NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

RIPARIAN FOREST BUFFER

(Acre)

CODE 391A

DEFINITION

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

PURPOSES

- Create shade to lower water temperatures to improve habitat for aquatic organisms.
- Provide a source of detritus and large woody debris for aquatic organisms and habitat for wildlife.
- Reduce excess amounts of sediment, organic material, nutrients and pesticides in surface runoff and reduce excess nutrients and other chemicals in shallow ground water.

CONDITIONS WHERE PRACTICE APPLIES

On stable areas adjacent to permanent or intermittent water bodies such as lakes, ponds, wetlands and areas with shallow ground water.

On stable areas adjacent to permanent or intermittent water courses such as streams.

CRITERIA

General Criteria Applicable to All Purposes Named Above.

The location, layout and density of the riparian forest buffer will accomplish the intended purpose(s) and function(s). **Active channel** is the stream width at the bankfull discharge (see General Specifications). The buffer will consist of a zone (identified as Zone 1) that begins at the edge of the active channel and extends a minimum distance of 15 feet, measured horizontally on a line that is perpendicular to the water body. Widths less than the minimum for Zone 1 will be based on the ability of the site to support woody native hydrophytes.

Dominant vegetation in Zone 1 will consist of well-distributed existing or planted native trees and shrubs suited to the site and the intended purpose(s). Planting density will be 500 stems per acre. The composition of trees and shrubs will be diverse and resemble native, undisturbed stands.

Site preparation shall be sufficient for establishment and growth of the selected species and be done in a manner that does not compromise the intended purpose(s) (refer to Site Preparation - 490 standard).

Only viable, high quality, adapted planting stock will be used (refer to Tree and Shrub Establishment-612 standard). Herbaceous vegetation will be selected which does not aggressively compete with the trees and shrubs but provides erosion protection and filtration.

Large trees which are dead or dying will be left as snags in Zone 1, provided they do not present a threat to life or property and do not harbor pests that would endanger other trees, shrubs, or crops.

Removal of tree and shrub products such as timber, firewood, dead trees or shrubs, nuts and fruit is not permitted in Zone 1.

Plant species selected for Zone 1 must be able to have their roots reach the water table during the growing season of the year they are planted. If this is not possible, supplemental irrigation may be necessary for plant survival.

Livestock shall be controlled or excluded as necessary to achieve and maintain the intended purpose(s).

Harmful pests present on the site will be controlled or eliminated as necessary to achieve and maintain the intended purpose(s).

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.

An additional strip or area of land, Zone 2, will begin at the up-gradient edge of Zone 1 and extend a minimum distance of 20 feet, measured horizontally on a line perpendicular to the water body.

For each side of the stream (see Figure 1 General Specifications):

- **The minimum combined width of Zones 1 and 2 will be 30 percent of the active (geomorphic) floodplain but not less than 35 feet. The active floodplain width will be determined from the *floodprone width.* Floodprone width (Rosgen 1994) is a floodplain value based on the size of the active channel (see General Specification 391A). The active floodplain (right and left bank) is usually different for each bank of the water course.**
- **The combined width of Zones 1 and 2 shall not be greater than 100 feet.**

Combined widths for Zone 1 and Zone 2 will be:

Active Floodplain Width	Buffer Width	Determination
<= 105 feet	35 feet	set minimum
>105 but <=333 feet	36-99 feet	30% of active floodplain
>333 feet	100 feet	set maximum

For Zone 2 only:

Removal of tree and shrub products such as timber, nuts and fruit is permitted on a periodic and regular basis. The loss of vegetation or harvesting disturbance must not compromise the intended purpose(s). Introduced trees may be used in Zone 2. Zone 2 trees and shrubs may be non-native, xerophytic species.

Zone 3:

Concentrated flow erosion, or mass soil movement shall be controlled in the up-gradient area immediately adjacent to Zone 2 prior to establishment of the Riparian Forest Buffer. This area is delineated and identified as Zone 3.

- **Zone 3 shall be designed in accordance with criteria in the Filter Strip (393A) standard.**
- **If Zone 3 is applicable, the combined width of Zone 1, Zone2, and Zone 3 shall not be greater than 150 feet.**

Additional Criteria to Protect or Improve Water Quality

All areas within the buffer, which are not planted with woody vegetation, will be maintained in herbaceous cover so that there is no bare earth. Interspersed herbaceous plants will provide varied habitat for wildlife.

Nutrients will not be applied within the buffer. Pesticides may be used on a spot-spray basis to control noxious weeds or pest outbreaks.

Additional Criteria to Create Shade:

The buffer shall be designed to achieve 60-80% canopy cover over water courses having an active channel width less than or equal to 50 feet.

Trees will be selected that have a mature canopy height greater than the active channel width. For narrow buffers, select trees that have a wide crown. For vegetation along the water's edge, select tree and shrub species with limbs that overhang the water.

Rock cliffs and steep hills which provide topographic shading are considered to be part of the riparian area even though they may not support woody vegetation.

Additional Criteria to Provide Large Wood Debris (LWD):

At least one tree species selected for Zone 1 will be coniferous (where they will grow). Conifers will be scattered throughout the buffer with a density similar to nearby natural areas having the same elevation and growing conditions.

Existing large trees that have fallen into the water will be left in place and cabled to their stump, or to a buried "deadman" if necessary to keep them in place.

Within the buffer, maintain at least 85% of the existing trees that have a diameter at breast height (DBH) of > 18 inches. When establishing a new buffer, select at least one tree species (preferably a conifer) that will become at least this large at maturity.

CONSIDERATIONS

The severity of bank erosion and its influence on existing or potential riparian trees and shrubs should be assessed. Watershed-level treatment or bank stability activities may be needed before establishing a riparian forest buffer.

In Zone 3, when concentrated flow erosion and sedimentation cannot be controlled vegetatively, consider structural or mechanical treatments.

For Zone 2, favor tree and shrub species that are native and have multiple values such as those suited for timber, biomass, nuts, fruit, browse, nesting, aesthetics and tolerance to locally-used herbicides.

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

Shading along south and west sides of water bodies will give more temperature protection than shading along north or east sides.

Roads and dikes within the riparian buffer can take up a large percentage of the buffer area and create additional water quality problems with negative impacts for both fish and wildlife. It may be feasible, in some cases, to relocate them outside of the buffer area.

Tall trees, established in Zone 2, will also help shade the water body. These trees can be upland species, particularly in arid portions of eastern Washington where water is scarce.

Stiff-stemmed (preferably, multi-stemmed) grasses, established in Zone 3, will help improve water quality by accelerating the deposition of sediment. When sedimentation, resulting from concentrated flow or excessive sheet and rill erosion, cannot be controlled vegetatively, consider structural or mechanical treatments.

Encourage the growth of woody vegetation or trees along irrigation diversion ditches and drainage ditches for shade cover and food production for aquatic life. Provide, where possible, wildlife travel corridors composed of woody vegetation between the water course or water body and isolated wetlands, constructed farm ponds and sediment basins.

Joining of existing and new riparian buffers increases the continuity of cover and will further moderate water temperatures. A mix of woody species with growth forms that vary from short and drooping to tall and wide-crowned will also help to moderate the effects of temperature.

Associated springs or small wetland areas can often be developed into "off-channel" rearing sites for juvenile fish. Consult with the Washington Department of Fish and Wildlife (WDFW) concerning excavation of these sites and development into small, open water areas that will also benefit wildlife.

The location, layout and density of the buffer should compliment natural features. Avoid layouts and locations that would concentrate flood flows or return flows.

PLANS AND SPECIFICATIONS

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

OPERATION AND MAINTENANCE

Actions, such as those below, shall be carried out to insure that this practice functions as intended throughout its expected life. They can be included in both the operation (normal repetitive activities in the application and use) and maintenance (repair and upkeep) of the practice.

The buffer will be inspected periodically and protected from adverse impacts such as excessive vehicular and pedestrian traffic, pest infestations, pesticide use on adjacent lands, livestock 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.

As applicable, control of concentrated flow erosion or mass soil movement shall be continued in Zone 3 to maintain buffer function.

Any use of fertilizers, pesticides and other chemicals to assure buffer function shall not compromise the intended purpose(s).

To provide habitat and corridors for wildlife, manage the buffer to favor food, shelter, and nesting cover that would satisfy the habitat requirements of the indicator or target wildlife species. Refer to Habitat Evaluation Procedures used by the U.S. Fish and Wildlife Service (USFWS), or equivalent State documents such as Priority Habitat and Species, used by WDFW, for the particular species.