



Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

RIPARIAN FOREST BUFFER

CODE 391

(ac)

DEFINITION

An area predominantly covered by trees and/or shrubs located adjacent to and up-gradient from a watercourse or water body.

PURPOSE

This practice is used to accomplish one or more of the following purposes:

- Reduce transport of sediment to surface water, and reduce transport of pathogens, chemicals, pesticides, and nutrients to surface and ground water
- Improve the quantity and quality of terrestrial and aquatic habitat for wildlife, invertebrate species, fish, and other organisms
- Maintain or increase total carbon stored in soils and/or perennial biomass to reduce atmospheric concentrations of greenhouse gasses
- Lower elevated stream water temperatures
- Restore diversity, structure, and composition of riparian plant communities

CONDITIONS WHERE PRACTICE APPLIES

Apply riparian forest buffers on areas adjacent to permanent or intermittent streams, lakes, ponds, and wetlands where channels and streambanks are sufficiently stable.

This practice does not apply to the treatment of conditions where high levels of pollutants can be anticipated such as animal feed lots, feed storage areas, and milking center waste areas. For these types of situations refer to Conservation Practice Standard Vegetated Treatment Area (Code 635) or other agricultural waste standards as needed.

This practice does not apply where soil loss is above tolerable levels within 300 feet of the proposed riparian forest buffer.

CRITERIA

General Criteria Applicable to All Purposes

Follow guidance provided in the Riparian Forest Buffer Guidance Document (Code 391).

1. Establishment.

- Perform necessary site preparation and planting at a time and manner that ensures the survival and growth of species selected for achieving the intended purpose(s). Refer to criteria in NRCS CPSs Tree and Shrub Site Preparation (Code 490) and/or Tree and Shrub Establishment (Code 612).
- Control state listed noxious weeds and invasive plants, if present. See Conservation Practice

NRCS reviews and periodically updates conservation practice standards. To obtain the current version of this standard, contact your Natural Resources Conservation Service State office or visit the Field Office Technical Guide online by going to the NRCS website at <https://www.nrcs.usda.gov/> and type FOTG in the search field.

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- Standard Brush Management (Code 314) and/or Herbaceous Weed Treatment (Code 315).
- Control concentrated flow and sheet and rill erosion within 300' up-gradient of the riparian forest buffer area. Soil erosion must be below tolerable loss levels in the 300' up-gradient area.
 - Evaluate areas of existing tree/shrub cover for quality and quantity. Treat these areas to achieve desired quality and/or quantity of riparian forest buffer vegetation, if needed. See Conservation Practice Standards Forest Stand Improvement (Code 666), Brush Management (Code 314), and/or Herbaceous Weed Treatment (Code 315) as needed.
 - Use plant species adapted to the projected duration of site saturation and inundation.
 - Use tree and shrub species that are native and noninvasive. Substitution with improved locally adapted species, or with species suited for a specific purpose, is allowed with WI NRCS state forester approval. For plantings, use only viable, high quality, and adapted plant materials. Where available, use the ecological site description to guide restoration to an appropriate vegetative community phase.
 - Design tree and shrub stem densities to assure the established riparian forest buffer is predominantly covered by trees and/or shrubs by the end of the practice lifespan.
 - Control competing vegetation until the trees and/or shrubs are established.
2. The starting point for measuring minimum riparian forest buffer widths for the following water features is as follows. Include existing tree/shrub vegetation when establishing riparian forest buffer width.
- Lakes - Measure from the ordinary high water mark.
 - Perennial and intermittent streams and drainage ditches - Measure from the top of the bank if apparent. If banks are not apparent, measure from the ordinary high water mark. Evaluate each side of the stream independently.
 - Wetlands - Measure from the upland-wetland interface.
3. Riparian forest buffer zones.
- No-harvest zone (Zone 1) - The no-harvest zone is a minimum of 15 feet in width on the down-gradient edge of the riparian forest buffer. Select native plant species that are adapted to site and hydrologic conditions and provide the structural and functional diversity preferred by fish and wildlife species likely to benefit from the installation of the practice, provided the intended purpose is not compromised. After riparian forest buffer establishment, limit management of Zone 1 to bank stabilization and removal of potential problem vegetation. Removal of trees may be permitted on a case-by-case basis where habitat and water quality values are not compromised.
 - Sustainable management zone (Zone 2) - Zone 2 will begin at the edge and upgradient of zone 1 and extend a minimum distance of 20 feet. Favor tree and shrub species that have multiple values, such as those suited for timber, nuts, fruit, florals, browse, nesting, and aesthetics, provided the intended purpose is not compromised. Periodic removal of some forest products such as high value trees and medicinal herbs, nuts, and fruits is permitted in Zone 2 provided the intended purpose is not compromised by the loss of vegetation or harvesting disturbance. Refer to criteria in NRCS Conservation Practice Standards (CPSs) Forest Stand Improvement (Code 666). Adhere to the current Wisconsin Forestry Best Management Practices for Water Quality when conducting management in Zone 2.
 - The minimum combined width of Zones 1 and 2 is the lesser of 100 feet or 30 percent of the geomorphic flood plain. In no case will the combined widths of Zones 1 and 2 be less than 35 feet.
 - Upgradient grass-forb zone (Zone 3) - A grass/forb buffer (Zone 3) may be used to control soil movement in the upgradient area immediately adjacent to Zone 2. If used, the minimum width for Zone 3 is 20 feet. Follow Conservation Practice Standard Filter Strip (Code 393) for seeding.

Stream type and site hydrology will determine buffer design and layout to ensure purpose is achieved.

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

Design for dominant vegetation that consists of existing, naturally regenerated, or planted trees and shrubs suited to the soil and hydrology of the site and the intended purpose(s).

Extend the vegetation to the minimum width needed to achieve the intended purpose(s). Width of buffer refers to one side of the watercourse.

Where it is important to maintain grassed waterway channels, do not plant trees within 50 feet of the edge of the grassed waterway.

Grazing is not permitted in the riparian forest buffer. Refer to criteria in NRCS CPSs Access Control (Code 472) and/or use Prescribed Grazing (Code 528) as applicable.

Areas below the ordinary high water mark shall not be disturbed. If banks need to be stabilized prior to riparian forest buffer establishment, refer to Conservation Practice Standards Streambank and Shoreline Protection (Code 580), Critical Area Planting (Code 342), and/or Stream Habitat Improvement and Management (Code 395).

Control or exclude harmful plant and animal pests present on the site as necessary to achieve and maintain the intended purpose. If pesticides are to be applied, refer to Windows Pesticide Screening Tool (WIN-PST) Criteria in NRCS CPS Pest Management Conservation System (Code 595) and comply with applicable State and local laws and product labels. Refer to criteria in NRCS CPSs Brush Management (Code 314) and/or Herbaceous Weed Treatment (Code 315) as applicable.

Additional Criteria to Reduce Transport of Sediment to Surface Water, and Reduce Transport of Pathogens, Chemicals, Pesticides, and Nutrients to Surface and Ground Water

To treat waterbodies threatened by transport of pathogens, chemicals, pesticides, or nutrients in surface runoff or ground water flows, either extend the minimum horizontal width to 50 feet or add an associated practice that treats the targeted resource concerns. Use NRCS CPSs Filter Strip (Code 393) or Field Border (Code 386).

Filter pollutants from underground drains that bypass the riparian area by plugging, removing, or replacing drains with perforated pipe/end plugs or water control structures. Saturated conditions in the riparian and adjacent areas may limit existing land use and management.

Additional Criteria to Improve the Quantity and Quality of Terrestrial and Aquatic Habitat for Wildlife, Invertebrate Species, Fish, and Other Organisms

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

Establish plant communities to meet the needs of target aquatic and terrestrial wildlife and provide multiple values such as habitat, nutrient uptake, and shading. The establishment of diverse native species will enhance wildlife and pollinator values.

Do not plan this practice where other habitat types (e.g., prairie or savanna) are appropriate and evident. Use other practices to restore these habitats, as needed.

Additional Criteria to Maintain or Increase Total Carbon Stored in Soils and/or Perennial Biomass to Reduce Atmospheric Concentrations of Greenhouse Gases

Maximize width and length of the riparian forest buffer.

Select adapted plants known to sequester high rates of carbon in soils and plant biomass. Refer to Conservation Practice Standard Tree/Shrub Establishment (Code 612) Planting Guide Guidance Document for carbon characteristics of different tree species. Use the appropriate stocking, seeding, or planting rate for the site.

Additional Criteria to Lower Elevated Stream Water Temperatures

Establish plant communities capable of reaching adequate heights to provide shade over stream channel water surfaces.

Incorporate topography and bank shade in the riparian forest buffer site design.

CONSIDERATIONS

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

Avoid tree and shrub species that are alternate hosts to pests. Consider species diversity to avoid loss of function due to species-specific pests.

Use seed and/or seedlings collected or propagated from multiple sources to increase genetic diversity.

Consider selecting species with tolerance to herbicide runoff or spray drift from adjoining fields.

Consider allelopathic impacts of plants (e.g., black walnut).

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

Consider extending the minimum width depending on wildlife species habitat needs. Minimum recommended widths are 50 feet for invertebrates, aquatic species, reptiles, amphibians, and birds that use edge habitat; 100 feet for birds needing interior habitat and small mammals; and 165 feet for large mammals.

For sites where continued function of drains is desired, woody root penetration may eventually plug the underground structure. In these cases, setback woody vegetation from the drain and use herbaceous cover or rigid nonperforated pipe.

When applied near current or historic Native American or other Tribal lands, consider consulting regional Tribes for any traditional ecological knowledge that may be applicable or advantageous to implement.

Materials and methods used to implement the standard on organic and transitioning to organic operations must comply with National Organic Program (NOP) rules and follow the NRCS National Organic Farming Handbook (Title 190), Part 612.

This practice can be included in a NOP applicant's organic system plan as part of the plan for meeting NOP requirements for resource conservation.

Consider how this practice will complement the functions of adjacent riparian, terrestrial, and aquatic habitats.

Consider the effects of upstream and downstream conditions, structures, facilities, and constraints on the planned activities.

Establish alternative water sources or controlled access stream crossings to manage livestock access to the stream and riparian area.

Corridor configuration, establishment procedures, and management should enhance habitats for threatened, endangered, State Species of Greatest Conservation Need, and other plant or animal species of concern, where applicable.

PLANS AND SPECIFICATIONS

Prepare plans and specifications that describe requirements for applying the practice to achieve its intended purpose and obtain any required permits.

Use implementation requirements or other acceptable documentation. At a minimum, provide—

- Objective(s) for establishment.
- Conservation plan map.
- Map showing the location of plantings and/or natural regeneration areas.
- Establishment method by species or vegetation type.
- Number and spacing of trees/shrubs per acre by vegetation type.
- Timing of planting relative to seasonal factors, plant physiology, disease, insects, and wildlife impacts.
- Methods of plant protection used during plant establishment.

OPERATION AND MAINTENANCE

Prepare an operation and maintenance plan for the riparian forest buffer site. As a minimum, include—

- Limiting access or damage from vehicles, equipment, livestock, and wildlife, during tree planting and until riparian buffer establishment to protect new plants and minimize erosion, compaction, and other site impacts.
- Inspecting the site at an appropriate time following planting to determine whether the survival rate for tree and shrubs meets practice and client objectives.
- Replacing dead trees or shrubs and controlling undesirable vegetative competition until the buffer is or will progress to a fully functional condition.
- Controlling undesirable plant species that may include but not be limited to those on the Federal or State invasive species and noxious weed lists.
- Inspecting the trees, shrubs, and site periodically, and protecting the plantings and site from adverse impacts of insects, diseases, competing vegetation, fire, livestock, excessive vehicular and pedestrian traffic, wildlife, concentrated flows, nonfunctioning tree shelters and/or weed barriers, etc.
- Applying fertilizers, pesticides, and other chemicals used to maintain buffer function in a way that will not impact water quality.

REFERENCES

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