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Growing High-Value Trees

Information to help you practice uneven-aged management in your woodlot

Would you like to achieve a variety of benefits from your forest, such as the opportunity to grow high-quality forest products, steady income from sale of high-value trees, aesthetic enjoyment, recreation, or wildlife habitat? If so, you may be interested in learning more about uneven-aged management and the financial support that may be available from the Category 7 Quality Improvement Silviculture Program.

What is uneven-aged management?

In uneven-aged management, trees are harvested individually or in small groups, not all at once. This allows you to maintain or achieve a forest similar to the one that would occur naturally, with different species of trees of different ages and heights. Periodic selection of some trees for harvest allows remaining trees to improve in growth and quality, increasing in value with time.

Why practice uneven-aged management?

With uneven-aged management, you always have a forest. The shade and moisture provided by your standing trees encourages the growth of shade-loving (aka *shade-tolerant*) species of trees that have high value once mature. Valuable species are regenerating naturally while you grow and harvest trees from your woodlot. Competition from noncommercial species such as Pin cherry and Grey birch is reduced because these species need more than 50% sun to grow.

With uneven-aged management, a suitable woodlot can produce steady income from a variety of forest products, yet remain available for recreation and other uses. Because the woodlot contains a diversity of tree species and ages, it will be less vulnerable to insect outbreaks, windstorms, and other potentially devastating events—even climate change.

What trees can I grow?

Some of the shade-tolerant species of trees that do well with uneven-aged management include Red spruce (our provincial tree), White pine, Hemlock, and (though rare) White cedar among the softwoods; Sugar maple, White ash, Yellow birch, Red oak, and Beech among the hardwoods. These shade-tolerant trees are long-lived and have the potential to become extremely valuable as they mature.

Each tree species has different requirements for germination, establishment, and growth. Understanding the requirements of the trees you want to encourage is important for success in uneven-aged management. Knowledge of what each desirable tree species needs to grow is referred to as tree *silvics*.

Which species to grow depends on site characteristics such as soil, physical conditions, and

Growing High-Value Trees Page 2

microclimate. For instance, the Cobequid and Cape Breton hills are best suited to shade-tolerant hardwood species such as Sugar maple, Yellow birch, and Beech. Conditions in many valleys are favorable to shade-tolerant mixedwoods that include species such as Red spruce, Yellow birch, Balsam fir, Hemlock, and White pine.

What is quality improvement silviculture?

Quality improvement silviculture is a term used to describe various practices that improve the growth and quality of high-value, shade-tolerant, long-lived trees. The desired trees, known as *crop trees*, are selected for potential growth, longevity, and physical characteristics such as vigor, crown (top) structure, quality, straightness, lack of limbs or scars, and species marketability. A silviculture practice known as *crop tree release* is used periodically to give these trees just enough but not too much growing space. The end product is high value timber. When *crop tree pruning* is added to the mix, the value of the timber increases even more.

Once a woodlot has a good mix of crop trees of various ages and sizes, *selection management* may be used to harvest trees individually or in small groups.

Quality improvement silviculture may be thought of as a type of *crop tree management* that focuses on shade-tolerant, long-lived species. These high-value species grow extremely well in Nova Scotia when given the right conditions.

Funding is available for quality improvement silviculture under a program administered by the Association for Sustainable Forestry (ASF), provided specific silviculture criteria are met. This program provides funding for selection management, crop tree release, and crop tree pruning on appropriate woodlots.

The Category 7 Quality Improvement Silviculture Program

The Category 7 Quality Improvement Silviculture Program is a new two-year program (2007-2009) administered by the ASF and funded by the Nova Scotia Department of Natural Resources (NSDNR). Its aim is to promote uneven-aged management and associated silviculture treatments—that is, selection management, crop tree release, and crop tree pruning.

During the next two years, NSDNR through the ASF will invest \$443,000 in the Category 7 program to encourage uneven-aged management private woodlot owners and contractors in Nova Scotia. These funds will be allocated to provide assistance for the three quality improvement treatments.

Funding highlights

Funding is available to all small private woodlot owners owning less than 2,000 hectares (4,940 acres) of woodland in Nova Scotia. The funding is administered through the ASF at no cost to you.

You can do the work yourself or hire a contractor or other agent to do the work for you.

There are specific criteria for each treatment; these must be met in order to be eligible for funding. (See information below for detailed descriptions of the criteria for each treatment.)

Application and claim forms must be signed by a forester or forest technician before the work can be approved for application and payment. This is to ensure that the required criteria can be met.

Treated sites must stay in forest production for at least 10 years. In other words, the land may not be converted to another use (e.g., residential, commercial, agricultural).

To apply for funding under this program, obtain an information package and application form from the ASF coordinator. Have a forester or forest technician visit the site to determine whether the required silviculture criteria are achievable. The forester or forest technician must sign your application before

Growing High-Value Trees Page 3

you submit it to the ASF coordinator, who will visit the site to approve eligibility and offer guidance on what needs to be done to meet requirements. Once the treatment is complete, submit a completed claim form to the ASF coordinator, who will inspect the site to approve payment.

For more information on the Category 7 Quality Improvement Silviculture Program and whether your woodlot may qualify, contact ASF Coordinator Rebecca Aggas by telephone at 902-895-1179 or email at rjaggas@asforestry.com. Information on the Category 7 Quality Improvement Program is also available at <http://www.asforestry.com/Category7program.htm>

Outreach Project

In addition to the funding program described above, the ASF is administering an outreach project designed to educate Nova Scotia woodlot owners and contractors about uneven-aged management and the Category 7 Quality Improvement Silviculture Program. This project is funded by NSDNR; outreach services are being delivered by the Nova Scotia Woodlot Owners and Operators Association and Picea Forestry Consulting under a contract with the ASF.

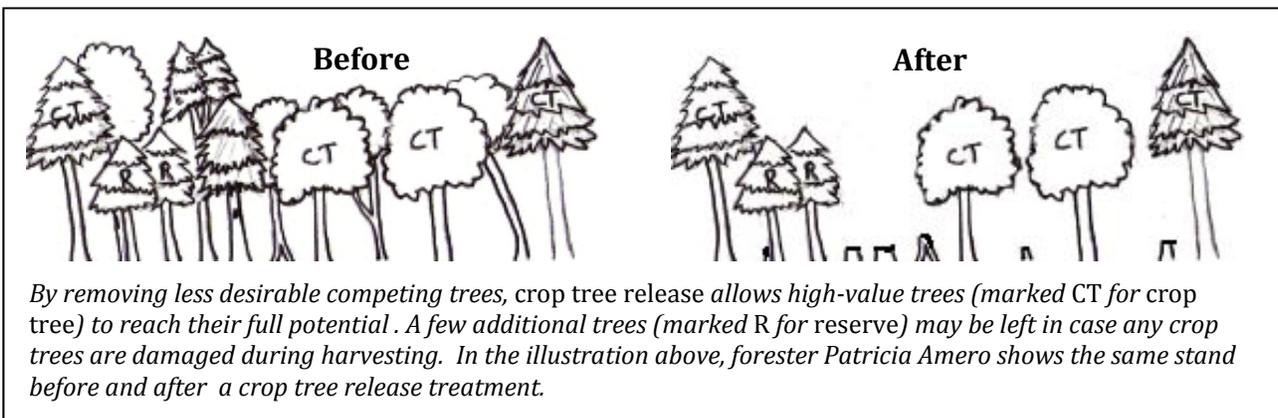
The Outreach Project will have booths at annual general meetings and Woodlot Owner Conferences and will also host a series of educational programs, including field visits, throughout the province. At least 20 woodland owners and contractors will be chosen for half-day site visits, providing an opportunity to discuss how uneven-aged management and the Category 7 program may be applied on woodlots.

The Outreach Project is also conducting research in order to recommend possible next steps for the Category 7 Quality Improvement Silviculture Program. Woodlot owners and contractors who take a survey will be entered in a prize draw to be held in September 2008.

If you have not done so already, please contact the Outreach Project in order to take our survey and receive an invitation to an educational program in your region. The Outreach Project can be contacted at 902-673-2278 or outreach@asforestry.com.

The Category 7 Quality Improvement Silviculture Treatments

Crop Tree Release



Crop tree release promotes growth and quality of desirable trees by removing trees that will not improve. This treatment gives selected trees (*crop trees*) room to expand their crowns, increasing their food supply. This allows the crop trees to establish stronger root systems, increasing nutrient uptake and wind firmness. Crop trees are then able to grow to their full potential. Crop tree release increases the health and present value of trees as well as their future value.

What kind of site is suitable for crop tree release?

Crop tree release can be applied to a variety of forest conditions, from degraded stands to old plantations.

Growing High-Value Trees Page 4

Both even- and uneven-aged forests can benefit from crop tree release. Basically the treatment can be applied wherever the crop trees are located.

What are the methods and techniques used in crop tree release?

The goal of crop tree release is to ensure that trees have enough space for both crown and root development. However, crop tree crowns should be released gradually, so that they do not become vulnerable to weather-related damage. This requires regular tending of selected trees, usually at intervals of about 10 years.

The extent to which crop trees can be released depends on their size, height, and vigor. The smaller and more slender the trees are, the tighter the spacing should be. Other considerations include whether the trees are exposed to damaging winds (particularly on north- and east-facing slopes), soil depth, and drainage. Soil depth and drainage dictate rooting depth and growth, thus affect windfall hazard.

What is required to qualify for Category 7 Quality Improvement Silviculture funding?

Qualifying crop tree release treatments are eligible for assistance at a rate of \$3 for each tree released. The treatment may be combined with crop tree pruning.

Red spruce, Red pine, White pine, Eastern hemlock, White ash, Yellow birch, Sugar maple, Red oak, White birch, and Red maple are the acceptable crop tree species. Stands are eligible for crop tree release once the average diameter of crop trees reaches 15 cm (6 in*) at breast height (1.3 m, or 4 ft, from ground). The site must contain at least 100 crop trees to a maximum of 125 crop trees/hectare. None of the crop trees can be less than 10 cm (4 in) in diameter at breast height. Crop trees must be marked for identification.

Crop tree crowns must be released on at least three sides, allowing each tree to grow freely for a minimum of 10 years. Once treated, the area must contain a minimum basal area** of 15 m²/hectare, which corresponds to moderate density.

Crop tree pruning

Trees lose their lower branches naturally when they are grown in shade, but this process takes many years. In crop tree pruning, the lower branches are removed artificially while the tree is growing. This encourages the tree to produce clear (knot-free) wood, which is highly valued for veneer-quality products. Like crop tree release, crop tree pruning can be applied wherever crop trees are found. In fact, the two treatments are often applied to the same trees at the same time.

What are the methods and techniques used in crop tree pruning?

The goal of crop-tree pruning is to remove all branches from the first 5 m (16 ft) of the tree bole. The younger a crop tree is when pruned, the sooner the tree will start producing knot-free wood. This yields a much larger benefit than pruning trees at later stages of development.

Although it is important to start pruning trees during early development, it is equally important to not remove too many live limbs too soon. The length of the crown must always be at least 1/3 of the total tree height. For instance, a 9 m (30 ft) tree should have at least 3 m (10 ft) of live crown.

Trees should be pruned where the branch meets the branch collar. Avoid ripping or tearing bark or damaging either the branch collar or the tree bole itself; this could introduce rot. It takes about 10

* Metric conversions are approximate.

** Basal area is a technical term referring to the surface area that would be occupied by trees at breast height; it is an indication of density, and depends on both the diameter and the distribution of trees in a stand. Combined with height, it is used to determine volume in cubic meters of trees per hectare.

Growing High-Value Trees Page 5

years for a tree to completely grow over the remains of the branch, so there is little benefit in pruning trees that will be harvested within the next 10 years.

What is required to qualify for Category 7 Quality Improvement Silviculture funding?

Qualifying crop tree pruning treatments are eligible for assistance at a rate of \$300/hectare. Red pine, White pine, White ash, Yellow birch, Sugar maple, Red oak, White birch, and Red maple are the acceptable species. To qualify, the crop trees must be more than 8 m (26 ft) tall. To receive funding, at least 125 trees/hectare must be pruned to a height of at least 5 m (16 ft). The treatment may be combined with either crop tree release or selection management.

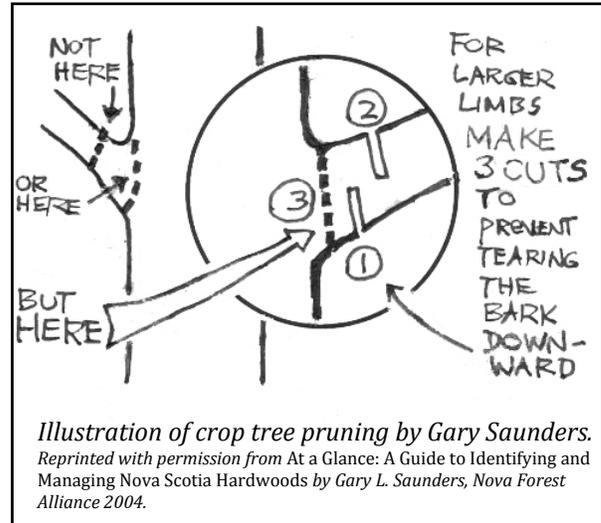


Illustration of crop tree pruning by Gary Saunders. Reprinted with permission from At a Glance: A Guide to Identifying and Managing Nova Scotia Hardwoods by Gary L. Saunders, Nova Forest Alliance 2004.

Selection management

In selection management, individual trees or small groups of trees are harvested periodically, providing a steady yield of forest products. The trees chosen for harvest are usually those that have poor form, vigor or quality. This leaves the best trees with more room to grow and creates small gaps in which new trees can regenerate. Selection management is sometimes referred to as “harvesting the interest” because, when it is practiced properly on a suitable site, the woodlot owner can earn a steady income but never deplete the woodlot’s “capital” (the value of its trees).

What kind of site is suitable for selection management?

Selection management is generally practiced in uneven-aged stands. Forest stands appropriate for selection management are probably more common than many people realize, especially on family and farm woodlots where harvests have been small but frequent. Crop trees favored during selection management can be anywhere from 20 cm (8 in) to 20 m (66 ft) tall.

What are the methods and techniques used in selection management?

In selection management, trees are harvested in small quantities, usually every 5 to 20 years. The woodlot owner or contractor aims to harvest trees that are no longer improving in size and quality. The harvest should leave behind several sizes of trees that still have potential for growth and improvement, and the amount of wood removed should never be more than the amount the forest is able to grow.

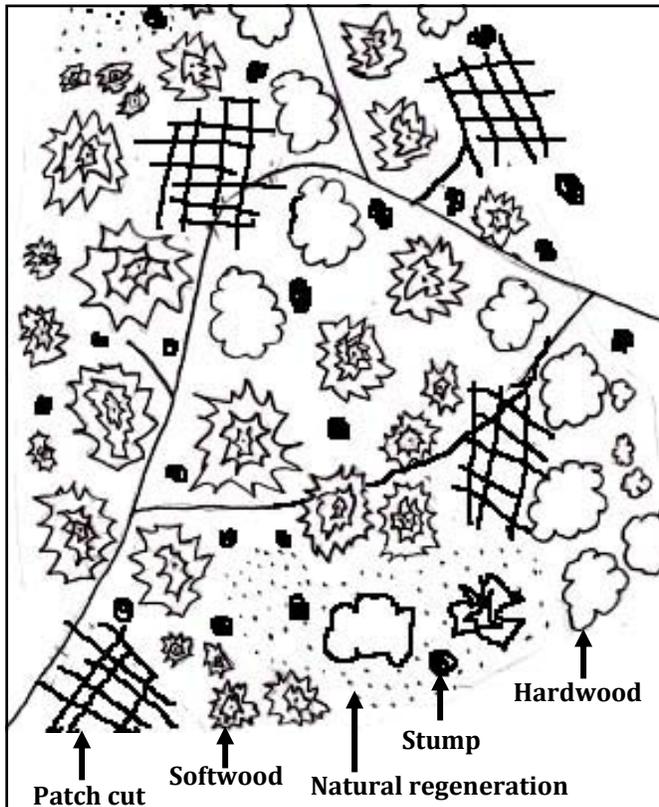
Additional considerations may play a role in deciding which trees to cut and which to leave in a selection management approach. For instance, a tree may be left because the owner wants to encourage regeneration of that particular species or because there is a cavity in the tree that offers shelter and nesting opportunities for small mammals and birds.

What is required to qualify for Category 7 Quality Improvement Silviculture funding?

In funding selection management, the Category 7 program assists the first entry at a rate of \$450/hectare and subsequent entries at a rate of \$300/hectare. The first entry receives higher funding because it usually removes mostly low-value trees and creates access to the area. Value of trees remaining will increase with each subsequent entry. Selection management may be combined with crop tree pruning.

Red spruce, White pine, Eastern hemlock, Eastern cedar, Balsam fir, White ash, Yellow birch, Sugar maple, Red oak, and American beech are the qualifying crop tree species. All of these species except Balsam fir are considered long-lived.

The area being managed must consist of at least three age classes. Age classes are determined by height.



The illustration above shows a woodlot that has been selection managed to an average basal area of 18 m²/hectare. (Basal area is a technical term used to describe the density of trees in a stand.) Some small areas were cut (patch cuts) to salvage dying White spruce and remove poor quality softwoods and hardwoods. Dotted areas represent natural regeneration (young trees) in areas that were patch cut about 20 years previously. The remaining area has been managed through selection of individual trees. Illustration by Patricia Amero, RPF.

After treatment some of the remaining trees must be taller than 10 m (33 ft). Differences in height between classes must average at least 3 m (10 ft). Regeneration can be considered one of the three classes.

To put this another way, the 3 classes should differ in age by about 20 years. An example of a suitable site would be one that consists of scattered trees about 18 m (60 ft) tall (about 90-100 years old); a larger number of trees 15 m (50 ft) tall (about 50 years old); and open patches with regeneration from 20 cm to 1 m (8 in to 3 ft) tall.

To be eligible for assistance, the entire area must have more than 80% tree cover. After treatment, the area must contain 16-30 m²/hectare basal area, of which 5 m²/hectare must consist of the qualifying crop tree species. A forester or forest technician can examine and explain basal area requirements when inspecting the site as part of the application process.

Following treatment, areas of dense young softwood 3-7 m (10-23 ft) tall and hardwoods 6-9 m (20-30 ft) tall must be spaced 1.5 meters (5 ft) apart.

This information packet was written and designed by Patricia Amero, RPF, and Flora Johnson. Many thanks to Rebecca Aggas for her assistance in this project and to Gary Saunders for the use of his drawings.

For more information

For a list of resources on uneven-aged management, application forms for the Category 7 Quality Improvement Silviculture Program, and detailed technical criteria for the Category 7 treatments, please see this Web page: <http://www.asforestry.com/Category7program.htm>

To contact the Uneven-Aged Management Project, please call 902-673-2278 or email outreach@asforestry.com

Information on the Category 7 Quality Improvement Silviculture Program and technical assistance in applying for the program are available from the Association for Sustainable Forestry, PO Box 696, Truro, NS B2N 5E5 Tel: 902-895-1179 Email: rjaggas@asforestry.com Website: <http://www.asforestry.com>

Outreach services under the Uneven-Aged Management Project are being delivered by the Nova Scotia Woodlot Owners and Operators Association (Box 823, Truro, NS B2N 5G6 Tel: 902-633-2108 Email: nswooa@gmail.com Website: <http://www.nswooa.ca>) in partnership with Picea Forestry Consulting (324 Mossman Rd., RR2, Bridgewater, NS B4V 2W1 Tel: 902-527-1222 Email: picea.forestry@ns.sympatico.ca).