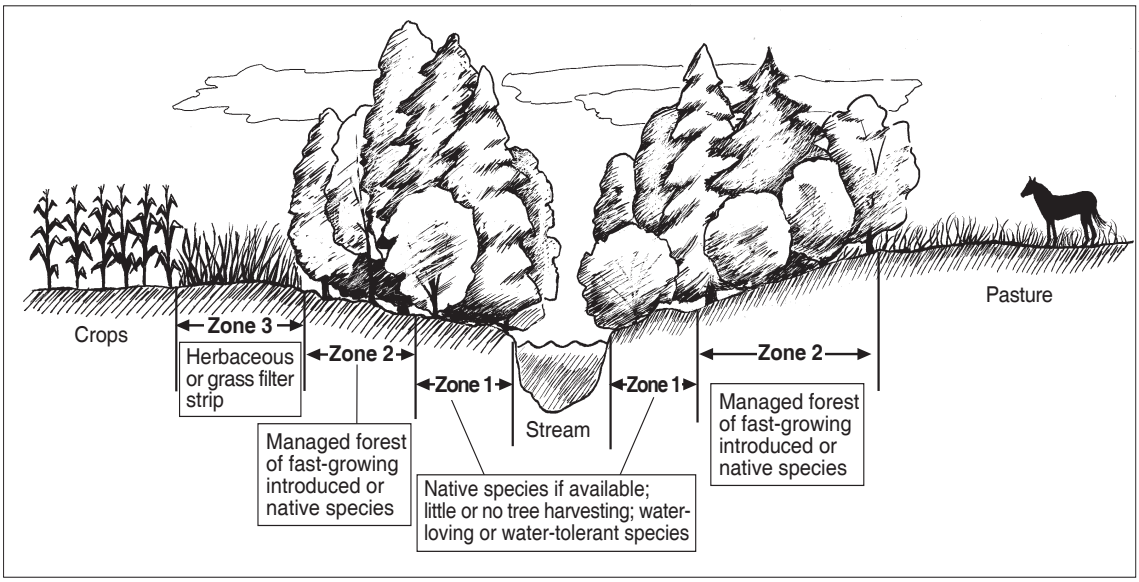
# RIPARIAN FOREST BUFFER

## Conservation Practice Standard 391 Guidance

**Natural Resources Conservation Service (NRCS)** **September**




### Purpose

To provide additional information for establishing and maintaining riparian forest buffers as outlined in Florida NRCS Conservation Practice Standard, Riparian Forest Buffer, Code 391.

### Specifications and Guidance

### PLANT LIST

Appendix 1 lists native woody plant species (trees and shrubs) commonly associated with and suited to riparian areas in Florida.

### PLANTING DENSITIES

Initial plant-to-plant densities for trees and shrubs will depend on their potential height at 20 years of age (Table 1).

Heights may be estimated based on performance of the individual species (or comparable species) in nearby areas on similar sites.

**Table 1. Planting density specifications**

| Plant Types/Typical Heights: | Plant-to-Plant Spacing: |
|---|---|
| Shrubs less than 10 feet in height | 3 to 6 ft. |
| Shrubs and trees from 10 to 40 feet in height | 6 to 10 ft. |
| Trees greater than 40 feet in height | 10 to 18 ft. |

## BUFFER WIDTHS

There is wide variation in buffer widths, depending on desired function. The following widths are based upon biological, chemical and physical characteristics as well as the particular function:

- 50-100 ft. for protecting wetlands and streams under most circumstances
- 60-100 ft. for water temperature moderation
- 30-200 ft. for sediment removal
- 15-300 ft. for nutrient removal
- 10-350 ft. for species habitat diversity

Zone 2, which begins at the edge and up-gradient of Zone 1 and normally extends a minimum distance of 20 feet, needs to 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 desired. The minimum combined width of Zones 1 and 2 is no less than 35 feet. For examples of Zone 1 and 2 widths for water courses and water bodies, see *Figure 1* on the adjacent page.

For Zone 1, plant only deciduous trees and shrubs. Loblolly, slash, or longleaf pine may be added to Zone 2; however, at least 20% of the plants in this zone should be deciduous trees and shrubs listed in Appendix 1. Plant the shrub rows on the outside edge so they will not be shaded out as the trees mature.

To filter sediment, address concentrated flow erosion, and maintain sheet flow when the buffer site is adjacent to cropland or other sparsely vegetated or highly erosive areas, add Zone 3 (see *Figure 2*) to the riparian buffer. Refer to Florida NRCS Conservation Practice Standard Filter Strip, Code 393, to design Zone 3

Where ephemeral, concentrated flow or sheet and rill erosion and sedimentation is a concern up slope of Zone 2, establish a vegetated strip consisting of perennial grasses and forbs (Zone 3). Consider use of native vegetative species when wildlife habitat values are a component of the management plan. Stiff stemmed grasses will accelerate deposition of sediment (*Figure 3.*)

See Florida NRCS Conservation Practice Standards Pasture and Hayland Planting, Code 512 and Filter Strip, Code 393, for guidance. For best wildlife benefit, plant a legume/ native warm-season grass mixture.

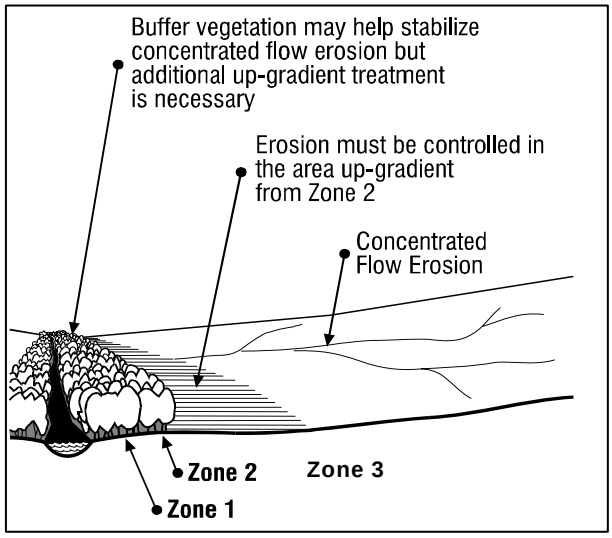



**Figure 2. Control of concentrated flow.**

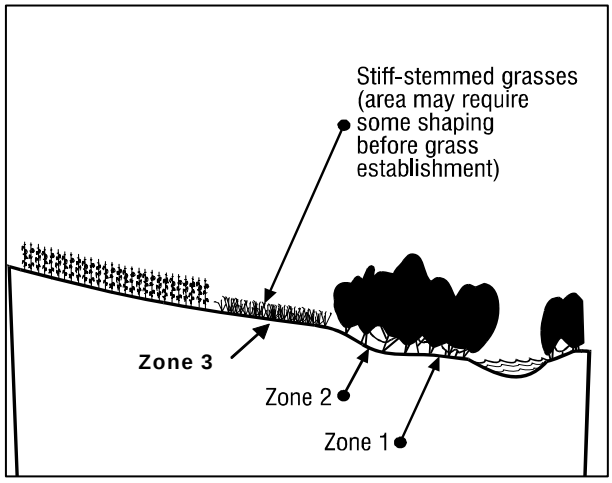



**Figure 3. Sediment trapping Zone 3.**

The following grasses and forbs are recommended for use in the sediment trapping/erosion control strip in Zone 3:

- Aeschynomene
- Bahiagrass, Pensacola
- Bermudagrass
- Clover, Crimson
- Clover, Red
- Clover, White
- Digitgrass
- Gamagrass, Eastern
- Panicgrass, Coastal
- Switchgrass

Other species may be suitable, consult with Florida State Resource Conservationist or Plant Materials Specialist for more information.

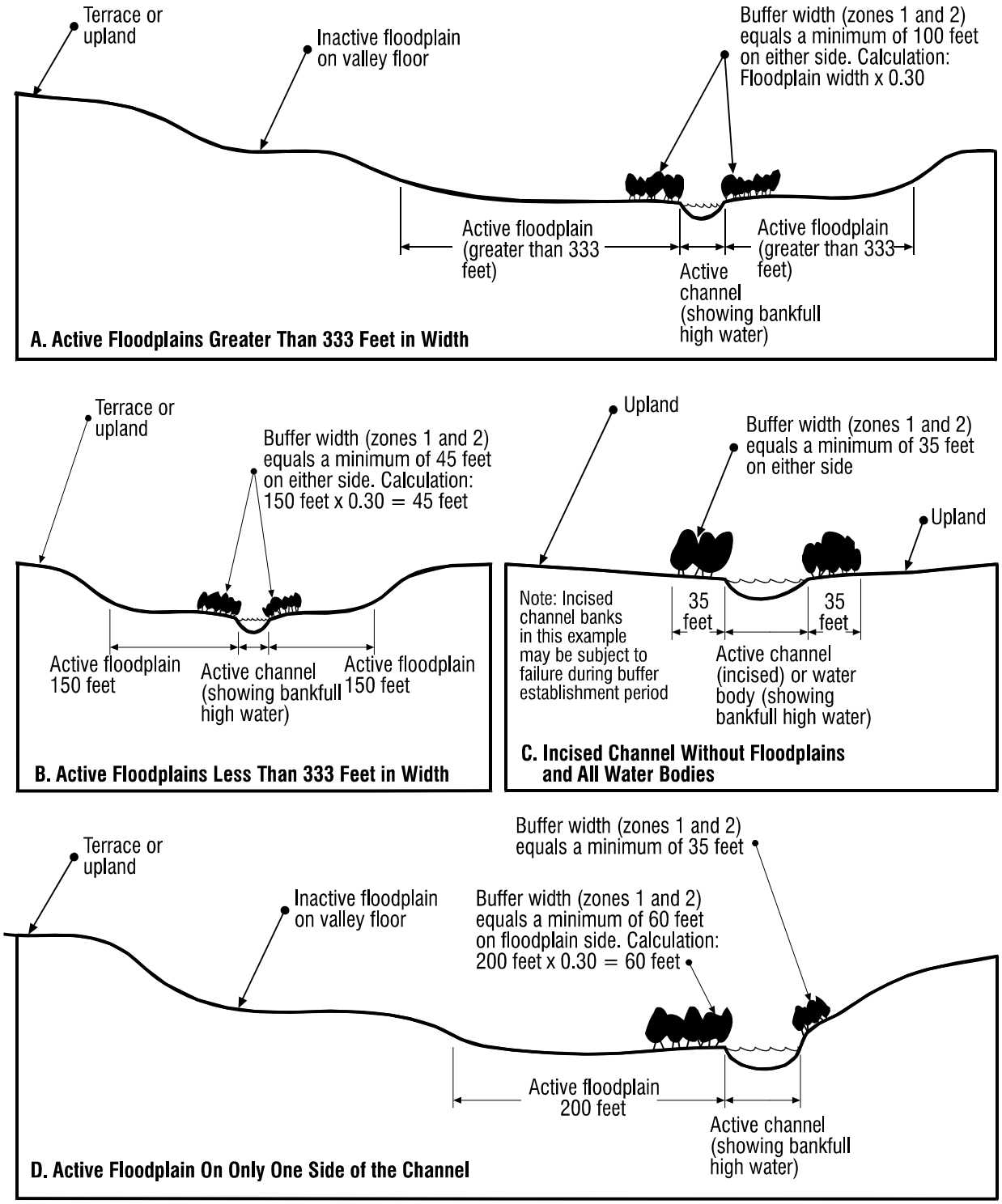



**Figure 1. Examples of riparian forest buffer widths for water courses and water bodies.**

Guide for Selected Wildlife Species

Widths in Table 2 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 Florida Conservation Practice Standard Tree/Shrub Establishment, Code 612, for design of upland forests).

**Table 2. Riparian buffers for wildlife.**

| Species | Desired Width |
|---|---|
| Bald eagle,<br>Cavity nesting ducks,<br>Heron rookery,<br>Sandhill crane | 600 ft. |
| Pileated woodpecker | 450 ft. |
| Beaver,<br>Florida mallard | 300 ft. |
| Deer | 200 ft. |
| Frog,<br>Salamander | 300 ft. |

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

Store planting stock in a cool, moist environment (34-38$^{o}$F) 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. Place live cuttings that will not be immediately planted in controlled storage conditions (34-38 degrees F) and keep protected until planting time. Using containerized “plug” pine seedlings is recommended due to better survival rates but containers should not exceed 1 gallon in size.

Seedlings need to be 1/4" in caliper or larger at 1" above the root collar. For cuttings, do not use material less than 3/4” in diameter, cut off tops with apical buds, remove side branches, and cut to 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. Keep roots of bareroot stock moist during planting operations by placing in a water-soil (mud) slurry, peat moss, super-absorbent (e.g., polyacrylamide) slurry, or other equivalent material. Keep rooting medium of container or potted stock moist at all times by periodic watering. Soak stored cuttings several days prior to planting. Do not plant stock when the soil is frozen or dry. Plant rooted stock in vertical position. For example, pine seedlings have about a 6- to 8-inch tap root and, therefore, need a 8- to 10-inch deep planting hole to permit roots to spread out and down without J-rooting or L-rooting. Root collar should be 1-2 inches below the ground line for bald cypress, loblolly, and slash pine. Insert cuttings to the depth necessary to reach adequate soil moisture with at least 2-3 buds above ground. After planting rooted stock or cuttings, pack soil around each plant firmly to eliminate air pockets. See *Figure 4*.
For further information on proper Tree and shrub establishment techniques, refer to the Florida NRCS Conservation Practice Standard 612 Guidance, Tree/Shrub Establishment.

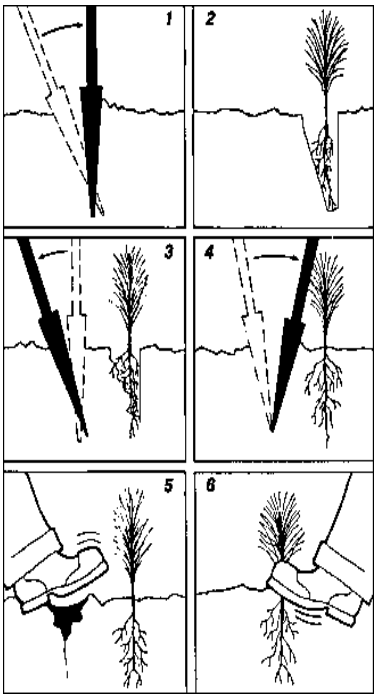



**Figure 4. Proper planting technique**.

## PAREPARATION OF PLANTING SITES

Planting sites need to be 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 planting in sites that have had a recent application of pesticides harmful to woody species to be used. 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 Florida NRCS Conservation Practice Standard Mulching, Code 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**

- Perennial herbaceous sites

  Summer fallow 1 year to kill the vegetation. Till (moldboard plow, disk plow, rototiller, or similar equipment) in the spring before planting the stock. Use a fall-sown crop of oats 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, 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. Use a fall-sown crop of oats 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. A cover crop between the rows may be necessary to control erosion and sediment deposition on planted stock.

**Tillable sites with sandy soils**

- Perennial herbaceous sites

  Till (moldboard plow, disk plow, rototiller, 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 2-to 4-inches deep. Place plants in the center of the scalped area.

  Rototill a 3-foot-wide strip, and 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 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 treatments that physically remove and kill 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.

- Machine or hand scalp an area at least 36 inches in diameter with subsequent plant placement in the center of the scalped area.
- Rototill a strip at least 36 inches wide the year prior to tree planting with subsequent plant placement in the center of the tilled strip.
- 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 centerline of the treated area.

**SURVIVAL**

Since the intent is to establish a forested buffer, a minimum of 50% of the trees planted must be surviving at the end of the first growing season after planting. Even where the minimum is met overall, gaps of over 75 ft, where no trees are present should be re-planted.

**REFERENCES**

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| Appendix 1. Trees and Shrubs Suitable for Zone 1 of a Riparian Buffer in Florida[1,2] | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Trees** | | | | | | | |
| **Hydric Soil** | | | | **Non-hydric Soil** | | | |
| **Plants** | **Height Class[3]** | **Evergreen[4]** | **Adaptation[5]** | **Plants** | **Height Class[3]** | **Evergreen[4]** | **Adaptation[5]** |
| Alder | B | | N | Ash, White | A | | N,C |
| Bay, Red | A | E | N,C,S | Basswood | A | | N,C |
| Bay, Loblolly | A | E | N,C,S | Beech, Blue | B | | N,C |
| Birch, River | A | | N | Buckeye, Red | B | | N,C |
| Cottonwood | A | | N | Cedar, Red | A | E | N,C |
| Cypress | A | | N,C,S | Cherry, Laurel | B | E | N,C |
| Dogwood, Swamp | B | | N,C,S | Cherry, Wild black | A | | N,C |
| Hackberry, Sugar | A | | N,C,S | Dogwood, Flowering | B | | N,C |
| Hickory, Water | A | | N,C | Elder, Box | A | | N,C |
| Holly, Dahoon | B | E | N,C,S | Elm, American | A | | N,C |
| Juniper, (white cedar) | B | E | N | Elm, Winged | A | | N,C |
| Lime, Ogeechee | B | | N | Fringetree | B | | N,C |
| Maple, Red | A | | N,C,S | Gum, Black | A | | N,C |
| Oak, Overcup | A | | N | Hackberry, Sugar | A | | N,C,S |
| Persimmon | A | | N,C,S | Hickory, Mockernut | A | | N,C |
| Popash | B | | N,C,S | Hickory, Pignut | A | | N,C |
| Poplar, Yellow | A | | N | Holly, American | A | E | N,C |
| Sweetbay | A | E | N,C,S | Hophornbeam | A | | N,C |
| Titi, Black | B | E | N | Magnolia, Southern | A | E | N,C,S |
| Tupelo, Water | A | | N | Mulberry | A | | N,C,S |
| Tupelo, Swamp | A | | N,C | Oak, Laurel | A | | N,C,S |
| Willow | A | | N,C,S | Oak, Live | A | | N,C,S |
| | | | | Oak, Post | A | | N,C |
| | | | | Oak, Shumard | A | | N |
| | | | | Oak, Southern red | A | | N,C |
| | | | | Oak, Swamp chestnut | A | | N,C |
| | | | | Oak, Water | A | | N,C,S |
| | | | | Oak, Willow | A | | N |
| | | | | Palm, Cabbage | A | E | N,C,S |
| | | | | Pecan | A | | N |
| | | | | Persimmon | A | | N,C,S |
| | | | | Plum. Wild | B | | N,C |
| | | | | Redbud | B | | N,C |
| | | | | Sweetgum | A | | N,C |
| | | | | Sycamore | A | | N |
| | | | | Waxmyrtle | B | | N,C,S |

| Appendix 1 Trees and Shrubs Suitable for Zone 1 of a Riparian Buffer in Florida[1,2] (cont'd) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Shrubs** | | | | | | | |
| **Hydric Soil** | | | | **Non-Hydric Soil** | | | |
| **Plants** | **Height Class[3]** | **Evergreen[4]** | **Adaptation[5]** | **Plants** | **Height Class[3]** | **Evergreen[4]** | **Adaptation[5]** |
| Arrowwood | C | | N,C | Beautyberry, American | C | | N,C,S |
| Buttonbush | B | | N,C,S | Blueberry | C | | N,C,S |
| Cyrilla, Swamp | B | | N,C | Chinkapin | C | | N,C,S |
| Elderberry | B | | N,C,S | Fetterbush | C | E | N,C,S |
| Pepperbush, Sweet | C | | N,C | Gallberry | C | E | N,C,S |
| Viburnum, Possum-haw | B | | N,C | Palmetto, Saw | C | E | N,C,S |
| Viburnum, Walter's | B | | N,C,S | Silverthorn | B | E | N,C |
| | | | | Sumac, Shining | B | | N,C,S |
| | | | | Viburnum spp. | B | | N,C,S |
| | | | | Yaupon | C | E | N,C |

[1]Other species may be used if approved by State Resource Conservationist.
[2]In order to achieve the desired detritus and large woody debris, Zone 1 should be primarily a mixture of deciduous trees and shrubs. Specifications should include:
- a row of mixed shrubs (2 or more species) adjacent to the stream
- two rows of trees (2 or more species) with rows 8 ft. apart, staggering plantings in the rows

[3]A = trees > 40 ft. at maturity; B = trees/shrubs 10 to 40 ft.; C = shrubs < 10 ft.
[4]E = evergreen
[5]N = North FL, C = Central Florida, S = South Florida according to the map in 26 Ecological Communities of Florida