

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

RIPARIAN FOREST BUFFER

(Ac.)

CODE 391

DEFINITION

An area dominated by trees and/or shrubs, located adjacent to and up-gradient from watercourses or water bodies.

PURPOSE

- Create shade to lower or maintain water temperatures to improve habitat for aquatic organisms.
- Create or improve riparian habitat for wildlife and provide a source of detritus and large woody debris.
- Reduce excess amounts of sediment, organic material, nutrients and pesticides in surface runoff; reduce excess nutrients and other chemicals in shallow ground water flow;
- Reduce pesticide drift entering the water body.
- Restore riparian plant communities.
- Increase carbon storage in plant biomass and soils.

CONDITIONS WHERE PRACTICE APPLIES

Riparian forest buffers are applied on areas adjacent to permanent or intermittent streams, lakes, ponds, and wetlands. They are not applied to stabilize stream banks or shorelines.

CRITERIA

General Criteria Applicable to All Purposes

Position and design the riparian forest buffer to achieve sufficient width, length, vertical structure/density and connectivity to accomplish the intended purpose(s).

Dominant vegetation will consist of existing, naturally regenerated, or seeded/planted trees and shrubs suited to the soil and hydrology of the site and the intended purpose(s).

The vegetation will extend a minimum width to achieve the intended purpose(s).

Measurement will begin at and perpendicular to the normal water line, bank-full elevation, or the top of bank as determined locally.

Maintain any overland flow through the riparian area as sheet flow. Control excessive sheet and rill erosion and concentrated flow in the areas immediately adjacent and up-gradient of the buffer site.

Use native and non-invasive tree and shrub species. Substitution with improved and locally accepted cultivars or purpose-specific species is allowed. Use only viable, high-quality plant materials that exhibit site-appropriate adaptations.

Favor tree and shrub species which offer multiple values, such as those preferred as food sources for aquatic invertebrates, those suited for timber, those that produce nuts, fruit, pollen/nectar, nesting sites or browse for wildlife, and those with floral or aesthetic value.

Periodic removal of some forest products, such as high value trees, medicinal herbs, nuts, and fruits, is permitted as long as the loss of vegetation or harvesting disturbance does not compromise the intended purpose(s) of the buffer.

Conduct site preparation and complete planting in a time and manner that maximizes survival and growth of selected species, thus improving the likelihood of achieving the intended purpose(s).

Control or exclude livestock and harmful wildlife as necessary to achieve the intended

purpose(s). Refer to conservation practices standards for Prescribed Grazing (528) and Access Control (472) as applicable.

Control or limit vehicular traffic and other uses within the forested riparian buffer (i.e., horseback riding or off-road vehicle riding) as necessary to prevent soil erosion or compaction, or to prevent damage to the desired plant community (including herbaceous plants).

Control or eliminate harmful plant and animal pests on the site as necessary to achieve and maintain the intended purpose(s). If pesticides are used, refer to the standard Pest Management, 595.

Additional Criteria to Reduce Excess Amounts of Sediment, Organic Material, Nutrients and Pesticides in Surface Runoff and Reduce Excess Nutrients and Other Chemicals in Shallow Ground Water Flow

The minimum width shall be at least 35 feet, measured horizontally on a line perpendicular to the water body beginning at the normal water line, bank-full elevation, or the top of the bank as determined locally.

For areas with high nutrient or sediment runoff, or areas with animal waste application, if the contributing area is not adequately treated or where an additional level of protection is needed, either: extend the buffer to a minimum of 50 feet wide or install a 35-foot Riparian Forest Buffer with an adjacent/upslope 35-foot Riparian Herbaceous Cover (390) planting.

Existing, functional underground drains which cross through the riparian area will pass pollutants directly to the outlet. To filter such pollutants, plug drains and/or remove or replace with perforated pipe/end plugs or water control structures (see Structure for Water Control - 587), thus allowing passage and filtration of drain water through the riparian forest root zone. However, be aware that saturated conditions in the riparian and adjacent areas may limit or change land use, management, and maintenance options.

Additional Criteria to Create or Improve Riparian Habitat and Provide a Source of Detritus and Large Woody Debris.

Extend the width to meet the minimum habitat requirements of the wildlife or aquatic species of concern.

Establish plant communities that address the targeted aquatic and terrestrial wildlife and pollinator needs and have multiple values such as habitat, nutrient uptake, and shading. Enhance the wildlife and pollinator value of the buffer by establishing diverse native woody and herbaceous species.

Additional Criteria for Reducing Pesticide Drift into Water Bodies

Maximize buffer width; maximize height and density of forest canopy. Minimum width shall be at least 35 feet, measured on a line perpendicular to the water body beginning at the normal water line, bank-full elevation, or the top of the bank as determined locally. Minimum canopy height shall be 30 feet on average at maturity, and minimum canopy density shall be 60% at maturity.

Select plants that have dense canopies and broad growth forms. If possible, include evergreens for additional screening; however, evergreens should not be used adjacent or near the protected water body.

Additional Criteria for Increasing Carbon Storage in Biomass and Soils

Maximize width and length of the riparian forest buffer.

Select plants that have higher rates of carbon sequestration in soils and plant biomass and are adapted to the site to assure strong health and vigor. Plant the appropriate stocking rate for the site.

CONSIDERATIONS

Avoid tree and shrub species which may be alternate hosts to undesirable pests. Increase species diversity to avoid loss of function due to species-specific pests.

Using seed and/or seedlings collected or propagated from multiple sources can increase genetic diversity.

Consider using a variety of plant materials to establish the buffer. Rooted stock (containerized, bare-root, balled and burlap), live stakes, direct seeding with seeds/nut, natural regeneration, and other methods are viable and effective establishment methods. Maximize buffer growth and survival by matching plant materials and planting

methods, and any combinations thereof, to site conditions.

Consider native tree and shrubs species whose leaves are favored food sources for aquatic invertebrates, to improve or restore the biotic community on the channel bottom. A functional biotic community on the channel bottom can reduce water-borne nutrients and chemicals by increasing in-stream adsorption and uptake of dissolved substances.

Consider selecting species with tolerance to herbicide leakage from adjoining fields.

Consider potential allelopathic impacts of selected plants.

Plan the location, layout and density of the buffer to complement natural features and mimic natural riparian forests. Consider installing the buffer with deciduous trees nearest the water body, shrubs or low-height trees in the center of the buffer's width, and herbaceous cover on the outer edge of the buffer, adjacent to other land uses like cropland or pasture. This layout will mimic natural conditions and maximize water quality and wildlife habitat benefits.

For sites where continued function of drains is desired, woody root penetration may eventually plug the underground structure. In these sites, minimize woody root penetration into the drains by establishing a setback for the woody vegetation and maintaining herbaceous plant cover over the drain or using rigid, non-perforated pipe for the drain.

Maximize widths, lengths, and connectivity of riparian forest buffers.

The species and plant communities that attain biomass more quickly will sequester carbon/ faster. The rate of carbon sequestration is enhanced as riparian plants mature and soil organic matter increases.

Do not plant woody buffer plants in utility right-of-ways. When a right-of-way crosses a buffer planting, herbaceous cover should be used in the right-of-way and the plant rows immediately adjacent to the right-of-way should be planted to short, multi-stemmed shrubs that will re-grow or root sprout if they are damaged by maintenance activities on the adjacent utility line.

PLANS AND SPECIFICATIONS

Prepare practice specifications for each site, referring to guidance such as *PA Practice Guide for Riparian Forest Buffers, Tree and Shrub Information for PA, and Woody Plants for Use in Pollinator-Friendly Plantings* as needed. Record using approved PA job sheet and specification sheet, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

Inspect the riparian forest buffer periodically and protect from adverse impacts, such as excessive vehicular and pedestrian traffic, pest infestations, concentrated flows, pesticides, livestock or wildlife damage, and fire.

Replace dead trees or shrubs and control undesirable vegetative competition until the buffer is, or will progress to, a fully functional condition.

Any manipulation of species composition, stand structure and stocking by cutting or killing selected trees and understory vegetation shall sustain the intended purpose(s). Refer to the standard Forest Stand Improvement, 666.

Continue to manage livestock and wildlife to avoid damage to buffer vegetation. Refer to the Practice Standards for Prescribed Grazing (528) and/or Access Control (472) as applicable.

Fertilizers, pesticides and other chemicals used to maintain buffer function shall not impact water quality.

REFERENCES

Bentrup, Gary 2008. Conservation buffers: design guidelines for buffers, corridors, and greenways. Gen. Tech. Rep. SRS-109. Asheville, NC: Department of Agriculture, Forest Service, Southern Research Station.

Salon, P. R. and C.F. Miller 2012. A Guide to Conservation Plantings on Critical Areas for the Northeast. USDA, NRCS, Big Flats Plant Materials Center, Corning, NY.

Practice Guide for Riparian Forest Buffers. 2014. USDA, Pennsylvania NRCS.

Woody Plants for Use in Pollinator –Friendly Plantings. 2014. USDA, Pennsylvania NRCS.