NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION 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 Riparian Forest Buffer. 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 performance of the individual species (or comparable species) in nearby areas on similar sites, or technical references. Planting density specifications are:

Plant Types/Heights:	Plant-to-Plant Spacing (ft)
Shrubs	3 to 15
Trees	8 to 20

PLANT LIST

Table 1 includes the lists of woody plant species (trees and shrubs) commonly associated with and suited to riparian areas. This table is a guide and not intended to exclude other species appropriate for riparian area. Refer to Tree/Shrub Establishment (Code 612) for tree planting. Ecological Life Zones are listed for each plant to assist with the selection and design process for establishing new buffers. Ecological life zones, described by Ewel & Withmore, 1973, for Puerto Rico and the U. S. Virgin Islands are major climatic divisions and define the conditions for ecosystem functioning (see pages 5 and 6 for Ecological Life Zones map for Puerto Rico and U. S. Virgin Islands).

Natural regeneration may be used to establish a buffer if the following conditions exist:

- There is an adequate natural seed source of desired species in adjacent areas.
- Site conditions are favorable for establishing the desired number and distribution of seedlings within specified time period.
- Noxious or invasive species are not likely to jeopardize the stand.

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

Planting stock will be stored in a cool, moist environment. 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 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.

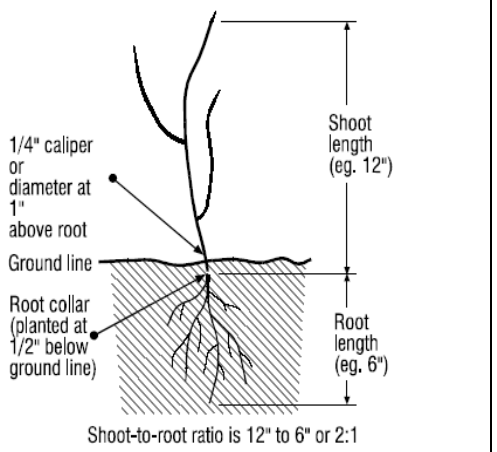


Figure 1. Plant or stock size requirements (for example only).

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 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.

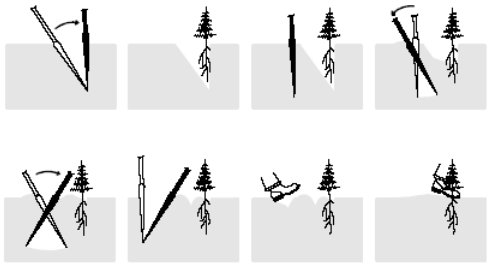


Figure 2. Proper plant and root placement of rooted stock using a planting bar.

PREPARATION OF PLANTING SITES

Planting sites shall be properly prepared based on the soil type and vegetative conditions. For sites to be tilled, leave a 4-foot untreated strip at the edge of the bank or shoreline. Avoid using pesticides.

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.

REFERENCES

Ewel, J. J.; Whitmore, J. L. 1973. The ecological life zones of Puerto Rico and the U.S. Virgin Islands. (Res. Pap. ITF-18.) Río Piedras, Puerto Rico: USDA Forest Service, Institute of Tropical Forestry. 72 p. With separate map at 1:250,000.

John K. Francis and Carol A. Lowe, Salvador Trabanino. 2002, International Institute of Tropical Forestry, Río Piedras, Puerto Rico, General Technical Report IITF-15, USDA Forest Service.

Fish and Wildlife Service Plant List recommended for reforestation, 2005, unpublished.

Table 1 Lists of Woody Plant Species Commonly Associated with Riparian Areas

Status	Names			Wet	Lower Montane Wet	Moist	Dry
	Scientific	**Spanish**	**English**				
N	*Acrocomia media*	Palma Corozo	Prickly palm			✓	
N-W	*Andira inermis*	Moca	Cabbage angelin	✓	✓	✓	✓
N	*Annona muricata*	Guanábana	Soursop				✓
N-W	*Bucida buceras*	Ucar	Black-olive			✓	✓
N-W	*Byrsonima spicata*	Maricao	Hogberry	✓	✓	✓	
N-W	*Calophyllum calaba*	María	Santa-maria	✓	✓	✓	
N	*Calyptrantes sintenissi*	Limoncillo de monte	Lidflower	✓	✓	✓	
N-W	*Cecropia schreberiana*	Yagrumo Hembra	Trumpet-tree	✓	✓	✓	
N-W	*Chrysophylum cainito*	Caimito	Star-apple	✓	✓	✓	✓
N	*Chryssobalanus icacao*	Icaco	Icaco				✓
N-W	*Clusia rosea*	Cupey	Wild-mammee	✓	✓	✓	✓
N-W	*Colubrina arborescens*	Abeyuelo	Coffee colubrina			✓	✓
N-W	*Cordia laevigata*	Capá Colorado	Red manjack			✓	✓
N-W	*Cordia sulcata*	Moral	White manjack	✓	✓		
N-W	*Cupania americana*	Guara	Candlewood-tree	✓	✓	✓	
N-W	*Dendropanax arboreus*	Pollo	Galipee	✓	✓	✓	
N	*Eugenia biflora*	Hoja menuda	Stopper			✓	
N-W	*Faramea occidentalis*	Café Cimarrón	False-coffee			✓	
N-W	*Ficus sintenisii*	Jaguey Colorado	Red fig	✓	✓	✓	
N	*Genipa americana*	Jagua	Genipa	✓	✓	✓	
N-W	*Guapira fragans*	Corcho	Black mampoo				
N-W	*Guarea guidonia*	Guaraguao	American muskwood			✓	
N-W	*Guazuma ulmifolia*	Guácima	Jacocalalu	✓	✓	✓	✓
N	*Hernandia sonora*	Mago	Jack-in-the-box			✓	✓
N	*Homalium racemosum*	Caracolillo	Acoma			✓	
N	*Hymanaea courbaril*	Algarrobo	West Indian locust	✓	✓	✓	
N-W	*Inga fagifolia*	Guamá	Sweetpea			✓	
N-W	*Inga vera*	Guaba	White sweetpea	✓		✓	
N	*Linociera domingensis*	Hueso blanco	White-rosewood			✓	✓
N	*Mammea americana*	Mamey	Mammee-apple	✓	✓	✓	
N-W	*Manilkara bidentata*	Ausubo	Balata		✓		
N-W	*Miconia sp.*	Camasey	Camasey	✓	✓	✓	
N-W	*Miconia* prasina*	Camasey blanco	Sardine	✓	✓	✓	
N-W	*Montezuma speciosissima*	Maga	Purple haiti-haiti			✓	

Status	Names			Wet	Lower Montane Wet	Moist	Dry
	Scientific	Spanish	English				
N-W	*Ocotea leucoxylon*	Laurel Geo	Loblolly sweet-wood	✓	✓	✓	✓
N-W	*Petitia domingensis*	Capá Blanco	Petitia			✓	
N-W	*Pimenta racemosa*	Malagueta	Bay-rum-tree			✓	✓
N	*Quararibaea turbinata*	Garrocho	Swizzle-stick tree	✓	✓	✓	
N-W	*Rapanea ferruginea*	Mantequero	Oil-tree	✓	✓	✓	
N-W	*Roystonea borinquena*	Palma Real	Royal palm			✓	
N-W	*Sapium laurocerasus*	Tabaiba	Tabaiba	✓	✓	✓	
N-W	*Shefflera morototoni*	Yagrumo Macho	Matchwood	✓	✓		
N-W	*Solanum rugosum*	Tabacón	Nightshade	✓		✓	
N	*Spondias mombin*	Jobillo	Yellow mombin			✓	✓
N-W	*Tetragastris balsamifera*	Masa	Gommier	✓	✓	✓	✓
N-W	*Trema micrantha*	Guacimilla	Florida trema	✓	✓	✓	
N-W	*Zanthoxylum martinicense*	Espino Rubial	White-prickle	✓	✓	✓	
I/N	*Artocarpus altitis*	Panapen/pana de pepita	Breadfruit	✓	✓	✓	
I/N	*Bauhinia monandra*	Mariposa	Butterfly bauhinia			✓	
I/N	*Bixa orellana*	Achiote	Anatto			✓	
I/N-W	*Erythrina berteroana*	Machete	Coralbean	✓	✓	✓	
I/N-W	*Erythrina fusca*	Bucaré	Swamp immortelle	✓	✓	✓	
I/N-W	*Erythrina poeppigiana*	Bucayo gigante	Mountain immortelle	✓	✓		
I/N	*Hibiscus tiliaceus*	Emajagua	Sea hibiscus			✓	
I/N	*Mangifera indica*	Mangó	Mango	✓	✓	✓	✓
I/N	*Manilkara zapota*	Níspero	Mespel			✓	✓
I/N	*Spondias purpurea*	Ciruela del País	Purple plum			✓	✓

Legend:

✓ Highly recommended

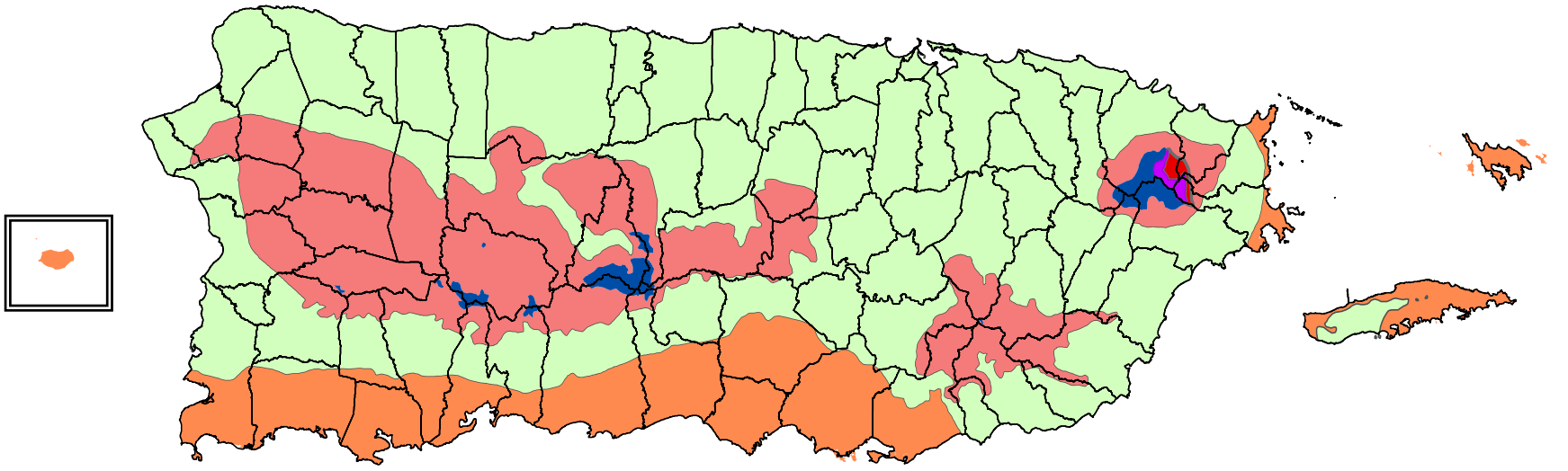
Status

N Native Species

I/N Introduced/Naturalized species

W Species important to wildlife in terms of food, shelter and/or nesting substrate.

Ecological Life Zones for Puerto Rico

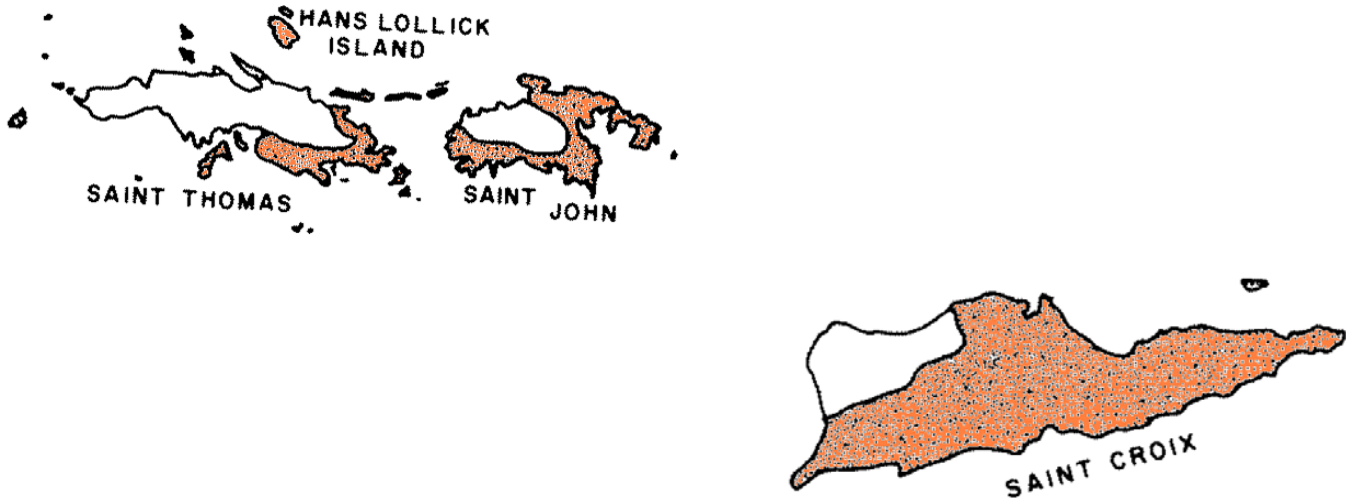


Legend

Ecological Life Zone

- Dry
- Moist
- Lower Montane Rain Forest
- Rain Forest
- Lower Montane Wet
- Wet

Life Zones of the U.S. Virgin Islands



Legend

Dry

Moist

Map not to scale
Source: Ecological Life Zones, for Puerto Rico and the US Virgin Island Ewel & Withmore, 1973,