United States Department of Agriculture

Natural Resources Conservation Service

Riparian Forest Buffer

Conservation Practice Job Sheet 391

Photo Credit GASWCC-AGBMP's

Definition

A riparian forest buffer is an area of trees and shrubs located adjacent to streams, lakes, ponds, or wetlands.

Purpose

Riparian forest buffers of sufficient width intercept sediment, nutrients, pesticides, and other materials in surface runoff and reduce nutrients and other pollutants in shallow subsurface water flow. Woody vegetation in buffers provides food and cover for wildlife, helps lower water temperatures by shading the stream or waterbody, and slows out-of-bank flood flows. In addition, the vegetation closest to the stream or waterbody provides litter fall and large wood important to fish and other aquatic organisms as a nutrient source and structural components to increase channel roughness and habitat complexity. Also, the woody roots increase the resistance of streambanks and shorelines to erosion caused by high water flows or waves. Some tree and shrub species in a riparian forest buffer can be managed for timber, wood fiber, and horticultural products.

Where used

Buffers are located along or around permanent or intermittent streams, lakes, ponds, wetlands, or seeps. Many of these areas feature year-round or seasonal moisture, which allows woody species to establish quickly. A new riparian forest buffer can rapidly benefit a variety of settings, such as cropland, rangeland, forest land, and urban areas.

INSTALLING THE PRACTICE

Location and Width

Extend the riparian buffer from the normal water's edge or the top of the bank from 40 to 100 feet.

Stabilize the bank by separate treatment where erosion or vertical cutting of the bank exists. The minimum riparian buffer width should be approximately 40 feet.

- **Zone 1** is in the channel from the water line or at the top of the bank extending 20 feet, measured horizontally. This is the area most susceptible to erosion. Shrubs are most desirable when Zone 1 is within the channel banks.
- **Zone 2** should be at least 20 feet wide measuring from the edge of Zone 1. The combined width of both zones 1 and 2 should be 40 to 100 feet.
- **Zone 3** is adjacent to Zone 2 and may be planted in a grass or grass/legume mixture to provide additional wildlife habitat, reduce concentrated flow, and decrease erosion. The filter strip also protects seedlings from sedimentation. Follow native grass-based options for Zone 3 unless addressing soil erosion.

Species Selection

Select native species that are adapted to the site. Hardwood species should be the predominant species in riparian buffers where wildlife is a primary objective. Seventy-five percent of the hardwood species should be oak species. A pine component of up to 20 percent may be included in the buffer. Select species that have multiple values such as those suited for timber, biomass, nuts, fruit, browse, nesting, aesthetics, and tolerance to locally used herbicides. Where water quality is the primary objective, up to 50 percent of the buffer may be planted to pine species if the soils are suitable for growing pine. Species suitable for buffers are:

Shrubs (Plant in outer rows of buffer)

Waxmyrtle
Southern Crab Apple Chickasaw
Plum

See Georgia Plant List for complete list of plants suitable for Riparian Area.

Oak Species (In order of adaptability to wet sites)

Overcup Oak
Nuttall Oak
Willow Oak
Water Oak
Swamp Chestnut Oak
Shumard Oak
Cherrybark Oak
White Oak

Other Species (In order of adaptability to wet sites)

Baldcypress
Tupelo Gum
Green Ash
Sweetgum
American Sycamore
Persimmon
Yellow-Poplar
Black Walnut
Eastern Redbud
Flowering Dogwood

Pine Species (Plant in outer rows of buffer)

Loblolly
Longleaf
Slash (use only in southern Coastal Plains)

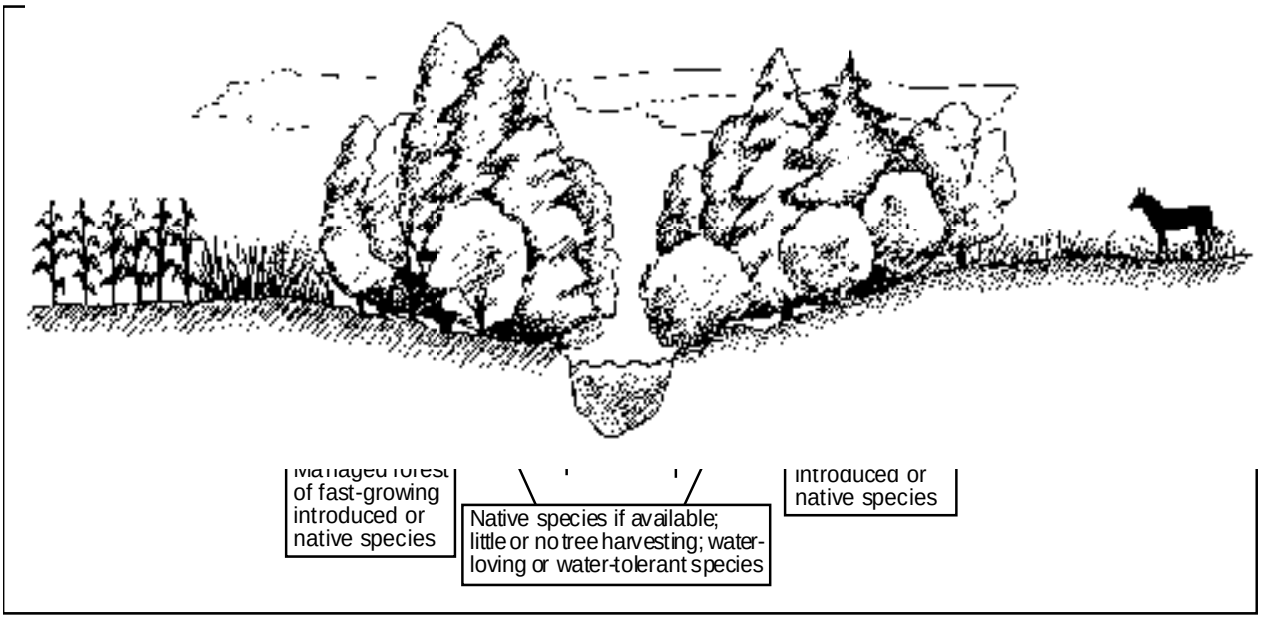
Spacing (feet by feet)

	Trees	Shrubs	TPA
Zone 1	12 X 12	20 X 30	HWD's 302-400
Zone 2	12 X 12	20 X 30	Pines or HWD's 302 - 400

Tree/shrub species – Plant only native species that provide multiple benefits for wildlife and water quality. Zone 1 should always be planted to hardwood species. Zone 2 shall consist of fast growing hardwoods or pines trees. Plant more than one variety of hardwood seedlings in riparian area. Mast producing hardwood species per zone is preferred. At minimum, 73 shrubs per acre can be planted in Zone 2. To achieve optimum interspersion, plant at least 2 species per row alternating species within the row.

Planting Dates

Plant trees/shrubs between November 1st and April 1st depending on the amount of rainfall for the year.



A riparian forest buffer includes a zone 1, the area closest to the stream or waterbody, and a zone 2, the area adjacent to and up gradient of zone 1. Trees and shrubs in zone 1 provide important wildlife habitat, litter fall for aquatic organisms, large wood that can fall into the stream or waterbody, and shading to lower water temperature. This zone helps stabilize streambanks and shorelines. Trees and shrubs in zone 2 (along with zone 1) intercept sediment, nutrients, pesticides, and other pollutants in surface and subsurface water flows. Zone 2 can be managed to provide timber, wood fiber, and horticultural products. A third zone, zone 3, is established if periodic and excessive water flows, erosion, and sediment from upslope fields or tracts are anticipated. Zone 3 generally consists of herbaceous plants or grass and a diversion or terrace, if needed. This zone provides a “first line of defense” to assure proper functioning of zones 1 and 2.

Wildlife

Connecting a riparian forest buffer with existing perennial vegetation, such as woodlots and woody draws (tree/shrub establishment) or other woody habitat (windbreak/shelterbelt establishment), benefits wildlife, including fish and other aquatic organisms. Select tree and shrub species and a planting pattern that benefit the wildlife species of interest and enhance local landscape aesthetics.

Effectiveness

Riparian forest buffers removed 25-85% of nitrogen, 50-75% of phosphorus and 50-75% of sediment in runoff in addition to the acreage converted to forests in studies. Restored Zone 3 buffers removed 60% of nitrogen and 65% of phosphorus entering from manure application sites to an adjacent water source in one Georgia research study. Grass buffers alone removed 45% of the nitrogen and 20% of the phosphorus from the same sites.

Riparian Forest Buffer – Job Sheet

Landowner_____ Field number_____

Purpose (check all that apply)	
☐ Create shade to lower water temperature/improve aquatic habitat	☐ Provide a harvestable crop of timber, fiber, forage, fruit, or other tree-related crops consistent with other purposes
☐ Provide detritus/large woody debris for aquatic/terrestrial organisms	☐ Provide protection against scour erosion within the floodplain
☐ Create wildlife habitat and establish wildlife corridors	☐ Restore natural riparian plant communities
☐ Reduce excess sediment, organic material, nutrients, pesticides in surface runoff and excess nutrients/chemicals in shallow groundwater flow	☐ Moderate winter temperatures to reduce freezing of aquatic over-wintering habitats
	☐ Increase carbon storage

Layout		
Water body/course type and name, other:		
Minimum buffer zone widths (40 ft.) – specify left and right of stream [facing upstream/downstream (circle appropriate one)] for a two-side buffer; use left only for water bodies, such as lakes and ponds; include herbaceous species in zone 3 notes or refer to other jobs sheets.		
Zone 1	**Zone 2**	**Zone3**
Left: Right:	Left Right:	Left: Right:
Notes:	Notes:	Notes (or refer to other job sheets):
Buffer zone length (ft):		
Additional location and layout requirements:		

Woody Plant Materials Information				
Species/cultivars:	Plants/acre:	Kind of stock[1]:	Planting dates:	Avg. Spacing[2]:
Zone # 1				
1				
2				
3				
4				
Zone # 2				
1				
2				
3				
4				

[1] Bare root, container, [2]Spacing between plants to achieve plants/acre.

Temporary Storage Instructions

Planting stock that is dormant may be stored temporarily in a cooler or protected area. For stock that is expected to begin growth before planting, dig a V-shaped trench (heeling-in-bed) sufficiently deep and bury seedlings so that all roots are covered by soil. Pack the soil firmly and water thoroughly. Additional requirements:

Site Preparation

Remove debris and control competing vegetation to allow enough spots or sites for planting and planting equipment. Additional requirements:

Planting Methods

For container and bareroot stock, plant stock to a depth even with the root collar in holes deep and wide enough to fully extend the roots. Pack the soil firmly around each plant. Cuttings are inserted in moist soil with at least 2 to 3 buds showing above ground. Additional requirements:

Operation and Maintenance

The buffer must be inspected periodically and protected from damage so proper function is maintained. Replace dead or dying tree/shrub stock and continue control of competing vegetation to allow proper establishment. Periodic harvesting of trees and shrubs in zones 1 and 2 may be necessary to maintain the health and vigor of mature stands. Keep large dead and dying trees for cavity nesting birds and a source of large wood in aquatic habitats. Additional requirements:

Prepared by: _____

Title: _____ Date: _____

Approved by: _____

Title: _____ Date: _____

Installation:

I certify that this practice has been installed in accordance with NRCS standards and specifications.

Certification by: _____

Date: _____