

## Partial Cutting - Ministry key training materials, standards, systems, and growth and yield models

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Considerable work has been completed related to partial cutting starting in the early 1990's with the establishment of the silvicultural systems program investing in research and extension to address stand structure, harvesting, wildlife, growth and yield, and stand development. Based on this work, as well as research from North America and other countries, a collection of training material, documents, and growth and yield models were developed by the Ministry.

Partial cutting refers generically to stand entries, under any of the several silvicultural systems, to harvest selected trees and leave desirable trees for various stand objectives. Partial cutting includes harvest methods used for: seed tree, shelterwood, selection, and retention systems and commercial thinning.

Below is a list of key Ministry training material, resources, and growth and yield models. Research publications and other material are available through the [Ministry of Forests, Lands and Natural Resource Operations Library \(link\)](#).

### Training Material

#### 1. [Introduction to Silvicultural Systems \(link\)](#)

Provides field practitioners with a common background in silvicultural systems and promotes consistency. The objective of the training material is to encourage consideration of the full range of silvicultural systems and site-specific application using current knowledge and careful consideration of all resource objectives at the stand and landscape levels.

#### 2. [Partial Cutting Training and Decision Aids \(link\)](#)

This site contains an introductory training course in silvicultural systems and information on partial cutting prescription development and harvest planning. From this site, you can also obtain the results of studies that examine the potential of partial cutting to meet resource objectives such as biodiversity and visual quality, as well as timber harvesting objectives.

#### 3. [Commercial Thinning Workshop \(link\)](#)

The main purpose of this workshop is to provide participants with an overview of planning and operations for commercial thinning programs and projects. Learning objectives include the concepts and principles of commercial thinning, strategic purposes, basic conditions for using commercial thinning, stand selection and ranking.

## Resources and Standards

### 1. [Silvicultural Systems Handbook for British Columbia \(link\)](#)

The intent of this handbook is to provide the field forestry practitioners with a first reference for silvicultural systems prescription development and implementation in BC. The handbook catalogues background knowledge intended to clarify concepts related to partial cutting silvicultural systems. The handbook also brings together treatments and approaches that have worked in various parts of the province to highlight strengths and weaknesses of each. The handbook also addresses the key questions and issues that emerge as partial cutting silvicultural systems are prescribed and implemented.

### 2. [Partial cutting safety handbook \(link\)](#)

This handbook of safety guidelines for partial-cutting operations was produced cooperatively by the BC Forest Service, Ministry of Environment, Lands and Parks, and WorkSafe BC, at the request of industry, labour and other interested agencies. It has been designed for use by planners, logging supervisors and forest workers involved in partial-cutting operations. While there are differences between coastal and interior operations-terrain, timber size, weather conditions, etc. - these basic safe work procedures apply to the entire province.

### 3. [Forest and Range Evaluation Program \(FREP\) Report #11, Timber-Focussed Evaluation of Partially Harvested Areas: Are Stand Conditions Consistent with Government's Objectives for Timber? \(link\)](#)

The report is an evaluation of partial-cut areas to determine the degree to which government objectives for timber (as specified in the *Forest and Range Practices Act*, FRPA) were being met. Methods for both routine and intensive evaluation were developed and then used in a trial evaluation. This report provides the 2006 draft version of the routine and intensive evaluation procedures and presents the results of their application in partial-cut stands in a management unit in south-eastern BC.

### 4. [Stocking in Partial Cut Stands \(link\)](#)

This web site provides information on a new method to assess regeneration stocking in partially cut stands in the BC interior. This method is especially relevant to stands with substantial variation in the size and spatial arrangement of live trees retained at harvest. Problems arise when British Columbia's existing systems for assessing stocking are applied in this stand type.

### 5. [Silviculture Survey Manual – Section 9 \(link\)](#)

Section 9 of the manual refers to alternatives to the basic standard survey techniques for simpler even-aged clearcut scenarios. Information on complex vertical structure survey methodologies for multi storey and layered structures as well as surveys for complex horizontal structures (e.g., even-aged clustered; Coastal mixedwoods, clearcut with reserves) are covered.

### 6. [Status of British Columbia's Long-Term Silvicultural Systems Trials \(link\)](#)

The goal of this report is to summarize the current status of these trials in British Columbia and to identify opportunities for how these trials may help address some of our current forest management challenges. The trials also have a critical role to play in the forecasted changes in climate. Changes in growing conditions (e.g., drought, frost, etc.) may result in the increased use of

alternative silvicultural systems in forest management and it is critical that natural resource managers have research information that will not only allow them to select the most appropriate system for their area and the tree species they manage, but will also tell them both the short- and long-term implications of that system on tree growth and yield, windthrow, insects and diseases, and on other values such as biodiversity and wildlife.

## **Systems and Growth and Yield**

Provincial Timber Supply modelling currently aggregates broadly similar stand types into analysis units based on provincial inventory information. Stand level models are then used to predict growth and yield of each aggregate unit. The Table Interpolation Program for Stand Yield (TIPSY) provides yield estimates derived from the Tree and Stand Simulator (TASS) for managed (plantation) units; the Variable Density Yield Projection program (VDYP7) is applied to naturally regenerated, unmanaged stands. Neither of these models can fully simulate the dynamics of stand growth and regeneration after partial cutting or partial disturbance. When necessary, yield curves for partially cut aggregate units are estimated based on predictions from one of these models that are adjusted according to best available knowledge and stand level information. Other growth and yield models could be used for stand-level modelling of partial cutting in some BEC subzones or areas using specific assumptions, but all require individual tree size data which, in the case of unmanaged stands, is not available in the inventory and, in the case of managed stands, would have to be provided for each partial cut opening.

The next generation of the Tree and Stand Simulator (TASS III), which is currently under development, will simulate the dynamics of stand growth and yield after partial cutting explicitly. However, this model will also require individual tree data as described above.

<b>Model Name</b>	<b>Ability to model partial cutting</b>	<b>Assumptions needed to model partial cutting</b>	<b>Limitations of the models For timber supply (TS)</b>	<b>Is the model currently used for Ministry timber supply estimates?</b>	<b>Contact</b>
TASS/TIPSY	Yes for Variable Retention and commercial thinning, No for intimately mixed complex stands	Can be used for predicting variable retention systems with the assumption that there is no further harvest of retained stand component.	No direct simulation of partial cut units but there are approaches and assumptions that have been used to create partial cutting yield tables for TS using custom model runs and post-processing adjustments.	Yes	Mario Di Lucca
Prognosis	Yes for certain BEC site series in mixed species stands	Can only be used in some interior areas/BEC zones	Could be used for TS, but requires stand level data to initiate the model	No	Kevin Astridge
Sortie	Yes for the northeast only	For northeast area only	Does not produce yield table predictions	No	Dave Coates
Mixedwood Growth Model (MGM)	Yes for boreal forests only	For boreal forests only	Best model for TS of boreal mixedwoods	No	Phil Comeau, University of Alberta
VDYP7	No	Can only reduce the estimate of total basal area by the amount removed in a partial cut.	Can approximate residual growth and can estimate regeneration as a separate step, if regeneration site index is known but there is no data to validate its performance if basal area reduction is severe.	Yes	Sam Otukol

## Partial Cutting Challenges

In addition to the numerous reports, handbooks, training material and modifications to growth and yield models to support partial cutting, challenges still exist both provincially and at the local level. More work is needed on:

- stocking standards,
- stumpage appraisal,
- forest health,
- refining stand level growth and yield impacts; and
- validating stand recovery performance after partial cutting.