Establishing

Streamside Buffer Areas

in Your Park or Community

BUSHKILL STREAM
CONSERVANCY

Published by the
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Cover photos:
Henry's Woods along Bushkill Creek, Jacobsburg State Park.
Delaware and Lehigh National Heritage Corridor

Spicebush Swallowtail, Turk's Cap Lillies and coneflowers.
Bushkill Stream Conservancy

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This report was compiled by Kate Brandes, Environmental Scientist, for the Bushkill Stream Conservancy. Other contributing partners include: Northampton County Conservation District, Lehigh County Conservation District, Delaware and Lehigh National Heritage Corridor and Jacobsburg Environmental Education Center.

Helpful comments were provided by David Brandes, Jim Moser and Bill Spafford of the Bushkill Stream Conservancy; Rebecca Kennedy of the Lehigh County Conservation District; Jim Wilson of the Northampton County Conservation District, Bob Egolf of Forks Township and Mark Fiely, Horticulturist at Ernst Seeds. Thank you to Tom Maxfield for his illustrations. Thanks to Bill Sweeney (DCNR) for the information and insight he provided on the native and invasive plants shown on pages 18-20. Special thanks to Stevie Daniels and Bob Carman of the Bushkill Stream Conservancy for technical review and comment.

PROJECT PARTNERS:

BUSHKILL STREAM CONSERVANCY

LEHIGH COUNTY CONSERVATION DISTRICT

Northampton County Conservation District

pennsylvania DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

Jacobsburg Environmental Education Center

DELAWARE & LEHIGH NATIONAL HERITAGE CORRIDOR

LEHIGH VALLEY GREENWAYS

Overview:

Streamside "No-Mow" Areas in Your Park or Community

"No-mow" areas and naturalized buffers can add character and texture to the landscape in a park or community setting. The plants are allowed to grow naturally without being mowed close to the ground to maintain the appearance of a traditional lawn. In addition, if managed properly, they provide a way to re-establish indigenous or native plants. These buffers provide a public service by protecting the health of the streams and rivers as well as beautifying the areas. Reducing mowable acreage and establishing more naturalized areas will also help decrease demands on staff time and equipment, which will help cut costs.

These areas can be allowed to transition to forested streamside buffers, in which trees, shrubs, and other natural vegetation are allowed to grow along a stream or waterway. They may also be enhanced with planting to see the benefits associated with forested streamside buffers more quickly. No-mow areas are best established near existing native plants that can provide a seed source.

Forested buffers along stream banks protect stream water from direct sunlight and resulting high temperature, provide food and shelter for fish and other aquatic species, and stabilize stream banks and the floodplain, preventing erosion and scour due to high velocity water flows. Plant roots absorb pollutants from the water as it migrates through the root zone. Plant stems and leaves filter sediment and pollutants from overland storm water flow passing through the buffer zone.

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As long as there are native seed sources and invasive plants are well managed, over time, shrubs and trees will naturally fill in and provide more diverse plant cover in the form of a forested buffer.

"No-mow" areas and buffers, like those pictured here, can enhance a property in many ways.
Above - Bushkill Creek.
Below -Lion's Park Meadow, Forks Township (see Case Study page 10).

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"No-mow" areas are allowed to naturally vegetate and are not cut in the way traditional lawns are maintained.

Want to save money?

Benefits: Economic

- Reduces maintenance expenses and chemical use.
- Helps protect against property loss from flood damage and stream erosion.
- Helps protect water quality and drinking water supplies.
- Provides community value.
- Supports recreation and tourism.
- Helps avoid costs of engineer design and permits associated with bank stabilization projects.

CASE STUDY:

Lehigh County Parks Department

Lehigh County Parks Department

Cedar Creek Parkway East, Salisbury Township, Pa.

Lehigh County Parks Department

Lock Ridge Furnace Park, Alburtis, Pa.

Cedar Creek (1+ acre) and Lock Ridge (2+ acres) of No Mow = Combined 4.25 acres.
Native fescue grass and little bluestem warm season grass were allowed to grow naturally.
Expense =$16.66/acre using 60" mower
(*Rate includes labor with benefits, fuel, and $1 per cut equipment wear*)
Normal mow rate of 32 times/year
Maintenance of no mow = leave natural and mow in late fall (Oct/Nov)
Only mow 1 time per year to 5" grass height

Savings of $70.80/week on 2 sites (4.25 acres) = total savings of $2,265/year

(Savings were used to purchase equipment to take the place of contracted mowing services.)

Want to enrich your outdoor experience?

Benefits: Social

- Helps protect surface waters for public recreation.
- Provides natural fences, visual screens, and noise control.
- Creates added visual interest to the landscape
- Offers places for nature study and better fishing.
- Provides aesthetically appealing setting.
- Helps trap excess carbon dioxide.

Lehigh Gap Nature Center

The Naturalists Club (right) at Lehigh Gap Nature Center. Opening day of trout season, Bushkill Creek (below).

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Want to attract more birds and butterflies?

Benefits: Ecological

- Protects fish and wildlife cover.
- Provides food for aquatic habitat.
- Provides shade for fish like trout that require cooler waters.
- Provides food and habitat for native insects and indigenous birds.

Want to improve fish habitat?

Benefits: Water Quality

- Discourages Canada geese from occupying park land since tall grass and trees make them uncomfortable.
- Stabilizes stream banks and prevents erosion.
- Reduces pollutants from entering the stream and keeps water cleaner, which can be particularly important in a park setting where people often play and fish in the water.
- Reduces the force and power of runoff entering the stream from stormwater, helping to prevent erosion.
- Reduces bank erosion (which can be a major source of sediment and degradation to the stream).

Wild Brown Trout (below).
A blue bird box, wildflowers and a butterfly at Emmaus Park (right).

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CASE STUDY:

Henry's Woods, Jacobsburg State Park, Pa.

Henry's Woods is a natural area with old growth forest located in Jacobsburg State Park. The Bushkill Creek flows through this natural area and Henry's Woods has become a popular spot for park visitors to access the creek. Over the years, concentrated foot traffic in the natural area has damaged stream banks and wildlife habitat.

This area was restored with a streambank stabilization project that included the installation of native plants and split rail fencing, installed to help direct park visitors away from sensitive streamside areas, while allowing access to the water for recreation.

The project helped stop streambank erosion problems, beautified the area, and reduced harmful sediment entering the Bushkill Creek.

Bushkill Stream Conservancy (*above and below*)

Jacobsburg Environmental Education Center

Heavy foot traffic along the streambank at Jacobsburg State Park (left) had damaged sensitive areas. Restored streambank features split rail fencing to deter visitors from treading on planted areas (above).

Buffers Step by Step - Planning: Step 1

Locations for Streamside "No-Mow" or Forested Areas:

- public parks
- schools
- college and universities
- community centers
- sports clubs
- golf courses
- businesses and industrial parks
- public buildings
- residential areas

Lehigh County Conservation District

Lehigh County Conservation District

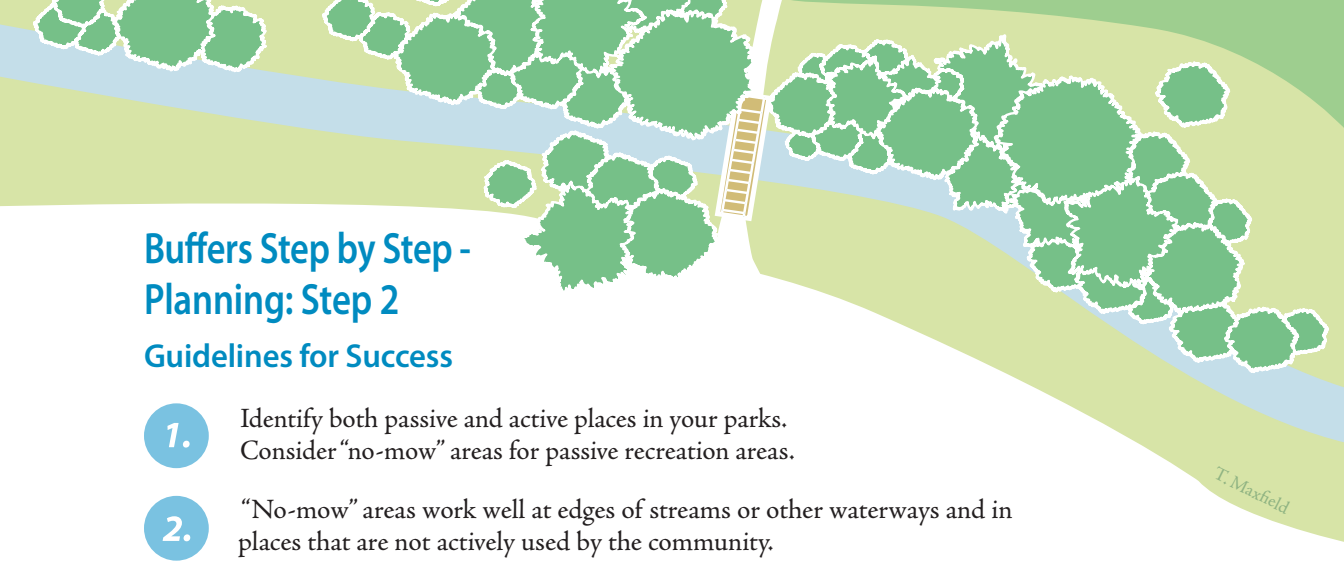
Bushkill Stream Conservancy

The meadow at Emmaus Park (above) creates visual interest and provides habitat for birds and butterflies. A paved path no mow area (left) at Emmaus Park greets visitors with a cheerful array of native vegetation and serves to buffer the nearby creek, filtering off road pollutants. Below - The unmowed area off of Newlin's Mill Road in Palmer Township Park works to expand the streamside buffer and reduce mowing costs.

Considerations for Municipalities:

- Review and ammend existing weed ordinances that might prevent the establishment of "no-mow" natural areas.

- Adopt model ordinances that protect riparian and natural areas [see Lehigh Valley Planning Commission (LVPC) woodland, riparian, floodplain, and steep slope model ordinances. www.lvpc.org]



Buffers Step by Step - Planning: Step 2

Guidelines for Success

1. Identify both passive and active places in your parks. Consider "no-mow" areas for passive recreation areas.

2. "No-mow" areas work well at edges of streams or other waterways and in places that are not actively used by the community.

3. Consider what neighbors and community feel the park area should be used for. If neighbors are invited to help plan the "no-mow" natural area, they are more likely to support it. Encourage participation and understanding through neighborhood meetings, newsletters and editorials, website announcements, signs, and information at your municipal office. Ask local conservation organizations for help with these outreach activities.

4. Keep entrances and exits neat, trim and attractive. Continue to maintain park areas around the newly established "no-mow" area as you have before. It is also important to select and maintain access points to streams and waterways.

5. Use marker posts, boulders, signs and fences to direct people and traffic as needed.

6. Allow for access points to utility lines, recreational areas, and periodic visual access for safety and transportation routes (road crossings and foot bridges).

7. Naturalization is a long-term process and some areas can take many years to develop into vibrant and diverse natural communities. The initial phases of naturalization can often present weed problems. These weeds will need to be managed. (See page 17.)

8. Use signs to explain what you're doing and to show that the natural areas you're working to establish are intentional. You may also describe the benefits of the natural areas. Simple signs that say "No-Mow Area" can be placed along a buffer area next to the creek.

9. Start slowly and expand steadily. If "no-mow" areas are new to your park or community site, begin by establishing a small demonstration natural area with an explanatory sign to get the public used to the idea. Once established, "no-mow" areas can be expanded more easily.

10. Include bird boxes in your "no-mow" design to help indicate that you are establishing a new natural area that will encourage wildlife that the public can enjoy.

11. Consider adding native wildflowers to the edge of the "no-mow" area so that it is more aesthetically pleasing to community members. Placing flowers at the edge allows for easier weed management.

Buffers Step by Step - Planning: Step 3
Getting Started

First, check local zoning and master plan provisions for buffer setbacks and then perform a visual assessment of existing buffers to see where buffers are needed or could be enhanced. Review and ammend weed control and mowing ordinances that might prevent "no-mow" areas.

For unstable stream or river banks –
Deal with an eroding stream or river bank first before restoring a buffer. Seek the advice of your local conservation district or other trained specialist.

Where Natural Vegetation exists –
Discourage the cutting of existing trees and other vegetation on stream bank.

Where Natural Vegetation has been removed (currently mowed areas) —
Establish "no-mow" areas to allow gradual natural succession of native plants. To enhance these areas you can:

- Revegetate with native trees, shrubs, and grasses.
- Select native plants that attract birds, butterflies, and other wildlife.
- Set plants in irregular groups of odd numbers for a natural effect.

The width of the buffer will depend on site conditions and what the goals of the project are. See page 14 for buffer width recommendations for bank stabilization, sediment control, improved wildlife habitat and more.

Planting a meadow in Lion's Park (below) in Fork's Township.
Bushkill Stream Conservancy

Buffers Step by Step - Troubleshooting

Public Perception

Aesthetics - some people will consider the natural areas to be:

- Too brushy
- Unkempt
- Trashy

Safety and Security - community members may be concerned about:

- Visibility
- Encroachment on private property
- Rats, snakes, mosquitoes

Other concerns may include a sense of:

- Reduction of service at park or community space and,
- Loss of "open space"

Catchy phrases to consider for signs and outreach material include:

"Growing for Cleaner Water"

"Meadow or Buffer in Progress"

"Stream Reforestation Coming Soon"

"Stream Protection Zone: Do not disturb plants or trees"

For more suggestions on overcoming public perception challenges see page 7.

An educational sign explains the native-grass meadow in progress at Lion's Park in Forks Township.

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CASE STUDY:

Lion's Park, Forks Township and Palmer Township Park, Pa.

The Bushkill Stream Conservancy established two new meadow areas, in Lion's Park in Forks Township and at a public park near Newlins Mill Road in Palmer Township. Both meadows were established in space that was previously mowed.

The area was first sprayed with an herbicide and then after a couple of weeks was planted with a mix of warm- and cool-season grasses.

The Bushkill Stream Conservancy is working with each of the two townships to manage the meadow areas in the first three to five years needed to get them fully established. The meadows will require some selective herbicide applications to help control broadleaf weeds and crabgrass. In addition, the meadows are being mowed two to three times a year to help manage broadleaf weeds.

The Conservancy has installed educational signs, and the townships have placed signs that say "No-Mow Riparian Buffer Area" and "Meadow in Progress" at the meadow sites to inform the public about the project and to indicate that the "no-mow" areas are intentional.

The Conservancy also hosted a "Meet the Meadow" workshop and a number of other educational events for members of the community to ask questions and provide feedback on the meadow projects.

To help address some of the communities' requests about the meadow project, the Conservancy has installed more flowers on the roadside of the meadow at Lion's Park and placed bluebird boxes in each of the meadows.

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Above - Palmer Township Park (top) . Lion's Park meadow in Forks Township (bottom).

Buffers Step by Step -
Enhancing a "No-Mow" Area:

- To decide what to plant, identify what native plants are already growing at your site.
- Keep existing native plants.
- Plant more of the same. These plants have already adapted to conditions at your area.
- Add different native plants that are adapted to your conditions and will increase diversity.
- Remove aggressive invasive plants. Consult with your local conservation organization or conservation district for guidance.
- Consider plants that are able to survive frequent flooding if planting along a stream or river.
- Limit the amount of soil disturbance since this can bring on an infestation of invasive plants.
- Tree protection may be needed where deer or beaver predation are a problem. Plastic tubes placed around the trunks of newly planted trees should be removed after two to three years.
- Select plants that deer do not prefer (beech, ash, common elder.)

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Delaware and Lehigh National Heritage Corridor

Above - A hummingbird with cardinal flower.
Below - A red eft.

Once grass or herbaceous material reaches between 12 and 18 inches, it should be mowed to no lower than 8 inches to help get plants established and to prevent weeds from seeding in the first two to three years.

Planting tip:
Mark plants with colored flagging to make them easier to locate during maintenance tasks and mowing.

CASE STUDY:

Borough of Wind Gap, Pa.

A tributary of the Little Bushkill Creek connects a series of wetlands in the Borough of Wind Gap. The Borough removed an old building that covered a portion of this tributary. After the building was removed, the Borough and its partners planted the newly exposed stretch of land near the stream with native plants. The site is open to the public and includes an attractive wildflower garden, a newly established streamside buffer, and educational signs for visitors to learn about the project and the value of native plants.

The Borough will mow the edges of this new public area to show that it is being actively maintained. The wildflower garden was established as a transition between the urban manicured area and the more naturalized setting of the newly established buffer. It will also be cared for by the Borough.

All photographs on this page - Delaware and Lehigh National Heritage Corridor

Above - The newly planted streamside buffer along a tributary of the Little Bushkill Creek in the Borough of Wind Gap.

Relationship of Vegetation Type to Buffer Effectiveness

	Vegetation Type		
Benefit	**Grass**	**Shrub**	**Tree**
Stabilize Bank Erosion	Low	High	High
Filter Sediment	High	Low	Low
Filter Nutrients, Pesticides, Microbes			
Sediment bound particle removal	High	Low	Low
Soluble particle removal	Medium	Low	Medium
Aquatic Habitat	Low	Medium	High
Wildlife Habitat			
Range/pasture/prairie wildlife	High	Medium	Low
Forest wildlife	Low	Medium	High
Flood Protection	Low	Medium	High
Water Temperature	Low	Low	High

Natural Resource Conservation Service

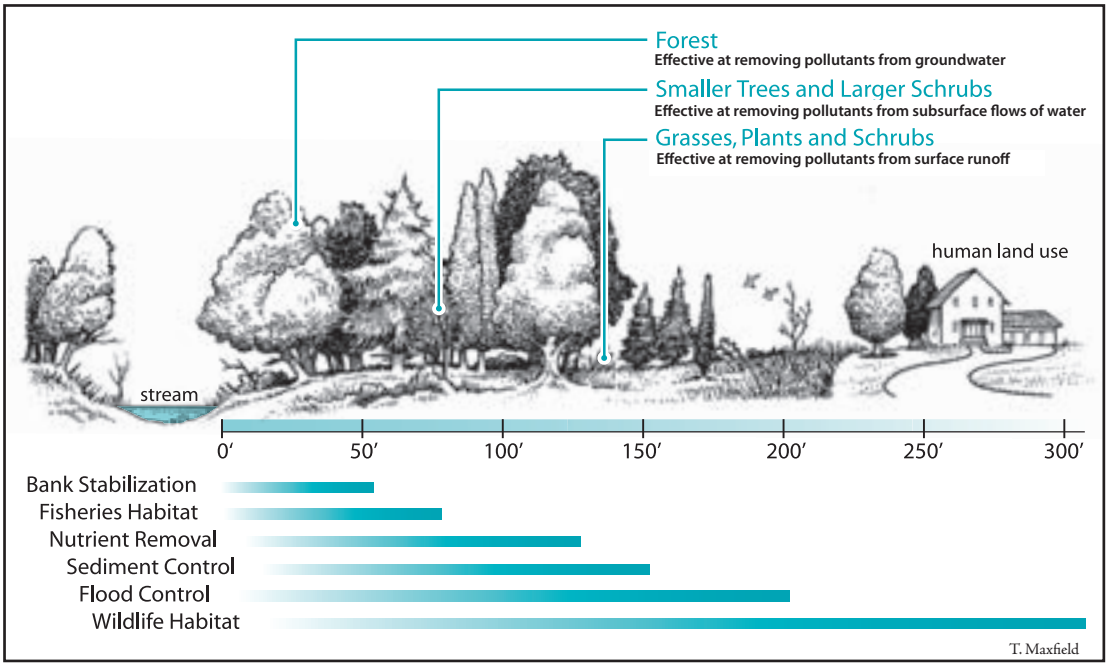
Forested vs. Non-Forested Streams

	Buffer Type		
Study Variable	**Forested**	**Grass**	**Comments**
Water Temperature	+	-	forested areas cooler in summer, warmer in winter, both beneficial
Streambed Habitat Quality	+	-	more usable streambed for habitat, both amount and quality
Removal of Nitrogen Pollution	+	-	forested areas remove 200% to 800% more nitrogen pollution
Removal of Phosphorous Pollution	+/-	+/-	no significant difference
Removal of Pesticide Pollution	+/-	+/-	no significant difference
Stream Velocity	+	-	lower in forested areas, providing more contact time for cleanup so water slows down
Stream Width	+	-	forested streams 2-3 X wider, providing 200-300% more habitat
Large Woody Debris for Habitat	+	-	key habitat and other benefits

Summary of Research by Stroud Water Research Center, 2004

Mixed Vegetation Buffer and Buffer Width

(Adapted from the *Living with River Series*, Connecticut River Joint Commission of NH & VT.)



CASE STUDY:

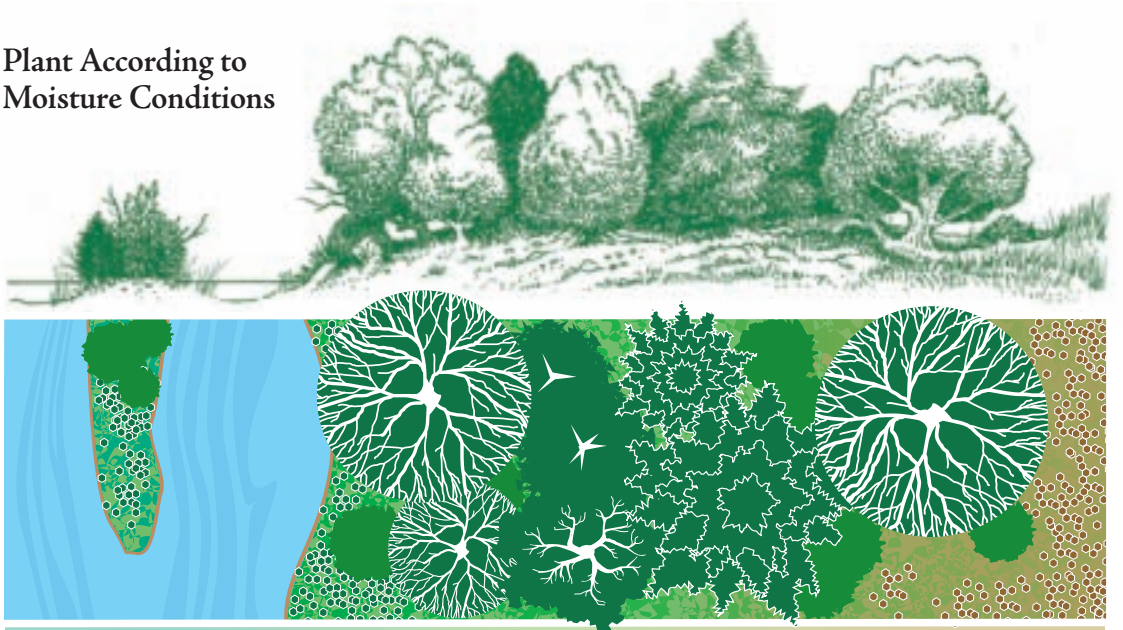
Emmaus Borough Community Park, Pa.

The Lehigh County Conservation District carried out a nearly 2,000 foot long riparian buffer project along the Leibert Creek as it flows through Emmaus Community Park. The park is the Borough's active recreation site: it contains eight picnic pavilions, a stage, the town pool, and ball fields. The buffer varies in width throughout the park, depending upon the site conditions. In some areas the buffer is 30 feet wide, where pavilions are directly alongside the stream. In other areas, the buffer expands to several hundred feet and includes a wildflower meadow that has attracted many nesting songbirds. The buffer area is delineated using split-rail fence, and includes a number of educational signs on wetlands, flood plains, native plants, buffers, fish habitat, and watersheds.

Project coordinators met individually with the public works director and with each of the Borough Council members, and took tours of the park. To add visual appeal, flowers were planted. Young trees were planted to replace old ones nearing the end of their lives.

Lehigh County Conservation District.

Plant According to Moisture Conditions



Wet	Moderate	Dry
SMALL TREES/SHRUBS River Birch Smooth Alder Chokeberry Red Chokeberry Black ▸ Groundselbush Dogwood, Red Osier and Silky Summersweet ▸ Winterberry ▸ Inkberry ▸ Swamp Rose Swamp Azalea Meadowsweet ▸ Highbush Blueberry ▸ Witherod ▸ N. Arrowwood **TREES** Box Elder Persimmon ▸ Ash, Black and Red Pawpaw ▸ Sweet-bay Magnolia Sycamore ▸ Cottonwood Swamp White Oak Willow Oak ▸ Oak, Sandbog and Black	**SMALL TREES/SHRUBS** ◂ Birch, Black and Sweet ▸ Mountain Laurel ▸ ◂ Hornbeam ▸ Yellow Birch ▸ ◂ Dogwood, Gray and Flowering ▸ American Hazelnut ▸ ◂ Black Huckleberry ◂ Common Spicebush ▸ ◂ Rosebay Rhododendron ◂ Southern Arrowwood ◂ Ninebark ◂ American Elder ▸ Bayberry ▸ ◂ Highbush Cranberry ▸ Red Elm **TREES** Hackberry ▸ ◂ Red Maple ▸ Bitternut Hickory ▸ ◂ Redbud ▸ American Beech ▸ ◂ White Ash ▸ ◂ Honey Locust ▸ ◂ Sweet-gum Tuliptree ▸ Black-gum ▸ ◂ Large-toothed Aspen ▸ ◂ Pin Oak ▸	**SMALL TREES/SHRUBS** Hop-hornbeam Witchhazel Staghorn Sumac Nannyberry Blackhaw **TREES** White Pine Black Cherry Sassafras Canada Hemlock White Oak ◂ Red Oak Chestnut Oak Shagbark Hickory Sugar Maple Black Walnut

Arrows denote that a certain species can tolerate either a wetter or drier environment.

Adapted from the Pennsylvania Stream ReLeaf Forest Buffer Toolkit. Alliance for the Chesapeake Bay, 1998,

T. Maxfield

Buffers Step by Step -
Seeding a "No-mow" Area

"No-mow" areas can be enhanced by seeding. This approach is less expensive than planting the area, but will take longer to become established. If you do choose to seed, here are guidelines from Ernst Seeds:

Fall or Dormant Seeding

- Fall seeding imitates natural re-seeding.
- Frost seeding is the broadcasting of seed over frozen soil after the first killing frost.
- Good seed-to-soil contact occurs through natural moisture and frost action.
- Natural stratification occurs; enhancing germination.
- Some cool season species will establish in the winter; however, warm season grasses and most forbs will germinate in the spring.
- Some seed can be lost to decay and wildlife consumption during the winter.
- Establishment may be hindered by weed competition that starts during the winter.
- Mulching is important to protect both the seed and soil and retain moisture.

Spring Seeding

- Cool season species germinate soon after seeding. Germination of warm season species generally occurs within three weeks of the soil temperature reaching 55° F.
- Seed loss is minimized.
- Seed-to-soil contact should be accomplished by working the seed into the soil ($^1/_4$"-$^1/_2$" deep).
- Seeding can be delayed until weed control can be accomplished to improve establishment.
- Irrigation during periods of dry weather is needed for proper germination.
- Light mulching is important to protect both the seed and soil and retain moisture.

Custom Seed Mixes*

Lehigh-Northampton County Riparian Buffer Mixes

Riparian Buffer Mix for Saturated Soils Along Streams

% of Mix	Latin Binomial	Common Name
20	Carex vulpinoidea	Fox Sedge
10	Elymus riparius	Riverbank Wild Rye
15	Elymus virginicus varied sun/shade	Virginia Wild Rye
20	Panicum anceps dryish	Beaked Panicgrass
15	Panicum clandestinum varied sun/shade, wet/dry	Deertongue
20	Panicum rigidulum more wet, floodplains	Redtop Panicgrass
100 Total	Seed at 15 bulk lbs/acre.	

Riparian Buffer Mix for Upland Areas

% of Mix	Latin Binomial	Common Name
2	Eragrostis spectabilis	Purple Lovegrass
98	Schizachyrium scoparium	Little Bluestem
100	Total	

Seed at 15 bulk lbs/acre.

Alternatives:
sideoats gramma (Bouteloua) and switch grass (Panicum virgatum).

Turf-Like Species For Out-Of-Play Buffer Area

% of Mix	Latin Binomial	Common Name
100	Agrostis perennans	Autumn Bentgrass

Seed at 22 to 33 lbs/acre.

Alternative: low-growing fescues.

Mark Fiely, Horticulturist at Ernst Conservation Seeds,
9006 Mercer Pike, Meadville, PA 16335

** Optimal seed mixes for your area will be dependent on site conditions.*

Buffers Step by Step -
Maintenance

- **Invasive Weed Control** – Weed competition limits buffer growth and survival, therefore weeds should be controlled by either using herbicides, removing manually or mowing.
- **Herbicides** – This short-term technique (two to three years) is generally considered less expensive and more flexible than mowing and will result in quicker establishment of the buffer. Proper care should be taken to ensure that proximity to water features is considered. Herbicides should be applied by a licensed applicator.
- **Mowing** – Mowing controls the height of existing grasses, yet increases nutrient uptake, therefore competition for nutrients will persist until the canopy shades out lower layers. Mowing should occur twice each growing season and mower height should be set between 8-12 inches.
- **Limiting Deer Damage:**
  Select plants that deer do not prefer (beech, ash, common elder).
  Use plastic-tube tree shelters if needed.

A volunteer manually removes invasive weeds in a buffer area.

Lehigh County Conservation District

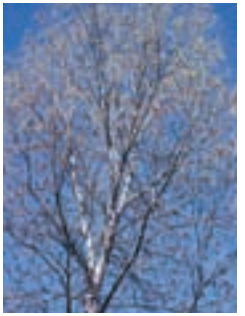
Native Plants Offer Beautiful Possibilities!

Recommended Beneficial Native Trees *(Based on terrestrial and aquatic ecological importance.)*

American Basswood
Tilia americana
LBJ Wildflower Center - Cox, Paul

Bitternut Hickory
Carya cordiformis
USDA - Mohlenbrook, R. H.

Tuliptree
Liriodendron tulipfera
LBJ Wildflower Center - Wosowski



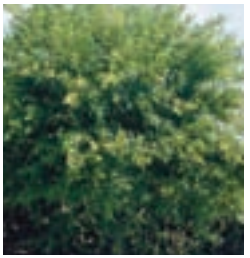
Eastern Cottonwood
Populus deltoides
LBJ Wildflower Center - Wosowski

Red Mulberry
Morus rubra
LBJ Wildflower Center - Cliffe, Harry

Black Willow
Salix nigra
LBJ Wildflower Center - Cliffe, Harry

Red Maple
Acer rubra
LBJ Wildflower Center - Wosowski

River Birch
Betula nigra
LBJ Wildflower Center - Cox, Paul



Green Ash
Fraxinus pennsylvanica
LBJ Wildflower Center - Flaigg, N.

Sycamore
Platanus occidentalis
LBJ Wildflower Center - Cox, Paul

Northern Red Oak
Quercus rubra
LBJ Wildflower Center - Cox, Paul

Native Beauties... (left)

1. Turks Cap Lilly, 2. Redbud Tree, 3. Red-osier Dogwood, 4. Pinxster-flower, 5. Swamp Azalea, 6. Rosebay Rhododendron, 7. Black Cohosh, 8. Bloodroot, 9. Canada Lilly, 10. Hepatica

All photographs on page 18 courtesy of the Lady Bird Johnson Wildflower Center, except for photo 1. Bushkill Stream Conservancy. Photographers: 2. Loughmiller, Campell and Lynn; 3., 5., 6., and 9. Wosowski, Sally and Andy; 4. Faucette, Steven; 7. Bransford, Mrs. W.D.; 8. Prothro, Elizabeth and 10. Vick, Albert F.W.

Harmful Invasives:

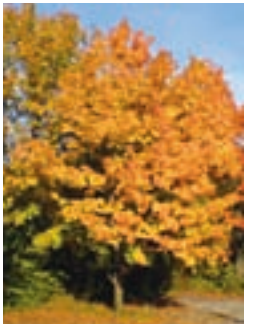
Morrow's Honeysuckle
Lonicera morrowii
USDA - Reveal, James L.

Burning Bush
Euonymus alatas
USDA - Howard, R. A.

Wild Chervil
Anthriscus sylvestris
Creative Commons - Silverberg, M.

Garlic Mustard
Allaria petiolata
USDA - Haug, E.
Smithsonian Institution

Lesser Celandine
Ranunculus ficaria
USDA - Stasz, J.



Norway Maple
Acer platanoides
Creative Commons - Magnenat, S.

Japanese Knotweed
Polygonum cuspidatum
Maxfield, K.

Japanese Barberry
Berberis thunbergii
USDA - Howard, R.A.
Smithsonian Institution

Tree of Heaven
Ailanthus altissima
USDA - Alexander, P.J.

Tatarian Honeysuckle
Lonicera tatarica
USDA - Howard, R.A.
Smithsonian Institution

Privet
Ligustrum vulgare
Univ. Of Conn. - Mehrhoff, L.J.

Other invasives in the Lehigh Valley include: Autumn Olive, *Eleagnus umbellata*; Multiflora Rose, *Rosa multifora*; Oriental bittersweet, *Celastrus orbiculatus*; Climbing honeysuckle, *Lonicera japonica* and others. See www.dcnr.state.pa.us/forestry/wildplant/invasive.aspx

For more information on invasive species and management, contact your local conservation district or organization office.

For more information, contact:

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