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.

Apply this practice at intermediate growing stages only.

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

If herbaceous invasive species are present refer to Herbaceous Weed Control (315) for treatment methods.

Use Brush Management (314) when the intent is to control only woody weed species or woody invasive species such as buckthorn.

CRITERIA

General Criteria Applicable to All Purposes

Base management decisions a current forest inventory with regard to the intended purpose for the stand.

Crop tree inventory, fixed area plot or point sampling can be used to inventory a stand. At a minimum, the inventory must be adequate to generate basal area (for even- or uneven-aged stands) or average diameter at breast height (DBH) and average spacing or trees per acre (for even-aged stands and plantations).

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

Stocking guidelines, if used, 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.

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

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Tree or shrub removal can be by chemical, mechanical or both, and/or by prescribed burning. If chemical treatments are planned, the practice Integrated Pest Management (595) must be used.

Site must be protected from grazing by domestic livestock if necessary. Refer to Access Control (472) for more information.

Forest stand improvement activities shall be performed to minimize soil erosion, sedimentation, compaction, rutting, and damage to remaining vegetation and will maintain hydrologic conditions. Use the Web Soil Survey to record soil site characteristics.

Refer to Access Road (560) for ingress/egress between the stand and public roadways; and Forest Trails and Landings (655) for skid trails and collection points within the stand.

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.

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

For more information refer to the guidelines in "Sustaining Minnesota Forest Resources: Voluntary Site-level Forest Management Guidelines", *Timber Stand Improvement*.

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).

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.

Felling direction must be compatible with designated trail layout as specified by Forest Trails and Landings (655).

Additional Criteria to Develop Renewable Energy Systems

Intensity and frequency of biomass removals for energy production will be managed to prevent long-term negative impacts on the stand or any other intended purpose(s) and functions, e.g., soil organic matter or wildlife habitat.

Refer to the "Sustaining Minnesota Forest Resources: Voluntary Site-level Forest Management Guidelines, *Biomass Harvesting Guidelines for Forestlands, Brushlands and Open Lands"* for more information.

Additional Criteria to Improve Forest Health

Create a diversity of species and age classes to reduce the risk of developing large even aged areas that may become vulnerable to pests.

Schedule forest stand improvement activities to avoid buildup of insect or disease populations. Follow appropriate insect and disease management prescriptions.

Use Tree/Shrub Pruning (660) for treating white pines for white pine blister rust.

Additional Criteria to Reduce Wildfire Risk and Hazard

Reduce stocking rates or alter spatial arrangements in overstock stands to reduce fuel loads.

For additional information on reducing wildfire risks and hazards refer to the standard Firebreak (394).

Additional Criteria to Improve Wildlife Habitat

Refer to "Biology Job Sheet #6 – "Forest Stand Improvement for Wildlife" for additional specifications.

Leave a minimum of 6 leave logs (live or dead) such as cavity trees, potential cavity trees and/or snags, per acre during forest stand improvement activities.

Create or maintain at least 2 (of the 6 required leave logs) as bark-on downed logs greater than 12 inches in diameter per acre. Hollow butt sections or other defective lengths of at least 6 feet are preferred.

If the site includes a riparian area, create or maintain a minimum of 4 leave logs per acre in the riparian management zone; the overall average number for the whole site can remain at 2 bark-on leave logs per acre.

Practices should be timed to minimize disturbance of seasonal pollinator and wildlife activities. Refer to Early Successional Habitat Development/Management (647), Rare and Declining Habitats (643), Upland Wildlife Habitat Management (645), and Wetland Wildlife Habitat Management (644) as appropriate to meet specific wildlife and pollinator species criteria, e.g. openings, using forest stand improvement treatments.

Preserve old growth trees for habitat improvement as suitable for the species, forest health and wildlife to be managed or defer timber activities to maximize wildlife values.

Identify and protect important food producing trees and shrubs (berries, buds, catkins and seeds) which are shaded or bordered by less valuable trees.

Retain some trees and shrubs of non-commercial species to maintain natural diversity and/or mast production on the site.

Avoid having equipment disturb pre-existing large down logs, standing stumps and uprooted stumps. These pre-existing snags count toward the minimum required downed logs if their condition, diameter and length meet minimum standards as above.

Additional Criteria to Increase Carbon Storage in Selected Trees

Manage for tree species and stocking rates that have the highest potential of growth and therefore carbon sequestration rates for the site.

Maintain stocking for optimal growth of the desired species, manage for longer rotations and larger trees (for long-lived forest products).

Use best management practices as is found in the publication “Sustaining Minnesota Forest Resources: Voluntary Site-level Forest Management Guidelines” and associated conservation practices such as Forest Trails and Landings (655) to reduce waste and damage to residual trees, shrubs and soils when implementing forest stand improvement activities including slash treatment and harvesting.

CONSIDERATIONS

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

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 impacts.

Landowners should secure a written contract with their service provider that specifically describes the extent and duration of activity, liability and responsibilities of each party and amount and timing of payments for services provided. Service contracts are wholly the responsibility of the landowner.

Slash, debris and other vegetation (biomass) removed during stand improvement may be commercially sold.

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

Clients should be advised of responsibilities of wildfire control and consider the development of a wildfire control plan. Refer to MNDNR’s webpage *Firewise* in Minnesota for more information.

http://www.dnr.state.mn.us/firewise/index.html

Manage forests for carbon sequestration purposes only on the best sites for the most suitable trees. Marginal sites should not be managed for carbon sequestration.

PLANS AND SPECIFICATIONS

Design specifications for applying this practice shall be prepared for each site and recorded using current state 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, see job sheet.

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 other supporting practices 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

Perkey, A.W., B.L. Wilkins, and H.C. Smith, "Crop Tree Management in Eastern Hardwoods." *Publication NA-TP-19-93,* 1994, USFS NE Area S&P Forestry, Morgantown, WV 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 State University Extension Fact Sheet. Pub. F-45-97. http://ohioline.osu.edu/for-fact/0045.html

"Thinning and Sanitation: Tools for the Management of Bark Beetles in the Lake Tahoe Basin." U of NV Cooperative Extension Service Fact Sheet 98-42. http://www.unce.unr.edu/publications/files/ho/other/fs9842.pdf

Minnesota Forest Resources Council. "Sustaining Minnesota Forest Resources: Voluntary Site-Level Forest Management Guidelines for Landowners, Loggers and Resources Managers." 2005. Minnesota Forest Resources Council, St. Paul, Minnesota. http://www.frc.state.mn.us/documents/council/site-level/MFRC_FMG&Biomass_2007-12-17.pdf

Minnesota Department of Natural Resources. "Field Guide to the Native Plant Communities of Minnesota, Ecological Land Classification Program, Minnesota County Biological Survey, and Natural Heritage and Nongame Research Program." (2003), MNDNR St. Paul, MN. http://www.dnr.state.mn.us/npc/index.html