

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE GENERAL SPECIFICATIONS**

**RIPARIAN FOREST BUFFER**

(Acre)  
CODE 391

*Procedures, technical details and other information listed below provide additional guidance for carrying out selected components of the named practice. This material is referenced from the conservation practice standard for the named practice and supplements the requirements and considerations listed therein.*

**PLANTING DENSITIES**

*Initial plant-to-plant densities for trees and shrubs will depend on their potential height at 20 years of age. Heights may be estimated based on: 1) performance of the individual species (or comparable species) in nearby areas on similar sites, or 2) predetermined and documented heights using Conservation Tree/Shrub Suitability Groups, Section II of the Field Office Technical Guide. Planting density specifications are:*

<i>Plant Types/Heights:</i>	<i>Plant-to-Plant Spacing in feet:</i>
• <i>Shrubs less than 10 feet in height</i>	<i>3 to 6</i>
• <i>Shrubs and trees from 10 to 25 feet in height (includes columnar trees)</i>	<i>5 to 8</i>
• <i>Trees greater than 25 feet in height</i>	<i>8 to 12</i>

**PLANT LIST**

*Table 1 (for example only) on pages 5 and 6 lists woody plant species (trees and shrubs) commonly associated with and suited to riparian areas. Key attributes are listed for each plant to assist with the design process for establishing new buffers.*

**CARE, HANDLING, SIZE AND PLANTING REQUIREMENTS FOR WOODY PLANTING STOCK**

*Planting stock will be stored in a cool, moist environment (34-38 degrees F in temperate climates) or heeled in. During all stages of handling and storage, keep stock tops dry and free of mold and roots moist and cool. Destroy stock that has been allowed to dry, to heat up in storage (e.g., within a bale, delivery carton or container), or that has developed mold or other pests. Live cuttings that will not be immediately planted shall be promptly placed in controlled storage conditions (34-38 degrees F) and protected until planting time.*

*Seedlings shall not be less than 1/4" in caliper at 1" above the root collar. For cuttings, avoid using material less than 3/4" in diameter, cut off tops with apical buds, remove side branches, and produce lengths long enough to reach adequate soil moisture required by the individual species during the growing season. Tops of dormant-season collected cuttings may be dipped into latex paint, paraffin or sealing wax to prevent desiccation and mark the up-end. Rooted planting stock must not exceed a 2:1 shoot-to-root ratio. See figure 1. Container stock shall normally not exceed a 1-gallon can size.*

Conservation practice general specifications are reviewed periodically, and updated if needed. To obtain the current version, contact the Natural Resources Conservation Service.

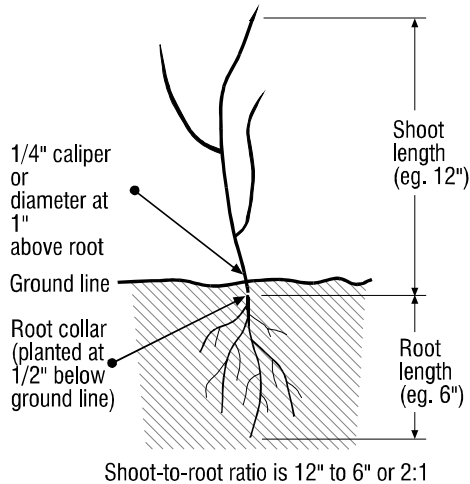


Figure 1. Plant or stock size requirements (for example only).

Roots of bareroot stock shall be kept moist during planting operations by placing in a water-soil (mud) slurry, peat moss, super-absorbent (e.g., polyacrylamide) slurry or other equivalent material. Rooting medium of container or potted stock shall be kept moist at all times by periodic watering. Pre-treat stored cuttings with several days of soaking just before planting. Stock shall not be planted when the soil is frozen or dry. Rooted stock will be planted in a vertical position with the root collars approximately 1/2-inch below the soil surface. Insert cuttings to the depth required to reach adequate soil moisture with at least 2-3 buds above ground. The planting trench or hole must be deep and wide enough to permit roots to spread out and down without J-rooting or L-rooting. After planting of rooted stock or cuttings, pack soil around each plant firmly to eliminate air pockets. See figure 2.

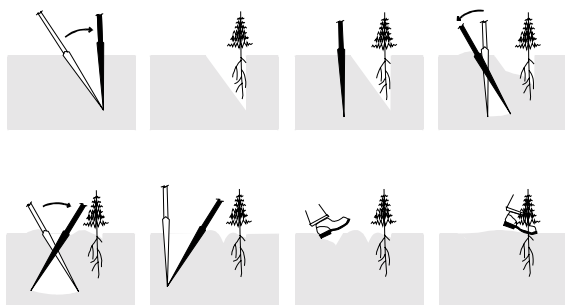


Figure 2. Proper plant and root placement of rooted stock using a planting bar.

### BUFFER WIDTH GUIDE FOR SELECTED WILDLIFE SPECIES

Widths below (for illustration only) include the sum of buffer widths on one or both sides of water courses or water bodies and may extend beyond riparian boundaries (in such cases refer to Tree/Shrub Establishment, 612, for design of upland forests).

Species:	Desired Width
• Bald eagle, cavity nesting ducks, heron rookery, sandhill crane	600
• Common loon, pileated woodpecker	450
• Beaver, dabbling ducks, mink, salmonids	300
• Deer	200
• Lesser scaup, harlequin duck	165
• Frog, salamander	100

### PREPARATION OF PLANTING SITES

Planting sites shall be properly prepared based on the soil type and vegetative conditions listed below. For sites to be tilled, leave a 3-foot untreated strip at the edge of the bank or shoreline. Avoid sites that have had recent application of pesticides harmful to woody species to be planted. If pesticides are used, apply only when needed and handle and dispose of properly and within federal, state and local regulations. Follow label directions and heed all precautions listed on the container.

Fabric mulch may be used for weed control and moisture conservation for new plantings on all sites, particularly those with pronounced growing season moisture deficits or invasive, weedy species. Refer to Mulching, 484, for installation procedures.

Based on site conditions and predominant soil texture of the fine earth fraction, procedures include:

**Tillable sites with loamy/clayey soils**

- Sod and alfalfa sites

Summer fallow 1 year to kill the sod or alfalfa. Till (moldboard plow, disk plow, rototiller, spot cultivator or similar equipment) in the spring before planting the stock. A fall-sown crop of oats may be used where needed to control erosion.

Sod may be killed by non-selective herbicides the year previous to planting stock. Plant stock in the residue. On heavy soils, tillage is usually necessary to achieve a satisfactory planting when a tree planting machine is used.

- Small grain or row crop sites

If the site is in row crop, till (moldboard plow, disk plow, rototiller, spot cultivator or similar equipment) in the fall or in the spring prior to planting the trees or shrubs. If the site has a plow or hard pan in subsoil, perform a deep disking or ripping operation in the fall. A fall-sown crop of oats may be used where needed to control erosion.

If the site is in small grain stubble, the stock may be planted in the spring without further preparation. If fabric mulch is to be installed, till in the spring before planting.

Tillage on steep slopes must be on the contour or cross-slope unless a spot cultivator is used. A cover crop between the rows may be necessary to control erosion and sediment deposition on planted stock.

**Tillable sites with sandy soils**

- Sod and alfalfa sites

Till (moldboard plow, disk plow, rototiller, spot cultivator or similar equipment) and plant to a spring cover crop (corn, grain, sorghum, etc.) the year prior to planting. Leave a stubble cover in which to plant. A light disking may be needed before planting if fabric mulch is used.

Sod may be killed by nonselective herbicides the year prior to planting. Plant trees or shrubs in the residue.

When hand planting, scalp or strip an area at least 3 feet in diameter and two-to-four inches

deep. (place plants in the center of the scalped area.)

Rototill a 3-foot wide strip. (Place plants in the center of the tilled area.) Where a drip watering system will not be used, rototill the strip the year prior to planting.

- Small grain or row crop sites

If the site is in small grain, corn, or similar clean tilled crop, and it is reasonably free of weeds, plant stock in the stubble without prior preparation. It may be necessary to till a narrow strip with a disk or other implement to kill weeds or volunteer grain, or to prevent stalks and other residue from clogging the tree planter. If fabric mulch is used, disking may also be needed. A cover crop or stubble may be needed between the rows to protect the planting from water or wind erosion.

**Non-tillable sites and/or erosive sites (including sites with undesirable brushy or herbaceous species)**

On sites where it is not practical or possible to operate tillage equipment (steepness, rockiness, etc.), where tillage of the site will cause excessive erosion, or where tillage of the site is impractical, the methods listed below may be used. Sites with undesirable brush will need initial treatment that physically removes or kills the brush species to facilitate planting of desired stock and prevent re-encroachment of the brush. Suitable methods include hand-cutting and removal, brush hogging, brush-blading, or other equivalent procedure with repeated treatment or use of herbicides to control resprouting.

Hand scalp an area at least 36 inches in diameter with subsequent plant placement in the center of the scalped area.

For sites with equipment access and limited rockiness, a spot cultivator may be used to create planting areas of at least 36 inches in diameter.

Kill the vegetation in a 36-inch diameter or larger area or in a 36-inch or wider strip with a non-selective herbicide the year prior to planting and plant in the center or along the center-line of the treated area.

**LAYOUT AND ADDITIONAL DETAILS**

**Job Sketch**

*Prepare an aerial view or a side view of the specific site, as needed, of the vegetation types, widths of zones 1, 2 and 3, a direction arrow, and the type of water body or water course. Other relevant information, such as shoreline or bank shape, upslope field conditions including crop types, and complementary practices, and additional buffer specifications may also be included in the space below.*

Scale 1" = \_\_\_\_\_ ft. (enter N/A if sketch is not to scale; grid size = 1/2" by 1/2")

**Additional Specifications and Notes**

**Table 1. Plant List (format and information for illustration only!)**

Common and Sci. Names	Height (feet) by MLRA and Precipitation Zone <sup>1</sup> (A-K) at Age 10 and 20 years												Attributes:									
	A-MLRA's B7, D26, D27	B-MLRA's B7, B10, B11, B12	C-MLRA's B7, B8, B10, B11, B12	D-B8, B12	E-B9, B12, B13, D25, D26, D28A, D28B	F-C18, C19, C20	G-D21, D22	H-A4, A5	I-A4, A5	J-A1, A2, A3, (elev. < 1800')	K-A2, A3, (elev. > 1800')	1. Shade Tolerance	2. Shade Value	3. Nutrient Uptake	4. Inundation Tolerance	5. Soil Saturation Tolerance	6. Drought Tolerance	7. Aesthetics	8. Native Species	9. Sediment Deposit. Tolerance	10. Special Notes	
<b>Tree (conifer)</b>																						
Species 1																						
Species 2																						
Species 3																						
<b>Tree (deciduous)</b>																						
Species 4																						
Species 5																						
Species 6																						
Species 7																						
Species 8																						
<b>Shrub</b>																						
Species 9																						
Species 10																						
Species 11																						
Species 12																						
Information for illustration only!																						
An individual state may use various climatic, moisture and other partitions for species selection of refer to previously developed guides.																						

Heights and other attributes are based on the species performance (at 10 or 20 years as applicable) on medium textured, non-saline, neutral pH soils. Explanation of the table and terms are on the back.

<sup>1</sup>Based on Avg. Annual Precip.: A=<7", B=7-9", C=10-12", D=13-15", E=16-19", F=20-24", G=25-29", H=30-39", I=40-49", J=50-59", K=60+". Topographic shading, moisture run-in positions and/or proximity to beneficial soil moisture from the water course/body increases the precip. zone by one or two classes.

**Explanation of Terms - Table 1**

Species are grouped by plant type and arranged in alphabetical order by common name. Heights are listed for applicable MLRA's (Major Land Resource Areas, USDA Ag. Handbook 296, Dec. 1981) and precipitation zones. Heights and attributes represent expected performance and characteristics of the individual plant at the reference age in dominant canopy positions on medium-textured, non-saline, neutral pH soils. The reference age for trees is 20 years of age. The reference age for shrubs is 10 years.

Attributes: (codes include H = High, M = Medium, L = Low, Y = Yes, N = No, with special notes about individual species denoted by a letter, e.g. "a")

1. *Shade Tolerance.* The plant's capacity to grow in a shaded condition. H = can grow in the shade of an overstory; M = can grow in partial shade; L = needs full or nearly full sunlight.

2. *Shade Value.* The density or fullness of shade provided by an individual plant's crown in a full leaf-out condition. H = provides full shade; M = a partially open crown that provides patchy or incomplete shade; L = a very open crown that provides little shade.

3. *Nutrient Uptake.* The plant's general capacity to use excess nutrients such as nitrate-nitrogen. H = can use large amounts; M = some excess nutrients used; L = plant is a low-nutrient user.

4. *Inundation Tolerance.* General capacity of the plant to withstand standing water, low soil aeration conditions. H = can tolerate 5 or more days of inundation; M = can tolerate 2-5 day events; L = can tolerate 1-day or less of inundation.

5. *Soil Saturation Tolerance.* The plant's capability to grow in near or saturated soil conditions. H = plant can withstand "wet feet;" M = some tolerance to saturated conditions; L = little or no tolerance of water-saturated soil.

6. *Drought Tolerance.* The plant's capability to grow in droughty or dry soil conditions. H = plant can withstand or has physiology to survive droughty periods; M = some tolerance to drought

or dry conditions; L = little or no tolerance of dry soil conditions.

7. *Aesthetics.* A very general rating (H, M or L) that indicates some aspect of the plant, e.g., flowers, special foliage characteristic, or plant part color, that enhances the appeal or viewing of the planting.

8. *Native Species.* Y indicates the plant is native to the state; N indicates it is introduced.

9. *Sediment Deposition Tolerance.* H = plant can withstand repeated, deep deposits of sediment; M = plant can withstand repeated, shallow deposits of sediment; L = plant can withstand little or no sediment deposits.

10. *Special Notes.*

a. Species tolerate a relatively wide range of soil conditions including pH's less than 8.0 and saline conditions generally less than 4 mmhos/cm.

b. Species tolerate a wide range of soil conditions including pH's of up to 9.0 and saline conditions of up to 16 mmhos/cm.

c. Species tolerate a wide range of soil conditions including pH's of up to 9.0 and saline conditions of greater than 16 mmhos/cm.