



Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

RIPARIAN FOREST BUFFER

CODE 391

(ac)

DEFINITION

An area predominantly of trees and shrubs that functions as a vegetated *ecotone*ⁱ and is located adjacent to and up-gradient of water bodies and water courses.

PURPOSE

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

- Provide shade to lower water temperatures and facilitate higher stream dissolved oxygen concentrations to improve habitat for aquatic organisms
- Provide a source of detritus and large woody cover for aquatic organisms
- Improve water quality by establishing permanent tree and herbaceous cover in floodplain areas subject to out-of-bank flow and/or scour erosion
- Provide habitat and corridors for aquatic and terrestrial flora and fauna
- Increase transpiration and infiltration, resulting in slower groundwater discharge to streams and reduced flood flows and to mitigate flood damage
- Restore riparian plant communities
- Improve water quality by reducing amounts of sediment, organic matter, nutrients, pesticides, and other pollutants in surface runoff and reducing the amounts of nutrients and other chemicals in shallow groundwater
- Reduce pesticide drift entering the water body
- Increase carbon storage in plant biomass and soils

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to areas adjacent to permanent or intermittent streams, drainage ditches, wetlands, and lakes where it is desired to have woody vegetation for the improvement of water quality and riparian stability, and to improve fish and wildlife habitat.

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 Wisconsin NRCS Field Office Technical Guide, Section IV (WI FOTG), Conservation Practice Standard 635, Wastewater Treatment Strip. This practice does not apply where soil loss is above “T” within 300 feet of the riparian forest buffer.

ⁱWords in the standard that are shown in italics are described in Definitions. The words are italicized the first time they are used in the text.

Where the primary purpose is to protect environmentally sensitive areas such as sinkholes, crevices, or springs, refer to WI FOTG Standards 393, Filter Strip; 342, Critical Area Planting; or other applicable technical standards.

Federal, Tribal, State and Local Laws

Installation and maintenance of forest buffers shall comply with all federal, tribal, state, and local laws, rules, or regulations. The operator is responsible for securing required permits. This standard does not contain text of any federal, tribal, state, or local laws.

CRITERIA

General Criteria Applicable to All Purposes

1. Establishment.
 - a. Forest buffers shall be established according to FOTG Standard 612, Tree Planting. Under certain habitat conditions, tree planting density may be as described in Section VI.A.
 - b. Recommended species are found in Table 1. Other appropriate Wisconsin native species can also be used. Invasive species shall not be included in any planting.
 - c. State listed *noxious weeds* and *invasive plants* shall be *controlled* during establishment, if present.
 - d. Weeds will be controlled until the trees and shrubs are established.
2. The starting point for measuring minimum forest buffer widths for the following landscape features shall be as follows.
 - a. Lakes. Forest buffers shall be measured from the *ordinary high water mark* (OHWM).
 - b. Perennial and intermittent streams and drainage ditches. Forest buffer strips shall be measured from the top of the bank if apparent. If banks are not apparent, measurement shall start 10 feet from the center of the channel. Each side of the stream shall be evaluated independently.
 - c. Existing tree and shrub corridors. Existing tree and shrub corridors shall be included as part of the measured forest buffer width.
 - d. Wetlands. Forest buffers shall be measured from the upland-wetland interface.
3. Forest buffer zones (see Figure 1).
 - a. No-harvest zone (Zone 1). The no-harvest zone is a minimum of 15 feet in width on the down-gradient edge of the forest buffer and accomplishes the following:
 - Provide shade to moderate and stabilize water temperature
 - Contribute necessary detritus and large woody cover to the aquatic ecosystem
 Management of Zone 1 will be limited 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.
 - b. Sustainable management zone (Zone 2). With the exception of the no-harvest zone, sustainable timber management is permitted in accordance with the Wisconsin Forestry Best Management Practices, such that the original purpose of the forest buffer is not compromised by loss of vegetation or disturbance. Zone 2 will begin at the edge and upgradient of zone 1 and extend a minimum distance of 20 feet.
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. See Figure 2.
 - c. Upgradient grass-forb zone (Zone 3). A grass/forb buffer (Zone 3) can be used to control soil movement in the upgradient area immediately adjacent to Zone 2. (See Figure 1.) Concentrated flow and sheet and rill erosion will be controlled within 300' up gradient of the

buffer. The minimum width for Zone 3 is 20 feet. Seeding should be done according to WI FOTG Standard 393, Filter Strip, and is in addition to the forest buffer width.

4. Areas of concentrated flow in the contributing drainage area shall be evaluated and treated. Where it is important to keep stable grass channels, trees should be kept back 50 feet from the grassed channel bank.
5. When soil disturbance is necessary due to streambank or gully repair, the appropriate action shall be taken to limit the disturbance and protect and replant all disturbed areas.
6. Grazing shall not be permitted in the forest buffer.
7. Areas below the ordinary high water mark shall not be disturbed. This does not preclude practices intended for bank stabilization or stream crossings.
8. Land below the downgradient edge of the forest buffer shall be maintained in vegetative cover adequate to prevent sediment delivery.

CONSIDERATIONS

Additional recommendations relating to design which may enhance the use of, or avoid problems with, this practice but are not required to ensure its basic conservation function are as follows.

1. Consult with your local resource manager to determine if particular habitat management concerns exist. For example, consider using WI FOTG Standard 393, Filter Strip immediately adjacent to spring creek coldwater streams located in the Driftless Area. In this case, if WI FOTG Standard 391 is used, trees should be planted at a minimum spacing of 18-20 feet in the first 50 feet adjacent to the stream so that a dense canopy does not develop and a grass understory can be maintained. Where prairie or savanna remnants occur on the site, the minimum 18-20 feet spacing can be maintained in the entire Zones 1 and 2.
2. Consider using this practice to enhance the conservation of declining species of wildlife, including those that are threatened or endangered.
3. Consider ecological factors such as promoting forested corridors to maximize benefits for wildlife and habitat.
4. Consider extending the buffer width to include the entire floodplain.
5. Consider marking forest buffer boundaries in an identifiable manner until Consider locations of vehicle and/or livestock crossings. Refer to WI FOTG Standard 560, Access Road.

PLANS AND SPECIFICATIONS

Plans and specifications for the forest buffer shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. Based on this standard, plans and specifications shall be prepared for each specific field site where a forest buffer will be installed. A plan includes information about the location, construction sequence, vegetation establishment, and operation and maintenance requirements.

Plan specifications will include the following.

1. Dimensions of the forest buffer to accomplish the planned purpose.
2. Species selection, planting rates, and spacing to accomplish the planned purpose.
3. Planting dates, care, and handling of the seedlings to ensure that planted materials have an acceptable rate of survival.
4. Site preparation sufficient to establish and grow selected species.

OPERATION AND MAINTENANCE

1. Avoid damage to forest buffer vegetation from herbicide application to nearby fields.
2. State listed noxious weeds shall be *controlled*. Control of non-native invasive plants is

encouraged.

3. Vehicular traffic shall be excluded except as necessary for establishment and maintenance activities.
4. Operation and maintenance activities should be conducted in accordance with Wisconsin Forestry Best Management Practices.

REFERENCES

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Wisconsin Department of Natural Resources. 1995. Wisconsin's Forestry Best Management Practices for Water Quality. Bureau of Forestry, Pub-FR-093 95.

Wisconsin Department of Natural Resources. 1997. Wisconsin Manual of Control Recommendations for Ecologically Invasive Plants. Madison, WI: Bureau of Endangered Resources.

Definitions

Control (VIII.B.) - To destroy the above-ground portion of a noxious weed in a manner and at the proper time to prevent the development and distribution of viable seeds or other propagules and their spread from one area to another. For species which reproduce vegetatively, control includes the use of methods which help contain or reduce the vegetative spread of the weed.

Ecotone (I.) – The boundary between adjacent ecosystem types. An ecotone can include environmental conditions that are common to both neighboring ecosystems and can have higher species diversity.

Geomorphic flood plain (V.C.2.) - Geomorphic Floodplain is the flat area adjoining a river channel constructed by the river in the present climate and overflowed at times of high discharge.

Invasive plants (V.A.3.) - Having the ability to significantly displace desirable vegetation in landscapes or to reduce yield of growing crops.

Noxious weed (V.A.3.) - An aquatic or terrestrial herbaceous or woody plant that is legally designated as being invasive and persistent, and is injurious to human values such as public health, the environment, livestock, growing crops, natural areas, or other lands.

Ordinary high water mark (V.B.1.) - The ordinary high water mark (OHWM) is the point on the bank or shore where the water is present often enough so that the lake or stream bed begins to look different from the upland. Specifically, the OHWM is the point on the bank or shore up to which the water, by its presence, wave action, or flow, leaves a distinct mark on the shore or bank. The mark may be indicated by erosion, destruction of or change in vegetation, or other easily recognizable characteristics.

The OHWM can be located through on-site studies of physical and biological conditions at the shoreline. The principal indicator is the change from water plants to land plants. In the area where the plants change, the investigator may also use indicators such as change in soil type, ridges, or other erosion marks or water stains on rocks, soils, trees, or structures. If none of these indicators are available in the immediate location, the elevation of the OHWM may be found at another spot and transferred to that site in question.

“T” (III.) – Soil loss tolerance. It is the average annual erosion rate that can occur with little or no long-term degradation of the soil resource on the field. Soil loss tolerance values are assigned to each soil map unit.

Table 1 Example Species

Somewhat Poorly or Poorly Drained Soils	Other Soils
Trees	
Green Ash	Norther Red Oak
Red Maple	White Oak
Silver Maple	Bur Oak
Eastern Cottonwood	Sugar Maple
Black Willow	Shagbark Hickory
Swamp White Oak	White Ash
Black Spruce	Aspen
Tamarack	American Basswood
Northern White Cedar	Black Walnut
Black Ash	White Pine
	Red Pine
	White Spruce
Shrubs	
Red Osier Dogwood	Gray Dogwood
Silky Dogwood	Arrowwood
Highbush Cranberry	Chokecherry
Elderberry	Juneberry
Ninebark	Leadplant
Black Chokecherry	Nannyberry
Speckled (Tag) Alder	New Jersey Tea
	ServiceberryWinterberry
	Ninebark
	Wild Plum
	Thornapple
	Hazelnut

Figure 1. Zones for woodland harvest and no harvest.

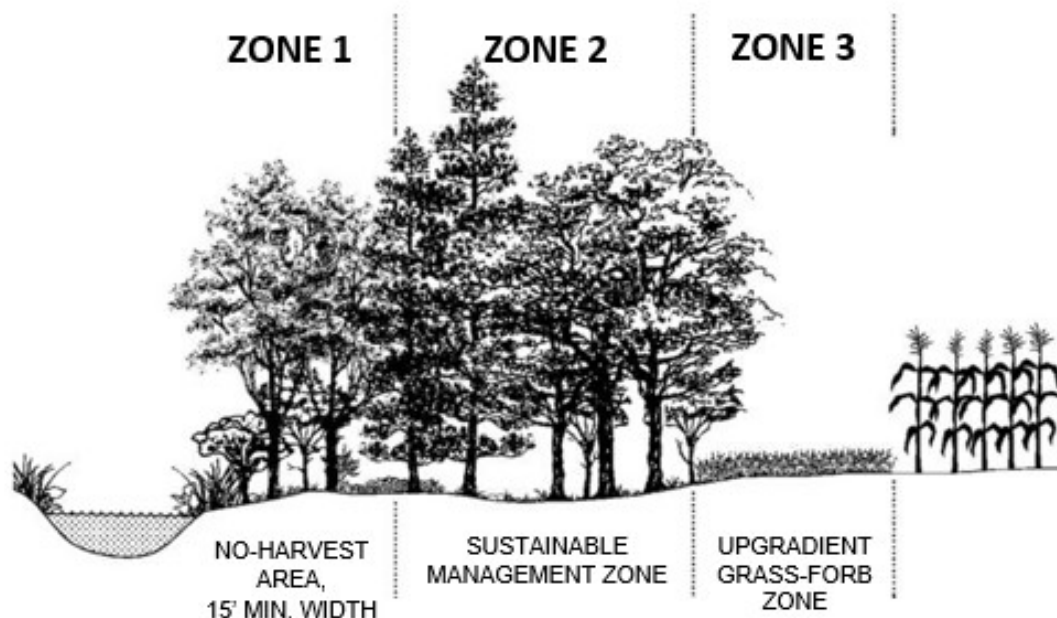


Figure 2. Examples of minimum riparian forest filter strip widths.

