Section 2

Good Forestry Practices and the Role of Silviculture

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GOOD FORESTRY PRACTICES

Good forestry practices refers to silvicultural activities conducted in ways that enable the stand to maintain ecological processes and wildlife habitats as well as grow healthy plants. They represent what the forestry profession, forest workers, and society have come to expect from all forest management operations. They have been derived from a recognition that silvicultural activities should lead to ecological sustainability of managed stands by minimizing harm to other forest values and by protecting significant features that help to maintain the integrity and long-term health of the stand.

More specifically they:

- minimize environmental damage to the site (i.e., soil, water, air)
- protect stand components (e.g., trees, associations of trees)
- minimize damage to wildlife habitats
- encourage sustainable forest management
- provide for worker safety
- provide economic benefits to landowners (e.g., growing the right trees for the site, if possible with commercial value, of good quality, in as short a time as possible, with proper and timely stand treatments that combine to maximize landowner return on investment)
- encourage positive public opinion of forestry operations
- reinforce the need for long-term planning.

The importance of planning

Successful implementation of good forestry practices depends on careful planning at all stages of forest management. This planning can help to determine:

- feasible management objectives, based on factors such as site characteristics and land capability, that will not lead to site or stand degradation, or unacceptable loss of critical ecological components
- required information that must be obtained in order to make the best possible management decisions necessary for good forestry practices (e.g., relationship of the site to the surrounding landscape, biophysical characteristics of the site, environmental sensitivity of the site to potential damage, value of site to rare species conservation)
- the full range of possible management strategies that enable selection of the most appropriate option(s)
- management strategies that encourage the best possible growth and survival of desired species
- the schedule of management activities to minimize environmental damage
- how best to protect sensitive features of the site and mitigate damage resulting from forest operations.

Basic rules

Good forestry practice requires adherence to some fundamental rules that are necessary to help meet landowner objectives while minimizing environmental damage, maintaining species diversity, and retaining significant wildlife habitats and other important features. Listed below are some of the more widely accepted rules to encourage good forestry practices.

For a more detailed description of techniques that can be used to minimize the environmental impacts of cutting and timber removal, *A Guide to Logging Aesthetics* by Geoffrey Jones is recommended reading. All modern forest harvesting operations should utilize a careful harvesting approach that is described in detail within **Section 8.3**.

Timing

- To reduce the impact on forest soils and vegetation, try to harvest only during winter months when the ground is still frozen and preferably snow-covered. If this is not possible, harvest in the fall when the ground is dry. Do not harvest in early spring when the ground is thawing or soft and the bark is easily torn from trees. Where possible, avoid harvesting from March 20th to August 31st while sensitive wildlife species are nesting and/or breeding.

Wildlife habitat protection

- Time harvesting to avoid critical nesting and breeding periods.
- Retain recommended levels of canopy closure and buffer protection for pertinent wildlife habitats (e.g., deeryards, raptor nesting areas, riparian habitats).
- Retain nest, cavity, and den trees as well as future snags and mast trees.

Protection of other forest values

- Do not implement silvicultural prescriptions and activities unless they can be conducted without destroying other important forest values such as the provision of significant wildlife habitat or vegetation cover.

Buffers

- Where possible, retain a 30 m buffer of uncut densely growing trees beside open fields or other hard edges to reduce windthrow and other damage to the forest interior and minimize invasion by exotic species.
- Maintain buffers of natural vegetation between cut areas and waterbodies, rare vegetation communities, and significant wildlife habitats.

Tree marking

- Qualified personnel should do all tree marking.

Where to harvest?

- Do not cut in areas with locally or regionally significant habitat features (e.g., fish spawning habitat; seepage areas; clusters of supercanopy trees; abundant downed woody debris; habitats of species of conservation concern such as warblers, raptors, grouse;

areas of dense conifer cover) unless advised to do so or where such cutting is necessary for maintenance of that habitat. These important wildlife habitats are described in detail in **Section 4.4**.

- Avoid cutting along lake and stream shorelines, in wetlands, and around springs and seeps.
- To prevent erosion, cut only on dry slopes less than 35 %.

Roads, skid trails, and landings

- Wherever possible, skid trails and roads should avoid steep slopes (e.g., greater than 12 % for roads; greater than 20 % for skid trails), wet spots, seepage and poorly-drained areas, and intermittent streams.
- Minimize the number and width of skid trails and roads and follow the land contours whenever possible unless seedbed scarification is part of the regeneration prescription.
- Never skid directly up or down a slope.
- Where possible, without lowering product value, skid shorter log lengths.
- Locate landings on well-drained sites away from waterbodies and watercourses.

Crossing streams

- Skid trails and roads should approach and cross streams at right angles to minimize impacts on stream banks and to prevent water from flowing down skid trails.
- Minimize the number of stream crossings, cross at only one location and where the stream is narrow and preferably has a rocky bottom (Archibald *et al.*1997). Remember that it is illegal to destroy any fish habitat.

Cutting and felling

- Use careful directional felling to minimize damage to the residual stand, regeneration, and to the tree that is being felled and to reduce skidding damage (i.e., fell trees so that they can be pulled out of the area as cleanly as possible).

Invasive exotic species

- Hose down forestry equipment between work sites to prevent the introduction of exotic species.
- Remove exotic species to help ensure long-term health of the forest stand.

Promotion of good forestry practices

Under either the *Forestry Act* or the *Municipal Act*, municipal councils can pass tree bylaws to restrict and regulate the removal of trees on private property. These bylaws attempt to conserve woodlots in a manner that protects both individual property rights and the environmental, economic, and social qualities of value to society. They are of concern to both landowners and the logging industry. However the restrictions imposed by these bylaws can vary among different municipalities. Therefore landowners and managers should become familiar with those that could apply to them and then employ good forestry practices to ensure the protection of the site and its associated values, as well as a continual supply of trees for future harvests. For tree bylaws approved under the *Forestry Act*, readers are advised to check

with their respective County or Regional municipality. Most municipalities in southwestern Ontario have such a bylaw. Lower tier municipalities (towns or cities) may have a tree preservation bylaw under the *Municipal Act*. Generally, the bylaws apply to trees cut in woodlots of 0.5 ha and larger**.** Some municipalities also regulate cutting on woodlots less than 0.5 ha (i.e., less than 2 acres).

Minimum circumference sizes specified in bylaws have been used and are generally preferred to regulate the removal of trees. This method of regulation is used for its ease of application and enforcement, but is not desirable from a silvicultural perspective. Usually trees with a circumference or diameter of less than the one specified in the bylaws are subject to the regulations and cannot be removed. While this approach concentrates on protecting smaller diameter trees, it frequently has detrimental impacts on the stands under management. For example, in even-aged stands, these smaller trees are often the suppressed trees and mostly represent poor growing genetic stock. Similarly, in uneven-aged tolerant hardwood stands many of the small diameter trees are also suppressed. Without thinning to release those with the most potential (e.g., best form, no sign of disease), it will be much longer than 15 to 20 years before an economic harvest can be obtained again from the stand.

Unfortunately a diameter-limit approach to tree bylaws promotes a diameter-limit approach to forest management, widely considered to be a poor practice. Many landowners and forestry professionals contend that current tree bylaws, even with the addition of several improvements such as the specification of minimum basal areas and leaving some trees over the diameter-limit, still allow or "legalize" exploitive practices such as cutting all and only the large, high-value trees, or cutting only high-value species.

In an attempt to solve the problem of having bylaws lead to unsustainable practices like diameter-limit cutting, a few bylaws include minimum stocking or basal area restrictions (see **Section 5.2** for a discussion of stocking), or require that cutting is done after tree marking by a provincially certified tree-marker (Regional Municipality of Muskoka 1999) to provincial standards (OMNR 2000). All tree bylaws have an exemption for good forestry practice that allows acceptable silviculture.

Bad practices

Most professional foresters and resource managers agree that harmful forestry practices can result in serious environmental damage to the site as well as a decrease in native species diversity, productivity and tree quality with successive cuts, and widespread loss or significant change in the quality of wildlife habitat and rare vegetation communities.

Bad practices usually result from a basic unawareness or deliberate disregard of accepted guidelines for good forestry practices. Some common examples of bad practices include:

- **Harvesting before a thorough pre-harvest site assessment has been conducted.** Minimizing damage to the site and important ecological functions and wildlife habitat requires a good understanding of the most important values of the site and its sensitivity to

disturbance, prior to the implementation of forest operations. For example, if workers are unfamiliar with the site, they may improperly locate skid trails, later resulting in soil desiccation, erosion, compaction and/or slumping; or siltation of waterbodies. Or they may not protect significant wildlife habitats or environmentally sensitive areas found in the stand by failing to retain buffers or by poor timing of harvests.

- **Employing methods that simplify the structural diversity of a stand.** By scouring the leaf litter and organic layer, and by removing snags, logs on the ground, and other organic ground debris the nutrient availability for vegetation and available wildlife habitat are both reduced.
- **Allowing livestock to graze in forest stands** (i.e., especially cattle, but also animals such as sheep, goats, fallow deer, elk, and emu). This leads to site degradation, reduction in structural diversity, loss of regeneration of most tree species, and the eventual disappearance of many herbaceous and shrub vegetation species.
- **Indiscriminate felling and skidding due to poor planning, trail layout, or from hurrying operations.** This results in more broken tops and abraded tree trunks, as well as possible site degradation and loss of wildlife habitat.
- **The use of inappropriate equipment.** For example, grapple skidders that must back up to every felled tree, thereby needlessly driving over advanced regeneration and compacting soils.
- **Failure to seek professional advice when owner(s) of the stand and workers are inexperienced and unfamiliar with the principles of forest management.**

Perhaps the most damaging practices in southern Ontario are "high-grade harvesting" and "diameter-limit cuts" because, after repeated use over time, they often result in detrimental changes to the genetic quality of future generations of trees and the loss of sustainable, long-term economic value. Those who employ either or both practices only consider the trees to be removed in terms of their immediate economic value, rather than considering the ecological health of the remaining forest and its ability to produce sustainable future harvests.

High-grade harvesting targets desired species (e.g., all red oaks in a stand) or phenotypes (e.g., all large diameter stems with clear boles); diameter-limit cuts tend to target the fastest growing trees in a stand. Ultimately these methods can result in reduced genetic diversity, stand productivity, and species composition; and lower timber quality because the best growing and best formed individuals are the ones removed in each harvest, leaving successively poorer growing and poorer quality trees as the next crop and as parent trees for any natural regeneration. Also stands with such a history may have an impaired ability to buffer environmental change (e.g., climatic disturbance, insect or disease outbreak) in the future.

Forest certification

Largely due to a growing public awareness of global forest destruction and degradation, increasing numbers of consumers are choosing to buy wood and wood products only from forests that are being sustainably managed to protect the forest ecosystem and to secure forest resources for the long-term. Forest certification programs are one response to this increase in consumer awareness. Briefly, to receive accredited certification, people involved

in commercial forestry operations must conduct their forest management activities in strict accordance with established standards that were designed to protect the natural characteristics and ecological processes of relatively undisturbed forests.

One of the guiding principles of forest certification programs is that forests should be sustainably managed. *A Silvicultural Guide to Managing Southern Ontario Forests* can play a role in this process by providing:

- an outline and discussion of the steps that should be followed and the specific information that should be collected prior to the initiation of any silvicultural activities (i.e., the development of a management plan)
- suggestions about how to minimize the environmental impacts of forestry operations
- autecological information about the major tree species in southern Ontario, especially factors that affect their growth, reproduction, and regeneration in this region
- a discussion of silvicultural systems and how to select the most appropriate ones having the greatest potential to enable sustainable forestry to occur on the site
- a discussion of the integration of timber harvesting and non-commercial concerns (e.g., protection of significant wildlife habitat) that can affect how a stand is managed
- some standards for management activities based on experience and research in southern and central Ontario and the northeastern and northcentral United States.

Summary of good forestry practices

Table 2.1 provides an initial checklist and explanation of important components that must be addressed to ensure that forest practices are sustainable. This guide discusses each component listed in this table. Refer to the appropriate section in bold print for more information and where applicable, the quantitative measures that can be used to define good forestry practices.

Table 2.1: Checklist of essential components of good forestry practices.

Component	Description, information required, and function/role
Landowner objectives (Section 2)	• includes revenue from forest products, wildlife habitat improvement, fuelwood for personal use, encouraging old-growth characteristics, recreation, nature appreciation • there are usually several objectives • required to establish management objectives, select priorities, and silvicultural activities designed to achieve landowner and management objectives • objectives should be realistic, and based on an analysis of the subsequent points in this table
Analysis of site suitability/quality (Section 4.1, Section 7, Appendix D)	• information based on soil productivity, suitability of tree species for certain soils and site conditions, history of site/stand, and manager's experience • used to help predict the potential ability of the site to support desired species and suggest possible silvicultural options
History of site (Section 4.2)	• includes natural events such as storms, fire or human land use activities that influenced the development of current site characteristics • may affect management objectives, choice of silvicultural prescription, productivity of site • can require considerable knowledge and experience to interpret the landscape • local landowners may know the history of the site • early surveyor records may provide a snapshot of forest cover at the time of the survey
Wildlife habitat management (Section 4, Tables 4.4.1, 4.4.2 and 4.4.3)	Objectives include: • ensuring that across southern Ontario, applied silvicultural systems maintain the full range of forest types/ecosystems (i.e., by site, age-structure, and vegetation composition), including subtle variations among similar forest types • emphasis on the maintenance of mature forest stands and large forested areas • management for old-growth characteristics on some sites, especially in areas with high potential and/or little or no representation of older woodlands • silvicultural systems that try to emulate natural disturbance patterns and provide diversity of species composition, structure (e.g., conifer cover, mast and cavity trees, supercanopy trees, downed woody debris, variations in canopy closure) of forest stands in southern Ontario

Table 2.1 *continued*

Component	Description, information required, and function/role
	• residual stand diversity and structure of ecologically healthy stands that as closely as possible, reflect pre-harvest stand diversity and structure OR residual stand diversity and structure of degraded stands subject to improvement cutting that eventually improve or are at least maintained • adoption of OMNR wildlife habitat guidelines as minimum standards for selected forest habitats (e.g., for mast, cavity, supercanopy trees; conifer cover; downed woody debris, seeps, riparian areas) and for selected wildlife species (e.g., white-tailed deer, moose, pine marten, raptors, pileated woodpecker) • managing to include or promote mid-tolerant and mast/catkin/fruit bearing species for diversity and habitat/food values
Site and stand inventory (Section 5, Appendix C)	• collects information on land characteristics, trees, and other resource values (e.g., local climate; site conditions; current successional stage of the stand; current tree density; species composition; general health of the stand; presence of other important values such as significant wildlife habitats, waterbodies) • used to set realistic management objectives, develop a forest management plan, schedule forestry operations, provide a foundation for monitoring activities • identifies physically sensitive features (e.g., watercourses, steep slopes) and important heritage, archeological, aesthetic or geological features
Autecology of tree species on the site (Section 6, Appendix B)	• describes the capacity of a species to establish itself and reproduce on different sites as well as its pattern of growth and response to disturbance • helps to determine the suitability of various silvicultural activities • may indicate silvicultural activities that can take advantage of certain traits of a species (e.g., ability to coppice)
Stand management objectives (Section 6)	first: • long-term objectives for the future stand condition should be stated with details on items such as species, sizes, ages, cavity trees, etc. then: • clear short-term or immediate objectives that can be later evaluated through data collection, should be set for each project or operation • common objectives include producing high-value wood products, establishing regeneration, controlling species composition and stand density, reducing losses to insect diseases and fire, enhancing non-timber values such as wildlife habitat and rare species protection • stand management objectives are based on the site inventory and history and consider the autecology of managed species, landowner

Table 2.1 *continued*

Component	Description, information required, and function/role
	objectives, other forest values, and • include recognition of the stand's value(s) to the local landscape in which it is located and how these values might be maintained
Selection of suitable silvicultural system (Section 6)	• selection of the most suitable system is based on all components listed above and is a complete description of the silvicultural activities that will be conducted on the site for the time period specified in the management plan • knowledge of most appropriate tree-marking guidelines; stocking targets; structural, species/age composition objectives; timing and regulation of cutting; location of openings is critical for success • stands with more natural composition and structure can be encouraged by selecting a silvicultural system that most closely mimics natural disturbances
Detailed written silvicultural prescription (Section 6, Appendix E)	• may require professional assistance • should include the transfer of stand inventory summary, stand management objectives (both long- and short-term), and details for exactly how to carryout the project, including targets for tree marking, and habitat protection
Site preparation (Section 8.1)	• use of mechanical means, prescribed burns, chemical treatments to improve the site for crop-trees (e.g., provide suitable seedbed, control severe competition, reduce soil erosion/compaction) • must know where and when to use (e.g., normally not practiced with uneven-aged management of most shade-tolerant species) • specific information required include seedbed requirements of species, effects of each preparation method on site and competing vegetation, timing of site preparation activities • must know the possible ways to minimize environmental damage of silvicultural activities on the site
Tending treatments (Section 8.1)	• designed to control and/or improve trees species composition, growth, and quality • must know when to implement, what trees and other vegetation to remove and retain, and where most appropriately applied • contributes to sustainable forestry by trying to ensure continued forest productivity
Tree marking (Section 8.2)	• for partial cutting operations, tree marking should be done prior to tree removal • requires special skills acquired through training and experience. The province provides certification for tree marking on Crown Land and is developing advanced training for southern Ontario.

Table 2.1 *continued*

Harvesting considerations (Section 8.3; Table 4.4.1)	• minimizing harvest damage to site, regeneration, and residual trees • adhering closely to silvicultural prescriptions • conducting careful harvesting • required information focuses on site topography, especially location of low and steep areas; soil texture, moisture, depth, permeability; drainage patterns on site; seasonal variation of site conditions; location of ecologically significant features (**Table 4.4.1**); best locations for skid trails/log landings; local market demands for wood products; and landowner objectives as described in the management plan • major contribution to sustainable forestry objectives by maintenance of site productivity • prior to harvesting, appropriate operating restrictions should be identified on the ground in Areas of Concern and buffers zones • complete a signed operating contract designed to protect the stand, landowner, and forest operators (see the Extension Note: *Selling Standing Timber* and **Section 8.3**) • methods to measure compliance are recommended. For example, are tree-markers audited for compliance with the silvicultural prescription? Are forest workers audited for compliance with the tree marking? • contact bylaw officer or submit "Notice of Intent" in municipalities with tree bylaws