

WOODLOT MANAGEMENT HOME STUDY

- a Brief Introduction to - SILVICULTURE

What is Silviculture?

Silviculture is the practice by which forest *stands*, are tended, harvested and replaced by new *stands* to meet landowner's objectives. Understanding trees and how they grow is the foundation of silviculture. Practicing silviculture treatment methods such as, early thinning or pre-commercial thinning, can increase the growth rate of trees in a *stand* and result in *stands* growing to harvest size up to 20 years before an untreated *stand*.

Stand Growth and Development

As trees age they go through three major phases of development - *immaturity*, *maturity*, and *decline*. Through each phase, changes occur in the rate of a tree's height, diameter, and volume growth. As *stands* age, changes also occur in *stand* density, stocking and development, and species composition.

To assist in planning and implementing silvicultural treatments, a forest is divided into units called *stands*.



Illustration 1: A forest stand

Stands are described using the following three terms:

- Age
- Percentage of softwood and hardwood trees
- *Developmental stage* (Illustration 2)

STAGES OF STAND DEVELOPMENT

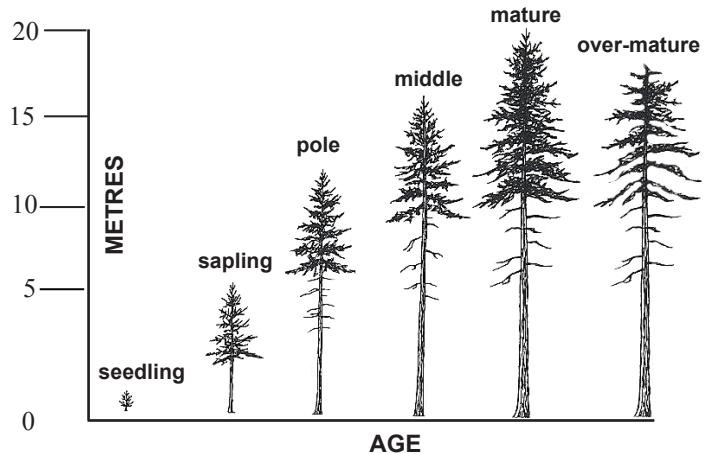


Illustration 2: Developmental stages

Stands are further characterized as either even-aged or uneven-aged. Even-aged stands are groups of trees with maximum age differences of 10 to 20 years. Uneven-aged stands are trees with at least three age classes and have a variation in heights and diameters.

Common Trees in Nova Scotia

To practice silviculture it is essential to recognize common trees, understand how they grow, and how growth can be influenced. Once you have this information, it is easier to make an informed decision about managing the trees on your woodlot.

Table 1: Common trees in Nova Scotia

Softwoods	Hardwoods
• Red Spruce	• Sugar Maple
• White Spruce	• Red Maple
• Black Spruce	• Yellow Birch
• Balsam Fir	• White Birch
• White Pine	• Grey Birch
• Red Pine	• White Ash
• Jack Pine	• Red Oak
• Hemlock	• Beech
• Tamarack	• Trembling Aspen

Stand Density and Stocking

Density indicates the degree of crowding trees within a *stand*. A species ability to survive in a dense stand depends on its height growth and to a greater extent, its ability to tolerate shade. It is important to consider this when planning silviculture operations.

Stocking refers to the amount of growing space used by trees. Throughout its life, a tree must have enough space to spread its crown and roots to reach maximum growth. If there are too many trees competing for the same space, the trees will develop smaller. If there are not enough trees and a lot of growing space, the trees will develop large limbs with extensive crowns. A *stand* is considered to be 100% stocked when there are enough trees to use all of the available growing space.

Physical and Biological Factors Affecting Growth

A number of physical and *biological* factors continually influence the growth and development of forests. Physical factors include climate, soils, and location. Biological factors include the *silvics* of each tree species, stand density, and damaging agents such as insects. In an *ecosystem* all of these factors play a role in how trees grow.

When managing a woodlot, it is important to know which biological factors can be changed and which physical factors cannot.

Land Capability

Land capability is determined by comparing the total age of a healthy *dominant* tree to its height. Favourable physical factors create a better land capability rating and enable a better response to silvicultural treatments. Sites with better land capability produce taller trees at a given age. Land capabilities are grouped by number. In Nova Scotia, the best land capability class is 13, sites with a capability class of four or lower are not generally worth spending a lot of time and money on.

During growth, from seedling to maturity, (Illustration 2), trees are constantly competing for sunlight, moisture, food, and space. The healthier, vigorous trees on better sites soon overtop other trees to become dominant and co-dominant members of the *stand*. The remaining trees develop into intermediate or suppressed positions within the *stand* (Illustration 3).

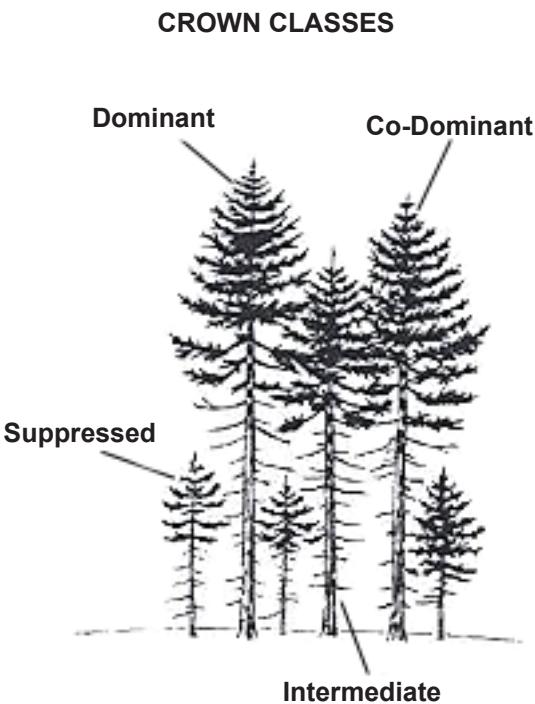


Illustration 3: Crown Classes

Height Growth

Although a tree will continue to grow in total height, the rate will decrease as the tree matures. The final height of a healthy, vigorous tree depends on the land capability.

Diameter Growth

Each year a tree produces an annual ring. The rate of diameter growth throughout a tree's life can be seen in the various widths of the rings. Diameter growth is directly related to stocking. If a tree is released from competition through silviculture, the rate of diameter growth will normally increase.

Volume Growth

Stand volume will increase as stocking increases as the site becomes more fully occupied.

Species Composition

As a *stand* gets older, the *intolerant* species within it generally die and are replaced by *tolerant* species that are able to compete and grow in the reduced sunlight.

Manipulation of Stands by Thinning

Growth and development of a *stand* is significantly affected by the competition among trees within the *stand*. Competition must be adjusted at the appropriate time with spacing treatments to enhance the growth and development of your woodlot. Reducing competition by thinning allows remaining trees to grow to the *stand's* full capability. When this is done, more merchantable wood will be produced sooner. The extra space will also allow for the growth of larger trees that will have a higher timber value.

Thinning treatments remove undesirable trees and free the best trees from competition. Trees that are considered undesirable will vary with each situation,

therefore it is important to always know what type of tree *species* or forest product you want to encourage on your woodlot.

EFFECTS OF PRECOMMERCIAL THINNING

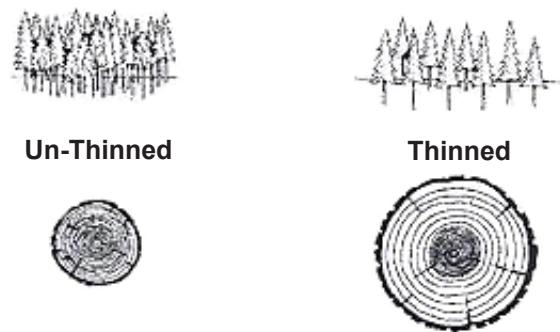


Illustration 4: For most trees, thinning results in dramatic increases in diameter.

Glossary

Biological - Characteristics of living organisms which influence their growth and health.

Declining stand - When height, diameter, and volume growth stops.

Developmental stage - This is determined based on average height and age of the trees within the stand.

Ecosystem - A dynamic set of living organisms (plants, animals, and micro-organisms) all interacting among themselves and with the environment in which they live (soil, climate, water, and light).

Immature stand - A stand of young trees past the regeneration stage usually showing good health and vigor.

Intolerant - Trees that require full sunlight to maintain vigorous growth.

Mature stand - When height, diameter and volume growth level off. Different species mature at different ages.

Silvics - Understanding how trees grow, reproduce and respond to environmental changes.

Species - A category of individuals thought of as a group because of common qualities and characteristics.

Stand - A group of trees, with similarities in species composition, height/diameter, distribution, and age composition.

Thinning - A spacing operation to improve growth, quality, and percentage of desirable trees.

Tolerance - Ability of a tree to regenerate and grow under shaded conditions.

For More Information

Please refer to the full lenght version of, **Home Study Module 1: Introduction to Silviculture**. This module along with other modules in the Home Study series are available free from:

Stewardship and Outreach Section

Department of Natural Resources

P.O. Box 698, Halifax, NS, B3J 2T9

Phone: (902) 424-5444

Toll free: 1-866-226-7577

Fax: (902) 424-7735

e-mail: woodlot@gov.ns.ca

web: www.gov.ns.ca/natr/extension/