

# WISCONSIN FOREST MANAGEMENT GUIDELINES

PUB-FR-226 2003



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*October, 2003*

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**Chapter 13**  
**MECHANICAL SITE**  
**PREPARATION**

## CHAPTER 13 — MECHANICAL SITE PREPARATION

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*Figure 13-1: A two-row Bracke Scarifier that is towed behind a prime mover to prepare planting scalps in a recently logged area.*



*Figure 13-2: Close-up of a Bracke Scarifier working in pine slash. The machine removes soil only from the small areas where seedlings will be planted.*

Site preparation is the practice of altering site conditions to favor the establishment, survival and growth of a desired tree species, browse or other vegetation. Site preparation can be accomplished through mechanical means, prescribed fire, the use of herbicides, or any combination of these approaches.

Mechanical site preparation accomplishes two goals:

- It facilitates planting, direct seeding and natural regeneration.
- It provides partial initial control of vegetation competing with crop trees for light, water and nutrients.

Common mechanical site preparation techniques include patch scarification, row scarification, raking, disking, bedding, roller chopping, and shearing. Herbicides are often applied in conjunction with mechanical site preparation, to increase control of competing vegetation.

The guidelines in this section focus on mechanical site preparation. For chemical use in a mechanical site preparation method, refer to the guidelines in Chapter 14: Pesticide Use. For prescribed burning, refer to the guidelines in Chapter 17: Fire Management.

### Integrated Resource Management Considerations

- Maintaining good soil condition is critical to accomplishing the goals of site preparation (to favor the establishment, survival and growth of a desired tree species). Practices that result in excessive exposure of mineral soil, compaction or rutting of soil, or removal of surface soil should be avoided. If soils are negatively impacted in the process of site preparation, then the “advantage” of the site preparation is reduced either through poor establishment or poor survival, or more often, lowered growth and productivity.
- Properly planned harvesting operations should include consideration of mechanical site preparation needs. Site preparation methods that minimize the potential for surface erosion should be evaluated prior to the implementation of site preparation operations.
- Selecting the appropriate technique, intensity and timing of a site preparation activity is important in maintaining the soil productivity of a site. Heavy equipment should be operated on a site when adverse soil impacts are most unlikely.



*Figure 13-3: Scarified patches by a Bracke Scarifier in a cutover stand. Patch or row scarification reduces competition for the new seedlings, yet has a low impact on the planting site.*

- Mechanical site preparation techniques and intensity for a given site should be determined by soil/site conditions, the silvicultural requirements of the tree species to be regenerated, and site preparation objectives. Specific site conditions (including soil characteristics, topography, vegetation, access, and distance to surfacewater) dictate what techniques may work best or provide the best operating window for any given site. Some sites may be planted with no site preparation other than removing the overstory.
- Practices that result in exposure of mineral soil or soil compaction on erodible slopes should not be used where surface erosion or runoff is likely to result in sedimentation of water or wetlands. For sources of information and planning assistance, see the Resource Directory.
- Activities that disturb soil such as disking, scarification, rock raking, and shearing, may not be appropriate within cultural resource areas.
- Contour preparation methods can minimize erosion, as well as the cost of remedial action or repair.
- Site preparation methods vary considerably, depending on the desired regeneration species.
- Every site preparation method has a different cost. For any method being considered, costs (both short- and long-term) should be balanced against effectiveness of the method in attaining visual quality objectives.
- Composition and condition of the original stand can impact the regeneration method chosen for a particular site.

## PLANNING AND DESIGN

### Layout and Design Considerations

- Consider alternative methods of site preparation, such as non-mechanical, or combinations of mechanical and non-mechanical methods, to accomplish site preparation goals while minimizing disturbance.
- Design mechanical treatments of regenerating stands to protect reserve areas and structural habitat components retained in previous stand treatments.
- Favor practices that do not remove surface soils, or only remove surface soils from the small areas in which an individual seedling will be planted.
- Identify occurrences of non-native invasive species, and if necessary, treat infestations prior to mechanical site preparation to help prevent spread. Monitor and control new infestations after site preparation activities are completed. Moving equipment from site to site may spread seeds of problem species or vegetative parts that can take root in the new location. Equipment cleaning may be needed before moving from an infested site into an area that is free of problem invasives.
- Favor practices that allow for dispersed slash or slash in small piles on the site, rather than piling or windrowing, in situations where residual slash does not conflict with management objectives or reforestation.
- Select appropriate species and stocking levels for reforestation, and plan site preparation intensity accordingly.
- Plan for a diversity of tree species where possible.
- Design practices to avoid direct runoff of sediment into water and wetlands.

### Timing and Intensity of Activities

- Enter a site the fewest number of times necessary, and avoid multiple passes of equipment over the same spot.
- Time site preparation activities and use proper equipment to minimize rutting and compaction of soils.
- Avoid shearing and raking operations on organic soils except under frozen conditions.
- In some cases it may be necessary to time site preparation work to coincide with a good seed year in order to maximize the chances of success.

#### DESIGN OUTCOMES TO MAINTAIN SOIL PRODUCTIVITY

Site preparation activities should be designed and implemented to achieve the following beneficial outcomes regarding soil productivity:

- Soil in a condition that favors the establishment, survival and long-term growth of the desired tree species.
- Displacement of only enough soil as needed to effectively accomplish tree establishment.
- Site preparation techniques employed so surface soils: 1) remain intact; 2) are only displaced a short distance (such as in scalping); or 3) are incorporated (such as in disking).
- Slash dispersed on the site, rather than piled or windrowed, where appropriate.
- Site preparation practices employed so they avoid funneling water (such as furrowing, scarification, and scalping on the contour).
- No additional establishment of non-native invasive species.



*Figure 13-4: A Two-row Leno Scarifier set up to create scarified patches in a clearcut. This approach causes minimal site disturbance, yet provides exposed soil for ideal planting conditions.*

### Selecting Application Methods

Common site preparation techniques include scarifying, shearing, raking, disking, and roller chopping. Select a technique based on specific site characteristics including soil, topography, vegetation, access, and distance to surface waters. Prescribed burning and herbicides are also used for site preparation; BMPs for these management tools are listed in Chapter 14: Pesticide Use and Chapter 17: Fire Management.

- To increase success of oak regeneration, use such pre- and post-harvest techniques as burning, stump sprout thinning, or scarification.
- Consider targeted mechanical site preparation methods (low-intensity, spot or band) in preference to broadcast applications.
- Use equipment that minimizes soil disturbance when moving slash on-site.

#### REDUCING VISUAL IMPACTS OF MECHANICAL SITE PREPARATION

- Use low-impact site preparation methods, such as patch or row scarification.
- Use spot or strip treatment of herbicides rather than broadcast treatment applications.
- Initiate revegetation efforts as soon as possible.
- Use land contours in site preparations.
- Avoid the effect of linear straight rows and resulting visual penetration immediately alongside travel routes or recreation areas.
- Avoid or screen windrows and slash piles.

#### BMP: Selecting Application Methods

- ✓ Use patch or row scarification as the preferred mechanical site preparation method for artificial regeneration when terrain or soil type necessitates minimal soil disturbance.



*Figure 13-5: A Marden Duplex Roller Chopper provides area site preparation, crushing logging slash over the entire cutover area.*



*Figure 13-6: Close-up of a TTS 35-disc trencher that is used for row scarification in cutover areas prior to tree planting.*

## OPERATIONAL CONSIDERATIONS

- Conduct on-site meetings with the contractor, landowner and resource manager prior to moving equipment onto a site. Such meetings can help assure an understanding of landowner objectives, contract specifications, and site conditions.
- Locate windrows and slash disposal piles to:
  - Avoid cultural resources.
  - Minimize interference with natural drainage patterns.
  - Be outside of riparian management zones. Refer to Chapter 5: Riparian Areas and Wetlands.
  - Follow contours when possible to mitigate the effects of overland flow.

### Managing Slash and Windrows

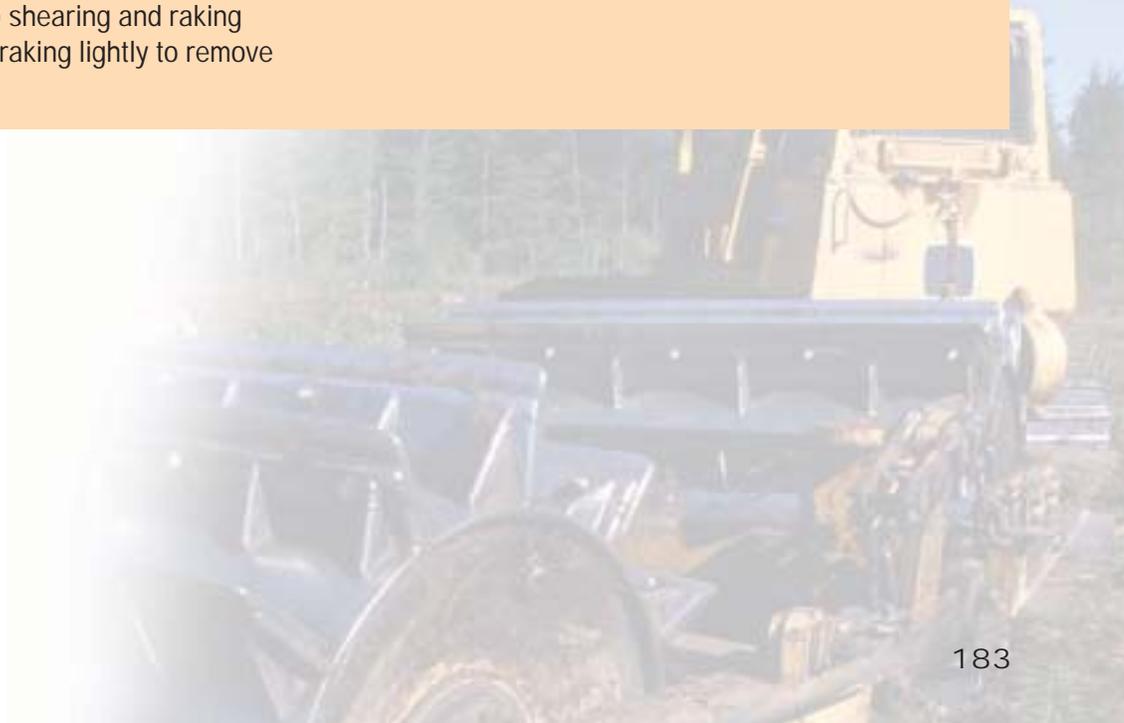
- Where shearing or windrowing slash is necessary, avoid scraping soil material or forest floor into windrows or piles. Preferred practices include:
  - Shearing and raking under frozen conditions
  - Light raking, which only removes slash
- Avoid placing residues into wetland areas from operations on upland sites. Deposit residues in stable upland locations.

### Protecting Resources

- Scarify or trench only the area necessary for seedling establishment and growth.
- Avoid operations during periods of saturated soil conditions when such operations may cause rutting, compaction or accelerated erosion.

## BMPs: Protecting Resources

- ✓ Operate mechanical site preparation and tree planting equipment on the contour where necessary to minimize erosion in waterbodies.
- ✓ Avoid operating mechanical site preparation and tree planting equipment on slopes greater than 30 percent, where the slopes drain directly into a waterbody.
- ✓ Minimize raking in areas, or under conditions, in which soil could erode and enter waterbodies. Two preferred practices are: (a) shearing and raking when soil is frozen and (b) raking lightly to remove slash only.
- ✓ Suspend operations during wet periods if equipment begins to cause excessive soil disturbance that will increase erosion into waterbodies.
- ✓ Deposit site preparation residues in stable locations outside riparian management zones.
- ✓ Use patch scarification or low-intensity prescribed burns on sites that have steep slopes, erodible or saturated soils, and on sites that drain to surfacewater.

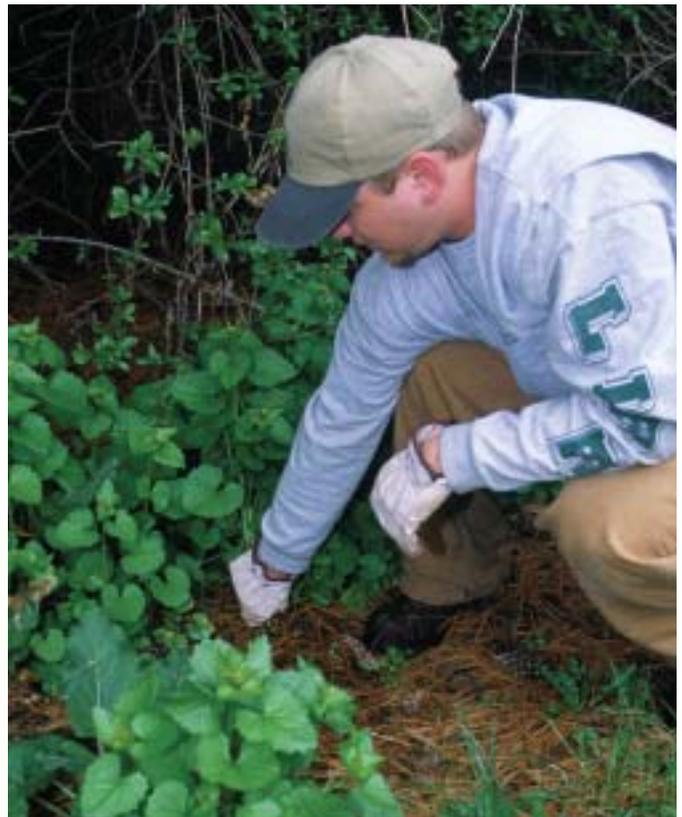


## POST-OPERATIONAL ACTIVITIES

- Regenerate the site quickly after site preparation.
- Soil disturbance can result in the establishment of non-native invasive species. Monitor and control any new infestations.
- Evaluate site preparation methods relative to site conditions and silvicultural prescriptions. Be sure to monitor and manage the site to ensure success of establishment, and minimize the need for a repeat operation.



*Figure 13-7: A Leno Scarifier that is mounted directly to the prime mover, allowing the operator to turn the machine easier in tight quarters.*



*Figure 13-8: A Wisconsin Conservation Corps crew leader begins pulling garlic mustard, a non-native invasive species, along a woodland edge.*