

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
RIPARIAN FOREST BUFFER

(Acre)

CODE 391

DEFINITION

An area of predominantly trees and/or shrubs located adjacent to and up-gradient from watercourses or water bodies.

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

PURPOSES

- Create shade to lower or maintain water temperatures to improve habitat for aquatic organisms.
- Create or improve riparian habitat and provide a source of detritus and large woody debris.
- 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.
- Reduce pesticide drift entering the water body.
- Restore natural riparian plant communities.
- Increase carbon storage in plant biomass and soils.

The vegetation will extend a minimum width to achieve the purpose(s). Measurement will begin at and perpendicular to the normal water line, bank-full elevation, or the top of the bank. The riparian buffer should not be less than the design width. However, the width may be adjusted for changes in topography, uneven field boundaries, etc.

For sites to be regenerated or planted, excessive sheet-rill and concentrated-flow erosion will be controlled in the area immediately adjacent and up-gradient of the buffer site.

Occasional removal of some tree and shrub products such as high value trees is permitted provided the intended purpose is not compromised by the loss of vegetation or harvesting disturbance. Tree and shrub pruning and removal shall be done according to the Oklahoma NRCS Tree/Shrub Pruning (660) and Forest Stand Improvement (666) standards.

CONDITIONS WHERE PRACTICE APPLIES

Riparian forest buffers are applied on areas adjacent to permanent or intermittent streams, lakes, ponds, and wetlands. Streambank and shoreline stabilization may be required prior to riparian establishment. Refer to the Oklahoma NRCS Streambank and Shoreline Protection (580) standard for guidance.

Favor tree and shrub species that have multiple values such as timber production, biomass, nuts, fruit, browse, aesthetics and tolerance to locally used herbicides.

Necessary site preparation and planting shall be done at a time and manner to insure survival and growth of selected species for achieving the intended purpose(s). Refer to the Oklahoma NRCS Tree/Shrub Site Preparation (490) standard.

CRITERIA

General Criteria Applicable to All Purposes

The location, layout, and density of the riparian forest buffer will accomplish the intended purpose and function.

Livestock shall be controlled or excluded as necessary to achieve the intended purpose(s). If pesticides are used, refer to the Oklahoma NRCS Pest Management (595) standard.

Natural regeneration of existing plants on the site may be used when the existing vegetation meet all of the following criteria:

- Plants must be native, non-invasive, trees or shrubs, adapted to the area
- Have a density of 300 plants per acre (3 per 1/100 acre)
- Plants must be at least 2 feet tall and in good health

Plant densities can be determined by marking the perimeter of a 1/100-acre circular plot (approximately 12 feet in radius) and then counting all desirable woody plants within that circle. When the area of consideration is >100ft. in length, several sites must be sampled and summarized to determine if the 300 plant per acre criteria is met.

Planting shall be done according to the Oklahoma NRCS Tree/Shrub Establishment (612) standard. Select species from Tables 1 and 2 of the (612) standard that are adapted to the soil and are within the rainfall area recommended. Refer to the NRCS approved Average Annual Precipitation Map.

Use tree and shrub species that are native and non-invasive. Only viable, high-quality and adapted planting stock or seed will be used. Substitution with improved and locally accepted cultivars or purpose-specific species is allowed.

Harmful pests present on the site will be controlled or eliminated as necessary to achieve and maintain the intended purpose. Invasive and/or non-native plants shall be removed as feasible.

For optimal carbon storage, select the species that are adapted to the site to assure strong health and vigor and plant the full stocking rate for the site.

A filter strip shall be added to the riparian buffer when adjacent to cropland or other sparsely vegetated or highly erosive areas to filter sediment and reduce the impact of concentrated flow erosion. The Oklahoma NRCS Filter Strip (393) standard shall be used for the design.

Comply with applicable federal, state and local laws and regulations during the installation, operation (including harvesting activities) and maintenance of this practice.

Additional Criteria to Create Shade to Lower or Maintain Water Temperatures to Improve Habitat for Aquatic Organisms.

When shading is desired to lower water temperatures for aquatic habitat improvement, a mixture of trees will be established that are suitable for the area with mature heights of at least 30 feet.

Riparian forest buffers will be established and maintained on the south and west sides of water course as much as possible for shading effect.

The tree canopy shall be established to achieve at least a 50% crown cover. Place drooping or wide-crowned trees nearest the water. Shoreline or channel depth and topographic shading will be taken into account in selecting species.

The riparian forest buffer shall have a minimum design width of 35 feet not to exceed 50 feet.

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 35 feet measured horizontally on a line perpendicular to the edge of the water body or the top of the stream bank.

The width may be extended up to a maximum of 160 feet when the adjacent area has the potential to yield excess amounts of nutrients, pesticides, sediments, or is an animal waste application area.

Existing, functional underground drains through the riparian area will pass pollutants directly to the outlet. To filter such pollutants, drains can be plugged, removed, or replaced with perforated pipe/end plugs to allow passage and filtration of drain water through the riparian forest root zone. Caution is advised that saturated conditions in the riparian and adjacent areas may limit existing land use and management.

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

Follow the guidelines for design width listed in **Table 1** for selected wildlife species to create or improve riparian habitat along streams.

Widths in **Table 1** are the total width required for the habitat of the selected wildlife species and can be on one side or split for both sides of the stream. The design width will not exceed the width of the floodplain.

Plant communities should be developed that are good for the targeted aquatic and terrestrial life. Select plant species that have multiple values for habitat, nutrient uptake, and shading.

Establish and manage species capable of producing stems and limbs of sufficient size to provide an eventual source of woody debris for in-stream habitat.

Table 1		
Wildlife Species	Minimum Width	Max Width
Providing habitat for bald eagle, cavity nesting ducks, heron, sandhill crane	600'	600'
Providing habitat for beaver, ducks, mink, other water mammals	300'	600'
Providing habitat for deer, non-game mammals, songbirds, and game birds	200'	300'

Additional Criteria for Increasing Carbon Storage in Biomass and Soils

The riparian forest buffer will be 35 feet to 160 feet in width.

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

CONSIDERATIONS

Streambank stability activities may be needed before establishing a riparian forest buffer. When concentrated flow erosion and sedimentation cannot be controlled vegetatively, consider structural or mechanical treatments. Refer to the Oklahoma NRCS

Streambank and Shoreline Protection (580) standard.

Tree and shrub species, which may be alternate hosts to undesirable pests, should be avoided. Species diversity should be considered to avoid loss of function due to species-specific pests.

Plants that deplete ground water should be used with caution in water-deficit areas.

The location, layout, and density of the buffer should complement natural features, and mimic natural riparian forests.

Woody root penetration may eventually plug underground pipelines so a setback of woody vegetation may be necessary or the use of non-perforated pipe through the buffer area.

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.

PLANS AND SPECIFICATIONS

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

The riparian forest buffer will be inspected periodically and protected from adverse impacts such as excessive vehicular and pedestrian traffic, pest infestations, pesticides, livestock grazing, wildlife damage, and fire.

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

The Oklahoma NRCS Use Exclusion (472) standard shall be used when excluding animals, people, or vehicles.

A firebreak may be needed in certain locations to protect the area from wildfire. Refer to the Oklahoma NRCS Firebreak (394) standard for design information.

Replace trees that have died as necessary to keep the riparian area in a functional condition.

REFERENCES

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Mutli-species Riparian Buffer Strip. Agroforestry Systems 29:201-225.

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