

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

RIPARIAN FOREST BUFFER

(Ac.)

CODE 391

DEFINITION

An area predominantly 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.
- Provide a source of detritus and large woody debris for aquatic and terrestrial organisms.
- 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.
- Create wildlife habitat and establish wildlife corridors.
- Provide a harvestable crop of timber, fiber, forage, fruit or other crops consistent with the intended purposes.
- Provide protection against erosion along watercourses and water bodies.

CONDITIONS WHERE PRACTICE APPLIES

Riparian forest buffers are applied on areas adjacent to permanent or intermittent streams, lakes, ponds, wetlands and areas with ground water recharge that are capable of supporting woody vegetation. They are not applied to stabilize stream banks or shorelines.

There are potentially three management zones that are applied in a riparian buffer depending upon the intended purpose(s) and site conditions. While some water courses have adjacent lands that are not actually higher than the streambank, this standard uses the "upgrade" to refer to the land as you move away from the stream, pond, wetland, etc.

Management Zone 1 is the zone immediately adjacent to the water. Zone 1 contributes most to the instream habitat with large woody debris, detritus and shade. Herbaceous and woody (usually water-loving) plants normally dominate the vegetation. The minimum width for Zone 1 is 15 feet for all purposes. No trees should be cut or harvested in Zone 1.

Management Zone 2 extends upgrade from Zone 1 to the outer edge of the stream or water body ecosystem. Zone 2 contains trees and shrubs that can be managed to provide wildlife habitat, buffering benefits, wood products, fruits, nuts, and other products. While Zone 2 can be managed, it is still critical to leave sufficient trees and/or shrubs to protect the water body. According to Texas Forestry Best Management Practices, a minimum of 50 square feet of basal area per acre, evenly distributed should be retained within this area. The trees should encompass all tree diameter ranges available and should vary to enhance wildlife values and food sources. Zone 2 along with Zone 1 intercepts sediment, nutrients, pesticides and other pollutants in surface and subsurface water flows.

The minimum width of Zone 2 is 35 feet. The combination of Zone 1 (15 feet) and Zone 2 (35 feet) meet the Texas Forestry BMP minimum requirements of 50 feet for a riparian forest buffer.

Management Zone 3 is upgrade of management Zone 2 and is generally comprised of herbaceous plants. Zone 3 is established if periodic and excessive water flows, erosion and/or sediment from upslope fields is anticipated. This zone extends the protection of the Riparian Forest Buffer and is particularly useful in streams of Order 3 or higher.

CRITERIA

General Criteria Applicable to All Purposes

The riparian forest buffer shall be positioned appropriately and designed 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). When selecting trees or shrubs to re-vegetate a Riparian Forest Buffer, examining the vegetation along the watercourse or water body should aid in determining what species to select.

The vegetation will extend a minimum width to achieve the purpose(s). Measurement shall begin at and perpendicular to the normal water line, bank-full elevation, or the top of the bank as determined locally and extend to the outer edge of the riparian area as indicated by yearlong or seasonal soil wetness, geomorphology and floodplain topography. The buffer width will not include the area in the stream or water body itself.

Length is measured parallel to the shoreline or bank. Area is a function of length and width.

Widths to use for Riparian Forest Buffers are: Buffer width = zone 1 + zone 2 + zone 3 (when applicable).

Purpose	Min Width	Max Width
Create shade to lower or maintain water temperatures to improve habitat for aquatic organisms.	50 feet	50 feet
Provide a source of detritus and large woody debris for aquatic and terrestrial organisms.	50 feet	75 feet
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.	75 feet	150 feet
Reduce pesticide drift entering the water body.	50 feet	150 feet
Restore riparian plant communities	50 feet	150 feet
Create wildlife habitat and establish wildlife corridors	50 feet	200 feet
Provide a harvestable crop of timber, fiber, forage, fruit or other crops consistent with the intended purposes.	50 feet	300 feet
Provide protection against erosion along watercourses and water bodies. (Order 3 and greater streams)	100 feet	200 feet

For sites to be regenerated or planted, site preparation shall be sufficient for establishment and growth and done in a manner that does not compromise the intended purpose.

When trees and shrubs must be planted, use only tree and shrub species that are native and non-invasive. Substitution with improved and locally accepted cultivars or purpose-specific species is allowed. For plantings and seeding, only viable, high-quality and adapted plant materials will be used.

Favor tree and shrub species that have multiple values such as those suited for timber, nuts, fruit, browse, nesting, and aesthetics.

Occasional removal of some forest products such as high value trees, medicinal herbs, nuts, and fruits is permitted provided the intended purpose is not compromised by the loss of vegetation or harvesting disturbance.

Excessive sheet-rill and concentrated-flow erosion will be controlled in the areas immediately adjacent and up-gradient of the buffer site.

Livestock shall be controlled or excluded as necessary to achieve and maintain the intended purpose. The amount of herbaceous forage produced in a riparian forest buffer is usually limited but can serve as an area for periodic grazing.

Harmful plant and animal pests present on the site should be controlled or eliminated as necessary to achieve and maintain the intended purpose.

Comply with Texas Forestry Best Management Practices (BMP's) and all other regulations that apply.

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

An additional strip or area of land, Zone 2, that begins at the edge and up-gradient of Zone 1 and extends a minimum of 35 feet measured horizontally on a line perpendicular to the water body. Criteria for Zone 1 apply to Zone 2 except that removal of products such as timber, fiber, nuts, fruits and forbs is permitted and encouraged on a periodic and regular basis provided the intended purpose is not compromised by loss of vegetation or harvesting disturbance.

Zone 2 widths will be expanded in high nutrient, sediment, and animal waste application areas, where the contributing area is not adequately treated or where an additional level of protection is needed.

A Zone 3 shall be added to the riparian buffer when adjacent to cropland, concentrated animal feeding operations or other sparsely vegetated or highly erosive areas. Zone 3 will filter sediment, address concentrated flow erosion and maintain sheet flow. Zone 3 is generally comprised of herbaceous vegetation and shrubs that should not be disturbed to maintain vegetative cover.

Additional Criteria to Provide or Improve Wildlife Habitat for Aquatic Organisms and Terrestrial Wildlife.

The width of Zone 1 and/or Zone 2 will be extended to meet the minimum habitat requirements of the wildlife or aquatic species of concern.

Establish plant communities that address the target wildlife needs and have multiple values such as providing habitat, food sources, nutrient uptake and shading. The establishment of diverse native woody and herbaceous species will enhance wildlife and pollinator values.

Riparian Forest Buffers provide valuable wildlife habitat so selecting the appropriate vegetation is key to protecting the water body while providing wildlife food and cover. Select appropriate trees, shrubs and herbaceous vegetation that are native to the area.

CONSIDERATIONS

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.

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

While riparian forest buffers do not produce large quantities of forage, livestock tend to congregate in the buffers due to shade, water and succulent vegetation. In the process they compact the soil and may erode the stream bank by climbing in and out of the water. Livestock should be controlled and managed in their use of the riparian forest buffer.

Consider cultural resources when planning this practice. This practice may adversely affect cultural resources and should comply with GM 420, Part 401, during planning and prior to installation.

Allelopathic impacts of plants should be considered.

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

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

PLANS AND SPECIFICATIONS

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

Replacement of dead trees or shrubs and control of undesirable vegetative competition will be continued 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 TX Standard Forest Stand Improvement, 666.

Control or exclusion of livestock and harmful wildlife shall continue. Refer to the TX Standards Prescribed Grazing, 528, and/or Use Exclusion, 472, as applicable.

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

REFERENCES

Agroforestry Note – Riparian #3. Riparian buffers for agricultural land. USDA National Agroforestry Center. January, 1997. 4 pgs.

Agroforestry Note – Riparian #4. How to design a riparian buffer for agriculture land. USDA National Agroforestry Center. January, 1997. 4 pgs.

Stream corridor restoration, principles, processes and practices. NEH Part 653. USDA-NRCS. August 1998.

