

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

(Ac.)

CODE 666

DEFINITION

The manipulation of species composition, stand structure and/or stand density by cutting or killing selected trees and/or understory vegetation to achieve desired forest conditions.

PURPOSE

- Increase the quantity and quality of forest products or ecosystem services, as defined by landowner objectives, by manipulating stand density and structure.
- Timely harvest of forest products.
- Development of renewable energy systems.
- Initiate forest stand regeneration.
- Reduce wildfire risk and hazard.
- Improve forest health by 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/or browsing.
- Improve visual quality.
- Improve recreation values.
- Improve wildlife habitat.
- Alter water yield.
- Increase pollinator habitat.
- Increase carbon storage in selected trees.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on all forest land.

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

CRITERIA

General Criteria Applicable to All Purposes

The extent or size and orientation of treatment area(s) shall be identified as part of practice design.

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

Spacing, density, size class, number and amounts of trees and understory species to be retained will follow established guidelines for the intended purposes.

Stocking guidelines shall contain stocking in terms of crop trees per acre, basal area per acre, between tree spacing or trees per acre by species and size class distribution.

Forest stand improvement activities shall be performed to minimize soil erosion, compaction, rutting, and damage to remaining vegetation and maintain hydrologic condition.

Refer to Forest Stand Improvement Design Procedures (666DP) for guidance on designing a forest stand improvement plan.

Additional Criteria for Timely Harvest of Forest Products

The sustainable harvest-regeneration strategy or desired future condition will be identified for all planned forest improvement harvesting:

- Uneven-aged management systems (e.g., single-tree selection, group selection, coppice selection)

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- Even-aged management (e.g., clear-cut, seed-tree, shelterwood, coppice)

The method, felling direction and timing of tree cutting for harvesting shall protect site resources, e.g., residual trees, wetlands, cultural resources, improvements and utilities. Time tree cutting to avoid buildup of insect or disease populations. Felling direction must be compatible with designated trail layout as specified by Forest Trails and Landings (655).

Forest stand improvement activities shall be performed to minimize soil erosion, compaction, rutting, and damage to remaining vegetation and maintain hydrologic conditions.

Refer to Access Road (560) for roads associated with forest stand improvement activities.

Slash and debris will be treated such that they do not present an unacceptable fire, safety, environmental, or pest hazard. Such remaining material will not interfere with the intended purpose or other management activities. Refer to Woody Residue Treatment (384).

Burning of slash and other debris on-site shall follow the standard Prescribed Burning (338).

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, e.g., soil organic matter or wildlife habitat.

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 Improve Forest Health

Create a mosaic of age classes to prevent development of large even aged areas that will become vulnerable to pests such as bark beetles.

Use sanitation-salvage criteria to determine trees to remove during forest stand improvement operations (see Thinning and Sanitation in References).

Additional Criteria to Reduce Wildfire Risk and Hazard

Reduce stocking rates and alter spatial arrangement of trees to minimize crown-to-crown spread of fire.

Remove “ladder” fuels to minimize the occurrence of crown fires adjacent to urban interface areas.

Further treat or eliminate slash accumulations next to roads and trails.

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

For additional wildfire risk and damage reduction, refer to Fuel Break (383) and Firebreak (394).

Additional Criteria to Improve Wildlife Habitat

Manage for a variety of native tree species and stocking rates that create light conditions that meet desired wildlife and pollinator species food and cover requirements.

Create, recruit and maintain sufficient snags and down woody material to meet requirements of desired species and secondary cavity nesting species in balance with conditions needed to achieve other intended purposes.

Minimize improvement actions that disturb seasonal wildlife activities.

When selecting trees to cut or kill leave a variety of height classes to improve or maintain vertical structure in treated stands.

Appropriately sized temporary forest openings will be necessary to create early successional habitat necessary for many declining wildlife species.

Refer to Early Successional Habitat Development/Management (647), Rare and Declining Habitats (643), Upland Wildlife Habitat Management (645), and Wetland Wildlife Habitat Management (644) to further develop and manage wildlife-related 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.

CONSIDERATIONS

Consider crop tree management when making decisions about which trees to retain and which to cut or kill.

Silvicultural objectives and harvest-regeneration strategies may change over time and may be limited by prior management.

Successful regeneration of desirable species is usually dependent upon timely application of forest stand improvement and other practices, e.g., prescribed burning, site preparation, tree and shrub establishment, prescribed grazing and access control.

The extent, timing, size of treatment area, or the intensity of the practice should be adjusted to minimize cumulative effects (onsite and offsite), e.g., hydrologic and stream alteration, habitat fragmentation, nutrient cycling, biodiversity and visual resources.

For purposes other than improving wildlife habitat, the practice should be timed to minimize disturbance of seasonal pollinator and wildlife activities.

Landowners should secure a written contract with any service provider that specifically describes the extent of activity, duration of activity, liability and responsibilities of each party and amount and timing of payments for services provided

Slash, debris and other vegetation (biomass) removed during stand improvement may be used to produce energy. Management alternatives should consider the amount of energy required to produce and convert the biomass into energy with the amount produced by the biomass. Wildlife and sustainability requirements should also be considered.

Invasive or noxious vegetation should be controlled during forest stand improvement operations. See Brush Management (314) for control of woody invasives and Herbaceous

Weed Control (315) for control of herbaceous invasives.

Consider removing vines from crop trees but retaining vines with wildlife value (e.g. grape and poison ivy) on non-crop trees.

Excessive removal of ladder fuels may eliminate advanced regeneration and vertical structure.

Clients should be advised of responsibilities of wildfire control and consider the development of a wildfire control plan including "defensible" space, access routes, fire-season water source, and location of wildfire control facilities.

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. Specific stocking guidelines will be developed that clearly describe the post treatment desired future condition.

OPERATION AND MAINTENANCE

Control erosion on forest roads, skid trails, landings, and adjacent areas by installing vegetative and mechanical practices as needed, see Forest Trails and Landings (655).

Refer to Access Road (560), Firebreak (394) and Fuelbreak (383), if applicable, for maintenance requirements.

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

Crop Tree Management in Eastern Hardwoods. Perkey, A.W., B.L. Wilkins, and H.C. Smith, USDA-Forest Service, NE Area S&PF, Pub. NA-TP-19-93, 1994, http://www.na.fs.fed.us/pubs/ctm/ctm_index.html

Firewise Communities, <http://www.firewise.org/>

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Controlling Undesirable Trees, Shrubs and Vines in your Woodland. Ohio St. Univ. Exten. Pub. F-45. <http://ohioline.osu.edu/for-fact/0045.html>

Thinning and Sanitation: Tools for the Management of Bark Beetles in the Lake Tahoe Basin. Susan Donaldson and Steven Seybold. NV Cooperative Extension Service Fact Sheet 98-42.

<http://www.unce.unr.edu/publications/files/ho/other/fs9842.pdf>

NE FOTG, Section IV,

- Forest Stand Improvement Design Procedures (666DP),
- Tree Pruning Design Procedures (660 DP),