

Riparian Forest Buffers

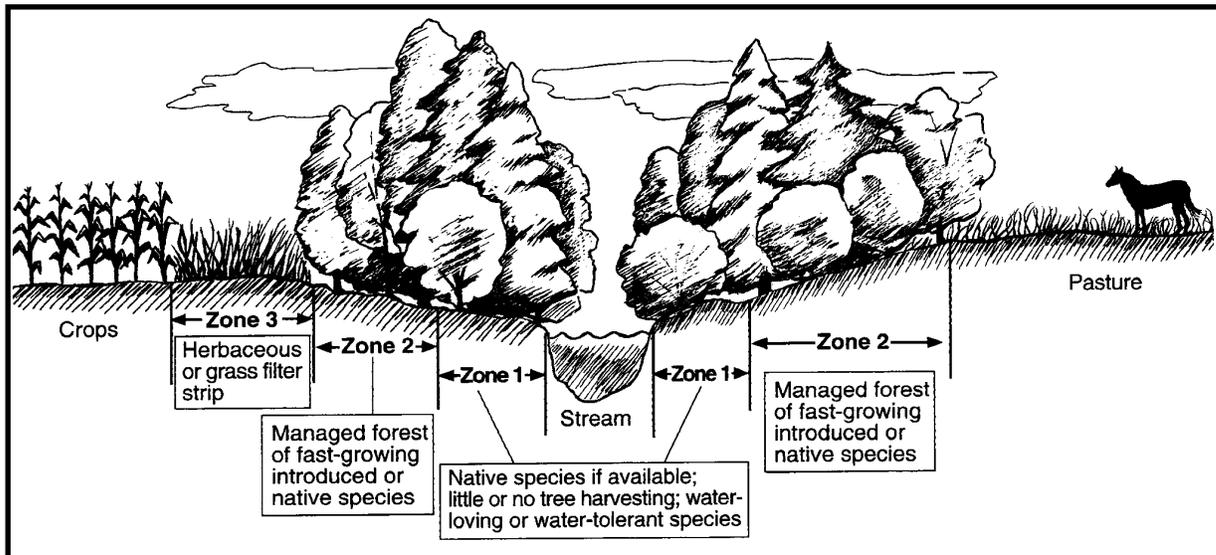


Figure 1. A riparian forest buffer includes Zone 1, the area closest to the waterbody or course, and Zone 2, the area adjacent to and up gradient of Zone 1. Trees and shrubs in Zone 1 provide important wildlife habitat, litter fall for aquatic organisms, and shading to lower water temperature. This zone 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. 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 is generally of herbaceous plants or grass and a diversion or terrace, if needed. This zone provides a “first defense” to assure proper functioning of Zones 1 and 2.

Definition

A riparian forest buffer is an area of predominantly trees and/or shrubs located adjacent to and up-gradient from watercourses or water bodies, such as streams, rivers, lakes, ponds, and wetlands.

Required Purpose(s)

- Remove nutrients, sediment, organic matter, and pesticides from surface runoff and subsurface flow by deposition, adsorption, plant uptake, denitrification, and other processes, and thereby reduce pollution and protect surface water and subsurface water quality while enhancing the ecosystem of the waterbody.
- Create shade to lower water temperatures to improve habitat for aquatic organisms.
- Provide a source of detritus (leaf fall) and large woody debris for aquatic organisms and habitat for wildlife.

Optional Additional Purpose(s)

- Provide protection against scour erosion within the floodplain.
- Restore natural riparian plant communities.
- Enhance wildlife habitat and establish wildlife corridors.
- To increase carbon storage in plant biomass and soils.
- Provide a future harvestable crop of timber, fiber, forage, fruit, or other crops consistent with other intended purposes after the life of the CRP-1 (contract).

Where Practice Applies

On areas adjacent to permanent or intermittent streams, lakes, ponds, wetlands and areas with ground water recharge that are capable of supporting woody vegetation.

General Criteria for All Purposes

There are potentially three specific zones that are applied in a riparian forest buffer depending upon the intended purposes and

site conditions. Figure 1 illustrates examples of Zones 1, 2 and 3 for water courses. Tables 1, 2 and 3 show the requirements for each riparian zone.

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Table 1. Requirements for Zone 1 Established for CRP Riparian Forest Buffers

Location	Buffer Purposes	Requirements	Buffer Width
Begins at the top of stream bank or normal waterline.	<p>Create a stable ecosystem adjacent to the water's edge.</p> <p>Create shade to moderate and stabilize water temperatures (generally resulting in higher dissolved oxygen levels) and provide source of detritus and woody debris to the stream ecosystem.</p> <p>Create habitat for aquatic insects and wildlife.</p> <p>Provides additional contact time that facilitates the buffering process to occur and to sequester excess amounts of sediment, organic matter, nutrients and pesticides in surface runoff and reduce excess nutrients and other chemicals in shallow ground water flow.</p>	<p>Dominant vegetation will consist of existing, naturally regenerated, or planted trees and shrubs suited to the site and the intended purposes. A seed source must be adjacent to the site when using natural regeneration to establish a buffer. If planted, there shall be a minimum of 2 rows. Planted vegetation will be composed of at least two native riparian tree species suited to the buffer purposes and seasonal variation of soil moisture and other site specific conditions within the planned buffer and such plantings as necessary for stream bank stabilization (example - willow species). To achieve the desired detritus (by providing the prolonged stable leaf fall and a variety of leaves) and woody debris necessary to meet the energy and pupation needs of aquatic insects, a mix of suitable hardwood species, including 1 or more oak species, will be planted (planting of pine species is not allowed).</p> <p>For all riparian buffers (regardless if located in buffer Zone 1 and/or 2), a restrictive area extending a minimum average distance of 35 feet, measured horizontally on a line perpendicular to the watercourse/body will be designated along all perennial and intermittent streams, lakes, ponds, and wetlands. Within the entire restrictive area, certain silviculture practices <u>are permitted</u>. They include: mowing, sub-soiling/ripping (especially when a restrictive layer exists within the seedlings' rooting zone); direct seeding, hand planting, or machine planting on the contour (Seedlings should be planted in the sub-soil trench or immediately beside if the soils have a high shrink-swell capacity.); and chemical control of competing vegetation during the first year after planting for increased survival. Herbicides should be banded (not broadcast) along the subsoil trench as a pre-emergent application (prior to bud break of the seedlings) in order to provide better control of competing vegetation and have fewer problems with phytotoxicity in seedlings. Selected herbicides should provide effective control on the targeted competitive species and be labeled for use on hardwoods. Any use of herbicides to increase chances for survival shall not compromise the intended purposes of the buffer. Practices that <u>are not allowed</u> within the restrictive area include mechanical site preparation (except as previously noted), fertilization, and aerial application or mist blowing of herbicides and insecticides. <u>Outside the restrictive area</u>, any site preparation and planting methods consistent with Mississippi's Best Management Practices for Forestry may be used if they do not compromise the intended buffer purposes.</p>	<p>Minimum - 15 feet* (measured horizontally on a line perpendicular to the stream bank)</p> <p>Optimum - ≥ 35 feet</p> <p>*Narrower widths within this job sheet recognize the value of streamside land for farming and limited bottomland acreage in many locations.</p>

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		No harvesting or grazing for the life of the CRP-1 (contract).	
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Table 2. Requirements for Zone 2 Established for CRP Riparian Forest Buffers

Location	Buffer Purposes	Requirements	Buffer Width
Begins at the edge of Zone 1.	Provides contact time for buffering process to occur and to sequester excess amounts of sediment, organic matter, nutrients and pesticides in surface runoff and reduce excess nutrients and other chemicals in shallow ground water flow.	<p>Dominant vegetation will consist of existing, naturally regenerated, or planted trees and shrubs suited to the site and the intended purposes. A seed source must be adjacent to the site when using natural regeneration to establish a buffer.</p> <p>Plantings will consist of predominately native tree and shrub species suited to the seasonal variation of soil moisture and other site specific conditions within the buffer area. A mix of 3 or more tree species will be planted in the <u>combined areas</u> of Zones 1 and 2. (Native pine species may be added to Zone 2. However, even in Zone 2, planting of pine species is not allowed within the 35-foot restrictive area along the water course/body.) Shrubs may be planted on the outside edge of this zone, so they will not be shaded out as the trees mature.</p> <p>Necessary site preparation and planting will meet the same criteria as for Zone 1. Silviculture practices outside the restrictive area that might possibly concentrate runoff, such as bedding, must be planned on the contour. If concentrated flow erosion within the buffer is caused by soil disturbing practices during establishment, the erosion will be adequately controlled, including providing any necessary stable outlets for runoff water.</p> <p>Runoff and wastewater from the area up-gradient of Zone 2 that is to be buffered or filtered will be limited to sheet flow or subsurface flow only. Concentrated flow must be converted to sheet flow or subsurface flow before <u>entering</u> this zone.</p> <p>No harvesting or grazing for the life of the CRP-1 (contract).</p>	<p>Extends a minimum average width of 20 feet (measured horizontally in the direction of flow)</p> <p>The minimum combined width of Zones 1 and 2 will be 100 feet or 30 percent of the geomorphic (active) floodplain whichever is less, but not less than 35 feet.</p> <p>Optimum - \geq150 feet (combined width of Zones 1 and 2)</p> <p>Maximum -180 feet; additional “minimum design criteria for water quality” and “infeasible to farm” widths must be approved by FSA and NRCS.</p>

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Table 3. Requirements for Zone 3 Established for CRP Riparian Forest Buffers

Location	Buffer Purposes	Requirements	Buffer Width
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<p>Begins at the edge of Zone 2 and extends horizontally in the direction of flow.</p>	<p>Provides sediment filtering, nutrient uptake, and the space to convert concentrated flow to uniform flow.</p>	<p>Dominant vegetation will be comprised of native grasses and forbs. Stiff stemmed grasses or forbs may be established to accelerate sediment deposition.</p> <p>Only required to convert concentrated flow erosion to sheet flow or subsurface flow to control excessive sheet and rill erosion or mass soil movement prior to establishment of the riparian forest buffer.</p> <p>This zone provides a “first defense” to assure proper functioning of Zones 1 and 2. Buffers are normally established concurrently with other practices (such as diversion, and/or critical area planting) as part of a conservation management system. Use of this practice without other nutrient, pesticide, sediment, and erosion control practices can result in adverse impacts on buffer vegetation and hydraulics. However, installation of other practices may be influenced by USDA policy on lands enrolled in CRP.</p> <p>Marginal pasture land may be eligible, but shall not exceed an average width of 20 feet.</p> <p>No harvesting or grazing for the life of the CRP-1 (contract).</p>	<p>Extends a minimum average width of 20 feet (measured horizontally in the direction of flow)</p>
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herbicides. See Table 4 for approved species list.

Design Considerations

The location, layout, width, length and species of plants in the riparian forest buffer will be designed to accomplish the intended purposes and function. Ideally the trees, shrubs, and herbaceous plants used in a riparian forest buffer should mimic those that occurred naturally on the site, but a number of alternatives are available to meet the landowner’s objectives.

- Recommended Widths
Buffer width = Zone 1 + Zone 2 + Zone 3 (when applicable). Wide widths are preferred. They are more effective for the listed purposes and more feasible to manage. Narrower widths within this job sheet recognize the value of streamside land for farming and limited bottomland acreage in many locations.

Refer to Table 1 of job sheet, MS-ECS-391-01(JS/SS), for recommended widths by purposes for riparian forest buffers. **However, minimum and maximum widths are specified by USDA policy on lands enrolled in CRP.**

- Vegetation Selection
For existing or naturally regenerated buffers, allow the buffer to grow up in native plants, if suitable species for targeted purposes are available in the seed bank or adjacent areas.

Avoid use of species identified in the USDA, Forest Service Technical Report SRS-62 on invasive plants of southern forests.

Species diversity should be considered to avoid loss of function due to species-specific pests.

Favor tree and shrub species that are native, non-invasive and have multiple values such as those suited for timber, biomass, nuts, fruit, browse, nesting, aesthetics and tolerance to locally used

Table 4. SUGGESTED PLANT LIST (Not limited to)

GRASSES:	SHRUBS/FORBS:
Switch grass	Partridge Pea
Bluestem spp.	Ragweed
Weeping love grass	American Plum
Bahia grass	Wild Plum
Dallisgrass	Crab Apple
Legumes (with grasses):	Native Holly spp.
White Clover	Hawthorn spp.
Red Clover	Vaccinium spp.
Crimson Clover	Viburnum spp.
TREES:	
Basswood	Yellow Poplar
Black Cherry	Oak species:
Blackgum	Cherrybark
Black Walnut	Chinkapin
Chinese Chestnut	Northern Red
Cottonwood	Nuttall
Cypress	Overcup
Dogwood	Pin
Green Ash	Sawtooth
Hickory	Scarlet
Native Pecan*	Shumard
Persimmon	Southern Red
Pine (only in Zone 2)	Swamp White
Sugarberry	Swamp Chestnut
Sweetgum	Water
Sycamore	White
White Ash	Willow
*No commercial varieties of pecans planted in an orchard fashion are allowed under CRP.	

Additional General Considerations

The severity of bank erosion and its influence on existing or potential riparian trees and shrubs should be assessed.

Stream crossings and livestock watering facilities shall be located and designed to minimize impact on buffer vegetation and shall be fenced.

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Operation and Maintenance

The following actions shall be carried out to insure that this practice functions as intended throughout its expected life:

- Buffer with trees to be established through natural regeneration should be inspected periodically until establishment of desired species and stocking is ensured.
- Replacement of dead trees or shrubs and control of undesirable vegetative competition will be continued until the buffer is, or progresses to, a fully functional condition.
- The buffer shall not be grazed by domestic livestock for the life of the CRP-1 (contract). Livestock shall be excluded as necessary to achieve and maintain the intended purpose and protect the buffer from livestock damage.
- The riparian forest buffer will be inspected periodically, and protected from destructive fire. Inspect the buffer after heavy storms. Check for areas where water is concentrating.
- As applicable, adequate erosion control shall be maintained within the buffer and in the up-gradient area immediately adjacent to Zone 2 to maintain buffer function.
- Invasive species, noxious weeds and other undesirable plants, insects, and pests shall be controlled.
- Excessive use of fertilizers, pesticides, or other chemicals, and vehicular traffic must be avoided.
- Chemicals applied for any purpose(s) must be Federally, State and locally registered and must be applied strictly according to authorized registered uses, directions on the label, and other

- Comply with applicable federal, state and local laws and regulations during the installation, operation and maintenance of this practice.
- In Zone 1 vegetation, undergrowth, forest floor, duff layer, and leaf litter shall remain undisturbed except for removal of trees that represent a hazard to streambank stability.
- In Zone 1 after establishment, dead trees should be left to eventually recruit large woody material into the water body and to provide food and shelter for birds and mammals.
- The buffer shall not be harvested for the life of the CRP-1 (contract). Additional guidance, for management of riparian Zones 1 and 2 to provide a future harvestable crop of timber, fiber, forage, fruit, or other crops consistent with other intended purposes after the life of the CRP-1 (contract), is available in the job sheet MS-ECS-391-01(JS/SS).
- This practice shall have periodic management activities performed, according to the conservation plan, during the life of CRP-1.
- Additional operation and maintenance requirements shall be developed on a site-specific basis to assure performance of the practice as intended.

Specifications

Site-specific requirements are listed on the specifications sheet. Additional provisions maybe entered on a job sketch sheet.

Specifications are prepared in accordance with this job sheet. Additional guidance is available in job sheet MS-ECS-391-01(JS/SS) and Mississippi NRCS Practice Standard Code 391-Riparian Forest Buffer.

USDA CRP policies may restrict or supercede information in this job sheet. Therefore, check with the appropriate agency for guidelines pertaining to lands under USDA programs.

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Riparian Forest Buffer - Specifications Sheet

Landowner _____

Field Number _____

Purpose (check all that apply)	
<input type="checkbox"/> Intercept sediment, nutrients, pesticides, other contaminants	<input type="checkbox"/> Wildlife habitat
<input type="checkbox"/> Create shade to lower water temperature	<input type="checkbox"/> Other (specify):
<input type="checkbox"/> Provide source of detritus and woody debris	

Location and Layout		
Water body/course type and name, other:		
Minimum buffer zone widths (ft.) - specify left and right of stream (facing upstream) for a two-side buffer; use left only for water bodies, such as lakes and ponds; include herbaceous species on Zone 3 notes or refer to other job sheets:		
Zone 1	Zone 2	Zone 3
Left: _____ Right: _____	Left: _____ Right: _____	Left: _____ Right: _____
Notes:	Notes:	Notes:
Buffer zone length (ft): _____		Buffer zone area (ac): _____
Additional location and layout requirements:		

Woody Plant Materials Information				
Species/cultivars:	Plants/acre:	Kind of stock ¹ :	Planting dates:	Average Spacing ² :
<i>Zone #1</i>				
1				
2				
3				
4				
<i>Zone #2</i>				
1				
2				
3				
4				

¹BAReroot, COntainer, CUtting; include size, caliper, height, and age as applicable. ²Average 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.
Site Preparation
Remove debris and control competing vegetation to allow enough spots or sites for planting and planting equipment. Additional requirements:
Planting Method(s)
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:
Buffer Maintenance
The buffer must be inspected periodically and protected from damage so proper function is maintained. Replace dead or dying tree and shrub stock and continue control of competing vegetation to allow proper establishment. Livestock shall be controlled or excluded as necessary to achieve and maintain the intended purpose and protect the buffer from livestock damage. No harvesting or grazing for the life of the CRP-1 (contract). Periodic harvesting of trees and shrubs in Zones 1 and 2 may be necessary to maintain the health and vigor of mature stands after the life of the CRP-1 . Additional requirements: