs, grasses, and other herbaceous perennials to enhance diversity and add benefits for wildlife. The amount of preparation your site will need depends on prior land use, the stream bank's condition, and other factors. Some things you will want to consider as you prepare and plant your buffer zone are:

■ Soil type

Although many plants thrive in a wide variety of soil types, some species do not do well in soils of a certain pH, moisture, or texture. Test the soil at various locations within your buffer to get the most accurate assessment of which plants you will need throughout your buffer.

■ Hardiness zones

Pennsylvania has three hardiness zones (5–7), so make sure that the plants you choose will tolerate your particular location.

■ Choice of plantings

Consider native plants that are available from local growers and nurseries, and avoid invasive species. Think about plants that offer the most benefit as food, cover, and nesting sites, and include a mix of deciduous and evergreen species. (See table at right.) If possible, plant species that are tolerant of full sun first and save understory or shade plants until after the first plantings have become established. For areas near the stream bank, choose species that will completely shade the stream when they reach full height. Where deer browsing or beaver

activity is a problem, use plants known to be less palatable to deer and beaver, or fencing may be needed.

■ Reducing effects on soil

Avoid using heavy equipment to plant trees or shrubs, especially near the stream bank; this causes soil compaction and erosion.

■ Fencing

On agricultural lands, livestock entering a stream area can seriously disrupt water quality as well as harm the stream bank. Stream bank fencing can be used along a riparian buffer to help keep livestock from walking near and through a stream, thus preventing water pollution, bank erosion, and excess sedimentation. Fencing also allows vegetation to regrow in the protected areas, further helping to trap sediment and pollutants and minimize erosion. It is recommended that fencing be placed a minimum of 25 feet from the edge of the stream bank. Fencing around newly planted saplings or seedlings can help to lessen damage caused by deer or beaver.

Maintaining Your Buffer

Your riparian buffer should be monitored and maintained regularly at first, and then periodically as the buffer becomes established. Routine maintenance may be necessary, depending on weather conditions and other factors. Some things to consider are the following:

■ Water

During the first growing season, newly planted trees and shrubs need water at least once a week until they become established. Newly planted vegetation should also be inspected after heavy rains to make sure that they are not damaged.

■ Weed control

Weed control may be necessary for the first few years as trees and shrubs become established. Organic mulches such as leaf humus, wood chips (avoid redwood or cedar; they can be toxic to some types of plant seedlings), pine mulch, or shredded bark help to retain moisture and limit weeds in a newly planted buffer.

Mechanical methods of weed control are preferable to using herbicides, which are likely to enter the water.

■ Mowing

Zone 3 may need to be mowed periodically to keep it as a grassy-herbaceous patch and to prevent its becoming overgrown with shrubs. Avoid mowing from April to July when birds may be nesting there.

Looking Ahead

While many different species will “find” your riparian buffer immediately after it has been planted, others will not use your buffer until it has a chance to mature, which may take several years to several decades. As your riparian buffer ages, the plant communities and habitat within it change as well and become attractive to different wildlife. Whatever type of riparian buffer you create, you have contributed a valuable resource for both people and wildlife.

Sources of Assistance and Additional Information

Books

Verry, E. S., J. W. Hornbeck, and C. A. Dolloff. *Riparian Management in Forests of the Continental Eastern United States*. 2001. Gives detailed information on the specific habitat needs and uses of wildlife along riparian zones in the eastern United States. Although geared towards forest managers, it still provides useful information for all landowners.

Web sites

Connecticut River Watershed

Provides a useful 10-part fact sheet series, “Riparian Buffers for the Connecticut River” and details many aspects of riparian buffers for residential and agricultural landowners. Call 603-826-4800 for reprints.
www.crjc.org/riparianbuffers.htm

Some native trees, shrubs and perennial herbaceous plants that you can plant in a riparian buffer. See “Sources of Assistance” for more information. A plant guide or nursery can provide information on hardiness zones, mature height, and other considerations.

Species	Site moisture preferences	Light preferences	Wildlife benefits
TREES			
American holly	W*	S to SH	Fruit
Black cherry	M to D	S to PS	Fruit
Black willow	W	S	Host plant for butterflies
Common hackberry	W to D	S	Fruit
Eastern hemlock	W	SH	Winter shelter
Eastern white pine	M to D	S to SH	Seeds, winter cover
Green ash and white ash	W to M	S to SH	Seeds
Persimmon	W to D	S to PS	Fruit
Red maple	W to M	S to SH	Flowers, buds, leaves, and seeds
Red oak	M to D	S to PS	Acorns
River birch	W	S to SH	Catkins, foliage, host plant for butterflies
White oak	M to D	S to SH	Acorns
Willow oak	W to M	S to PS	Acorns
SHRUBS			
American cranberrybush	W	S to SH	Fruit
American holly	W	S to PS	Fruit, winter cover
Black chokeberry	W to D	S to S	Fruit
Flowering dogwood	M to D	S to PS	Fruit
Grey (swamp or red-panicle) dogwood	W to D	S to PS	Fruit, twigs, leaves
Highbush blueberry	W	S to PS	Fruit
Inkberry	W to M	S to SH	Fruit
Mapleleaf viburnum	W to D	M to S	Foliage, twigs, fruit
Mountain laurel	W	S to S	Foliage, twigs, winter shelter
Nannyberry	W to D	S to PS	Fruit
Northern bayberry	M to D	S to PS	Fruit
Silky dogwood	W to M	S to PS	Fruit
Spicebush	W to M	PS to SH	Fruit, nectar, host plant for butterflies
Winterberry	W to M	S to S	Fruit
HERBACEOUS PERENNIALS			
Bee-balm	M to D	S to PS	Nectar
Black-eyed susan	M	S to SH	Nectar, host plant
Blue lobelia	W to M	S to SH	Nectar
Cardinal flower	W to M	S to SH	Nectar
Christmas fern	M	PS to SH	Shade
Joe-pye weed	W to M	S to PS	Attracts butterflies, beneficial insects
New England aster	M	S to PS	Nectar, seeds
Partridgeberry	M to D	PS to SH	Berries
Solomon's seal	M	S to S	Berries
Swamp milkweed	W to M	S to PS	Nectar, host plant

Species to avoid: multiflora rose; mile-a-minute; purple loosestrife; autumn olive; Japanese barberry; Norway maple; Japanese knotweed

*Key: W=wet, M=moderate, D=dry, S=sun, PS=partial sun, SH=shade

Pennsylvania Department of Environmental Protection

PENNSYLVANIA'S STREAM RELEAF PROGRAM
As part of the Chesapeake Bay Program, the state has committed to help restore riparian buffers on Pennsylvania waterways by 2010. The program publishes a handbook containing lists of resources that can help you in planning your buffer and places to look for money and technical advice.

www.dep.state.pa.us/hosting/streamreleaf

Natural Resources Conservation Service

STREAM VISUAL ASSESSMENT PROTOCOL
This protocol helps landowners to assess visually the condition of their streams.
www.wcc.nrcs.usda.gov

Bat Conservation International, Inc.

Provides help on constructing bat houses and information on how to attract bats to your property. www.batcon.org/

Financial Assistance, Technical Advice, and Volunteer Help

U.S. Fish and Wildlife Service

PARTNERS FOR FISH AND WILDLIFE PROGRAM

Provides financial and technical assistance for habitat restoration on private lands. Eligible land must be set aside for at least 10 years. partners.fws.gov

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Illustrations

Jeffery Mathison: pp. 2, 3, 4, 5
John Sidelinger: pp. 1, 6

U.S. Department of Agriculture/ NRCS/Farm Service Agency

Web site (www.fsa.usda.gov/dafp/cepd/default.htm) has information on all the programs listed below. Or contact your county USDA service center office for more information.

CONSERVATION RESERVE PROGRAM (CRP)

Offers annual rental, incentive, and maintenance payments for certain activities, including establishing riparian buffers on croplands or marginal pasturelands.

CONSERVATION RESERVE ENHANCEMENT PROGRAM (CREP)

An offspring of the CRP, the CREP is a voluntary program for agricultural landowners. The program involves state-federal partnerships that focus on high priority environmental concerns.

ENVIRONMENTAL QUALITY IMPROVEMENT PROGRAM

Farmers can receive financial and technical help to implement structural or management conservation practices on suitable lands.

Sources of Native Plant Information, Seeds, and Seedlings

NATURAL LANDS TRUST

This organization has a useful guide to native Pennsylvania trees and shrubs as well as their site preferences and wildlife value. www.natlands.org

WILDLIFE HABITAT COUNCIL—THREE RIVERS HABITAT PARTNERSHIP

Provides general information on riparian buffers and a list of native tree and shrub species and their wildlife value. Also lists suppliers of native plants.
www.wildlifehc.org/threerivers/

PENNSYLVANIA DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

Publishes a brochure, "Landscaping with Native Plants," which lists some plants native to Pennsylvania and their site preferences. Also available on Web site. www.dcnr.state.pa.us/forestry/wildplant/native.htm

PENNSYLVANIA NATIVE PLANT SOCIETY

Web site lists native plant sources in the state. www.pawildflower.org/

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