

**NATURAL RESOURCES CONSERVATION SERVICE
NEW JERSEY
CONSERVATION PRACTICE STANDARD
TREE/SHRUB ESTABLISHMENT**

(Acres)

CODE 612

DEFINITION

Establishing woody plants by planting seedlings or cuttings, direct seeding, or natural regeneration.

Cropping (311), Windbreak/Shelterbelt Establishment, 380; Critical Area Planting (342), Hedgerow Planting (422).

PURPOSE

Establish woody plants for:

- Forest products such as timber, pulpwood, etc
- Wildlife habitat
- Long-term erosion control and improvement of water quality
- Treating waste
- Storing carbon in biomass
- Reduce energy use
- Develop renewable energy systems
- Improving or restoring natural diversity
- Enhancing aesthetics

CONDITIONS WHERE PRACTICE APPLIES

Tree and Shrub Establishment can be applied on any appropriately prepared site where woody plants can be grown. Utilize other practice standards for specialized tree/shrub establishment situations, e.g., Riparian Forest Buffer (391), Alley

CRITERIA

General Criteria Applicable to All Purposes

Composition of species will be adapted to site conditions and suitable for the planned purpose(s).

No plants on the Federal or state noxious weeds list shall be planted.

Planting or seeding rates will be adequate to accomplish the planned purpose for the site.

Planting dates, and care in handling and planting of the seed, cuttings or seedlings will ensure that planted materials have an acceptable rate of survival.

Only viable, high-quality and adapted planting stock or seed will be used.

A precondition for tree/shrub establishment is appropriately prepared sites. Refer to practice standard Tree/Shrub Site Preparation (490).

Adequate seed sources or advanced reproduction needs to be present or provided for when using natural regeneration to establish a stand.

Selection of planting technique and timing will be appropriate for the site and soil conditions.

The acceptability and timing of coppice regeneration shall be based on species, age and diameter.

The planting will be protected from plant and animal pests and fire. Refer to standard Integrated

Pest Management (595) to assist with site-specific strategies for pest prevention, pest avoidance, pest monitoring, and pest suppression.

Each site will be evaluated to determine if mulching, supplemental water or other cultural treatments (e.g., tree protection devices, shade cards, brush mats) will be needed to assure adequate survival and growth.

Additional Criteria For Treating Waste

Species used to treat waste shall have fast growth characteristics, extensive root systems, high nutrient uptake capacity and tolerance of the planned effort.

Additional Criteria for Improving Natural Diversity

Composition of species selected for planting or those favored for natural regeneration will be native to the site and create a successional state that can progress to the potential natural plant community.

Additional Criteria for Storing Carbon in Biomass

The species and plant communities that attain biomass more quickly will sequester carbon faster. The rate of carbon sequestration is enhanced as trees/shrubs mature and soil organic matter increases. Select plants that have higher rates of growth and potential for carbon sequestration in biomass and are adapted to the site. Plant species at the appropriate stocking rate for the site.

Additional Criteria for Developing Renewable Energy Systems

Select plants that can provide adequate kinds and amounts of plant biomass to supply identified bioenergy needs.

Intensity and frequency of energy biomass removals will be managed to prevent long-term negative impacts on the system.

The harvesting of energy biomass shall be accomplished in a manner that will not compromise the other intended purpose(s) and functions.

Additional Criteria to Reduce Energy Use

Orient trees to shade a building to reduce summer energy usage. The first priority is placement on the building's west side where the greatest daily heat gain occurs. The second priority is the east side.

Select plants with a potential height growth that will be taller than the structure or facility being protected. Use proper plant densities to optimize the shade produced and meet energy reduction needs.

Trees planted within 30 to 50 ft of the building generally provide effective shade to windows and walls depending on tree height potential.

Keep trees at least 10 ft or further from the structure depending on mature crown spread, to avoid damage to foundations or restrict maintenance access to windows and walls.

CONSIDERATIONS

Use locally adapted seed, seedlings or cuttings. Priority will be given to plant materials that have been selected and tested in tree/shrub improvement programs for a given area. All plant materials should comply with a minimum standard, such as the NJ State Forest Service, US Forest Service, or state-approved nursery.

Tree/shrub arrangement and spacing should allow for and anticipate the need for future access lanes for purposes of stand management.

On sites where previous management practices include chemical applications, residual chemical carryover should be evaluated prior to planting.

Species used to treat waste should have fast growth characteristics, extensive root systems, capable of high nutrient uptake, and may produce wood/fiber products in short rotations.

Livestock shall be excluded from planting area unless a Silvopasture System is planned. See [AgroForestry Note](#) for tree care and livestock.

Pests (animal, insect, or plant) that may limit or prevent the planting from achieving its desired function(s) will be managed as necessary to achieve and maintain the intended purpose(s).

(i.e., deer browsing seedlings). See the Specifications Section for details.

Favor native trees, shrubs, & herbaceous plants that have multiple values and meet landowner objectives. Exceptions may be heavily disturbed sites, such as strip mines or borrow piles.

Avoid tree and shrub species, which may be alternate hosts to undesirable pests or that, may be invasive or considered noxious or undesirable. Species diversity should be considered to avoid loss of function due to species-specific pests. Also, consider species that best meet wildlife needs.

Consider the type of human use (rural, suburban, and urban) and the aesthetic, social and safety aspects of the area to determine the vegetation selection, arrangement and management. For example, avoid shrubs that block views or traffic lines of sight. Prune low tree branches near recreation trails to ease patrolling.

Species selection criteria to improve aesthetics include seasonal foliage color, showy flowers and fruit, foliage texture, form and branching habit. The layout design should be appropriate for the setting as determined by adjacent land uses. A landscape analysis can help determine specific aesthetic requirements.

A precondition for tree/shrub establishment is appropriately prepared sites. Refer to practice standard Tree/Shrub Site Preparation, 490.

Adequate seed sources or advanced reproduction needs to be present or provided for when using natural regeneration to establish a stand.

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall follow procedures, technical details and other information listed on the following pages which provide additional guidance for tree and shrub establishment.

PLANTING DATES

On sites with moderate to heavy soils, bare-root planting seedlings should be planted during the spring to prevent frost heaving. On sites with lighter soils, bare root seedlings may be planted in spring or fall. Planting dates for New Jersey are generally March 1st to May 1st and November 1st to December 15th, provided that the site is not frozen, flooded, or too dry to plant.

Containerized plant materials should be planted during the same spring and fall planting dates, but may be planted later in the spring or earlier in the fall. If planted later, supplemental irrigation may be needed for these plants.

PLANTING DENSITIES

Initial plant-to-plant densities depend on the proposed tree species to plant and planting site condition. Planting density specifications are:

NUMBER OF TREES TO PLANT FOR TRADITIONAL FORESTRY PRODUCTS and CARBON SEQUESTRATION

SITE CONDITION	TREE SPECIES TO PLANT		
	PINES and other CONIFERS	HARDWOODS	ATLANTIC WHITE CEDAR
Agricultural Field or cleared woodlots with few if any trees.	600 minimum per acre. 8' X 9' approximate spacing	400 minimum per acre. 10' X 10' approximate spacing	1000 minimum per acre. 6' X 7' approximate spacing
Understocked woodlands (Maximum basal area 60 square feet) (A professional forester should prepare the plan.)	300 minimum per acre. Total number of planted and existing desirable seedlings should equal 600 minimum per acre	200 minimum per acre Total number of planted and existing desirable seedlings should equal 400 minimum per acre	500 minimum per acre. Total number of planted and existing desirable seedlings should equal 1000 minimum per acre

Greater spacing between trees and shrubs is permissible if the stated purpose for the tree planting is something other than traditional forest products. A minimum planting density is 200 trees and shrubs per acre.

NATURAL REGENERATION

Natural regeneration or direct seeding may be used where rapid establishment is not a priority and invasive plant species are absent. Adequate seed or advanced reproduction needs to be present or provided when using natural regeneration. The acceptability and timing of coppice (sprouting from stumps or roots) regeneration shall be based on species, age, and diameter.

A naturally regenerated forest is considered established when plant densities reach the planted densities recommended above. Three growing seasons is a reasonable amount of time in which to determine if natural regeneration is successful. Trees and shrubs are considered established when they have begun to dominate herbaceous plants and undesirable shrubs.

A professional forester should prepare the regeneration plans if natural regeneration is proposed.

PLANT LIST

Table 1 lists suggested woody plant species. Key attributes are listed for each plant to assist with the design process.

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

Planting stock should be stored in a cool, moist environment (34-38 degrees F) or "heeled in"¹. 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 should 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 1/4" in diameter. Rooted planting stock must not exceed a 2:1 shoot-to-root ratio. See Figure 1. Container stock should normally not exceed a 1-gallon can size.

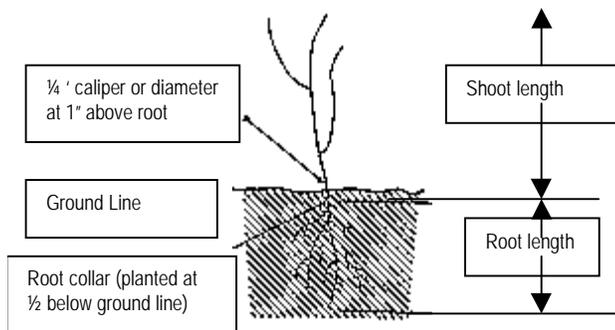


Figure 1. Shoot-to-root ratio is 12" to 6" or 2:1. Plant or stock size requirements

Roots of bare-root stock should 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 should be kept moist at all

¹ Heeled in refers to the practice of digging a trench six inches deep by several feet long and placing seedlings in this trench for temporary storage. These seedlings are placed side by side, and soil is placed over the roots to planting depth.

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.

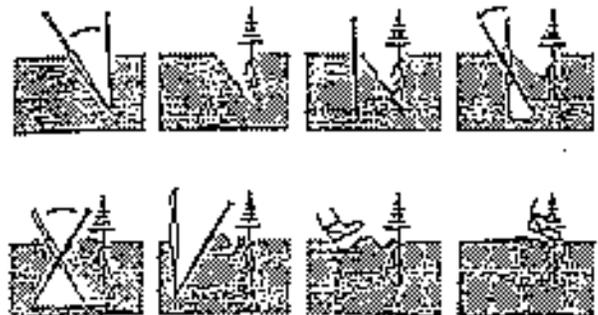


Figure 2. Proper plant and root placement of rooted stock using a planting bar.

PREPARATION OF PLANTING SITES

Planting sites should be properly prepared based on the soil type and vegetative conditions listed below. For sites to be tilled leave a 15-foot untreated strip at the edge of the stream bank or shoreline. Competitive weeds, particularly Canada thistle, multiflora rose, sweet fern, or grasses, particularly fescues, should be controlled prior to planting. Avoid sites that have had recent application of pesticides harmful to the woody species to be planted. If pesticides are used for site preparation, 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 weeds. Refer to Standard 484 "Mulching"², for installation procedures.

² USDA Tech Guide Section 4

The following are recommended site preparation methods for agricultural field and previously forested areas:

FORMER AGRICULTURAL FIELD

Tillable sites with loamy/clayey soils:

Sod and alfalfa sites

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

Small grain or row crop sites.

If the site is in small grain, corn, or similar clean tilled crops, 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 be needed. A cover crop or stubble may be needed between the rows to protect the planting from erosion.

Tillable sites with sandy soils.

Sod and alfalfa field.

When hand planting without site preparation, scalp or strip the existing vegetation from an area at least 3 feet in diameter and two to four inches deep. Plant plants in the center of the scalped area.

Alternatively, 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.

Same recommendation as for clayey soils.

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.) or tillage of the site will cause excessive erosion, the methods listed below may be used. Sites with undesirable brush will need initial treatments that physically remove or kill the brush. Suitable methods include hand-cutting and removal, brush hogging, or herbicides applications

Machine or hand scalp an area at least 6 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 center-line of the treated area.

PREVIOUSLY FORESTED AREAS

Consult with a professional forester for proper site preparation prior to planting. These methods may included the following mechanical treatments: drum chopping, root-raking, and/or woodland disking. Herbicide treatments may also be used.

SEEDLING PROTECTION from Wildlife

Newly planted seedlings can be damaged by wildlife. Deer browsing is by far the greatest wildlife hazard, though, beavers will eat new seedlings in certain locales. In addition, mice and voles can chew on the bark and cambium of new seedlings. Since deer-browsing is the biggest wildlife threat to seedling survival, protection strategies from deer are discussed below. Additional information is available from the NJ State Forest Service, Rutgers Cooperative Extension, and

commercial vendors of products that protect tree seedlings. These products are advertised in garden or forestry supply catalogues.

In areas of heavy deer populations, use one or a combination of the three methods discussed below to protect seedlings from browsing.

Fencing

Livestock-type fencing can be installed around the perimeter of the planting site. Non-electric fence should be 8 feet tall to prevent deer from jumping over the fence. Electric fence can be lower in height, since deer first try to go through or under a fence, before they leap. In this case, they get a shock and remember to avoid the area. See Rutgers Cooperative Extension Fact Sheet Number FS888 "Portable Electric Fencing for Preventing Wildlife Damage".

Tree Shelters

Several types of individual seedling protectors are commercially available. These protectors are small diameter cylindrical covers made out of mesh or opaque materials that are placed over each seedling like a chimney. The solid cylinders not only protect the seedling from predation, but also, create a greenhouse effect that increases seedling growth. To create this greenhouse effect, the base of the shelters must be covered by soil.

Chemical Repellants

There are a number of chemical repellants available commercially that discourage deer from browsing on seedlings. These products contain substances that are noxious to deer, such as rotten eggs or hot peppers. These products usually last for 1 to 2 months depending on the weather, after which another application is needed. In areas with extremely high deer population, this method is not very effective without continuous reapplications.

EXPLANATION OF TERMS

TABLE 1.

Species are grouped by plant type and arranged in alphabetical order by common name. 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 50 years of age. The reference age for shrubs is 10 years.

1. Soil Drainage Class – The following abbreviations are used:

E – Excessively well-drained soils.

W- Well-drained soils

MW – Moderately well-drained soils.

SP – Somewhat poorly drained soils.

P – Poorly drained soils.

2. Shade Tolerance. The plant’s capacity to grow in a shaded condition. High: can grow in the shade of an overstory; Medium: can grow in partial shade; Low: needs full or nearly full sunlight.

3. Wildlife Value. A rating of “High”, “Medium”, or “Low” based on the food and/or cover value provided by the plant.

4. Forest Products Value – A rating of “High”, “Medium”, and “Low” based on the tree’s economic value for traditional forest products, such as lumber, siding, post, firewood, pulp and chips. A rating of “Specialty Forest Products” means the tree or shrub has an economic use for special forest products, such as medicinals, florals, edibles, and other uses. See also Income Opportunities in Special Forest Products.

5. Native Species. “All” indicates the plant is native to all Major Land Resource Areas (MLRA) in the state. If a plant is just native to one or two MLRA’s, that MLRA is given. If “no” is listed in this block, then this species is an introduced species. See Figure 3, map on last page.

PLANS AND SPECIFICATIONS

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

Plans and specifications will include the following:

- adapted tree species for the purposes outlined,
- spacing,
- site preparation.
- planting methods,

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- cultural practices
- maintenance requirements, and
- variations in methods and species between interplanting, underplanting, and planting in open areas. Separate specifications can be prepared for each of these planting methods.

OPERATIONS AND MAINTENANCE

The following actions should be carried out to insure that this practice functions as intended throughout its expected life.

- Inspect the planting site periodically. Protect and restore as needed to maintain the intended purpose from vehicular and pedestrian traffic, pest infestations, pesticide use from adjacent lands, livestock damage and fire. Biological control of undesirable plant species and pests (e.g. using predator or parasitic species) should be used where available and feasible.
- Replace dead trees and shrubs and control undesirable vegetative competition until the planting is fully functional.
- Control concentrated flow erosion from upslope areas, where necessary.
- To provide habitat and corridors for wildlife, manage the planting to favor food, shelter, and nesting requirement for indicator or target wildlife species. Refer to standards for Wildlife Upland Habitat Management and Wildlife Wetland Habitat Management.
- Additional operation and maintenance requirements shall be developed on a site-specific basis to assure performance of the practice as intended.

REFERENCES

Harlow and Harrar. Textbook of Dendrology McGraw-Hill Book Company. 1969.

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US Department of Agriculture. Forest Service. Income Opportunities in Special Forest Products. Agriculture Information Bulletin 666 May 1993.

U.S. Department of Agriculture. Forest Service. Silvics of Forest Trees of the United States, Agricultural Handbook No.271. 1965

US Department of Agriculture. Natural Resources Conservation Service. Agroforestry Notes #8 November 1999

TABLE 1 – Trees and Shrubs to plant

Plant Species	MATURE HEIGHT	SOIL DRAINAGE CLASS	SHADE TOLERANCE	WILDLIFE VALUE	FOREST PRODUCTS USE	NATIVE SPECIES	COMMENTS
1. EVERGREEN TREES							
American Holly <i>Ilex opaca</i>	40	P - MW	High	High	Specialty Forest Products	All but 140	Excellent aesthetic
Atlantic White Cedar <i>Chamaecyparis Thyoides</i>	80	P	Low	High	High	All but 140	Plant in sandy wet or mucky soils only. Excellent rot resistance, lumber.
Eastern White Pine <i>Pinus strobus</i>	100	SP – W	Medium	Medium	High	All	Not native to Pine Barrens
Pitch Pine <i>Pinus rigida</i>	60	P - E	Low	Medium	Medium	All	Plant in Pine Barrens. Use improved pitch pine.
Loblolly Pine <i>Pinus taeda</i>	100	SP – W	Low	Medium	High	No	Possible native in extreme southern New Jersey
Shortleaf Pine <i>Pinus echinata</i>	80	MW-E	Low	Medium	High	All	
2. DECIDUOUS TREES							
American basswood <i>Tilia americana</i>	80	SP-W	High	High	High	All but 153	Prefers moist sites, Bees love it
Black Gum <i>Nyssa sylvatica</i>	60	P-MW	Medium	High	Low	All	Early brilliant fall coloring
Black Walnut <i>Juglans nigra</i>	80	MW-W	High	Medium	High	All	Excellent lumber Mast production
Black Oak <i>Quercus velutina</i>	80	MW-E	Medium	High	High	All	
Chestnut Oak <i>Quercus prinus</i>	80	MW-E	Medium	High	Medium to High	All	
Eastern Cottonwood <i>Populus deltoides</i>	120	SP-W	Low	Medium	Medium	All	Fast growth
Hackberry <i>Celtis occidentalis</i>	60	SP-W	High	High	Medium	All	Hardy Yellow fall color
Hybrid Poplar <i>Populus spp.</i>	80	SP-W	Low	Low	High	Y/N	Extremely fast growth Biomass production
Mockernut hickory <i>Carya tomentosa</i>	70	MW-W	High	High	Medium	All	Mast production
Persimmon <i>Diospyrus virginiana</i>	50	SP– W	High	High	Low	All	Fleshy fall fruit
Pin Oak <i>Quercus palustris</i>	60	P-MW	Medium	All	Medium to High	All	Perpendicular branching habit Mast production
Red Maple <i>Acer rubrum</i>	80	P-W	High	Low	Low to Medium	All	Red fall color & bloom

TABLE 1 – Trees and Shrubs to plant (continued)

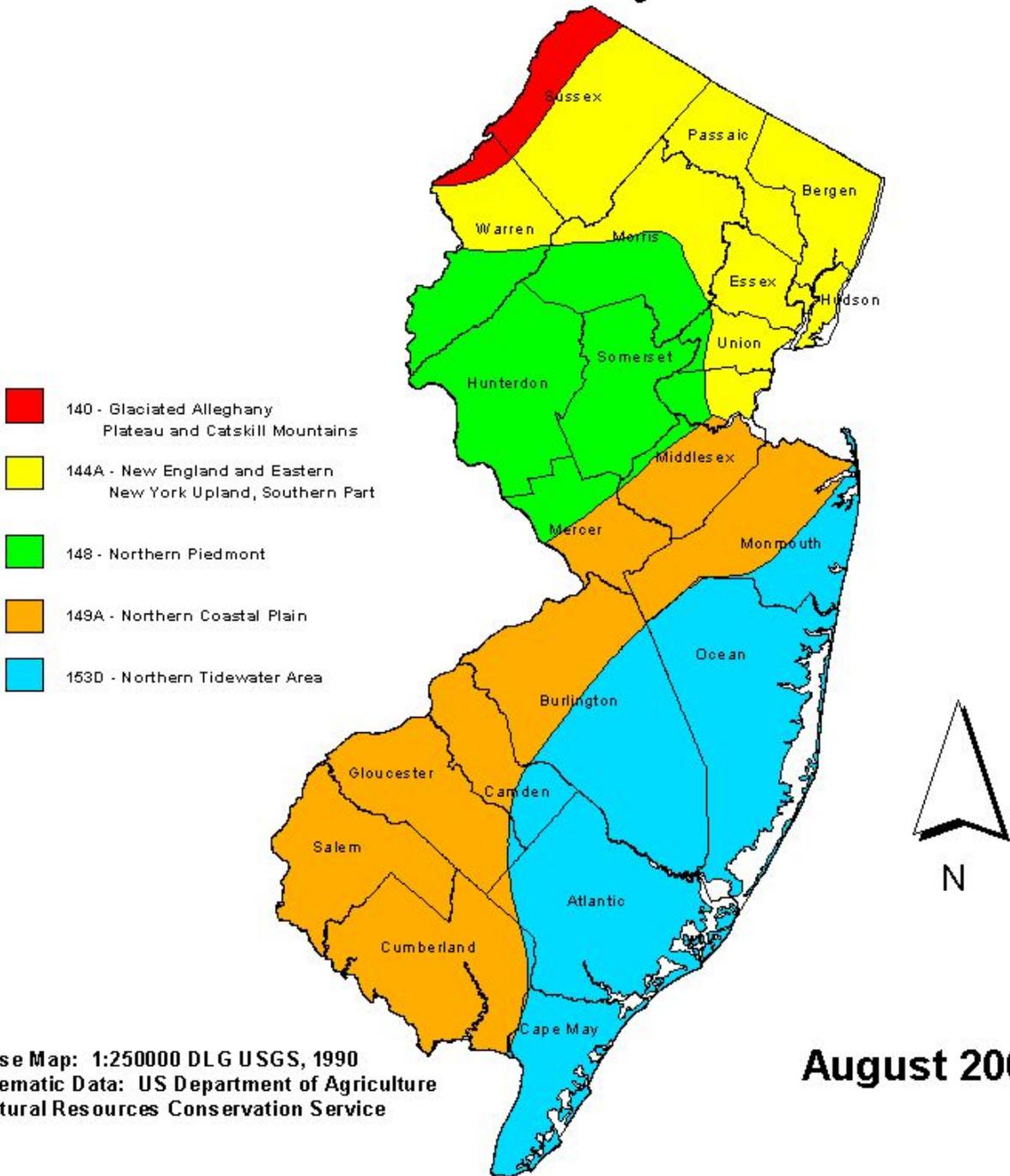
Plant Species	MATURE HEIGHT	SOIL DRAINAGE CLASS	SHADE TOLERANCE	WILDLIFE VALUE	FOREST PRODUCTS VALUE	NATIVE SPECIES	COMMENTS
Red Oak <i>Quercus rubra</i>	80	MW-W	Medium	High	High	All	Red fall color
River Birch <i>Betula nigra</i>	80	P-MW	Medium	Low	Low	All	Exfoliating bark Yellow fall color
Shagbark Hickory <i>Carya ovata</i>	70	MW-W	High	High	Medium	All	Mast production
Swamp White Oak <i>Quercus bicolor</i>	60	P-SP	High	High	High	All	Good growth for Oak, Lumber Mast production.
Sweet Gum <i>Liquidambar styraciflua</i>	60	P-MW	Medium	Medium	Medium to High	All but 149	Fast growth Red fall foliage
Sycamore <i>Platanus occidentalis</i>	80	P-MW	Medium	Low	Medium to high	All but 153	Fast growth Prone to sycamore anthracnose
Willows (tree-type) <i>Salix</i> sp.	70	P	Low	Medium	Medium	Y/N	<i>Salix nigra</i> is native Fast growth
White Oak <i>Quercus alba</i>	80	SP-W	Low	High	High	149 & 153	Good lumber species Mast production
Willow Oak <i>Quercus phellos</i>	80	P-MW	Low	High	High	149 & 153	Good lumber species Mast production
White Ash <i>Fraxinus americana</i>	90	SP-W	Medium	High	High	All	Good Lumber, good growth Yellow fall foliage
Yellow Poplar <i>Liriodendron tulipifera</i>	100	SP-W	Low	Low	High	All	Fast growth Good lumber
3. SHRUBS							
Arrowwood <i>Viburnum dentatum</i>	10	P-SP	Medium	High		All	Late spring flower
Highbush Blueberry <i>Vaccinium corymbosum</i>	10	P-SP	Medium	High	Specialty Forest Product	All	Fruit production
Red-Osier Dogwood <i>Cornus stolonifera</i>	10	P-SP	Medium	High	Specialty Forest Product	All	Good for streambank stabilization
Silky Dogwood <i>Cornus amomum</i>	10	P-SP	High	High	Specialty Forest Product	All	Produces fruit at 2-3 years
Spicebush <i>Lindera benzoin</i>	20	SP-W	High	Medium	Specialty Forest Product	All	
Sweet Pepperbush <i>Clethra Alnifolia</i>	10	P-SP	High	High		All	Summer flower
Willows (shrub) <i>Salix</i> sp.	10	P-SP	High	Medium	Specialty Forest Product	Y/N	<i>S. exigua</i> and <i>S. sericea</i> are native
Witch Hazel <i>Hamamelis virginiana</i>	20	SP-W	High	Medium	Specialty Forest Product	All but 153	Potential herbal/medicinal use Yellow fall foliage
Winterberry Holly <i>Ilex verticillata</i>	10	P	Medium	High	Specialty Forest Product	All	Need male & female plants for fruit Potential floral market

TABLE 1 – Trees and Shrubs to plant (continued)

Plant Species	MATURE HEIGHT	SOIL DRAINAGE CLASS	SHADE TOLERANCE	WILDLIFE VALUE	FOREST PRODUCTS VALUE	NATIVE SPECIES	COMMENTS
Shadbush <i>Amelanchier canadensis</i>	20	P-MW	Medium	High		All	Attractive flower in early spring
Elderberry <i>Sambucus canadensis</i>	12"	SP-MW	Medium	High	Specialty Forest Product	All	Fast growth Attractive flower and fruit
Smooth Alder, <i>Alnus serrulata</i>	10'	P-SP	Low	Medium		All	Nitrogen fixing
Buttonbush <i>Cephalanthus occidentalis</i>	8	P-SP	Medium	Medium		All	Unusual round white flower

Figure 3:

Major Land Resource Areas New Jersey



Base Map: 1:250000 DLG USGS, 1990
Thematic Data: US Department of Agriculture
Natural Resources Conservation Service

August 2001

