

# Timber Stand Improvement

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REMEMBER:

Guidelines help with *how* to manage,  
not *whether* to manage.

These guidelines focus on *how* to protect the functions and values of forest resources during forest management activities. They do not provide advice on *whether* to manage or which management activities are needed.

Guidelines provide a *menu*, not a *mandate*.

Site-level resource management decisions are based on many different factors, including resource needs, landowner objectives, site capabilities, existing regulations, economics and the best information available at any given time. No one will apply all of the guidelines related to a particular activity. Instead, the landowner, resource manager or logger will consider many different factors in determining which combination of guidelines provides the best “fit” for a particular site at a particular time. The intent of having multiple guidelines is to provide decision-makers with as much flexibility—and as much choice—as possible in taking steps to effectively balance forest management needs and resource sustainability.

*General* guidelines and *activity-specific* guidelines  
are closely related.

Frequent references from activity-specific guidelines back to the general guidelines will make it easy for landowners, resource managers, loggers and others to consider all of the related guidelines—both general and specific—that apply to a particular management activity.

Guidelines are supplemented from time to time  
by “Additional Considerations.”

The guidelines are supplemented from time to time by “Additional Considerations,” which provide additional guidance to further promote sustainability of our forest resources.

## INTRODUCTION

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Timber stand improvement (TSI) includes activities or treatments that improve the composition, structure, condition, health and growth of even-age or uneven-age stands.

Such activities may include mechanical or chemical treatment of vegetation that competes with desirable trees; removing diseased or dying trees; thinning; pruning; and post-harvest treatments on natural regenerating stands.

These practices are intended to do three things:

- Increase the value of the stand
- Improve the growth and form of crop trees
- Manipulate stand composition

Row thinning is an example of a timber stand improvement activity that increases the value of the stand, improves the growth and form of crop trees, and manipulates stand composition. *Photo courtesy of Minnesota DNR*



## The Benefits of Guidelines

Benefits to cultural resources: TSI guidelines can minimize the direct or indirect effects of timber stand improvement activities (such as mixing of surface soils, rutting, compaction and erosion) on certain kinds of cultural resources. Guidelines particularly address the use of heavy equipment, which can be of most concern to protection of cultural resources.

Benefits to forest soils: TSI guidelines can help minimize the effect of equipment trafficking on soils, thus reducing soil compaction, rutting and erosion. Reducing these potential impacts eases root penetration, availability of water, ease of water absorption by plants, available amounts of oxygen and other gases in the soil, and the degree to which water moves laterally and vertically through the soil.

Benefits to riparian areas: TSI guidelines address TSI activities that can alter the vegetation within the riparian area. That vegetation is important for providing inputs of coarse woody debris and fine litter to water bodies; retaining nutrients, sediment and energy; bank and shoreline stabilization; maintenance of moderate water temperatures through shading; and wildlife habitat. Guidelines for retaining vegetation can also have a positive impact on aesthetics, wood products and recreation.

Benefits to visual quality: TSI guidelines can minimize visual impacts of some TSI activities that result in alterations to the stand or the accumulation of debris.

Benefits to water quality and wetlands: TSI guidelines address the potential for increased erosion and subsequent sedimentation of water bodies and wetlands as a result of TSI activities exposing mineral soil. Guidelines that address equipment operations and maintenance can help protect water quality and wetlands.

Benefits to wildlife habitat: TSI guidelines can help avoid reductions in overall species diversity on a site while maintaining or enhancing structural diversity.

## Considerations

- Timing of TSI activities should take into account disease and insect cycles that may be enhanced by the presence of slash.
- Restricted operating hours (to regulate noise near recreation areas) may affect the cost of TSI activities.
- Additional slash disposal requirements (to control disease or to enhance visual quality) may affect the cost of TSI activities.
- TSI (including removal of brush and small suppressed trees) can allow people to see into the stand.



Have you identified  
your goals and objectives?

See *Identifying Goals and Objectives*  
in General Guidelines.

Have you conducted a site inventory?

See *Conducting a Site Inventory*  
in General Guidelines.

## PLANNING

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IMPORTANT! Review General Guidelines:

- Incorporating Sustainability into Forest Management Plans
- Maintaining Filter Strips
- Managing Riparian Areas

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In addition to specific TSI guidelines and related general guidelines provided below, refer to the following forest management activity sections for additional guidelines appropriate to TSI.

For TSI activities involving:	Refer to these guidelines:
Felling trees	Timber Harvesting
Application of pesticides	Pesticide Use
Trafficking sites with heavy equipment	Mechanical Site Preparation and Timber Harvesting
Road building or access development	Forest Road Construction and Maintenance

## OPERATIONAL ACTIVITIES

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### IMPORTANT! Review General Guidelines:

- Protecting Cultural Resources
- Managing Equipment, Fuel and Lubricants
- Protecting the Normal Flow of Streams and Wetlands
- Protecting Wetland Inclusions and Seasonal Ponds
- Retaining Leave Trees
- Providing Coarse Woody Debris

**U** Conduct on-site meetings with the logger, landowner and resource manager prior to moving equipment onto a site. Such meetings can help assure common understanding of landowner objectives, timber harvesting regulations, contract specifications and site conditions.

**U** Allow for a diversity of species and ages when implementing TSI activities.

**U** Avoid cultural resources when mechanically strip thinning with heavy equipment.

**U** Leave standing a minimum of 6 cavity trees, potential cavity trees, and/or snags per acre during TSI operations. These trees and snags should be distributed throughout the site as much as possible. For preferred characteristics, see *General Guidelines: Retaining Leave Trees*.

**U** Rehabilitate landings and skid trails where necessary to mitigate soil compaction and reduce erosion.

### *Additional Considerations*

**K** Consider retaining some stems of non-commercial species (such as ironwood and bluebeech) in TSI operations to maintain natural diversity and/or mast production on site.

**K** Consider creating snags during commercial thinning of even-age, low-diversity stands (such as old-field pine plantations). Girdling, topping or herbicide injection may be used to kill selected trees and create snags where none exist. Physical injury will induce fungal decay to create a potential cavity tree. (These techniques, if applied to pines in summer, will increase risk of bark beetle infestation to adjacent healthy pines.)

**K** Consider maintaining the diversity of mast sources on the site, as well as some level of current production of mast sources. For example, avoid operations in pockets of fruit-producing shrubs.

## Reducing Visual Impacts of Timber Stand Improvement

### *In areas classified as most sensitive:\**

- U Time TSI operations so that they will not occur during periods of peak recreational use.
- U Treat slash and debris from TSI operations (by lopping, removing, crushing or burning) whenever possible. Keep slash height below 2 feet. See *Timber Harvesting: Managing Slash*.
- U Reduce noise in early morning, late evening and other appropriate times whenever possible near residences, businesses and outdoor activity areas.
- U Inform and educate recreational users regarding the concept and benefits of TSI prior to, during and after TSI activities.

### *In areas classified as moderately sensitive:\**

- U Avoid TSI operations during periods of peak recreational use whenever possible.
- U Inform and educate recreational users regarding the concept and benefits of TSI prior to, during and after TSI activities.
- U Treat slash and debris as per guidelines in *Timber Harvesting: Managing Slash*.

### *In areas classified as less sensitive:\**

- U Use methods and applications consistent with integrated resource management objectives for the area.

\*See Part 2, *Visual Quality: Visual Sensitivity Classifications* for information related to how classifications are determined and which Minnesota counties have developed visual sensitivity classification maps.