

Chapter 9:

Harvesting Timber

Charles R. Blinn, Extension Specialist, University of Minnesota

Angela S. Gupta, Extension Educator, University of Minnesota

A timber harvest should be designed to help you accomplish your management goals and objectives. Therefore, decisions such as the location of roads and in-woods skid trails, the specific equipment selected, what to do with limbs and tops and where processing occurs all should relate back to those goals.

Most timber harvesting is done by professional loggers who have the equipment, knowledge, and experience necessary to conduct an effective and safe operation. The work and time your forester spends in planning your timber harvest will reward you with higher profits, a better quality residual stand, and protection of the environment.

Select trees to cut based on your management objectives, stand conditions, and the silvicultural principles described in Chapter 6: Managing Important Forest Types. Local or temporary market opportunities may play a role in the timing or design of your sale. This chapter provides basic information on the harvesting process, including safety, forest management guidelines, the infrastructure needed to create access to and within a timber stand, harvesting equipment, and harvesting systems. Your forester will be able to help design the harvest to fit your management objectives.

Safety

Logging is one of the most hazardous occupations in the United States. Professional loggers should follow standard safe logging procedures. Have a conversation about safety with the logger before any cutting begins. When you visit an active logging site, remain visible to the operators, wear a hardhat and an orange vest, stay away from equipment when it is operating, and avoid going near any trees that may be leaning. Do not speak with anyone operating equipment until the person has stopped the machinery and signaled that it is safe to approach.

Timber Harvesting Guidelines

Timber harvesting operations can affect a number of factors within your forest, including:

- Cultural resources such as historic structures, cemeteries, and archaeological sites
- Riparian areas
- Plant and animal species of special concern
- Soil productivity soil
- Visual quality
- Water quality and wetlands
- Wildlife habitat

To minimize those effects, states have developed best management practices and forest management guidelines. Incorporating appropriate guidelines into your timber sale contract can help facilitate the sustainability of forest resources. Avoid including inappropriate guidelines because they may reduce interest from potential buyers. Your forester will be able to recommend appropriate guidelines for your timber harvest.

Timber Harvesting Systems

Descriptions of three basic timber harvesting systems—whole-tree or full-tree, tree-length, and shortwood or cut-to-length—follow. The systems differ in terms of the amount of processing that occurs at the tree stump and the form in which wood is transported to the landing for further processing or transport to the mill. One harvesting system may be better suited for accomplishing your objectives than others.

1. Whole-tree or full-tree – In this system, the entire tree—including the stem, limbs, and top—is brought to the landing with a skidder or horse. This system removes the maximum amount of material from a site. It also facilitates moving tops and limbs to the landing for processing, burning, or firewood production. However, because the entire tree is taken to the landing, residual trees may be damaged and a larger landing is needed to handle the size of material.

2. Tree-length – In this system, trees are felled and the top and limbs are removed before the trees are brought to the landing with a skidder or horse. By leaving limbs and tops at the stump, this system retains nutrients at the stump.

3. Shortwood or cut-to-length – In this system, the tree is felled, the top and limbs are removed, and the tree stem is bucked (cut) into individual forest products (such as pulpwood and sawtimber) at the stump area. The shorter product lengths allow a forwarder to move in tight areas. The forwarder may drive on slash mats, reducing soil compaction. A smaller landing is required in this system than in the other two.



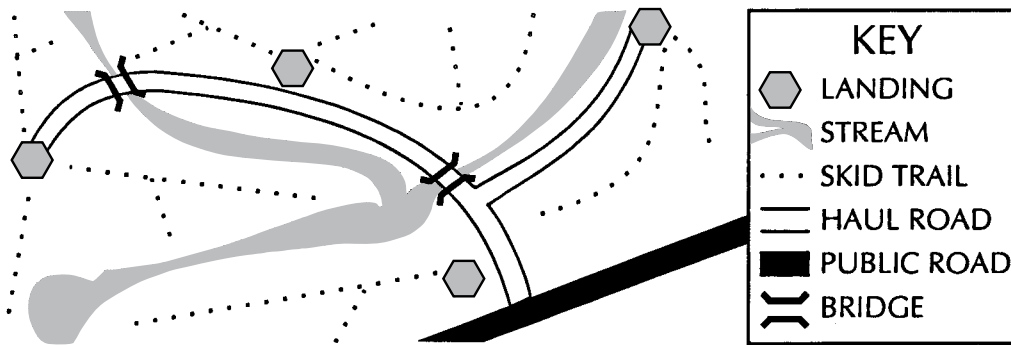


Figure 9-1. Example of a plan for a system of haul roads, skid trails, and log landings.

Transportation Infrastructure

Few harvesting decisions have a longer lasting impact than the design and construction of haul roads, skid trails, and landings (Figure 9-1). Haul roads usually are permanent roadways that provide access for trucks to specific points in the woodland for hauling logs or other management purposes. Skid trails generally are temporary, unimproved roadways that enable skidders, forwarders or horses to transport logs from the interior of the woodland to the landing. Landings are areas used for processing (such as sorting products, delimiting, cutting logs to shorter lengths, and debarking) and for loading timber products onto trucks.

The general goal is to minimize the cost and amount of infrastructure and environmental impacts (such as soil erosion) while still achieving your land management goals. While roads, skid trails, and landings are generally constructed by loggers, landowners should understand the basic processes and standards. When planning new infrastructure, locate it in areas that facilitate your long-term ownership goals and plans.

The layout of transportation infrastructure is influenced by property lines, topography, soil conditions, streams and wetlands, economic limits on skidding distances, and other features. Permits may be required for stream and wetland crossings, culvert installations, driveway access, and other road work.

The potential for soil erosion and stream siltation is especially pronounced in areas with steep slopes and erodible soils. To reduce soil erosion avoid building roads and skid trails that run directly uphill or downhill. Use water

diversion systems that move water off the exposed surface or away from ditches into the vegetated forest floor. Because water diversion options may impede some recreational uses of roadways, discuss their design with your forester.

Revegetate roads, skid trails, ditches, and landings with grasses and forbs (any herb other than grass) to help prevent erosion. The seed mix and application rate will vary according to your climate and soil. Native seed mixes are recommended to reduce the chance of introducing harmful invasive species. The seed mixture can include food and cover plants that are beneficial to wildlife. Where possible, lightly disk and fertilize the bare roadbed before broadcast seeding.

To protect roads and skid trails after logging:

- Keep ongoing travel to a minimum.
- Use them only when the soil can support the equipment without causing ruts.
- Inspect them periodically to make sure that water diversion structures (such as waterbars, ditches, and culverts) are working correctly.

Skid Trails

Skidding is the process of transporting logs from the stump after trees are felled to a landing where they can be further processed or loaded onto trucks. Logs are usually dragged by a skidder or horse or carried by a forwarder, thus creating skid trails. These trails usually are not graded and need only a minimum amount of clearing. Depending on your management objectives and forest conditions, material may be skidded over a fixed trail

network or the logger could use a different skid route for each trip to help knock down undesirable trees and shrubs, thus helping to clear the site for regeneration. Frozen or dry soil conditions are recommended to avoid compacting soils. If soils are not frozen, it is generally advisable to minimize the area affected by skid trails to avoid compacting the soils across a broad area of the forest. Your forester may be able to recommend additional techniques to minimize compaction.

Landings

Landings are busy places during a harvesting operation, producing big impacts on a relatively small area. Carefully select landing locations to provide for efficient timber removal and minimize adverse environmental impacts. Proper construction and maintenance of a landing is similar to that for roads.

Locate landings close to concentrations of timber. Choose locations with a slight slope so that water will drain away. Avoid steep slopes and low, wet areas where trucks cannot maneuver. Locate landings below ridge crests to reduce the need for steep, hazardous roads. The haul road approaching the landing should have a low grade. Landing size and shape will be influenced by the timber length, loading method, type of hauling equipment, and processing to be performed at the landing.

Take special care when storing petroleum products and maintaining equipment in woodlands. Designate a specific place for draining vehicle lubricants so they can be collected and stored until being transported off-site for recycling, reuse, or disposal. Provide receptacles for solid wastes such as grease tubes and oil filters. Locate refueling areas away from water. A landing may be an excellent location for storing these products and maintaining equipment.

Cull logs and other debris may be a hazard to snowmobilers and other recreational users if left on the landing.

Harvesting Equipment

Harvesting equipment is generally designed to perform a limited number of tasks. Those operations (described below), may occur at the tree stump, during in-woods transport from the stump to the landing, or at the landing. While some logging businesses consist of one person who operates different pieces of equipment during the course of the harvest, others have several employees, each operating one piece of equipment. If possible, recommend that the logger power wash all equipment before taking it into the sale area. This may help reduce the spread of invasive or noxious weeds if seed is embedded in dirt or debris that may be clinging to the equipment.

Operations at the Stump

Operations at the stump always include felling the tree. Felling may be done by a chainsaw, feller-buncher, or a processor (Figure 9-2). After felling, the tree may be further processed by removing the limbs and top and by bucking (cutting) it into individual product sections. When material is being transported to a landing, leave the limbs and tops at or near the stump to help avoid scarring remaining trees. This makes even more sense if markets limit the use of this material or if the soil tends to be nutrient deficient. Removing the entire tree may be the preferred option where there are concerns about pest invasions after the harvest, when the whole tree will be processed at the landing, or to make it easier to cut firewood from the residue.

Transporting Material from the Stump to the Landing

Short logs, tree-length material, or whole trees may be transported from the stump to the landing either by skidding (dragging them on the ground) or forwarding (carrying them completely off the ground). Timber can be dragged to the landing using a rubber-tired or tracked skidder, farm tractor, or horse, or carried on a forwarder (see Figure 9-2). A rubber-tired skidder is lighter weight, less expensive, faster, and provides better traction over rocks than a tracked skidder. The tracked skidder, on the



other hand, may compact the soil less, provide better traction in mud and slippery soils, and be less likely to create deep ruts. Wide tires on a rubber-tired skidder provide similar benefits to a tracked skidder.

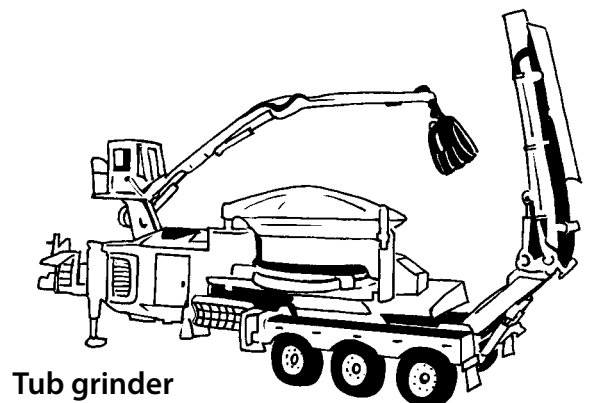
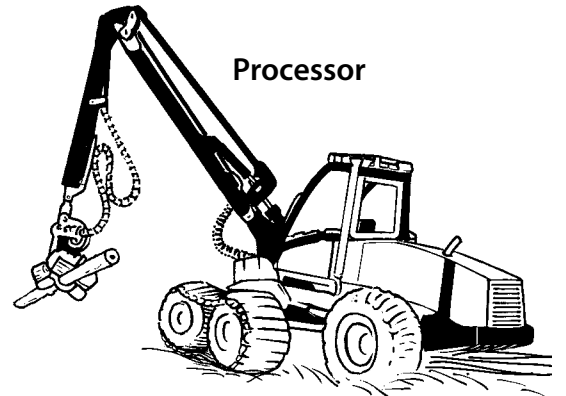
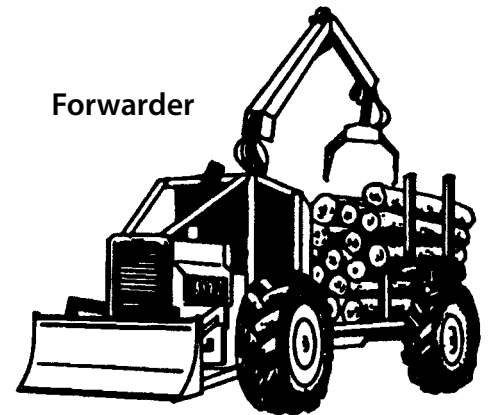
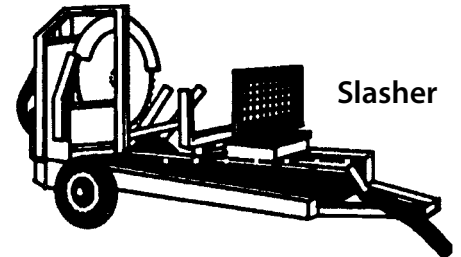
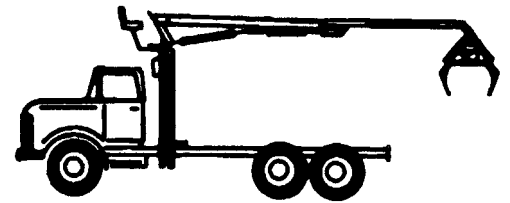
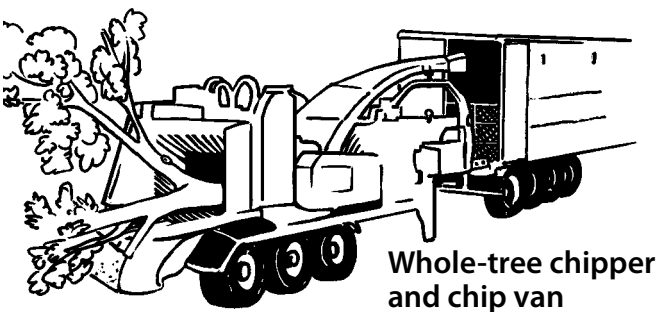
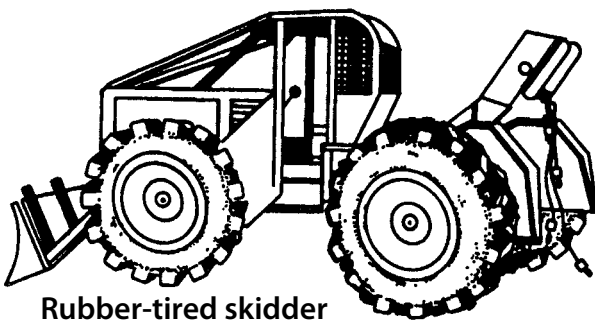
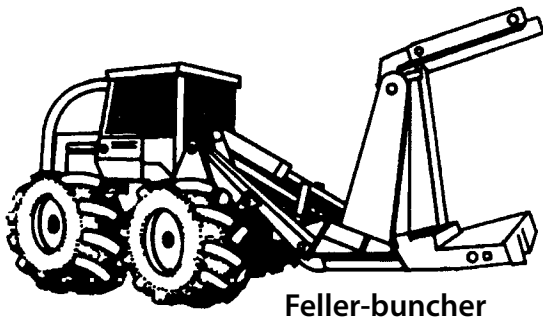
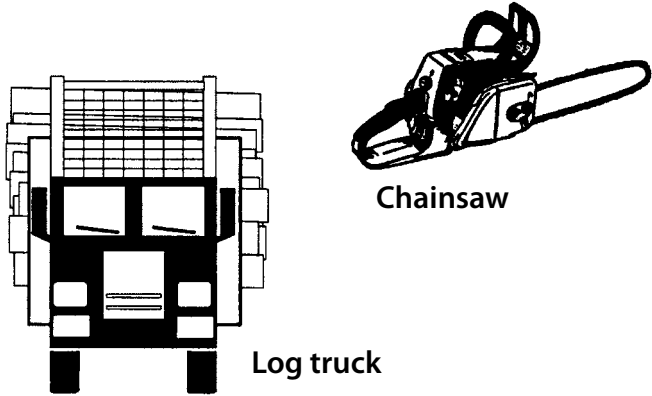


Figure 9-2. Logging Equipment.

Farm tractors sometimes are used for skidding, but they usually need modifications to become effective, safe skidders. A winch connected to the tractor's power take-off (PTO) is an important asset. Some also require shields beneath their bodies to protect them from damage by high stumps and rocks.

Forwarding machines are equipped with a hydraulic loading boom and have a bunk for holding a load of logs. Forwarders frequently travel on the debris (slash) from limbs and tops to avoid rutting the soil.

Landing Operations

At the landing, material may be delimbed, topped, bucked or slashed into product lengths; debarked, chipped or ground and blown into a van; or loaded directly onto a trailer before being transported over haul roads to a mill or other site. Landing equipment may include a chainsaw, slasher, chipper, or tub grinder (Figure 9-2).

If bucking, debarking, or other processing occurs on the landing, some limbs, bark, or other woody debris could become piled. That residual wood could be returned to the forest and dispersed by a skidder to redistribute nutrients back to their source. It also could be converted to chips by a chipper or tub grinder, cut for firewood, burned, or left to decay.

Because of the variety of operations that may occur at a landing, it may be as small as the area adjacent to the haul road or a quarter acre in size or larger. Make it large enough to allow the equipment to operate efficiently, to store products that have not been hauled to the market, for trucks to enter and leave, and for safety. Your forester can help determine the most appropriate size for your landing or landings.

Equipment Selection

Your forester should recommend harvesting equipment that is most appropriate to your management goals and desired outcomes. Some of the most important considerations for choosing timber harvesting equipment are described in the following list.

- Tree size affects the size of equipment needed to handle the timber.
- Silvicultural prescriptions (such as clearcutting, shelterwood harvesting, and thinning) influence the choice of felling and skidding equipment as well as where limbs and tops are removed.
- Topography, especially ground slope, affects the type of equipment and method used to skid logs.
- Wood volume to be removed and time constraints influence the preferred mix of equipment.
- Slash cleanup or noncommercial tree removal may require specialized equipment.
- Key site elements, such as unstable soil and proximity to water bodies and wetlands, may limit the size and type of equipment.
- Season of the year.

Forest Certification

Selling forest products that have not been certified is becoming increasingly difficult. Forest certification is a process that verifies whether your forest management, including timber harvesting, is environmentally appropriate, socially beneficial, and economically viable. This process assures consumers that the forest products they are buying were obtained from well-managed forests. The primary certification systems in the United States are those offered by the Forest Stewardship Council, the Sustainable Forestry Initiative, and the American Tree Farm System.

To qualify for forest certification, you typically must:

- Practice sustainable forestry.
- Abide by forestry-related laws.
- Follow best management practices.
- Conserve biodiversity.
- Protect water quality and other important resources.

The process of certifying your woodland requires an independent evaluator (a professional forester) who has no personal stake in your property to



review your management plan and inspect your woodland. You pay a fee for this service. If you do not meet all of the certification criteria, you can make changes in your planning, record keeping, and management activities to comply. In some states an association of loggers has trained and certified loggers to harvest timber in a sustainable manner. Under some certification systems, if such a logger harvests timber from your land in compliance with certification standards, the wood harvested from your land will enter the marketplace as certified wood. This is a low-cost means to sell certified timber without the expense of arranging a professional review of your comprehensive plan and inspection of your woodland.

Many public and forest industry lands in the Lake States are certified. Relatively few family forests are certified because of the inspection and compliance costs. These costs can be reduced if you join other landowners in a cooperative to share in the certification process. Since some paper mills, sawmills, and large retail lumber distributors have made commitments to purchase and sell mainly certified wood products, there may be opportunities in the future to earn more for your certified stumpage and, therefore, justify the cost of certification. For timber to enter retail markets as fully certified, all handlers must follow a chain-of-custody process to track the wood from the stump to the retail market.

Certification is a voluntary process for landowners, but demand is growing rapidly for certified wood so certifying your woodland or timber harvest may give you a marketing advantage. Contact a forester for more information about certification opportunities in your state.

Additional Resources

- Garland, J. J. 1983. *Designated Skid Trails Minimize Soil Compaction* (Extension Circular 1110). Corvallis: Oregon State University.
- Garland, J. J. 1983. *Felling and Bucking Techniques for Woodland Owners* (Extension Circular 1124). Corvallis: Oregon State University.
- Michigan Department of Environmental Quality. 2008. *Sustainable Soil and Water Quality Practices on Forest Land*. East Lansing, MI: Michigan Department of Natural Resources Available online at http://www.michigan.gov/dnr/0,1607,7-153-30301_31154_31261---,00.html
- Minnesota Forest Resources Council. 2005. *Sustaining Minnesota Forest Resources: Voluntary Site-level Forest Management Guidelines for Landowners, Loggers, and Resource Managers*. St. Paul, MN: Minnesota Forest Resources Council. Available online at <http://www.frc.state.mn.us/FMgdline/Guidebook.html>
- Pope, P. E., B. C. Fischer, and D. L. Cassens. 1980. *Timber Harvesting Practices for Private Woodlands* (FNR-101). West Lafayette, IN: Purdue University, Cooperative Extension Service.
- Simmons, F. C. 1979. *Handbook for Eastern Timber Harvesting* (Stock No. 001-001-00443-01). Washington, DC: U.S. Government Printing Office.
- Smidt, M. F., and C. R. Blinn. 1995a. *Logging for the 21st Century: Protecting the Forest Environment*. (FO-06518). St. Paul: University of Minnesota Extension Service Available online at: <http://www.extension.umn.edu/distribution/naturalresources/DD6518.html>
- Smidt, M. F., and C. R. Blinn. 1995. *Logging for the 21st Century: Forest Ecology and Regeneration* (FO-06517). St. Paul: University of Minnesota Extension Service. Available online at: <http://www.extension.umn.edu/distribution/naturalresources/DD6517.html>

Wiest, R. L. 1998. *A Landowner's Guide to Building Forest Access Roads* (NA-TP-06-98). Radnor, PA: USDA Forest Service, Northeastern Area State and Private Forestry. Available online at <http://www.na.fs.fed.us/spfo/pubs/stewardship/accessroads/accessroads.htm>

Wisconsin Department of Natural Resources. 2003. *Wisconsin Forest Management Guidelines* (Pub-FR-226). Madison, WI: Wisconsin Department of Natural Resources, Division of Forestry. Available online at <http://www.dnr.state.wi.us/forestry/Publications/Guidelines/>

Wisconsin Department of Natural Resources. 2008. *Maintaining Soil Quality in Woodlands: A Lake States Field Guide* (Pub-FR-409). Madison, WI: Wisconsin Department of Natural Resources, Division of Forestry. Available online at: <http://dnr.wi.gov/forestry/publications/pdf/FR-409.pdf>

