

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
FOREST STAND IMPROVEMENT

(Ac.)

CODE 666

DEFINITION

The manipulation of species composition, stand structure and stocking by cutting or deadening 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 (380) (operation and maintenance), and Windbreak/Shelterbelt Renovation (650).

CRITERIA

General Criteria Applicable to All Purposes

Identify the extent, or size and orientation of treatment area(s) as part of the practice design.

Identify and retain the preferred tree and understory species in order to achieve all planned purposes.

Follow the established guidelines for the intended purposes when establishing the spacing, density, size class, number and amounts of trees and understory species to be retained.

Use basal area (BA), spacing, or trees per acre by species and size class to describe levels of stocking.

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

Protect residual trees, wetlands, cultural resources, improvements, utilities, and other sensitive areas by thoroughly investigating all aspects of the harvesting plan. Identify the

method, felling direction and timing of tree cutting for harvesting or thinning to protect all resources. Proper timing of these activities will avoid a buildup of insect or disease populations.

Consult Forest Trails and Landings (655) standard to ensure felling direction is compatible.

Perform all forest stand improvement activities in a manner that will minimize soil erosion, compaction, rutting, and damage to remaining vegetation and maintain hydrologic conditions.

Refer to the Access Road (560) standard for roads associated with forest stand improvement activities. Refer to Forest Trails and Landings (655) when only light, infrequent access will be needed.

Treat slash and debris in a manner that does not present an unacceptable fire, safety, environmental, or pest hazard. Any remaining material should not interfere with the intended purpose or other management activity. Consult Slash Treatment (384) standard for guidance. Consult the Prescribed Burning (338) standard for guidance on burning of slash and other debris resulting from this practice.

Additional Criteria to Develop Renewable Energy Systems

Manage bioenergy intensity and frequency of energy biomass removals to prevent long-term negative impacts on the stand, e.g., soil organic matter or wildlife habitat.

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

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, aphids, defoliators, etc.

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.

Eliminate or treat 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 the standards Fuel Break (383), and Firebreak (394).

Additional Criteria to Improve Wildlife Habitat

When wildlife habitat is the objective of forest stand improvement, follow this guidance where applicable and feasible:

Refer to the Conservation practice standard Upland Wildlife Habitat Management (645) and the Kentucky Wildlife Habitat Evaluation Procedure (KWHEP) for strategies to enhance or manipulate forest stands for wildlife.

For pollinator habitat maintain an open understory and encourage forest gaps that support diverse forbs and shrubs that provide pollen and nectar for pollinators. In addition, retain very early and early blooming flowering tree species during harvest activities, especially near edges of fields and openings. Refer to the Kentucky Pollinator Handbook for information regarding species and habitat for pollinators in forestry settings.

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 fell or deaden.

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., site preparation, tree and shrub establishment, 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 the disturbance of seasonal pollinator(s) and wildlife nesting activities.

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

Slash, debris and other vegetation (biomass) removed during forest stand improvement may be used as an energy source. 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 woody vegetation should be monitored and controlled by either mechanical or chemical methods. Consider the extent of invasive species infestation and the impact of completing forest stand improvement on the stand. Opening of the overstory canopy and subsequent increase in light, may potentially increase the infestation. 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.

Advise clients of responsibilities of wildfire control and encourage consideration of the development of a wildfire control plan including “defensible” space, access routes, fire-season water source, and location of wildfire control facilities.

Wildlife Considerations

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

- Maintain a good balance of white oaks and red oaks.
- Ensure that overstory and understory diversity will be provided to maximize benefits
- Maintain a minimum of 2 to 4 cavity trees/acre or identify a similar number of larger low quality trees to remain for cavity development after the thinning operation.
- 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 may be necessary to create early successional habitat necessary for many declining wildlife species.
- Consider Early Successional Habitat Development/Management (647), Rare and Declining Habitats (643) and Wetland Wildlife Habitat Management (644) to further develop and manage wildlife-related activities.

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.

All conservation plans recommending this practice will complement plans and specifications prepared by:

- Kentucky Division of Forestry (KDF) staff,
- Technical Service Providers (TSP) certified in the Forestry category,
- Private consultant forester in good standing with the Association of Consulting Forester's (ACF), or Society of American Forester's (SAF).

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 these follow-up inspections shall determine the need for additional treatment under this practice. Encourage clients to periodically inspect treatment areas following activity to ensure the purposes have been achieved and resource damage is minimized. Items to monitor may include assessment of insects, disease and other pests, storm damages, and potential

damage by trespass. These followup inspections are helpful in determining the need for additional treatment by forest stand improvement.

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/>

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

Miller, Stringer, and Merker: "Technical Guide to Crop Tree Release in Hardwood Forests" Professional Hardwood Notes, University of TN Extension, PB1774