

Maintaining Riparian Areas and Wetlands

Riparian areas are the lands along the banks of our rivers, lakes, and tidal waters. Many riparian areas not only border surface waters, but they are often adjacent to or actually include wetland areas, too. Delaware has 132,000 acres of freshwater wetlands and almost 90,000 acres of tidal wetlands. Wetlands are one of the most productive environments and provide a host of benefits, including filtering pollutants from the water, providing protection from flooding, and providing critical habitat for many species of plants and animals. Wetlands can hold large quantities of water, releasing it gradually while recharging groundwater. The soils and plants within wetlands are very effective at removing pollutants from runoff and groundwaters. Over the past 40 years, 40,000 acres of wetlands have been lost in Delaware.¹

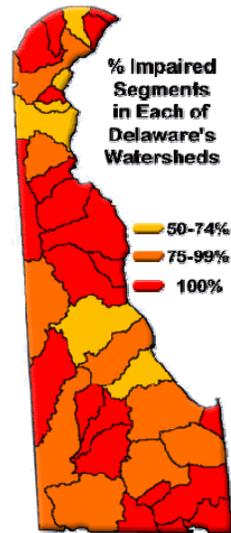
More than 90 percent of Delaware's waterways are considered impaired. The state's list of impaired waters includes 377 bodies of water that suffer from 11 different impairments, the most common of which are pathogens and nutrients (nitrogen and phosphorus). Most of these impairments come from nonpoint sources.² Increased runoff during storm events due to impervious cover in urban and suburban areas is one of the primary causes of nonpoint source pollution. Stormwater runoff can contain nutrients, hydrocarbons, pathogens, and toxic metals.

Forests play an important role as a buffer to our waterways. However, over the past 20 years Delaware has lost more than 20,000 acres of forest land. Those acres adjacent to water bodies are of particular concern for their pollution filtering capabilities.

The Importance and Benefits of Buffers

Riparian buffers perform a number of important functions:

- Σ **Slowing the velocity of stormwater runoff.** The vegetation in buffers slows water flow, increasing the amount of time it takes runoff to reach surface waters. This extra time allows for more water to infiltrate through soil, more particulate matter in runoff to settle out, more opportunity for plants to take up water and nutrients, and less erosion.
- Σ **Filtering stormwater pollutants.** Plants effectively remove contaminants from runoff through nutrient uptake and soil filtration. For areas where nutrients in runoff are of particular concern, deep-rooting grasses and woody plants are effective groundwater denitrifiers (they utilize the nitrogen,



From *Delaware's Pollution Control Strategy*, DNREC 2000.

Types of Buffers

Riparian Buffers

Natural riparian buffers are areas of wooded land adjacent to water resources, which act as a transition zone between uplands and aquatic habitat. Riparian buffers as a BMP are made up of three zones: a hardwood forest, a mixed forest, and a vegetated filter strip (grass area).

Vegetated Filter Strips

These areas can be the third zone of a riparian buffer or they can stand alone. For adequate pollution prevention, widths from 35 to 300 feet may be needed, depending on the site characteristics and the pollutants of concern.

removing it from the groundwater), and trees remove large quantities of phosphorus from soil and water.

- Σ **Shading surface water.** Buffers provide shade for narrow stream segments during the summer heat, helping to maintain a safe water temperature range for aquatic life.
- Σ **Bank stabilization.** The deep root systems of trees and shrubs provide soil stabilization.
- Σ **Habitat.** Buffers provide excellent habitat for many different species. Within buffers there is food, shelter, and close proximity to water. Debris from streamside buffers provides organic matter for the aquatic food chain.
- Σ **Habitat connectivity.** Riparian corridors can connect diverse habitat types, from tidal wetlands to interiors of upland forests and perhaps across the peninsula to tidal wetlands again, allowing animals to move along them and utilize much larger habitats.
- Σ **Recreational opportunities.** Riparian buffers increase the scenic quality of the landscape. They are wonderful for hiking, biking, bird-watching, and other outdoor activities.



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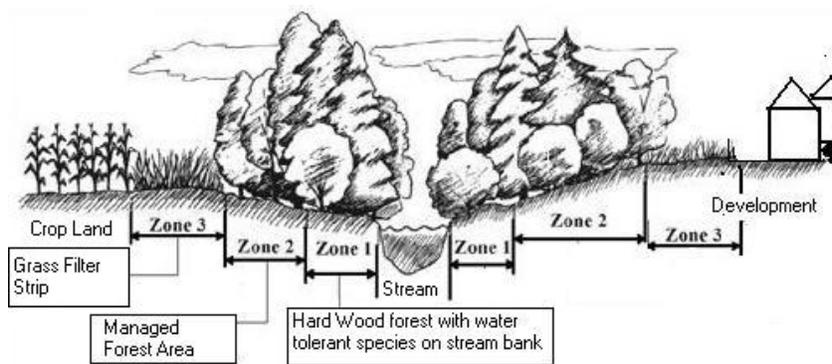
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Three-Zone Riparian Buffer, adapted from *USDA NRCS Riparian Forest Buffer Conservation Practice Job Sheet 391*.

Buffers don't act alone. For riparian buffers to function properly, it is advisable to keep impervious cover to a minimum and, if at all possible, separate impervious areas with infiltration opportunities such as rain gardens or grassed swales. When construction starts, minimize lot disturbance and damage to existing buffers. Protective riparian buffers are just one part of low-impact development, and for optimal function they should be used in concert with other BMPs highlighted in this manual.

Good Practices for Local Governments

Plan and Minimize

When reviewing new development proposals, consider that the less that is disturbed during construction, the less you will have to fix afterwards. Existing riparian areas should be maintained. Some planning questions include the following: How wet is the soil on-site? Is it safe to build there without adding fill, a practice that alters the hydrology of the site and reduces the effectiveness of wetlands and riparian buffers? Does the site contain a wetland that should be protected? How can buffers be utilized within this project?

When revegetating a stream bank to create a new riparian buffer, choose native plant communities, which are naturally adapted to the local conditions and require little maintenance. Construction vehicles should be kept out of riparian areas to reduce chances of soil compaction.

A three-zone riparian buffer is more effective at pollution reduction than a simple grass filter strip, but site characteristics might sway you to one option over the other. Additionally, the following site characteristics may lead to increased buffer widths needed for water pollution prevention:

- Σ Steep slopes
- Σ High sediment loads
- Σ Dense soils (from tillage or compaction)
- Σ Altered hydrology on-site such as concentrated flows or subsurface drains

Mitigate and Maintain

Trees and their associated plant communities in Zone 1 of a riparian buffer are the first line of defense to protect water and should not be disturbed. Recreation should be discouraged from this area, and access to the water should be guided to specific points. Woody debris should not be removed from this portion of the buffer, and only the stability of selected water access points needs to be maintained.

Zone 2 is the forested area where trails for recreation activities can be located. This area can also be managed to provide forest products if desired. If no harvesting is to occur in this area, woody debris should be left in place.

Did You Know?

Not all runoff is appropriate for buffers.

Concentrated overland flow (flow out of a gutter, pipe, or in a channel) can cross a 50-foot buffer in 1 minute, too fast for any water treatment to occur.

Sheet flow (dispersed surface flow) is desirable for buffers, where flow takes up to 20 minutes to cross a 50-foot buffer. When designing a riparian area, it is important to ensure that no concentrated flow is directed at the buffer and that sheet flow can occur.

Natural obstructions to flow – vegetation, woody debris, rocks, etc. – within the buffer are good at decreasing flow velocity and should be left in place. Avoid paving trails; keeping impervious areas out of the buffer should be a priority.

The final zone furthest away from the water body is Zone 3, comprised of grasses and sometimes shrubs. This area is mowed infrequently, potentially once every three years to keep down encroachment of invasive species. If uses other than trails, such as a picnic area, are planned for Zone 3, mowing should occur no more than two to three times a growing season. It is important to plan who is responsible for the mowing before the project is under way.

What to Plant?³

<u>Streamside Trees</u>	<u>Zone 1 and 2 Trees</u>	<u>Zone 1 and 2 Shrubs</u>	<u>Zone 3</u>
silver maple	American beech	arrowwood	warm or cool season grasses
black willow	bald cypress	bayberry	switchgrass - primary
eastern cottonwood	basswood	elderberry	indiangrass
green ash	butternut hickory	maple-leaf viburnum	big/little bluestem
sycamore	sweetgum	red chokeberry	wildflowers
	white ash	spicebush	black-eyed susan
	red maple	swamp azalea	purple or grey-headed
	tulip polar	winterberry	coneflower
			clover and other legumes

For more potential riparian plants go to www.agnr.umd.edu/MCE/Publications/Publication.cfm?ID=13&cat=N

What not to plant

For a list of plants not native to Delaware go to www.dhrec.state.de.us/fw/nonnative_plants03.pdf

Tradeoffs

Developer and Property Owners

Costs:

- Σ Technical surveys and reports
- Σ Buffer delineation
- Σ Loss of developable land
- Σ Buffer restoration
- Σ Buffer protection during construction

Benefits:

- Σ Increased property values
- Σ Low-maintenance stormwater management
- Σ Stream bank stabilization and control
- Σ Increased diversity of wildlife
- Σ Increased recreational opportunities

Local Government

Costs:

- Σ Staff training
- Σ Staff time
- Σ Public education efforts
- Σ Technical assistance to developers and land owners

Benefits:

- Σ Increased property values
- Σ Low-maintenance stormwater management
- Σ Stream bank stabilization and erosion control
- Σ Reduction in flood damage
- Σ Groundwater recharge
- Σ Preservation of wildlife habitat
- Σ Increased recreational opportunities
- Σ Preservation of drinking water quality

Questions to Ask During the Development Process

- Σ Where are the well heads, excellent recharge areas, wetlands, streams, waters, flood plains, and other resources such as slopes that need to have natural buffers for protection?
- Σ Are riparian buffers a good fit to meet Total Maximum Daily Loads (TMDLs) or protect sensitive water bodies in your watershed?
- Σ Are there existing buffers on the site that can be maintained, or are new buffers being constructed?
- Σ If new buffers are being constructed, what is the appropriate size and vegetation type for the proposed project? (Note: The same project on two different sites may benefit from different buffers. This is where it is important to know about soil type, depth to groundwater, type of water body the project borders, etc.)
- Σ Are the buffers within the property lines or are they part of the community open space?
- Σ How do you intend to educate homeowners about their role in maintaining the buffer?
- Σ With the knowledge that all management practices need to be maintained, how will buffer maintenance be scheduled and budgeted for?
- Σ Do you want to provide a healthy environment to your constituents in a way that costs a minimum of tax dollars to institute and administer and provides environmental benefits permanently?

For Further Information

A simple Google search on “riparian buffer” will turn up a wealth of information. Some very useful sites are listed below:

Designing Buffers

www.agnr.umd.edu/MCE/Publications/Publication.cfm?ID=13&cat=N

This is a good reference because information provided is relevant to Delaware.

Incorporating Buffers Into Development Plans

[www.crjc.org/buffers/Guidance for Communities.pdf](http://www.crjc.org/buffers/Guidance%20for%20Communities.pdf)

This is a guideline for town planners on how to incorporate riparian buffers into future development plans. Though it is for the Connecticut River and not specifically for Delaware, it is still a very good resource.

State Government Site

www.dnrec.state.de.us/dnrec2000/divisions/soil/dcmp/riparian.htm

Information on Delaware’s Riparian Buffer Initiative links to a riparian buffer brochure and riparian buffer workshop summary that took place in 2000. There is also contact information for the DNREC personnel in charge of the Riparian Buffer Initiative Program.

Federal Government Site

www.nps.gov/cue/programs/aquaticceology/stream_restoration_course/cd/references/tech_notes/RiparianBuffer.pdf

This is the Natural Resources Conservation Service (NRCS) definition of a riparian buffer. There is information on what can be expected from riparian buffers and what maintenance is needed.

References

1. DNREC(a). Delaware’s Pollution Control Strategy. DNREC Online, www.dnrec.state.de.us/water2000/Sections/Watershed/ws/impaired.htm
Data retrieved March 1, 2003.
2. DNREC(b). Wetlands. DNREC Online, www.dnrec.state.de.us/dnrec2000/Divisions/Water/Wetlands.htm
Data retrieved March 1, 2003.
3. Tjaden, R. L. and G. M. Weber. 1999. *FS-725 Riparian Forest Buffer Design, Establishment, and Maintenance*. University of Maryland College of Agriculture and Natural Resources Extension Services.
www.agnr.umd.edu/MCE/Publications/Publication.cfm?ID=13&cat=N