

**NATURAL RESOURCES CONSERVATION SERVICE
NEW JERSEY
CONSERVATION PRACTICE STANDARD
FOREST STAND IMPROVEMENT**

(Acre)

Code 666

DEFINITION

The manipulation of species composition, stand structure, and stocking by cutting or killing selected trees and understory vegetation.

This standard is not applicable for Alley Cropping, 311; Multi-story Cropping, 379; Windbreak/Shelterbelt Establishment 380; and Windbreak/Shelterbelt Renovation, 650.

PURPOSES

- To increase the quantity and quality of forest products by manipulating stand density and structure.
- Timely harvest of forest products.
- Development of renewable energy systems.
- Initiate forest stand regeneration.
- Improve forest health reducing the potential of damage from pests and moisture stress.
- Restore natural plant communities.
- Achieve or maintain a desired native understory plant community for special forest products, grazing, and browsing.
- Improve wildlife habitat.
- Improve aesthetic, recreation, and open space values.
- Reduce wildfire hazard.
- To restore natural plant communities.
- Alter water yield.
- Increase carbon storage in selected trees.

CRITERIA

General Criteria Applicable to All Purposes

Streamside Management Zones (SMZ) criteria as defined by the NJ Forest Service shall be observed at all times.

Forest stand improvement when applied shall be part of a forest management plan prepared or approved by a professional forester.

The harvest-regeneration strategy shall be identified for all planned forest improvement harvesting:

- Uneven-aged management systems (single tree-selection, group selection, coppice selection)
- Even-aged management (clear-cut, seed-tree, shelterwood, coppice)

The extent or size of treatment area shall achieve the intended purpose.

All trees harvested, as a part forest improvement shall not compromise the intent of the practice.

Preferred tree and understory species shall be identified and retained to achieve all planned purposes.

The method, felling direction and timing of tree cutting for forest improvement shall facilitate efficient and safe tree removal and protect sensitive areas such as wetlands, riparian zones, cultural resources, and structures.

Forest stand improvement activities shall be performed in such a manner to minimize soil

CONDITIONS WHERE PRACTICE APPLIES

All forest land.

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Conservation practice standards are reviewed periodically and updated as needed. The most current version of this standard can be obtained on our website at <http://www.nrcs.usda.gov/technical/efotg/>

erosion, compaction, cutting, and damage to non-target vegetation.

Slash and debris left on the site after treatment will not present an unacceptable fire, safety, environmental, or pest hazard. Such remaining material will not interfere with the intended purpose or other management activities. Forest Stand Improvement must be planned and implemented to meet all federal, state, and local laws and regulations.

Additional Criteria to Develop Renewable Energy Systems

Bioenergy intensity and frequency of energy biomass removals will be managed to prevent long-term negative impacts on the stand.

The harvesting of energy biomass shall be accomplished in a manner that will not compromise the other intended purpose(s) and functions. If applicable refer to State woody biomass Best Management Practices (BMPs).

Additional Criteria to Alter Water Yield

All forest improvement activities shall be done to improve rainfall retention and infiltration. This shall include improving survivability of understory regeneration, encouragement of fungal driven soil biology, and runoff management from access roads and landings.

Additional Criteria to Reduce Wildfire Hazard

Reduce stocking rates of trees to minimize crown-to-crown spread of fire.

Remove "ladder" fuels to minimize the occurrence of crown fires.

Treat or eliminate slash accumulations next to roads and trails if fire is a danger.

Reduce or eliminate species with high volatility but not to a level that would compromise other intended purposes.

Additional Criteria to Improve Wildlife Habitat

To improve wildlife habitat, consider the following actions:

Creation of snags to benefit woodpeckers, and cavity nesting species.

A minimum of 6 snags per acre from trees greater than 6 inches DBH shall be created from unhealthy, poor formed, damaged trees, or trees that are not potential crop trees.

Release trees beneficial to wildlife

Trees beneficial to the target species shall be released from crown competition on at least 3 sides to encourage tree health, vigor and larger crown growth. See FOTG Standard 645, Upland Wildlife Habitat Management and Standard 644, Wetland Wildlife Habitat Management for tree species beneficial to wildlife.

Preserve trees that benefit wildlife

- Trees possessing active nests
- Den trees, having one or more hollow chambers are used by a variety of birds, mammals and reptiles for nests, roosts and cover. Preserve 4 den trees per acre.
- Trees with high potential to develop den sites (e.g. dead branch stubs, tree wound or small cavities in young trees).

Creation of brush piles (or short rows) for wildlife cover.

Create brush piles for wildlife cover with materials left from forest stand improvement work. Brush piles shall be distributed adjacent to clearings, roads, and along the outer edges of the site. Place larger logs crisscrossed at the base of each pile with smaller limbs and twigs on top. Piles shall be 15 to 20 feet in diameter, and three to four feet high.

Feathering of Edge to Create Wildlife Habitat

The creation of a gradual edge with dense, shrubby vegetation provides additional food and cover for wildlife species such as quail and rabbits. A 150-foot wide feathered edge will be created around the perimeter of the site. Approximately 75% of the overstory or canopy will be removed from the first 50 feet of the woodland edge. Fifty percent of the canopy will be removed from the next 50 feet, and 25% of the canopy is removed from the next 50 feet of woodland. Similar results can be obtained through forest regeneration openings.

Minimize improvement actions that disturb seasonal wildlife activities.

Additional Criteria to Increase Carbon Storage in Selected Trees

Manage for tree species and stocking rates that have higher rates of growth and potential for carbon sequestration.

Additional Criteria to Initiate Forest Stand Regeneration

The location, size and orientation of regeneration openings shall be designed to achieve the desired regeneration goals. All desirable species within the regeneration area less than 10 inches in diameter (measured at 12 inches off the ground) will be cut at ground level or no higher than 10 inches off the ground to encourage coppice regeneration.

Within the regeneration area control all woody vegetation greater than 2 inches DBH (diameter breast height), and/or woody vegetation greater than 12 feet tall.

Cut and treat all vines with herbicides that are labeled for this practice.

Additional Criteria to Increase the Quality and Quantity of Forest Products

Thinning forest stands can improve and sustain timber production by increasing tree growth rates in diameter and height. **A professional forester shall mark all thinnings.**

Additional Criteria To Improve Aesthetics and Recreation

Complete forest stand improvement to:

- Open vistas.
- Improve trails created from log roads, and skid trails.
- Removing safety hazards near pedestrian areas (snags, large dead limbs, etc.).
- Release trees of unique aesthetic quality from crown competition on 2 sides to encourage tree health and vigor.

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- Start thinning forest stands no earlier than 15 to 20 years of age. Additional thinning can occur at 10-15 year intervals, up until three-fourths of the rotation age is reached.
- Improvement cuttings shall be light enough (maintaining at least 60% stocking) to restrict the growth of undesirable species, to maintain full site utilization, and to reduce epicormic branching and basal sprouting. Free tree crowns to provide four or more feet of opening between crowns.

Base thinning choices on:

- Relative tree position
- Relative crown position
- Crown condition
- Tree health
- Bole quality
- Species
- Management objectives

A number of thinning methods and guides are used by professional foresters. The three methods most commonly used in New Jersey are *Crop Tree Management*, *D + x*, and the *Basal Area Central Hardwoods Thinning Guide*. These methods are described below.

CROP TREE MANAGEMENT

Commercial use and local demand will determine what species are considered crop trees.

To improve species composition and tree growth crop trees will be identified, retained, and released from competition.

- Crop trees shall be released from crown competition on at least 3 sides by controlling competing vegetation using appropriate methods.
- All vines on crop trees greater than 1 inch in diameter shall be controlled using appropriate methods.
- For more information refer to "Crop Tree Management in Eastern Hardwoods" at http://www.fs.fed.us/na/morgantown/frm/perkey/ctm/ctm_index.html

D + X THINNING

This method works best for thinning forest plantation. This method is given on the USDA SCS Woodland Information Stick (1977).

For stands with an average DBH of 6 inches or greater, use the following tables as a guide for minimum residual stocking after thinning:

Hardwoods (minimum stocking levels)

Ave. Stand Diameter (inches)	Spacing (feet)	Basal Area (sq. ft.)	Trees Per Acre (no.)
6	13	55	258
8	16	60	170
10	19	65	121

Pine (minimum stocking levels)

Ave. Stand Diameter (inches)	Spacing (feet)	Basal Area (sq. ft.)	Trees Per Acre (no.)
6	12	60	304
8	14	75	222
10	16	90	170

BASAL AREA CENTRAL HARDWOODS THINNING GUIDE

This guide defines tree stocking levels using stand basal area, average tree diameter, and trees per acre. (See Appendix 1 graph) Using these three variables, most stands can be determined as Overstocked (above line A), Fully Stocked (between Line A and B), or Under stocked (between line B and C). Stands that need to be thinned are Overstocked or in the upper end of the Fully Stocked region. After a proposed thinning the stand should remain in the Fully Stocked region.

CONSIDERATIONS

County Soil Surveys should be used to determine desirable tree species for each soil type and to estimate site productivity.

When appropriate for forest stand improvement, kill undesirable trees, shrubs, and vines by any of the following methods or combination of methods:

- Cutting
- Girdling.

- Stem Injection
- Basal Bark Spray

Refer to Controlling Undesirable Trees, Shrubs, and Vines in Your Woodlands at <http://ohioline.osu.edu/for-fact/0045.html> . Follow all applicable state and federal laws concerning the safe application of pesticides.

Grapevines are an excellent source of food and cover for wildlife. However, grapevines can be detrimental to the health and vigor of crop trees. Consider leaving a minimum of 5 grapevines per acre.

Consider leaving grapevines on snags, den trees, trees left for wildlife, and in areas where manipulation will be minimal, such as adjacent perennial streams.

Consider wildlife food and cover needs when making modifications to forest composition and tree spacing.

Consider leaving an untreated 30 foot strip of woodland adjacent to open fields, highways, or open water areas to provide wind protection for the woodland, and contribute to the aesthetics of the community.

Increased wind and sunlight penetration from creating a feathered edge for wildlife may adversely impact quality timber tress and may not be appropriate in all areas.

Protect woodlands from grazing livestock except as part of a grazing plan to remove understory vegetation when degradation of the forest resource will not occur.

Potential landowner and operator liability should be assessed before forest stand improvement begins.

PLANS AND SPECIFICATIONS

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

OPERATION AND MAINTENANCE

Periodic inspections during and after treatment activities are necessary to ensure that purposes are achieved and resource damage is minimized, e.g. assessment of insects, disease and other pests, storm damage, and damage by trespass. The results of inspections shall determine the need for additional treatment under this practice.

REFERENCES

- Ohio State University 1997. Controlling Undesirable Trees, Shrubs, and Vines in Your Woodland. Extension Publication F-45.
- Perkey, A. W.; Wilkins, B.L.; and Smith, H.C. 1994. Crop Tree Management in Eastern Hardwoods. USDA Forest Service, NE Area S&PF, Pub. NA-TP-19-93.
- Smith, D.M. 1962. The Practice of Silviculture. John Wiley and Sons, New York.
- Wenger, Karl 1984. Forestry Handbook, Second Edition
- White, Olin 1985. Field Manual for Consulting Foresters. NJ Bureau of Forest Management
- US Forest Service, Central Hardwoods Thinning Guide. Warren, PA.
- Central Hardwoods Thinning Guide. USDA Forest Service, Warren, PA.

APPENDIX 1:

