Riparian Buffers

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Simply stated, riparian buffers are natural areas adjacent to streams and other water bodies that protect waterways from urban pressures. Filled with diverse native plant species, riparian buffers are an absorption bed that prevent yard chemicals, asphalt residues, road runoff, domestic animal waste, and other human activities from polluting water. Some riparian buffers fall under Virginia's Chesapeake Bay Resource Protection Area, which are sometimes called "RPAs." Virginia has a limited number of jurisdictions requiring RPAs and their special protections. "Riparian buffer" is a globally-recognized scientific concept and "RPA" is a regulated, legal interpretation within Virginia.

Compared to other biological sciences, wetland ecology is a new discipline. The first published study (Lindeman 1942) was about a Minnesota peat bog. As the knowledge increased about wetland ecology and

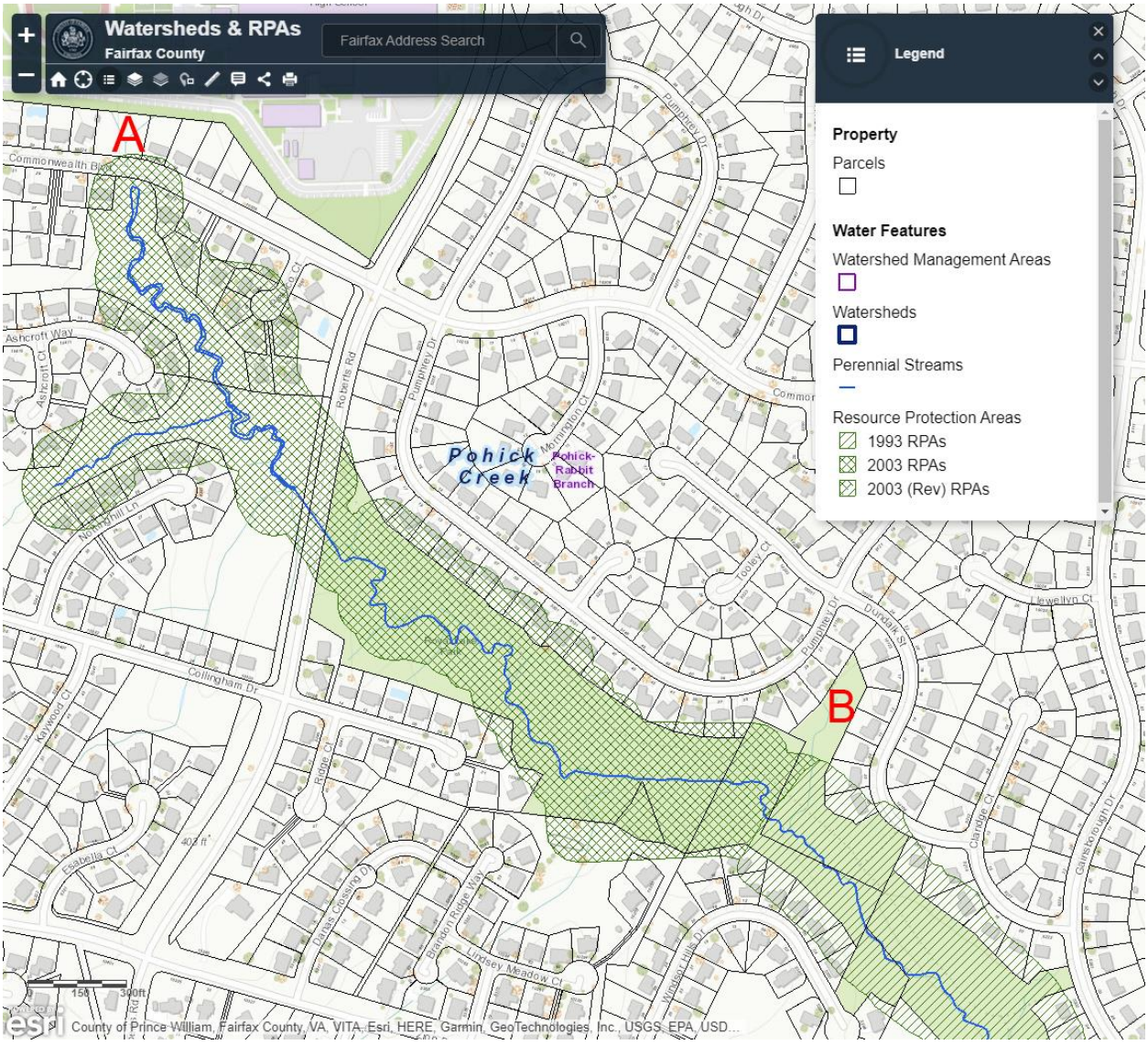

Figure 1. This RPA map shows the upstream section of Shanes Creek, which flows into Pohick Creek. Whereas the 1993 and 2003 RPAs are shaded, they miss the origin even though it has perennial waterflow (A). A stream restoration is underway on Shane's Creek from Roberts Road almost to Royal Lake. The restoration includes a riparian buffer (B) outside of the RPA and is the site for this article's photo essay.

how inland activities impacted coastal waters, land management policies also evolved. Before RPAs, people cleared, drained, dumped, developed, plowed, grazed livestock, and did whatever else they wanted to land surrounding waterways. After seeing how this free-for-all degraded the water quality and escalated erosion, Virginia enacted the Chesapeake Bay Preservation Act (aka, the Bay Act) in 1990. The Bay Act includes RPAs to protect critical, sensitive environmental zones surrounding perennial waters. Fairfax County's first RPAs were established in 1993, then updated in 2003. RPAs encompass *any* land—from fully forested to wholly impervious—within 100 feet of a waterway that flows throughout the year. In Fairfax County, these areas range from a small creek to the Potomac River with the same 100-foot offset around marshes and other core surface water components. Surveys by wetland ecologists can determine the exact delineations. Activities restricted within an RPA include building structures, disturbing or compacting the soil, clearing vegetation, and paving or installing other new, post-1993 impervious surfaces. Unless there were reasons such as grandfather clauses (the Fairfax County Chesapeake Bay Preservation Ordinance, Section 118 lists all restrictions and exemptions), houses located in what is now an RPA would never have been built there today. Besides the environmental impacts, these residents are more likely to be concerned about water in the basement and flooded property than people living in housing built away from an RPA. Folks with property in an RPA may receive a notice from Fairfax County that the land lies on a conservation easement, meaning activities like removing vegetation or installing a shed might need County pre-approval. While RPA may be a Virginian term, other state governments apply slightly different names to similar programs. An interactive map overlaying major Fairfax County RPAs and used to create Figure 1 is at:

https://fairfaxcountygis.maps.arcgis.com/apps/Viewer/index.html?appid=67ca30a491084ddf92db292337bd87e1#!

Riparian buffers' strengths rest in their biodiversity. Instead of a monoculture or lawn, the roots of numerous plant species form a complementary network. Below the surface lie deep taproots, long-running rhizomes, dense root balls, and shallow surface roots. They form a resilient absorption bed that filters out urban pollutants while stabilizing the soil against erosion. The roots soak up some runoff so that not all of a storm's precipitation enters the creeks where that water's power would cause streambank erosion. Above ground, the plants break the fall of pounding rains so those droplets' energy is reduced when they reach the ground. Since areas around waterways are prone to floods and other natural disturbances, the plants found in riparian buffers typically grow fast and can quickly fill voids. This botanical biodiversity creates habitat for all sorts of animals. Riparian buffers stretch for miles, making excellent wildlife corridors.

When a riparian buffer needs repairs and poor water quality made healthy again, stream restoration may be required, as is currently underway along Shanes Creek. As a surgeon needs to cut healthy tissue before removing a tumor, the restoration contractors must cut into forested areas for the habitat's long-term improvement (more about the restoration and how it is done is in the reference section). The parkland between Dundalk Street and Pumphrey Drive (B on Figure 1) is a good example of the good, bad, and ugly facing riparian buffers. The woodland is outside of the RPA while remaining important enough for stream restoration. At the end is a storm drain outfall and a second outfall is close. The area by the second outfall has concrete parged along the banks, essentially creating a water chute. This concrete application is an archaic approach to storm water management though it is still occasionally used today. Water racing off the chute hits the earthen streambed and banks, which are badly eroding into a narrow chasm instead of dispersing the water's energy over a broader area. The following is a photo essay of this site from several surveys prior to stream restoration. Some of the problems depicted here are now remedied and other parts are currently under construction. After construction, a riparian buffer will be replanted. The best way for neighbors to help the land heal is to end encroaching on parkland and restrict activities to their side of the property line. People wanting to help the watersheds can reduce impervious surfaces and lawn on their yards, landscape with native plants, volunteer for watershed clean-ups, and join invasive plant removal workdays (visit https://www.fairfaxcounty.gov/parks/invasive-management-area for more information). A healthy riparian buffer aids the immediate site and benefits the waterway's course to the Bay.

Special thanks to Chris Ruck, Ecologist IV, Stormwater Planning Division, Watershed Assessment Branch, Fairfax County's Department of Public Works and Environmental Services, for technical consultation.

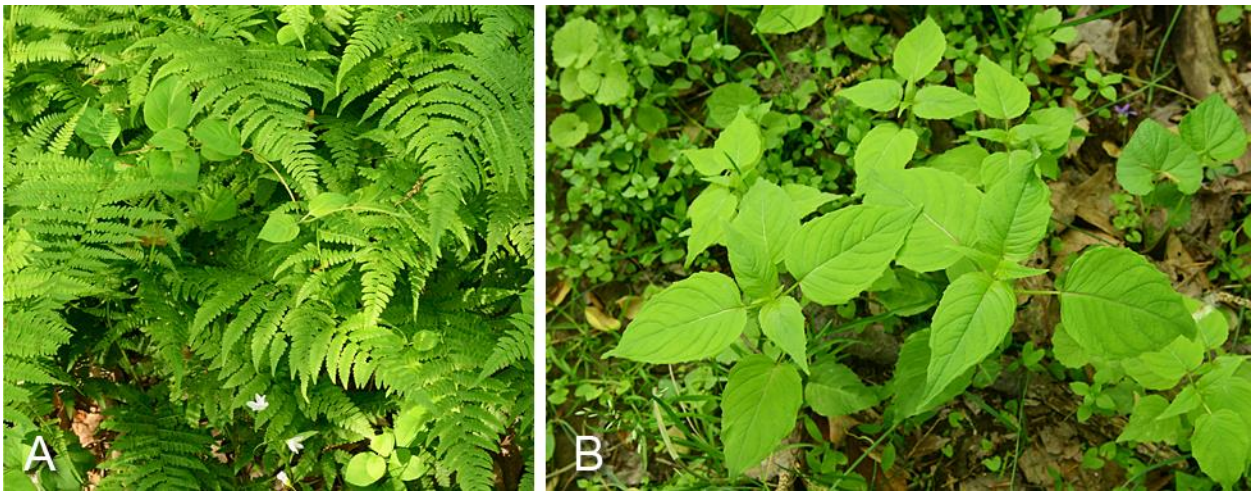

Figure 2. Like many riparian buffers, this one has a mix of native plants and invasive species. An invasive Japanese honeysuckle (*Lonicera japonica*) vine grows amongst native New York fern (*Amauropelta noveboracensis*) and spring beauties (*Claytonia virginica*) in bloom (A). Enchanter's nightshade (*Circaea canadensis*) and common blue violets (*Viola sororia*) are found with invasive garlic mustard (*Alliaria petiolata*) and Japanese stiltgrass (*Microstegium vimineum*) seedlings (B).

Figure 3. Pressures on this forested riparian buffer (A) include a severely eroded stormwater channel (left), which is downstream of the concrete parging. An unauthorized so-called "social trail" is on the right. Among the harmful encroachment activities is dumping yard debris on parkland (B). These piles, which smother native plants, pollute the water, and introduce invasive weeds, are sliding into to the waterway.

Figure 4. This set shows more detrimental human activity. The area (A) should be filled with native plants. Instead, the riparian buffer was replaced with a lawn full of invasive Japanese stiltgrass. Structures, such as the bridge and zipline, should not be present. A tree grows into the cable of a zipline anchor point (B).

Figure 5. Encroaching onto the parkland for playground equipment (A) and personal storage (B) are other ways the riparian buffer is damaged. Furthermore, the trampoline has debris piles from leaf blowers nearby. The wood stack is right against the waterway. At its base grows an invasive liriope patch.

Figure 6. Healthy sections contain a botanical community (A) including Christmas fern (*Polystichum acrostichoides*), blueberries (*Vaccinium* sp.), maple-leaf viburnum (*Viburnum acerifolium*), American hazelnut (*Corylus americana*), and Virginia creeper (*Parthenocissus quinquefolia*). Other natives found here are false Solomon's seal (B, *Maianthemum racemosum*) and American Euonymus (C, *Euonymus americanus*).

Figure 7. A common dewberry (A, *Rubus flagellaris*) blooms on the forest floor next to Virginia creeper. This eastern box turtle (B, *Terrapene carolina carolina*) is one of the critters benefiting from the habitat.

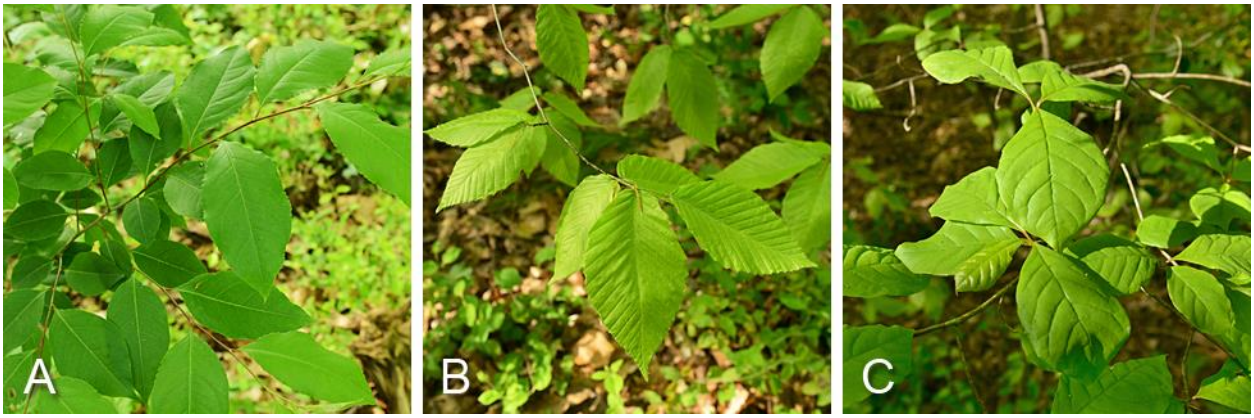

Figure 8. Native trees found here include (A) black cherry (*Prunus serotina*), (B) American beech (*Fagus grandifolia*), and (C) black gum (*Nyssa sylvatica*).

For more about Fairfax County RPAs, check out these resources:

Fairfax County FAQs: Resource Protection Areas: https://www.fairfaxcounty.gov/landdevelopment/faqs-resource-protection-areas

Riparian buffer brochure: https://www.fairfaxcounty.gov/parks/sites/parks/files/assets/documents/nature-history/riparian-buffers-brochure.pdf

Chesapeake Bay Preservation Ordinance: https://www.fairfaxcounty.gov/landdevelopment/chesapeake-bay-preservation-ordinance#:~:text=The%20first%20county%20RPA%20guidance%20maps%20were%20adopted,RPA%20features%20described%20in%20CBPO%20%C2%A7%20118-1-7%20%28b%29.

Additional information on riparian buffers and wetlands:

Baird, Alice R.T. and Douglas G. Wetmore. 2006. Riparian Buffers Modification & Mitigation Guidance Manual. Virginia Department of Conservation and Recreation, Chesapeake Bay Local Assistance. pp. 153. https://www.fairfaxva.gov/home/showpublisheddocument/17952/637611843116000000

Lindeman, Raymond L. 1942. The trophic-dynamic aspect of ecology. *Ecology* 23(4):399-418.

Virginia Department of Environmental Quality, Chesapeake Bay Preservation Act: https://www.deq.virginia.gov/water/chesapeake-bay/chesapeake-bay-preservation-act

Article 2.5. Chesapeake Bay Preservation Act: https://law.lis.virginia.gov/vacodefull/title62.1/chapter3.1/article2.5/

9VAC25-830-80. Resource Protection Areas: https://law.lis.virginia.gov/admincode/title9/agency25/chapter830/section80/

Virginia Department of Forestry. Plant Riparian Forest Buffers (website with additional resources): https://dof.virginia.gov/water-quality-protection/water-quality-protection-landowner-assistance/plant-riparian-forest-buffers/

Chronological Eco-Articles on Stream Restoration:

Q/As About Shanes Creek and Royal Lake (April 2019)

Emergency Restoration to Rabbit Branch (September 2020)

Quick Points About the Shanes Creek Restoration Project (June 2022)

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