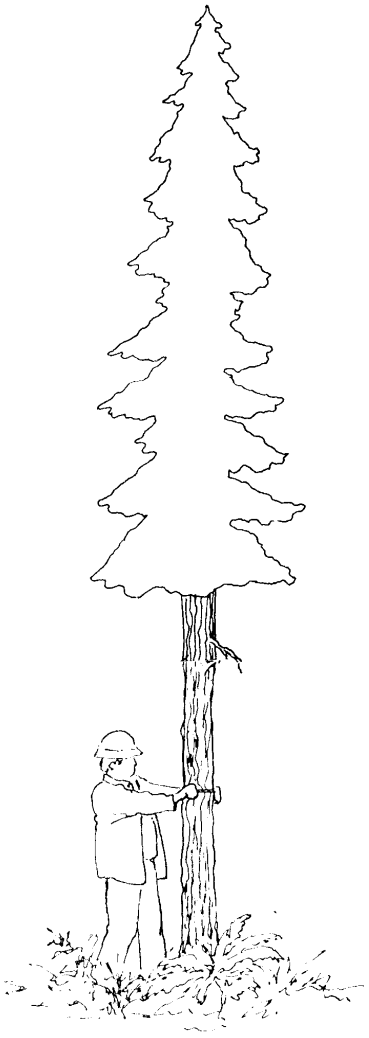
MINISTRY OF FORESTS

Woodlot Licence Inventory Manual



BRITISH COLUMBIA

March, 1999

Published by the Vancouver Forest Region

March 1999, Nanaimo

Funding provided by:

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Acknowledgments

Funding for the preparation of this document is provided by the Vancouver Forest Region and by Forest Renewal BC. David Kilshaw, R.P.F. of the Resources Inventory Branch in Victoria developed the Provincial Guidelines for Woodlot Inventories which are the basis of this manual. The project was initiated by Doug Stewart, R.P.F. and finalized by Paul Tataryn, R.P.F. both in their function as Regional Woodlot Foresters in the Vancouver Forest Region.

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Table of Contents

List of Tables

List if Figures

1 Introduction

This “Woodlot Licence Inventory Manual” is designed for woodlot licensees as defined in the *Forest Act* for the Province of British Columbia. In particular, the manual is designed primarily for woodlot licensees in the Vancouver Forest Region who have had maps developed for their woodlot licence to a 1:5,000 scale.

The objective of this manual is to provide woodlot licence holders (“licensees”) with a standardized procedure which is acceptable to the Ministry of Forests for completing a field inventory of their woodlot licence area. At the very last, this field inventory is designed to collect information to develop accurate polygon labels and stand attributes which reflect the true characteristics of the stands (i.e. species and species distribution, height, age, site index). The updated information is intended to be suitable for determining an annual allowable cut for the woodlot licence.

This manual has been designed in a user friendly format so that, with a little training, most woodlot licensees will be able to complete the inventory themselves. A computer is not necessary to assemble the inventory; however, the use of one will speed up the compilation of the inventory information.

For more information on the use of this manual please contact your Ministry of Forests District office.

2 Basics

2.1 What is an Inventory?

An inventory is a record of items you have in stock. A forest inventory is a record of forest resources in your woodlot. It collects information on things that are important to you as a land manager; this may include information on timber, forest health and growth potential on your woodlot. An accurate inventory of your woodlot is essential if you want to plan and manage your woodlot licence operations in an efficient and cost effective way. As a forest manager you cannot ensure that you are managing the forest resources on your woodlot properly and sustainably until you know what you have and how fast is it growing.

Woodlots contain thousands of trees, often numerous streams and roads, and therefore inventorying an entire woodlot area by counting and measuring every tree is impossible. To solve this problem forest inventory procedures have been developed which use various aids and sampling techniques to give the forest manager a best approximation of what is actually out there. The common forest inventory procedures are air photo interpretation and field sampling.

Air Photo Interpretation:

Aerial photography, which generates basically a picture of the woodlot area taken from a plane, is often the first step in producing an inventory. With the use of aerial photography, inventory specialists can accurately determine the location of roads, streams and hydro lines. In addition, by using stereo pairs of air photos, the woodlot inventory specialists can see a three dimensional view of the woodlot area which will help them to determine contour lines (area of similar elevation) as well as the approximate height of the trees in your woodlot.

Lastly, inventory specialists are able to use aerial photography to group areas of similar characteristics such as areas with similar tree species composition, height, age and growing site or open areas such as rock, lakes and swamps. These areas of similar characteristics are referred to as polygons, and they form the basis for forest management planning and operations.

Field Sampling:

To obtain accurate inventory information, field sampling is required as air photo interpretation alone is often not accurate enough to determine reliable polygon labels and stand attributes which contain information on the height, age, type and productivity of the trees. Field sampling is often the only way to obtain accurate stand information and information on soils, forest health, sensitive areas and other details. By measuring a small portion of a polygon it is possible to get an accurate picture of the entire polygon.

2.2 Why an Inventory is Important?

An accurate inventory of the woodlot licence is important because:

- It tells what is on the woodlot licence.
- It will help to determine what is physically possible and financially realistic in managing the woodlot.
- It will help to set the management plan goals.
- It enables one to determine forest development and the schedule of field operations.
- It forms the basis for determining an accurate annual allowable cut rate (AAC) for your woodlot.

Woodlot licences are expected to be managed sustainably; good inventory data in combination with a detailed long term yield calculation is the most important prerequisite.

An inventory must be seen as a long term investment; it can be considered valid for up to 20 years provided it is updated regularly to account for growth and harvesting. With more sophisticated yield calculation programs becoming available, it will be possible to determine the long term impacts of various management regimes such as incremental silviculture, forest health management and commercial thinning.

A valuable side effect of conducting an inventory is that the woodlot licensee will cover the entire licence area on the ground and mind map all stands and features with their particularity. This usually improves one's ability to plan the management of timber and other forest resources.

Any updating of the existing forest cover information by the licencee will only be acceptable on the basis of an inventory which is in accordance consistent with the procedures in this manual. Even the detailed stand information received with the 1:5000 woodlot maps is not to be used for an AAC calculation if not updated by field inventory.

2.3 What Information is Available?

The Ministry of Forests (MoF) has 1:20,000 forest cover maps for all forested crown land, including woodlots. Stands are mapped on a broad scale and the inventory information was created using aerial photography. This is the default source of information if no further ground work were to be conducted in the woodlot.

Many of the existing woodlot licences in the Vancouver Forest Region were re-mapped to a 1:5,000 scale with 10 meter contour intervals to provide more detailed maps for planning and operations (woodlot maps). With these new maps, the minimum polygon size has been reduced to approximately 1 hectare. Since limited or no ground work was done to produce the stand attribute estimates of these new maps, the stand data is not suitable for an AAC calculation.

Both maps, ie. the MoF forest cover maps and the woodlot maps, show standard MoF polygon labels; this is a compressed representation of the stand attributes. The coding and classification convention is as follows:

Species Composition:	Species are listed in order of their dominance. Each species comprising 20 % or more of the volume is regarded as a major species. Species comprising 10 - 19 % of the volume are minor and are shown in brackets. Species under 10 % are not shown.
Age Class:	20 year age classes up to 140 years, then 141-250, 251+
Height Class:	9m height classes (Class 1 is 0-10.4 meters; Class2 is 10.5 to 19.4 meters; etc.),
Stocking Class:	Number of stems per hectare above a minimum diameter. Estimated to the nearest 100 stems per hectare; class 0 is immature; class 1 is mature, with ≥76 stems/ha of 27.5+ diameter at breast height (1.3 m); class 2 is mature, with <76 stems/ha of 27.5+ cm DBH. Class 3 and 4 are specific for mature stands with Lodgepole Pine as leading species.
Crown Closure:	Amount of ground area 'covered' by the canopy of trees (measured in 10% crown closure classes); 60% crown closure means that 60% of the ground area covered by the canopy of the trees.
Site Index:	Growing potential of the site; it is the estimated average height of the dominant trees of the leading species of the polygon at age 50, measured at breast height.

AGE CLASS

CODE	LIMITS (years)
1	1 - 20
2	21 - 40
3	41 - 60
4	61 - 80
5	81 - 100
6	101 - 120
7	121 - 140
8	141 - 250
9	250 +

HEIGHT CLASS

CODE	LIMITS (m)
1	0.1 - 10.4
2	10.5 - 19.4
3	19.5 - 28.4
4	28.5 - 37.4
5	37.5 - 46.4
6	46.5 - 55.4
7	55.5 - 64.4
8	64.5 +

STOCKING CLASS

CODE	APPLIES to
0	all immature
1-4	all mature

SITE INDEX

All SI are shown to the nearest meter, referenced at 50 years Breast Height Age

CROWN CLOSURE CLASS

CODE	LIMITS (%)
0	0 - 5
1	6-15
2	16-25
3	26-35
4	36-45
5	46-55
6	56-65
7	66-75
8	76-85
9	86-95
10	96-100

FOREST COVER LABEL EXAMPLE:

21 Polygon No.
H(CF) Species Composition
4209-11
4 Age Class
2 Height Class
0 Stocking Class
9 Crown Closure
11 Site Index

Figure 1: Forest Cover Label Codes

Both map types, ie. the forest cover maps and the woodlot maps have corresponding databases containing more detailed stand information for the particular polygons. Still, this data is generated mostly by air photo interpretation and therefore potentially inaccurate.

The field inventory for woodlot licences is designed as a minimum to collect information to develop accurate stand attributes which will reflect the true characteristics of the timber stands (i.e. species distribution, height, age, crown closure, and growing potential). This updated polygon information can be used to determine an annual allowable cut (AAC) for the woodlot licence.

2.4 Compatibility with Provincial Inventory Procedures

2.4.1 Provincial Inventory Procedures for Woodlot Licences

The inventory procedures described in this manual correspond closely with a level 3 inventory as described in the Provincial Inventory Guidelines for Woodlot Licensees developed by the Resource Inventory Branch in Victoria. Highlights of the level 3 inventory are as follows:

- New or existing polygon boundaries.
- Fixed system of plots over the entire woodlot licence.
- "Simple" fixed radius plots or an option to use prism plots in each polygon - maximum of 5 plots per polygon.
- Woodlot map is suitable for the forest development plan and the stand attributes are acceptable for an AAC calculation.

2.4.2 Forest Inventory Manual

The inventory procedures described in this manual were developed using from the phase 2 (Ground Samples) procedures of the Provincial Inventory Manual. Although the procedures for woodlot licences are simplified, the methods of basic measurement and data processing are similar.

The reliability of data generated according to the procedures of this manual is estimated to be lower than the reliability of data generated according to phase 2 procedures of the Provincial Inventory Manual, but higher than the reliability of data derived from air photo interpretation or phase 1 procedures of the Provincial Inventory Manual (air plots and air calls).

2.4.3 Provincial Cruising Manual

The method described in the Provincial Cruising Manual is designed for operational cruises which to determine stand volume and species grades. The systematic sampling procedure of cruising allows one to statistically measure the sampling error. Again, the methods of basic measurement and data processing are similar to the inventory procedures described in this manual.

It is possible to combine a woodlot inventory according to this manual with an operational cruise, if the cruising requirements are met and the cruise plan is approved by the District Cruising Coordinator. Since cruise data is usually valid for 5 years, it may be used for areas which will be developed in the future. Please contact your Ministry of Forests district office for the current cruise requirements.

3 Designing Your Inventory

3.1 Where to Start

Prior to designing the field inventory you must obtain the most recent copy of the map that covers your woodlot licence. This map should be the largest scale available (1: 5,000 if possible), and should have contour lines (areas of similar elevation) and forest cover polygons (areas of similar forest types) delineated.

You should ensure this map has been updated to account for any new development on the woodlot since the map was produced, such as new roads, cutblocks, changes in the boundary of the woodlot licence, etc.

3.2 Organizing the Information

Complete the following on the woodlot map:

- Number all polygons, if not yet numbered.
- Determine the area of each polygon using a dot grid, planimeter, or computer, if not yet determined.
- Check to make sure the sum of the polygons totals the area of the woodlot licence.

3.3 What are Inventory Plots

During the traverse through a particular polygon, observations will be made that help to estimate stand and site attributes. Nevertheless, at predetermined locations inventory plots need to be established and detailed measurements on individual trees must to be conducted. Plots are samples of a sub-population of trees that will be prorated for the polygon area. The plots described in this manual are radial and have a plot center that has to be established with a marked center stake. Since plots represent a larger area than they actually cover, it is important that they are distributed evenly over the polygon.

3.4 Determining Plot Locations

For representative sampling, the plot locations should be established systematically (without bias). The only cases where plots can be moved in the field is when they fall onto a non-productive area, are outside or between polygons, or cannot be established (e.g. water, bluff). Moving plots on the basis of subjective judgment, especially when in the field, will invalidate the representative character of the sampling.

In small areas, generally there will be enough features (e.g. road junctions, creek junctions, bridges, FC, ..) where you can tie your traverse line to. These features are called tie points. Tie points are locations that are identifiable on the map as well as in the field and which are used to locate your traverse lines and plots. In these small areas, your traverse line can zigzag and every second line should be tied into one of these tie points.

In larger areas a “baseline” has to be established first. A baseline is a reference line in the field. This baseline has to be tied on both ends to any obvious tie points. While you are doing the baseline layout, regular intervals (normally every 100m) should be marked. Your inventory traverse lines will start perpendicular to the baseline from these nodes.

For determining plot locations, a plot grid as shown in *Appendix B*: Plot Location Grid can be used. This involves laser copying the template onto a transparent sheet. The plot grid is designed so that each grid line is 100 meters apart on a 1:5,000 scale; therefore, the intersection of two lines will represent a plot location.

Overlay the field map with the clear plot grid and line it up with the cardinal directions (i.e. North, South, East and West). Transfer the plot locations with a 1 plot/ha density onto the map with lead pencil first. Check to see that every polygon has the appropriate number of plots for its polygon size (see Table 1) and remove surplus plots in a systematic manner (every second, every third plot, etc.). If plots fall onto polygon boundaries they can be moved in cardinal directions in increments of 50 m. A buffer of at least 30 m from the edge of the type must be maintained to prevent sampling transition zones. Avoid "clumping plots"; the idea is to have good coverage over the polygon.

Complete the field map by drafting the base line if required, and connecting the plots with traverse lines. Mark your tie points and tie lines, including the point of commencement (P.O.C.) and the plot numbers. Points of commencement are locations that can be identified on the map and in the field; they are generally the start of your traverse and will help you and other people to follow your lines.

The following example shows a layout of traverse lines and plots on a woodlot map. Please note that plot No. 4 falls onto a polygon boundary and needs to be moved along the traverse line to be within a polygon. This correction should be completed before going into the field.

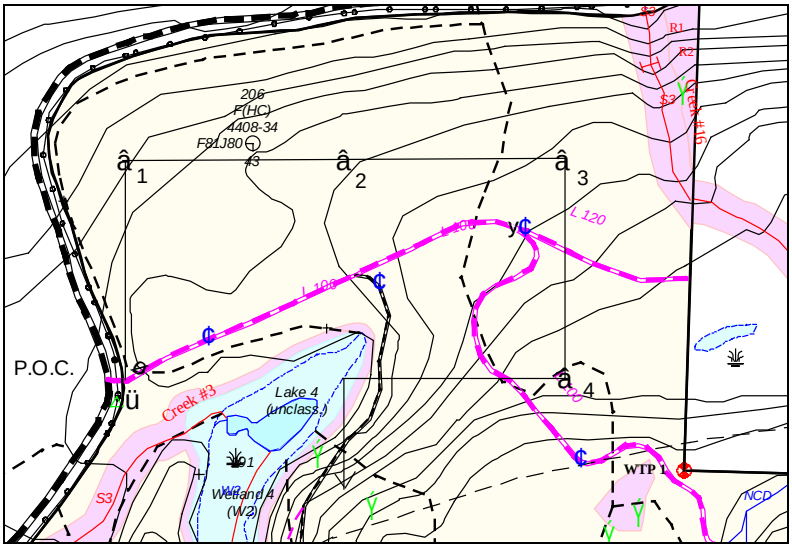


Figure 2: Example of Traverse Line and Plot Layout

3.5 Determining How Many Inventory Plots Are Required

All polygons need to be visited on a traverse line to record estimated stand data, but not all polygons need to have plots established. The effect of small polygons on the AAC is comparably small, so that the systematic sampling requirement will be waived for polygons smaller than 1 hectare. Although polygon delineation of the woodlot map is generally very detailed, it is expected that there will only be a few small polygons.

Table 1: Plot Density Requirements

Polygon Area	Plots per ha	Procedure
smaller than 1 ha	Walk-through	Traverse through polygon and record stand and site data. Measure age and height from 2 representative Top Height Trees
from 1 ha to 4 ha	1 plot per ha	Traverse through polygon and record stand and site data. Measure age and height from 1 Top Height Tree per plot with a minimum of 2 Top Height Trees per polygon
more than 4 ha	4 plots for the first 4 ha and 1 plot per 4 ha thereafter	Traverse through polygon and record stand and site data. Measure age and height from 1 Top Height Tree per plot

While traversing the polygon you should observe the stand characteristics and try to estimate attributes such as crown closure and average stand height as an average for the polygon. Even if you don't have to complete an inventory plot

(polygon < 1 ha), there are mandatory records of data that need to be completed before leaving the polygon. These mandatory estimates also have to be completed if you establish a number of plots in a polygon, since this information will not be collected with the tree measurements in the plot.

3.6 What Equipment is required

The inventory can be conducted with one or two persons. The following equipment list is sufficient for a one person inventory. For orientation and measuring traverse distances you need a forestry grade **compass** (accurate to 2 degrees and with adjustable declination) and a **hipchain** (meter box with spool of cotton thread).

A **clinometer** allows you to convert slope distances to horizontal distance (as per map) and to measure tree heights. With an 16 inch increment borer you will be able to drill and measure the ages of most of the second growth trees. A **tape measure** (50 m) or long logger's tape will help to determine accurate distances for the tree height measurements.

To determine the plot radius you need a **plot cord**, 5.64 m long (or a set of prisms), and a plot cord 3.99 m in length. Finally, you will need a **field book**, a **calculator** with sinus functions, a small ruler, some water proof notepaper, field cards, and lead pencils to record the data. If you use a surveyor's vest you can carry all equipment within reach and work comfortably.

4 Completing Your Inventory

4.1 Traverse and Plot Establishment

From the field map and air photos, find the tie point on the ground and mark it with a metal tag and ribbons (pink and blue). The metal tag must have the following information:

Woodlot Number	W 2000
Traverse Number	1
First polygon number to be sampled	101
Direction in degrees	270°
Distance in meters to the first plot	35 m
Date	99/06/30

The POC and POT must have similar information to the tie point, with their respective changes. The traverse line shall be marked with blue ribbon at intervals of no more than 15 m or less if necessary.

Mark the plot center with a plot center stake, metal tag and ribbon (blue and pink). Make sure to mark the woodlot number, plot number, polygon number, and the date on the metal tag. Proceed with the plot measurement as detailed below.

4.2 Sampling Inventory Plots

The procedures in this manual distinguish between two types of plots: the understorey plot and the main inventory plot. The latter measures merchantable timber and is probably the most common plot used in the inventory. In regenerating stands and in stands where the understorey plays a significant role, understorey plots are necessary.

4.2.1 Understorey Plot

Within the polygon, a decision is to be made whether or not understorey plots are required. A few simple rules may be applied. When the understory is in very poor condition, has fewer than 200 stems/ha, or is distributed in clumps, it can be considered insignificant. Therefore, understorey plots are not required.

If the understory is significant, or if the forest vegetation is in the regeneration stage, understorey plots have to be established. These plots must be fixed radius plots of 3.99 m in radius (50 m^2). The plot centers will be the same as for the plots for the overstorey. Record the information on a Pre-Stand Tending Survey card (FS 748) or a second woodlot inventory plot card counting all commercial species. The classes are: 20 cm to 1.3 m (height), 0 to 2.5 cm (DBH), 2.5 to 7.5 cm (DBH)

and 7.5 to 12.5 cm (DBH). Record layer height, and condition, and measure one Top Height Tree per species.

If the trees are too small to take site index samples from a leading species tree, the Biogeoclimatic Ecosystem Classification (BEC) method as described in the Land Management Handbook No. 28 can be used to determine the site index. Alternatively, this information can be taken from an adjacent similar site with bigger trees or from the stand record of the previous stand (Silviculture Prescription, Site Plan, etc.).

4.2.2 The Main Inventory Plot

Main inventory plots will be established whenever the stand has merchentable timber (>12.5 cm DBH). If the stand structure is single or multi-layered (more than two layers), in both cases only one layer will be sampled and recorded. This top layer (sample layer) will most likely consist of dominant and co-dominant trees and, therefore, will contain the majority of the stand volume. An existing veteran layer could also be described.

If the stand consists of two clearly distinguishable layers, differ more than 10 m in height or 40 years in age, and constitute more than 6 percent of the stand volume, it is justified to sample each layer separately. If two layers are recorded, the crown closure percentages are to be estimated for each layer separately.

4.2.3 Fixed Radius Plots versus Variable Radius Plots

The sampling procedure for the main inventory plot allows either variable-radius plots or fixed-radius plots. Once selected, the plot type and size will be maintained throughout the polygon. Individuals using variable radius plots (prism plots) have to be familiar with the use of prisms or the use of a relascope. For a detailed description of the sampling procedures of variable radius plots, please refer to the Provincial Cruising Manual.

There is only one size of fixed radius plots to be used (5.64 m radius, 100 m^2). Using only one plot size eliminates a potential source of bias which could be introduced if crews change the plot sizes in the field to obtain some desired tree count.

The fixed radius plots are easier to implement in the field, especially for individuals, who are not familiar with operational cruising procedures. The variable radius plots are probably somewhat faster and yield instant stand information. In any case, the required inventory data obtained will be similarly.

4.2.4 Selecting the BAF in Variable Radius Plots

Variable radius plots are sampled by using prisms or a relascope to determine the plot radius depending on the DBH of a particular tree. The larger the DBH, the larger the plot radius for the particular tree. Various prism sizes have various basal

area factors, so that it is possible to select from a set of prisms the one that will sample a particular number of trees in a plot.

The optimum basal area factor (BAF) will result in an average of 4 to 8 live trees per plot. A variable radius plot may have fewer than 4 live trees or more than 8, but over the entire polygon an average of 4 to 8 live trees per plot is desirable.

The sample size should ensure efficient volume and basal area measurements and minimize non-sampling error due to excessive or difficult measurements. In areas with reduced visibility or difficult ground to sample, the BAF size may be increased to reduce the potential for measurement error.

The selected prism size (BAF) should be used throughout the polygon. The selection of this BAF must be determined prior to arrival at the plot centre. One way to select the appropriate BAF is to quickly do tree counts using various prism sizes as you approach the sampling site within the polygon. In areas with restricted visibility, choose a BAF that minimizes the potential of missing trees.

4.2.5 Measuring Borderline Trees "in" and "out"

The objective of the inventory is to correctly determine which trees are within the plot. The procedure will vary by plot type, fixed radius or variable radius plot. The centre of a tree at DBH will be used to check the borderline distance.

Fixed-Radius Plots:

1. Correct all measurements to horizontal distance
2. Use the central point of the tree stem at DBH to determine if the tree is "in" or "out" of the sample. This central point is generally equated with the tree pith.

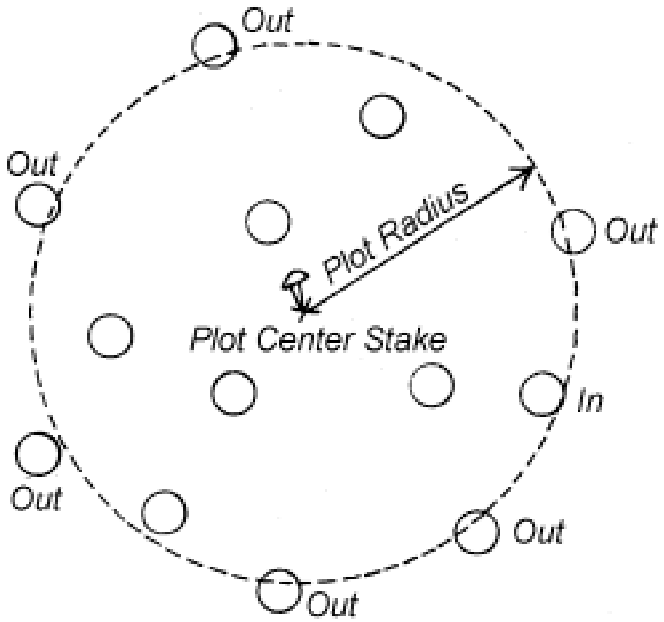


Figure 3: Fixed Radius Plot

Variable-Radius Plots:

Use a prism or relascope to select trees for measurement only when a tree is clearly “in” or “out”. If the observed DBH is not obviously “in” or “out”, measure the tree for DBH and compare the horizontal distance with its plot radius. If you are not able to decide if a tree is “in” or “out,” you must measure it.

Measure the horizontal distance from the plot centre to the centre of the tree at breast height at the side of the tree. Compare the horizontal distance to the calculated plot radius for the tree (DBH * PRF). If the horizontal distance is within the tree plot radius, the tree is “in”. If the horizontal distance is greater than the tree plot radius, the tree is “out”.

The plot radius factor (PRF) is determined as follows:

$$PRF = 0.5 / \sqrt{BAF}$$

where BAF is the prism basal area factor in m^2/ha. The following table gives plot radius factors for a selection of prism basal area factors.

Table 2: Plot Radius Factors for selected Basal Area Factors

BAF	PRF	BAF	PRF	BAF	PRF
3	0.2887	10	0.1581	18	0.1179
4	2.500	11	0.1508	20	0.1118
5	0.2236	12	0.1443	20.25	0.1111
6	0.2041	12.25	0.1429	24	0.1021
6.25	0.2000	13	0.1387	25	0.1000
7	0.1890	14	0.1336	30.25	0.0909
8	0.1768	15	0.1291	32	0.0884
9	0.1667	16	0.1250	64	0.0625

4.2.6 Tree Number

All counted 'in-trees' will be numbered to identify them in the field and on the field cards if cruise tally sheets are used. The plots may be remeasured in the future and are subject to auditing. Numbering the trees in a consistent sequence will enhance the chances of a successful remeasurement check. Trees will be marked (usually with log marking paint) in a way similar to an operational cruise plot.

1. Start numbering the trees from due north of the plot centre on all plots, and proceed in a clockwise direction.
2. Mark all standing and fallen trees with painted numbers on the side facing the plot centre, if possible.
3. On trees too small to be clearly painted, wire a numbered tag to a branch near DBH.
4. Paint an X on trees measured "out". Alternative marking methods may be required when it is not desirable to mark trees with paint or tags.

4.2.7 Tree Species

Assign a species code to all merchantable trees, including dead potential individuals. A list of tree species recognized in the inventory is included in *Appendix C: Tree Species Code.*

4.2.8 Diameter Breast Height (DBH)

Measure and record the diameter of all merchantable live/dead, standing/fallen trees equal to or greater than 12.5 cm DBH. A tree with rot has to be more than 50 % sound in order to be merchantable. If the inventory data is also used for operational cruise purposes, keep an additional tally of trees between 12.0 and 12.5 cm. Also use Cruise Tally Sheets (FS 205).

1. Determine high side ground (HSG) level at the base of the tree.
2. Record the DBH with a tight diameter tape, outside the bark, making no allowance for missing bark. Measure the DBH in cm and tenths at 1.3 metres from the ground on the high side.
3. Alternatively, except for the "Top Height Tree", the DBH may be estimated to the nearest 5 cm class.
4. Paint a line on the tree where DBH was measured, preferably facing the plot centre.

The diameter classes are in 5 cm intervals, beginning with 12.5 cm in the main inventory plot.

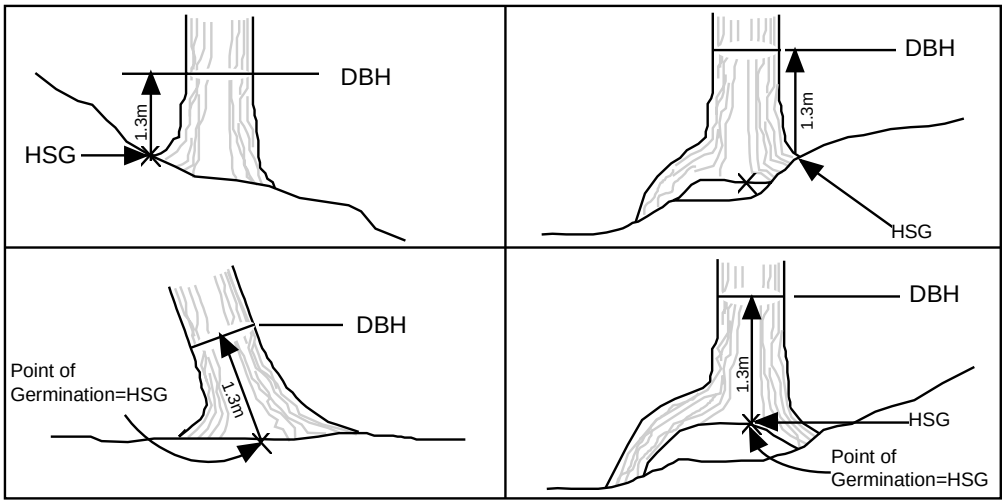


Figure 4: DBH in Relation to High Side Ground (HSG)

4.2.9 Site Index Methods

There are three different methods to determine the site index of a stand; each has its particular application.

- The Site Index method is used in stands older than 30 years breast height age, but not in old growth stands.
- The Growth Intercept method is used in stands between 3 and 30 years breast height age, but tables are not available for all species.
- The Biogeoclimatic Ecosystem Classification (BEC) method is used for stands of less than 3 years breast height age and in old growth stands.

The reliability of these 3 methods varies, with the Site Index method being most and the BEC method being least reliable. The site index tables are included in *Appendix D*, some of which contain the data for the Growth Intercept method.

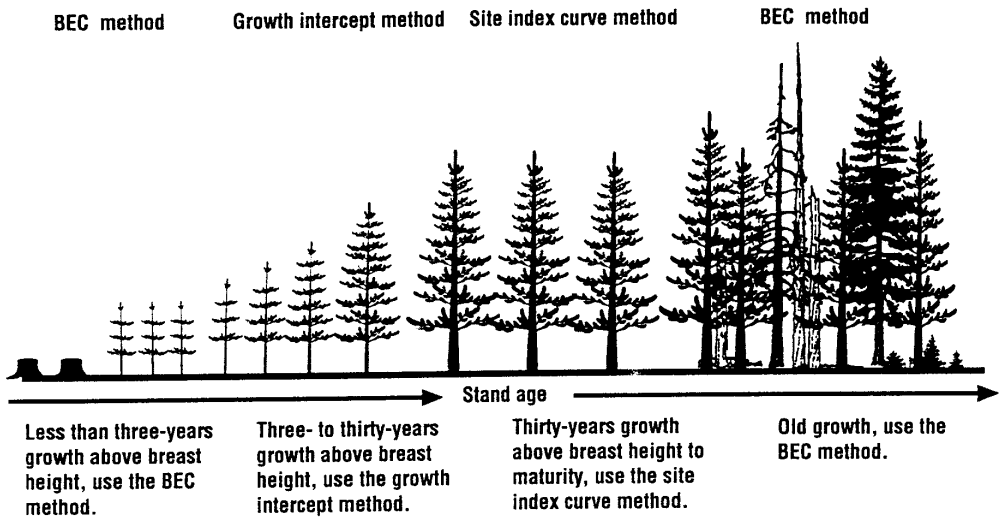


Figure 5: Site Index Methods and Stand Age

There are a number of publications and a Ministry of Forests course about site index determination. The Site Productivity Coordinator of the Resources Inventory Branch can be reached in Victoria at (250) 387-0970.

4.2.10 Top Height Tree

The main purpose of Top Height Tree samples is to determine the site index and the age of a stand. If 2 layers are sampled and described in a polygon, the Top Height Trees for each layer need to be measured separately.

The number of Top Height Trees to be sampled in a polygon is specified in table 1. Nevertheless, sampling more trees in a plot is desirable in order to increase the data reliability and especially when the leading species is in doubt. For the estimate of the average stand height, it helps to use the measured Top Height Tree as a comparison.

The official definition of a Top Height Tree is "the average height of the 100 largest-diameter trees per hectare". For purposes of this inventory, the *Top Height Tree* is defined as the *largest* diameter "suitable" tree on a 100 m^2 (5.64 m radius) plot.

If a "suitable" tree does not exist on the plot, then the nearest suitable tree to the plot center will be selected.

Suitable trees are:

- Of the leading tree species;
- Dominant or codominant trees;
- Standing and live;
- Without damage which significantly affects height growth;
- Not suppressed;
- Not a veteran tree;
- Free of major forks or crooks; dead tops are acceptable only in exceptional circumstances (eg. all trees in a mature cedar stand have broken tops).

If the leading species cannot be accurately assessed, it may be necessary to collect top height data on several species in order to ensure that at the end of the cruise the correct species was selected for top height.

4.2.11 Determining Age of Top Height Trees

Age is an important measurement in cruising because it helps in determining the site index and projected rate of growth. There are the following options for a Breast Height Age count:

1. Determine the age by a ring count from an increment borer core, if possible. The count will be the number of full rings (see Figure 6).
2. Count the whorls above DBH and add one to calculate the age of the tree (see Figure 8).

The pith should be included in Top Height Tree cores as often as possible to ensure accuracy, particularly in stands less than 80 years old. If you can get within a few years of the pith (relative to the tree age) and can confidently estimate the remainder, there is no need to rebore the tree. Record the actual age at the level

where the tree was bored. Adjustments for years to reach that point will be done in the office compilation.

Note: In all cases of Top Height Trees, the length of the Top Height Tree to an unbroken top must be available, since this data is used for site index calculations. On a tree with a small break at the top, always estimate the height to an unbroken top.

On large trees, or trees that have rotten centres, record the age of the sound portion and the length of sound core. Prorate the age to ½ DBH. Be careful to measure only inside bark length along the core (see Figure 7).

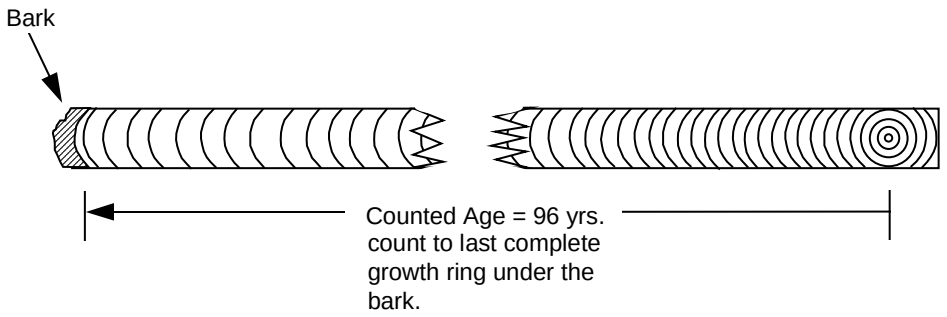


Figure 6: Normal Tree where the Increment Borer can reach the Tree Pith

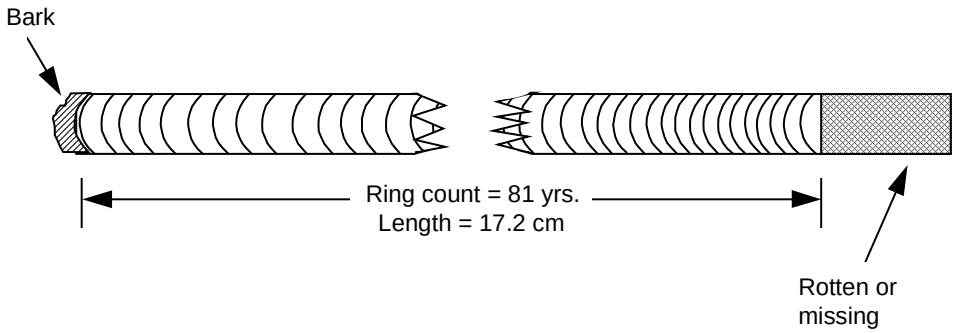


Figure 7: Tree with Rotten or Missing Core

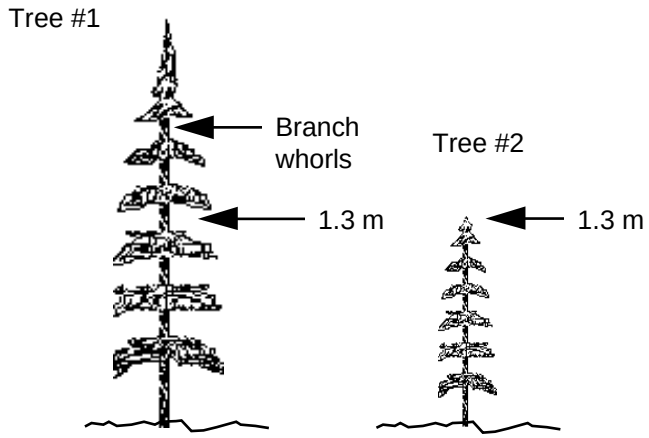


Figure 8: Recording Age using Whorl Count.

The bored age at breast height yields the breast height age, which is the entry value for the site index tables (*Appendix D*). In order to derive the total age for a tree, the years to breast height need to be added to the counted age. In Chapter 5.3.2., Table 5, one can look up the years to breast height, depending on species and site index.

4.2.12 Determining Height of Top Height Trees

The position at which the height reading is taken should preferably be uphill and at a distance that yields not more than 120 % for the top shot. Mark the sampled Top Height Tree with a S painted in the direction of measurement and mark the sample position in the field with flagging. Make sure the breast height mark and the tree top are visible and clearly distinguishable. If a sonic or laser instrument is used, follow the instructions of the manufacturer.

If a clinometer is used, follow this procedure:

1. Measure the distance from the tree centre at breast height to your eye (slope distance, SD).
2. Measure the slope in percent to the breast height of the Top Height Tree (bottom shot, BS).
3. Measure the slope in percent to the tree top (top shot, TS); be aware that the crown form of hardwood trees might obscure the real tree top.

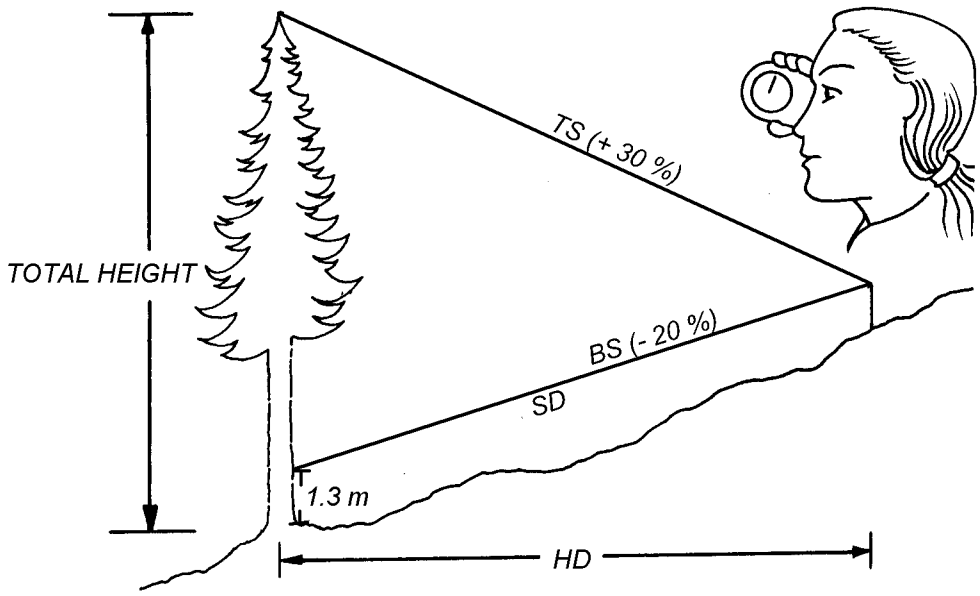


Figure 9: Measurements for Determining Total Tree Height

The following formulas are used to calculate the tree height:

HD = *COS* (*ARCTAN* [BS]) * SD

HEIGHT = HD * (TS - BS) * 0.01 + 1.3

Calculate the horizontal distance (HD) with your calculator:

- enter the value of BS times 0.01,
- press INV (2^{nd} F, or SHIFT),
- press *TAN*,
- press *COS*,
- multiply by your SD value.

Calculate the total height with your calculator:

- multiply HD with the sum of TS and BS (if BS is negative, subtract BS from TS)
- multiply by 0.01 (the result is the tree height starting from breast height)
- add 1.3 to this value.

4.2.13 Crown Class of Top Height Trees

Crown class is a ranking by crown position of a tree in relation to other trees in the immediate area surrounding the tree being measured. The crown class will be useful in future stand management planning.

Table 3: Crown Class Code

Code	Description
D	**Dominant** Trees with crowns that extend above the general level of the trees immediately around the measured trees. They are somewhat taller than the codominant trees, and have well-developed crowns, which may be somewhat crowded on the sides.
C	**Codominant** Trees with crowns forming the general level of the trees immediately around the measured trees. The crown is generally smaller than those of the dominant trees and is usually more crowded on the sides.
I	**Intermediate** Trees with crowns below, but extending into, the general level of the trees immediately around the measured trees. The crowns are usually small and quite crowded on the sides.
S	**Suppressed** Trees with crowns entirely below the general level of the trees around the measured trees.

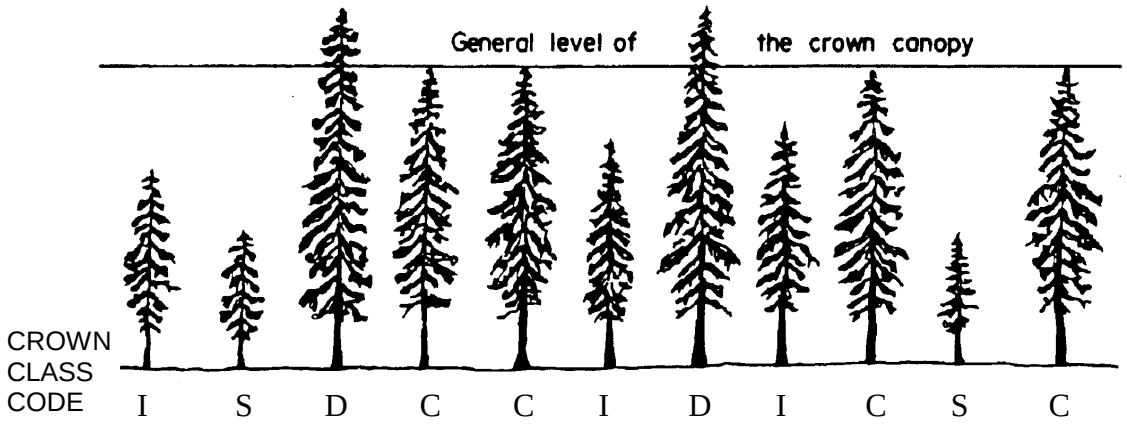


Figure 10: Example of various Crown Classes in a Stand

4.3 Recording Stand and Site Data

4.3.1 Additional Data

The following data is mandatory and must be estimated for each plot (for a polygon, if no plots are sampled):

Species Composition, to nearest 5 percent
Average Stand Height in metres, to nearest 0.1 metres
Crown Closure in percent
Slope in percent, most severe slope to a point 15 metres from the plot centre
Dispersed NP in percent for the entire polygon
Stand Structure:
- a) one, two, or multi-layered (> 10 m height and > 40 years age difference)
- b) even or uneven aged

Uneven aged stands contain trees of every age and the canopy may be broken and irregular. As trees increase in diameter, their numbers diminish throughout the stand. A stand with two separate age classes would most likely be a two layered stand with each layer being even aged.

Dispersed NP refers to non-productive areas in a polygon that are not mappable (too small) and dispersed throughout. This could be rock outcrops or swampy depressions which generate holes in the canopy. Roads, lakes and wetlands, which are shown on a map do not fall into this category.

When estimating the crown closure percent, the dispersed NP does not play a role. The crown closure percent is the area of the polygon covered by the tree canopy. The crown closure estimation guide in *Appendix E* can be used to compare the canopy closure with density figures on the chart.

The following information is optional and can be collected in each polygon:

Terrain (even, rolling gullied, broken)
Slope range in % for polygon or area around plot
Aspect in degree
Soil Depth in cm and Coarse Fragments %
Soil Texture and Humus Form
Brush Severity
Forest Health
Lakes, Streams and Wetlands
Other Resource Values
Limitations to Management
Suitable Harvesting Methods
Silviculture Systems
Recommended Treatments

4.3.2 Field Cards

The plot information can be recorded on Cruise Tally Sheets (FS 205) (preferable if the inventory is conducted in combination with an operational cruise) or Woodlot Inventory Plot Cards, which were developed for the procedures contained in this manual. A plot card template can be found in Appendix A.

The understorey plot information can be recorded on a Pre-Stand Tending Survey card (FS 748) or on a modified Woodlot Inventory Plot card.

LICENCE NO.	LICENSEE	LOCATION	LINE No.	PLOT No.	POLYGON	SURVEYOR	DATE
W 2000	B. FAST	UNIT 2	1	4	205	B. FAST	99/03/15

PLOT TALLY

PLOT RADIUS	PLOT SIZE	PLOT FACTOR	BAF	DBH Limit	LAYER
5.64 m	100 m²	100		12.5 cm	☒ TOP ☐ BOTTOM ☐ REGEN

TREE SPECIES	DBH CLASS 15	20	25	30	35	40	45	50	55	60			BA m²/ha	AVER. HEIGHT	VOL. (m³/ha)
Fd					•	••									
Hw					•										
Cw	•		•												
Dr				•											
TOTAL	1		1	1	2	2					7	700/ha			

TOP HEIGHT TREE DETAILS

TREE No.	HEIGHT (total)	SPECIES CODE	DBH	CROWN CLASS	TOTAL AGE	SI 50	BH AGE	YEARS to BH	Height Calculation: TOP SHOT	BOT. SHOT	TOTAL	SLOPE DIST.	SLOPE %	HORIZ. DIST.	HEIGHT (BH)
2	42.6	Fd	39.8	D	67	38	60	7	95	-10	105	39.5	-10	39.3	41.3
4	43.2	Fd	42.1	D	72	37	65	7	93	-5	98	42.8	-5	42.7	41.9

WOODLOT INVENTORY PLOT CARD 3/99

Figure 11: Example of completed Woodlot Inventory Plot Card

4.4 Checking Standards and Rating

4.4.1 Standards

Species composition:	Correctly identify the leading species and composition.
DBH:	Top Height Tree DBH must be within +/-3%, other trees tallied for density should be within the 5 cm DBH class limits (Table 7A, Field Pocket Manual).
Age:	+/- 5% of 3 years, whichever is greater as determined from the core of annual rings.
Height:	Measured height: +/-5% Estimated height: +/-10%
Missed and extra trees:	+/-1 tree

4.4.2 Rating

Inventory plots must be correctly marked, both on the ground and on the map.

Errors on	**Error Points**
Location on map and ground	1
Tie point well marked on ground	½
Bearing	½
Distance	½
Plot centre marked	1
Missed or extra trees	2
Species composition	2
Age	2
Height	2
Top Height Tree(s) marked	½

More than 2 error points averaged over the entire inventory would fail the field measurements.

5 Compiling Your Inventory

After completing the field sampling of the inventory, it is necessary to organize the information and to compile the data. The following steps have to be completed in this order:

- Update your maps with field information
- Determine which plot belongs to which polygon
- Determine species composition in each polygon
- Get site index for Top Height Trees
- Average the age and site index
- Average the crown closure, dispersed NP, etc.
- Create stand attribute table for all polygons

5.1 Updating the Maps

The first step after completing the field work is to update your maps from the field notes in order to record changes of plot or survey line locations and any polygon boundary corrections. All additional information such as new streams, swamps, steep or unstable terrain, unique features, etc. should be entered soon after returning from the field since many details will be fresh in your memory. Even if the maps will be updated electronically, it is good to summarize all new information first on a single paper copy. During the compilation process, you can then refer to this base map and confirm plot locations, timber types, terrain data, etc.

5.2 Organizing the Plot Cards

The next step will be to group the field cards according to polygons and layers and to establish a reference list that shows which plots are in which polygons. The order of the polygon numbers should be ascending; this will be maintained throughout the entire compilation.

Check if the plot density requirement is achieved and the information on the field cards is complete. The height measurements should be computed for total tree heights if this has not already been done in the field.

5.3 Compiling the Data

The compilation will be completed for each polygon and layer separately. If there is more than one layer sampled in one polygon, the layer information will be kept separate. References made in the following paragraphs to polygons apply to layers accordingly.

The first step is to determine the species composition by basal area. This is a minor variance from the Provincial Inventory Standards, where the species composition is determined by tree height.

There are 4 tables included in *Appendix F: Table Compilation Method* which can be utilized to compile the field data. The following chapters detail the formulas and procedures used for the data compilation.

5.3.1 Species Composition

If variable radius plots were recorded (prism or relascope), the calculation is quite simple. For each tree recorded on the card, take the particular basal area factor (BAF) and add all BAFs of the same species of all plots in one polygon. Divide the sum by the number of plots sampled in this polygon or layer to derive at the basal area (BA in m^2/ha) of a particular species in this polygon. Divide the BA of a particular species by the total BA of all species of all plots in a polygon and multiply with 100 to derive at the percentage of a particular species. Repeat this step for each species.

If fixed radius plots were used, the basal area of each counted tree has to be calculated with the following formula:

$$BA(tree) = \pi * (DBH/2 * 0.01)^2 \qquad \text{units are } m^2$$

The following table shows the relationship between the diameter and the basal area of a tree at diameter class mid point. For simplicity, every tree counted in a particular diameter class will be calculated with the diameter at class mid point.

Table 4: Relationship between Diameter Class Mid Point and Basal Area of Tree

DBH	AREA (m^2)	DBH	AREA (m^2)	DBH	AREA (m^2)
15	0.018	45	0.159	75	0.442
20	0.031	50	0.196	80	0.503
25	0.049	55	0.238	85	0.567
30	0.071	60	0.283	90	0.636
35	0.096	65	0.332	95	0.709
40	0.126	70	0.385	100	0.785

The BA(tree) of all trees of the same species from all plots of the same polygon are to be added together and divided by the total BA(tree) of all trees of all plots. Multiply by 100 in order to derive at the percentage of a particular tree species. If this is completed for all counted tree species in a polygon, the species composition has to add up to 100 %.

Following is an example of a species composition and forest cover label:

Fd65 Hw20 Cw12 Dr3 FH(C)

5.3.2 Top Height (Site Index) Tree

The site index will be determined from the dominant and codominant Top Height Trees of the leading species in a polygon. For each relevant Top Height Tree, look up the site index in the corresponding site index table (*Appendix D: Site Index Tables*).

The breast height age helped to determine the site index value. To get the total age of a Top Height Tree, the years to breast height have to be added to the sampled breast height age. The following table shows the years to breast height for the various species and site indices.

Table 5: Years to Breast Height

Fd	Site Index	≤16	17-22	23-28	29-35	36-41	42-47	≥48			
	Years to bh	11	10	9	8	7	6	5			
Cw	Site Index	≤16	17-22	23-28	29-35	36-41	42-47	≥48			
	Years to bh	11	10	9	8	7	6	5			
Hw	Site Index	≤20	21-27	28-34	35-42	≥43					
	Years to bh	7	6	5	4	3					
Ba	Site Index	≤12	13-14	15-17	18-19	20-21	22-24	25-26	27-29	30-31	≥32
	Years to bh	14	13	12	11	10	9	8	7	6	5
Ss	Site Index	≤11	12-18	19-22	23-28	29-33	34-38	≥39			
	Years to bh	10	9	8	7	6	5	4			
Pl	Site Index	5	6	7	8	9-10	11-14	15-22	≥23		
	Years to bh	14	13	12	11	10	9	8	7		
Act	Site Index	all sites									
	Years to bh	2									
Dr	Site Index	all sites									
	Years to bh	2									

Build the average of the age and site index values of the relevant Top Height Trees in a polygon to derive at the age and site index for this polygon. If the leading species of a stand is different from those provided in the site index tables, it is possible to substitute some species using the following list:

Yc	with	Cw
Hm	with	Hw
Bg	with	Ba
Mb	with	Act

5.3.3 Crown Closure and Dispersed Non-Productive Area

The crown closure and dispersed non-productive area (NP) estimates are to be averaged for each polygon. Crown closure is an important value that effects the stand density factor in the VDYP data base. NP is relevant in determining the "Other Adjustment Factor" (OAF) if TIPSY yield data is used for the AAC calculation. A dispersed NP of 25 % would relate to an OAF of 0.75. VDYP (natural stands) and TIPSY (managed stands) is the yield source data for the AAC calculation.

5.3.4 Completing the Stand Attribute Table

After compiling all polygon data, the stand attribute table is to be completed for each polygon and layer. Two layers in one polygon can be distinguished by adding a letter to the polygon number, eg. 327a, 327b.

Poly #	Operable AREA (ha)	AGE	HT	SITE INDEX	Spec 1	Spec 1 %	Spec 2	Spec 2 %	Spec 3	Spec 3 %	Spec 4	Spec 4 %	Spec 5	Spec 5 %	CR CLOS	NP %
1	16.44	60	20.8	20.8	Fd	97	Mb	3							5	3
3	1.00	25	9.1	21.9	Fd	90	Cw	5	Hw	5					20	10
4	0.69	51	23.1	25.7	Fd	50	Hw	40	Cw	10					70	5
5	1.21	40	16.5	21.5	Fd	95	Pl	5							90	10
6	2.93	25	8.8	21.1	Fd	90	Cw	10							20	5
7	4.84	59	13.3	13.6	Fd	95	Cw	5							40	5
8	5.30	36	14.0	21.5	Fd	95	Pl	5							90	10
9	5.42	57	22.1	22.8	Fd	100									68	10
10	2.44	60	18.2	18.5	Fd	95	Pl	5							70	10
12	1.29	59	29.7	29.4	Fd	95	Cw	3	Hw	2					60	3
13	2.48	63	21.3	20.6	Fd	98	Cw	2							80	0
14	0.81	25	8.8	18.0	Hw	70	Cw	20	Fd	10					50	5
16	18.79	63	21.3	20.6	Fd	98	Cw	2							75	5
17	5.14	47	15.6	18.6	Hw	50	Cw	25	Fd	25					60	10
Total	**68.78**															

Figure 12: Example of Stand Attribute Table

5.3.5 Completing the Stand Data Table

If optional data was collected during the inventory sampling, one table for each polygon can be prepared. This way a reference record exists which will help in future planning and presentation. The inventory data can be projected every 5 years to reflect the stand growth and development.

ID		STAND DESCRIPTION												Record	2
Stand	Area	Tree Species Composition		Age	Height	dbh	Crown Closure	Site Index (ht @ 50 years)	Basal Area	# of stems/ha	Volume	Operab. Area	Total Merch. Volume	MAI	Rotation Age
No.	ha	Spec.	%	yrs	m	cm	%	m	m2/ha	Total	m3/ha	ha	m3	m3/ha/yr	yrs
2	2.17	Fd	45	74	32.0	35.1	65	30.6	46.9	263	536	2.17	1163	7.7	120
Forest Parcel		Cw	45	Notes											
W 2000/C		Pw	5	Light thinning from below, Fd regen present, retain Cw wildlife trees											
Working Group		Mb	5												
I															
Year of Survey															
1998															
Site Type		CWHxm 01		Slope (%)		6		Soil Depth (cm)		100		Brush		M-H	
Elevation (m)		61		Soil Texture		LS		Coarse Frag.(%)		30		Silvi. System		GS	
Aspect (°)		75		Humus Type		Moder		Comp. Hazards		M		Harv. Method		S, GC, H	

* Silviculture Systems: Clearcut (CC), Patch Clearcut (PCC), Shelterwood (SW), Group Selection (GS), Single Tree Selection (STS)

** Harvesting Systems: Highlead (HL), Groundlead (Gc), Skidder, Harvester (S), Horse (H)

Figure 13: Example of Stand Description Table

6 Updating Your Allowable Cut

The **operational** area of each polygon has to be calculated for the AAC calculation in order to include only those areas which are productive and can be realistically managed. This procedure is called net-down and you should try to consider any present and future limitations to your operations.

Common factors which can be measured on a map and netted out per polygon are: riparian reserve zones and other reserves, wildlife tree patches, swamps, lakes, roads and right-of ways, unstable terrain, hydro lines, FENs, gravel pits, inaccessible woodlot portions, etc. If there are areas to be reserved in the future which are can not yet located, it is possible to apply a general net down factor during the AAC calculation.

Poly #	Total Area (ha)	Operable Area within WLL (ha)	Inoper. Area within WLL (ha)	Lakes & Wetlands (ha)	Riparian Reserves (ha)	Road/ Right of Way (ha)	Comments or Class
12	5.5	5.5	0.0				Fd on poor ridgetop stand
22	7.4	6.1	1.3		1.1	0.2	thriving young Fd stand; fish in wetland
35	4.3	3.8	0.5		0.5		Fd at CT age; little root rot
36	1.3	1.3	0.0				marginal Dr stand, wet
37	7.5	7.2	0.3		0.3		healthy mixed stand, wet
38	31.4	30.3	1.1		1.1		Fd at CT age; heavy root rot
39	6.9	0.0	6.9	6.9			W1 wetland, creeks, elk, deer
40	1.3	0.0	1.3	1.3			W2 Hardhack swamp
41	1.3	0.0	1.3	1.3			W2 Swampy, deep pools
42	2.5	1.3	1.2		1.2		essentially wetland, immature Dr
43	1.8	1.6	0.2		0.2		Fd at CT age; little root rot
44	8.8	8.8	0.0				Fd on poor site, high brush (salal)
	80.0	**65.9**	**14.1**	**9.5**	**4.4**	**0.2**	

Figure 14: Example of Area Allocation Table

The completed Stand Attribute Table (Figure 12) contains all necessary data needed for the AAC calculation. There are two ways to enter the data into the 'Woodlot' program:

Manually key-in into the data screen or import a table from a spreadsheet. The latter method is time saving, especially if the data is already entered on a spread sheet. On the other hand, the program would not recognize all possible errors, so that locating the error can become a frustrating exercise. For the novice program user, it is recommended that the data entry screen of the 'woodlot' program be used.

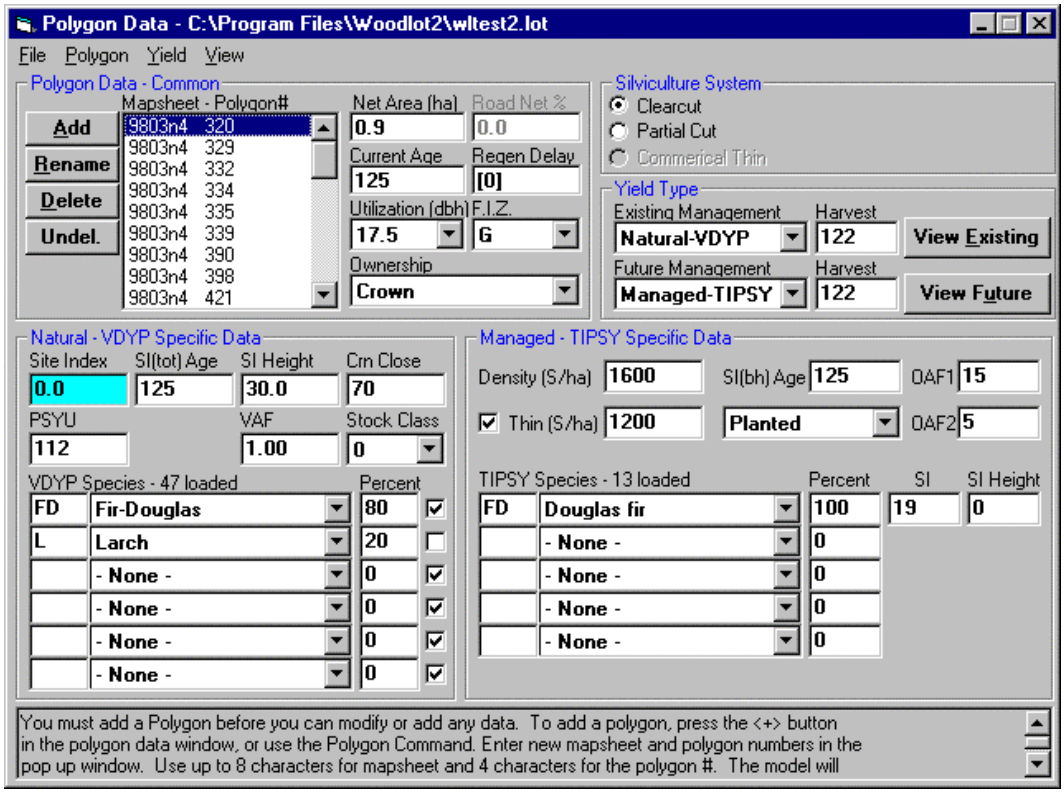


Figure 15: Woodlot Program Data Entry Screen

The use and interpretation of data calculated with the 'woodlot' program involves many variables and considerations. The program is public domain, sponsored by the Ministry of Forests, and can be downloaded from the following website: http://www.enfor.com/software/woodlot/index.htm

For more background information, consult the manual for the 'woodlot' program, which is also available on the Enfor website.

7 Appendices

7.1 Appendix A: Plot Card Template

7.2 Appendix B: Plot Location Grid

7.3 Appendix C: Tree Species Code

7.4 Appendix D: Site Index Tables

7.5 Appendix E: Crown Closure Estimation Guide

7.6 Appendix F: Table Compilation Method

Appendix A: Plot Card Template

LICENCE NO.	LICENSEE	LOCATION	LINE No.	PLOT No.	POLYGON	SURVEYOR	DATE
W							

PLOT TALLY

PLOT RADIUS	PLOT SIZE	PLOT FACTOR	BAF	DBH Limit	LAYER
m	m^2			cm	☐ TOP ☐ BOTTOM ☐ REGEN

TREE SPECIES	DBH CLASS 15	20	25	30	35	40	45	50	55	60			BA m^2/ha	AVER. HEIGHT	VOL. (m^3/ha)
TOTAL															

TOP HEIGHT TREE DETAILS

TREE No.	HEIGHT (total)	SPECIES CODE	DBH	CROWN CLASS	TOTAL AGE	SI 50	BH AGE	YEARS to BH

Height Calculation

TOP SHOT	BOT. SHOT	TOTAL	SLOPE DIST.	SLOPE %	HORIZ. DIST.	HEIGHT (BH)

WOODLOT INVENTORY PLOT CARD 3/99

LICENCE: W	LOCATION:	POLYGON:

POLYGON DETAILS ***MANDATORY***

SPECIES COMPOSITION (%)	AVERAGE STAND HEIGHT (m)	CROWN CLOSURE (%)

SLOPE (%)	DISPERSED NP (%)

STAND STRUCTURE		
☐ SINGLE-LAYERED	☐ 2-LAYERED	☐ MULTI-LAYERED
☐ EVEN AGED	☐ UNEVEN AGED	

ADDITIONAL INFORMATION ***OPTIONAL***

TERRAIN			
☐ EVEN	☐ ROLLING	☐ GULLIED	☐ BROKEN

SLOPE RANGE (%)		ASPECT (°)
MIN:	MAX:	

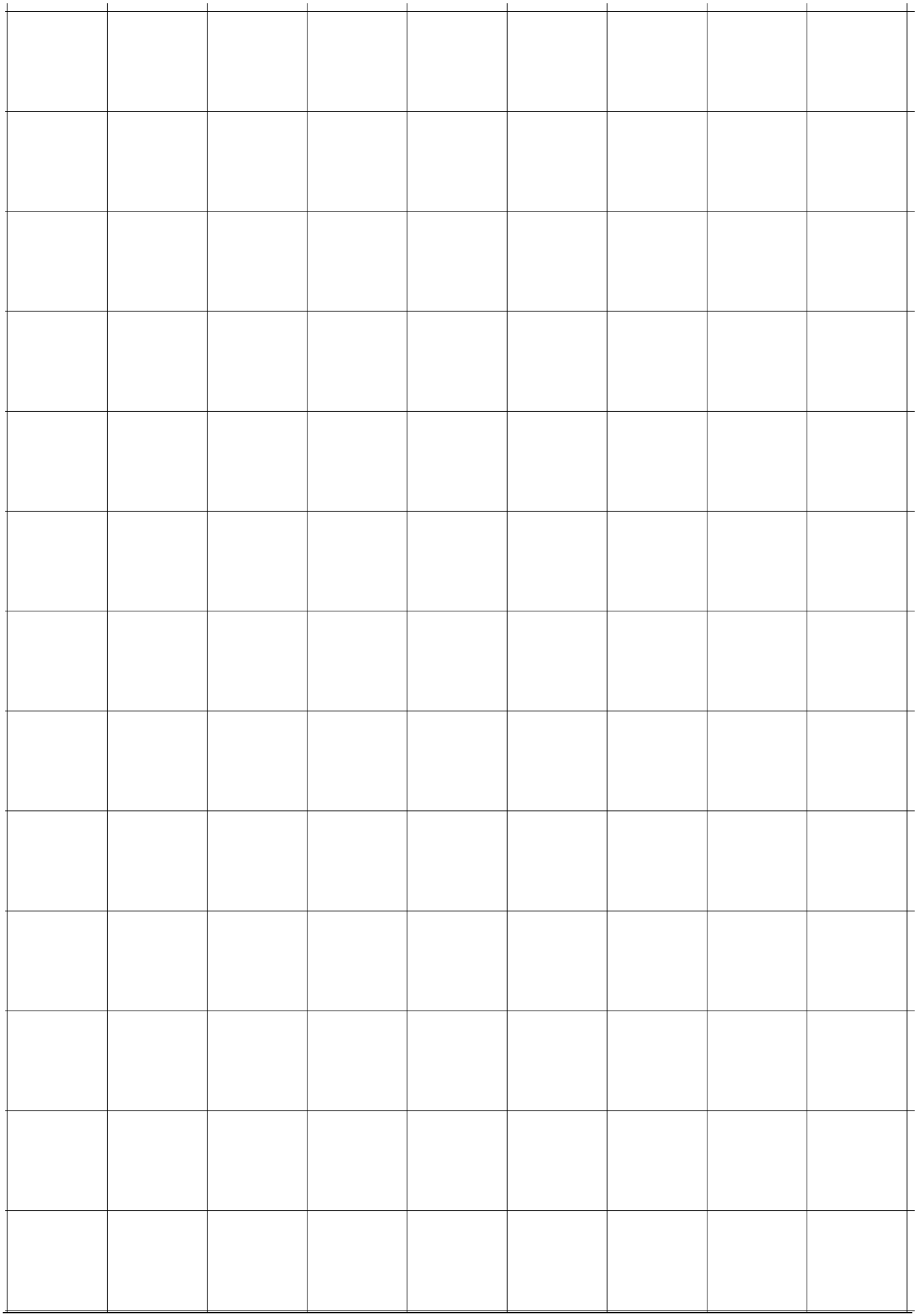
SOIL	
DEPTH (cm):	COARSE FRAGMENTS (%):
TEXTURE:	HUMUS:

BRUSH			
☐ NIL	☐ LOW	☐ MEDIUM	☐ HIGH

COMMENTS ***OPTIONAL***

FOREST HEALTH:	
WATER BODIES:	
OTHER REOURCE VALUES:	
LIMITATIONS TO MANAGEMENT:	
SUITABLE HARVESTING METHODS:	
SILVICULTURE SYSTEMS:	
RECOMMENDED TREATMENTS:	

Appendix B: Plot Location Grid



Appendix C: Tree Species Code

THE B.C. TREE CODE LIST[1,2]
Version 4 **March 1998**

NATIVE CONIFERS

Cedar	***Thuja***	**C**
western redcedar	*Thuja plicata*	Cw
Cypress	***Chamaecyparis***	**Y**
yellow-cedar	*C. nootkatensis*	Yc
Douglas-fir	***Pseudotsuga***	**F**
Douglas-fir	*P. menziesii*	Fd
coastal Douglas-fir	*P. menziesii* var. *menziesii*	Fdc
interior Douglas-fir	*P. menziesii* var. *glauca*	Fdi
Fir (Balsam)	***Abies***	**B**
amabilis fir	*A. amabilis*	Ba
grand fir	*A. grandis*	Bg
subalpine fir	*A. lasiocarpa*	Bl
Hemlock	***Tsuga***	**H**
mountain hemlock	*T. mertensiana*	Hm
western hemlock	*T. heterophylla*	Hw
mountain x western hemlock hybrid	*T. mertensiana* x *heterophylla*	Hxm
Juniper	***Juniperus***	**J**
Rocky Mtn. juniper	*J. scopulorum*	Jr
Larch	***Larix***	**L**
alpine larch	*L. lyallii*	La
tamarack	*L. laricina*	Lt
western larch	*L. occidentalis*	Lw
Pine	***Pinus***	**P**
jack pine	*P. banksiana*	Pj
limber pine	*P. flexilis*	Pf
lodgepole pine	*P. contorta*	Pl
lodgepole pine	*P. contorta* var. *latifolia*	Pli
lodgepole x jack pine hybrid	*P.* x *murraybanksiana*	Pxj
ponderosa pine	*P. ponderosa*	Py
shore pine	*P. contorta* var. *contorta*	Plc
western white pine	*P. monticola*	Pw
whitebark pine	*P. albicaulis*	Pa
Spruce	***Picea***	**S**
black spruce	*P. mariana*	Sb
Engelmann spruce	*P. engelmannii*	Se
Sitka spruce	*P. sitchensis*	Ss
white spruce	*P. glauca*	Sw
spruce hybrid	*Picea* cross	Sx
Engelmann x white	*P. engelmannii* x *glauca*	Sxw
Sitka x white	*P.* x *lutzii*	Sxl

[1] Data Custodian: Director, Research Branch, B.C. Ministry of Forests

[2] Trees are defined as being woody, single stemmed, and capable of growing to greater than 10 m in height.

Sitka x unknown hybrid	*P. sitchensis* x *?*		Sxs
Yew	***Taxus***	**T**	
western yew	*Taxus brevifolia*		Tw

NATIVE HARDWOODS

Alder	***Alnus***	**D**	
red alder	*A. rubra*		Dr
Apple	***Malus***	**U**	
Pacific crab apple	*Malus fusca*		Up
Aspen, Cottonwood or Poplar	***Populus***	**A**	
poplar	*P. balsamifera*		Ac
balsam poplar	*P. b.* ssp. *balsamifera*		Acb
black cottonwood	*P. b.* ssp. *trichocarpa*		Act
hybrid poplars	*P.* spp.		Ax
trembling aspen	*P. tremuloides*		At
Arbutus	***Arbutus***	**R**	
Arbutus	*Arbutus menziesii*		Ra
Birch	***Betula***	**E**	
Alaska paper birch	*B. neoalaskana*		Ea
Alaska x paper birch hybrid	*B.* x *winteri*		Exp
paper birch	*B. papyrifera*		Ep
water birch	*B. occidentalis*		Ew
Cascara	***Rhamnus***	**K**	
cascara	*R. purshiana*		Kc
Cherry	***Prunus***	**V**	
bitter cherry	*P. emarginata*		Vb
choke cherry	*P. virginiana*		Vv
pin cherry	*P. pensylvanica*		Vp
Dogwood	***Cornus***	**G**	
Pacific dogwood	*Cornus nuttallii*		Gp
Maple	***Acer***	**M**	
bigleaf maple	*A. macrophyllum*		Mb
vine maple	*A. circinatum*		Mv
Oak	***Quercus***	**Q**	
Garry oak	*Q. garryana*		Qg
Willow	***Salix* spp.**	**W**	
Bebb's willow	*S. bebbiana*		Wb
Pacific willow	*S. lucida*		Wp
peachleaf willow	*S. amygdaloides*		Wa
pussy willow	*S. discolor*		Wd
Scouler's willow	*S. scouleriana*		Ws
Sitka willow	*S. sitchensis*		Wt

Appendix D: Site Index Tables

Coastal species: Fd - Coastal Douglas-fir

Site index equation: Bruce (1981)

Date: Jan 27, 1999

Substituting growth intercept curves for ages 1-30

bh age	Top height (m)																													bh age
(years)	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	(years)
	Site Index (m)																														
5	14	32	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
10	7	17	26	33	40	47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
15	5	11	17	23	28	33	38	43	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
20	4	9	13	18	22	26	30	34	38	41	45	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
25	3	7	11	14	18	21	25	28	31	35	38	41	44	47	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25
30	3	6	9	12	15	18	21	24	27	30	33	35	38	41	44	46	49	-	-	-	-	-	-	-	-	-	-	-	-	-	30
35	2	5	7	10	12	15	17	20	23	25	28	30	33	35	38	41	43	46	49	-	-	-	-	-	-	-	-	-	-	-	35
40	-	4	7	9	11	14	16	18	21	23	25	28	30	32	35	37	39	42	44	46	49	-	-	-	-	-	-	-	-	-	40
45	-	4	6	8	11	13	15	17	19	21	23	26	28	30	32	34	36	39	41	43	45	47	49	-	-	-	-	-	-	-	45
50	-	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	-	-	-	-	-	50
55	-	4	6	8	10	11	13	15	17	19	21	23	25	27	28	30	32	34	36	38	40	42	43	45	47	49	-	-	-	-	55
60	-	4	6	7	9	11	13	15	16	18	20	22	23	25	27	29	31	32	34	36	38	39	41	43	45	47	48	50	-	-	60
65	-	4	5	7	9	11	12	14	16	17	19	21	23	24	26	28	29	31	33	34	36	38	39	41	43	44	46	48	49	-	65
70	-	4	5	7	9	10	12	13	15	17	18	20	22	23	25	27	28	30	32	33	35	36	38	40	41	43	44	46	47	49	70
75	-	4	5	7	8	10	11	13	15	16	18	19	21	23	24	26	27	29	31	32	34	35	37	38	40	41	43	44	46	47	75
80	-	4	5	7	8	10	11	13	14	16	17	19	20	22	24	25	27	28	30	31	33	34	36	37	39	40	42	43	44	46	80
85	-	3	5	6	8	9	11	12	14	15	17	18	20	21	23	24	26	27	29	30	32	33	35	36	38	39	40	42	43	45	85
90	-	3	5	6	8	9	11	12	14	15	17	18	19	21	22	24	25	27	28	30	31	32	34	35	37	38	39	41	42	43	90
95	-	-	5	6	8	9	10	12	13	15	16	18	19	20	22	23	25	26	28	29	30	32	33	34	36	37	39	40	41	42	95
100	-	-	5	6	8	9	10	12	13	14	16	17	19	20	21	23	24	26	27	28	30	31	32	34	35	36	38	39	40	42	100
105	-	-	5	6	7	9	10	11	13	14	16	17	18	20	21	22	24	25	27	28	29	31	32	33	34	36	37	38	40	41	105
110	-	-	5	6	7	9	10	11	13	14	15	17	18	19	21	22	23	25	26	27	29	30	31	33	34	35	36	38	39	40	110
115	-	-	5	6	7	9	10	11	12	14	15	16	18	19	20	22	23	24	26	27	28	30	31	32	33	35	36	37	38	39	115
120	-	-	5	6	7	8	10	11	12	14	15	16	17	19	20	21	23	24	25	27	28	29	30	32	33	34	35	36	38	39	120
125	-	-	5	6	7	8	10	11	12	13	15	16	17	18	20	21	22	24	25	26	27	29	30	31	32	34	35	36	37	38	125
130	-	-	5	6	7	8	9	11	12	13	14	16	17	18	20	21	22	23	25	26	27	28	30	31	32	33	34	36	37	38	130
135	-	-	4	6	7	8	9	11	12	13	14	16	17	18	19	21	22	23	24	26	27	28	29	30	32	33	34	35	36	37	135
140	-	-	-	6	7	8	9	10	12	13	14	15	17	18	19	20	22	23	24	25	26	28	29	30	31	32	34	35	36	37	140
145	-	-	-	-	7	8	9	10	12	13	14	15	16	18	19	20	21	23	24	25	26	27	29	30	31	32	33	34	35	37	145
150	-	-	-	-	7	8	9	10	11	13	14	15	16	17	19	20	21	22	24	25	26	27	28	29	31	32	33	34	35	36	150

Coastal species: Cw - Western Redcedar

Site index equation: Kurucz (1985)

Date :Jan 27, 1999

bh age (years)	Top height (m) 2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	bh age (years)
	Site Index (m)																														
5	9	26	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
10	5	14	22	29	36	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
15	4	10	15	21	26	31	35	40	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
20	3	7	12	16	20	24	28	32	36	40	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
25	3	6	10	13	17	20	24	27	30	33	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25
30	2	5	9	12	15	18	20	23	26	29	32	35	38	40	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30
35	2	5	8	10	13	16	18	21	23	26	28	31	34	36	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35
40	2	5	7	9	12	14	16	19	21	23	26	28	30	33	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40
45	2	4	6	9	11	13	15	17	19	22	24	26	28	30	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45
50	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	-	-	-	-	-	-	-	50
55	2	4	6	8	9	11	13	15	17	19	21	23	24	26	28	30	32	34	36	38	40	41	43	-	-	-	-	-	-	-	55
60	2	4	5	7	9	11	12	14	16	18	20	21	23	25	27	28	30	32	34	36	37	39	41	-	-	-	-	-	-	-	60
65	2	4	5	7	9	10	12	14	15	17	19	20	22	24	25	27	29	30	32	34	36	37	39	-	-	-	-	-	-	-	65
70	2	3	5	7	8	10	11	13	15	16	18	19	21	23	24	26	28	29	31	32	34	36	37	-	-	-	-	-	-	-	70
75	2	3	5	6	8	9	11	12	14	15	17	19	20	22	23	25	26	28	30	31	33	34	36	-	-	-	-	-	-	-	75
80	2	3	5	6	8	9	11	12	13	15	16	18	19	21	22	24	25	27	29	30	32	33	35	-	-	-	-	-	-	-	80
85	2	3	5	6	7	9	10	12	13	14	16	17	19	20	22	23	25	26	28	29	31	32	34	-	-	-	-	-	-	-	85
90	2	3	4	6	7	9	10	11	13	14	15	17	18	20	21	22	24	25	27	28	30	31	33	-	-	-	-	-	-	-	90
95	2	3	4	6	7	8	10	11	12	14	15	16	18	19	20	22	23	25	26	27	29	30	32	-	-	-	-	-	-	-	95
100	2	3	4	6	7	8	9	11	12	13	15	16	17	19	20	21	23	24	25	27	28	29	31	-	-	-	-	-	-	-	100
105	2	3	4	5	7	8	9	10	12	13	14	16	17	18	19	21	22	23	25	26	27	29	30	-	-	-	-	-	-	-	105
110	2	3	4	5	7	8	9	10	11	13	14	15	16	18	19	20	22	23	24	25	27	28	29	-	-	-	-	-	-	-	110
115	2	3	4	5	6	8	9	10	11	12	14	15	16	17	19	20	21	22	24	25	26	28	29	-	-	-	-	-	-	-	115
120	2	3	4	5	6	7	9	10	11	12	13	15	16	17	18	19	21	22	23	24	26	27	28	-	-	-	-	-	-	-	120
125	2	3	4	5	6	7	8	10	11	12	13	14	16	17	18	19	20	22	23	24	25	26	28	-	-	-	-	-	-	-	125
130	2	3	4	5	6	7	8	9	11	12	13	14	15	16	18	19	20	21	22	24	25	26	27	-	-	-	-	-	-	-	130
135	2	3	4	5	6	7	8	9	10	12	13	14	15	16	17	18	20	21	22	23	24	26	27	-	-	-	-	-	-	-	135
140	2	3	4	5	6	7	8	9	10	11	13	14	15	16	17	18	19	21	22	23	24	25	26	-	-	-	-	-	-	-	140
145	2	3	4	5	6	7	8	9	10	11	12	13	15	16	17	18	19	20	21	23	24	25	26	-	-	-	-	-	-	-	145
150	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	25	26	-	-	-	-	-	-	-	150

Coastal species: Hw - Western Hemlock

Site index equation: Wiley (1978)

Date: Jan 27, 1999

Substituting growth intercept curves for ages 1-30

bh age	Top height (m)																													bh age
(years)	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	(years)
	Site Index (m)																														
5	15	31	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
10	8	19	27	34	40	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
15	5	13	19	24	29	34	38	42	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
20	4	10	15	19	23	27	30	34	37	40	43	46	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
25	3	8	12	16	19	22	25	28	31	34	37	39	42	44	47	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25
30	2	6	10	13	16	19	22	24	27	30	32	35	38	40	42	45	47	50	-	-	-	-	-	-	-	-	-	-	-	-	30
35	2	5	8	11	13	16	19	21	24	26	29	31	34	36	38	41	43	45	47	49	-	-	-	-	-	-	-	-	-	-	35
40	-	5	7	10	12	14	17	19	21	24	26	28	31	33	35	37	39	41	44	46	48	-	-	-	-	-	-	-	-	-	40
45	-	4	6	9	11	13	15	17	20	22	24	26	28	30	32	34	36	39	41	43	45	-	-	-	-	-	-	-	-	-	45
50	-	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	-	-	-	-	-	-	50
55	-	4	6	7	9	11	13	15	17	19	21	22	24	26	28	30	32	34	36	38	40	42	44	46	48	49	-	-	-	-	55
60	-	4	5	7	9	10	12	14	16	17	19	21	23	25	27	28	30	32	34	36	38	40	41	43	45	47	49	-	-	-	60
65	-	3	5	7	8	10	12	13	15	17	18	20	22	23	25	27	29	30	32	34	36	38	40	41	43	45	47	49	-	-	65
70	-	3	5	6	8	9	11	13	14	16	17	19	21	22	24	26	27	29	31	33	34	36	38	40	42	43	45	47	49	-	70
75	-	-	5	6	8	9	10	12	13	15	17	18	20	21	23	24	26	28	29	31	33	35	36	38	40	42	44	46	47	49	75
80	-	-	4	6	7	9	10	11	13	14	16	17	19	20	22	24	25	27	28	30	32	33	35	37	39	40	42	44	46	48	80
85	-	-	4	6	7	8	10	11	12	14	15	17	18	20	21	23	24	26	27	29	31	32	34	36	37	39	41	43	45	46	85
90	-	-	4	5	7	8	9	11	12	13	15	16	17	19	20	22	23	25	26	28	30	31	33	35	36	38	40	41	43	45	90
95	-	-	4	5	6	8	9	10	12	13	14	16	17	18	20	21	23	24	26	27	29	30	32	33	35	37	39	40	42	44	95
100	-	-	4	5	6	7	9	10	11	12	14	15	16	18	19	20	22	23	25	26	28	29	31	33	34	36	38	39	41	43	100
105	-	-	4	5	6	7	8	10	11	12	13	15	16	17	19	20	21	23	24	26	27	29	30	32	33	35	37	38	40	42	105
110	-	-	4	5	6	7	8	9	11	12	13	14	15	17	18	19	21	22	24	25	26	28	29	31	33	34	36	37	39	41	110
115	-	-	4	5	6	7	8	9	10	11	13	14	15	16	18	19	20	22	23	24	26	27	29	30	32	33	35	37	38	40	115
120	-	-	4	5	6	7	8	9	10	11	12	14	15	16	17	18	20	21	22	24	25	27	28	30	31	33	34	36	38	39	120
125	-	-	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	21	22	23	25	26	27	29	30	32	34	35	37	38	125
130	-	-	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	23	24	26	27	28	30	31	33	34	36	38	130
135	-	-	3	4	5	6	7	8	9	10	12	13	14	15	16	17	19	20	21	22	24	25	26	28	29	31	32	34	35	37	135
140	-	-	3	4	5	6	7	8	9	10	11	12	14	15	16	17	18	19	21	22	23	25	26	27	29	30	32	33	35	36	140
145	-	-	-	4	5	6	7	8	9	10	11	12	13	14	16	17	18	19	20	22	23	24	25	27	28	30	31	33	34	36	145
150	-	-	-	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	24	25	26	28	29	31	32	34	35	150

Coastal species: Ba - Amabilis Fir

Site index equation: Kurucz (1982)

Date : Jan 27, 1999

bh age (years)	Top height (m) 2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	bh age (years)
	Site Index (m)																														
5	15	31	40	47	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
10	8	17	24	31	36	41	45	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
15	5	12	17	22	27	31	35	38	42	45	48	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
20	4	9	13	18	21	25	29	32	35	38	41	43	46	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
25	4	7	11	15	18	21	24	27	30	33	36	38	41	43	45	48	50	-	-	-	-	-	-	-	-	-	-	-	-	-	25
30	3	6	9	13	15	18	21	24	26	29	32	34	36	39	41	43	45	48	50	-	-	-	-	-	-	-	-	-	-	-	30
35	3	6	8	11	14	16	19	21	24	26	28	31	33	35	38	40	42	44	46	48	-	-	-	-	-	-	-	-	-	-	35
40	3	5	8	10	12	15	17	19	21	24	26	28	30	32	35	37	39	41	43	45	47	-	-	-	-	-	-	-	-	-	40
45	3	5	7	9	11	13	15	18	20	22	24	26	28	30	32	34	36	38	40	42	44	-	-	-	-	-	-	-	-	-	45
50	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	-	-	-	-	-	50
55	2	4	6	7	9	11	13	15	17	19	21	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	-	-	-	-	55
60	2	4	5	7	9	10	12	14	16	18	19	21	23	25	27	29	30	32	34	36	38	40	42	44	46	48	50	-	-	-	60
65	-	3	5	7	8	10	12	13	15	17	18	20	22	24	25	27	29	31	33	35	36	38	40	42	44	46	48	50	-	-	65
70	-	3	5	6	8	9	11	13	14	16	17	19	21	22	24	26	28	29	31	33	35	37	39	41	43	45	47	49	-	-	70
75	-	3	5	6	7	9	10	12	13	15	17	18	20	21	23	25	27	28	30	32	34	36	37	39	41	43	45	47	49	-	75
80	-	-	4	6	7	9	10	11	13	14	16	17	19	21	22	24	25	27	29	31	32	34	36	38	40	42	44	46	48	50	80
85	-	-	4	6	7	8	10	11	12	14	15	17	18	20	21	23	25	26	28	30	31	33	35	37	39	41	43	45	47	49	85
90	-	-	4	5	7	8	9	11	12	13	15	16	18	19	21	22	24	25	27	29	30	32	34	36	38	40	41	43	46	48	90
95	-	-	-	5	6	8	9	10	11	13	14	16	17	18	20	21	23	24	26	28	29	31	33	35	37	38	40	42	44	47	95
100	-	-	-	5	6	7	9	10	11	12	14	15	16	18	19	21	22	24	25	27	29	30	32	34	36	37	39	41	43	45	100
105	-	-	-	5	6	7	8	9	11	12	13	15	16	17	19	20	22	23	25	26	28	29	31	33	35	37	38	40	42	45	105
110	-	-	-	-	6	7	8	9	10	12	13	14	15	17	18	19	21	22	24	25	27	29	30	32	34	36	38	40	42	44	110
115	-	-	-	-	6	7	8	9	10	11	12	14	15	16	18	19	20	22	23	25	26	28	30	31	33	35	37	39	41	43	115
120	-	-	-	-	-	7	8	9	10	11	12	13	15	16	17	18	20	21	23	24	26	27	29	31	32	34	36	38	40	42	120
125	-	-	-	-	-	6	7	8	10	11	12	13	14	15	17	18	19	21	22	24	25	27	28	30	32	33	35	37	39	41	125
130	-	-	-	-	-	-	7	8	9	10	12	13	14	15	16	18	19	20	22	23	25	26	28	29	31	33	35	36	38	40	130
135	-	-	-	-	-	-	-	8	9	10	11	12	14	15	16	17	18	20	21	23	24	26	27	29	30	32	34	36	38	40	135
140	-	-	-	-	-	-	-	-	9	10	11	12	13	14	16	17	18	19	21	22	24	25	27	28	30	32	33	35	37	39	140
145	-	-	-	-	-	-	-	-	-	10	11	12	13	14	15	16	18	19	20	22	23	25	26	28	29	31	33	35	36	38	145
150	-	-	-	-	-	-	-	-	-	-	11	12	13	14	15	16	17	19	20	21	23	24	26	27	29	30	32	34	36	38	150

Coastal species: Ss - Sitka Spruce

Site index equation: Nigh (1997)

Date: Jan 27, 1999

Substituting growth intercept curves for ages 1-30

bh age (years)	Top height (m) 2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	bh age (years)
	Site Index (m)																														
5	15	33	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
10	10	22	29	35	41	45	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
15	7	15	21	26	31	35	39	43	46	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
20	4	11	16	20	24	28	32	35	38	41	45	48	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
25	3	8	12	16	19	23	26	29	32	35	38	41	44	46	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25
30	2	6	10	13	16	19	22	25	28	30	33	35	38	40	43	45	48	50	-	-	-	-	-	-	-	-	-	-	-	-	30
35	2	6	8	11	14	17	19	22	24	27	29	32	34	37	39	41	44	46	48	50	-	-	-	-	-	-	-	-	-	-	35
40	-	5	7	10	12	15	17	20	22	24	26	29	31	33	35	38	40	42	44	46	48	-	-	-	-	-	-	-	-	-	40
45	-	4	7	9	11	13	15	18	20	22	24	26	28	30	32	35	37	39	41	43	45	47	49	-	-	-	-	-	-	-	45
50	-	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	-	-	-	-	-	50
55	-	-	5	7	9	11	13	15	17	18	20	22	24	26	28	30	32	34	36	38	40	42	43	45	47	49	-	-	-	-	55
60	-	-	5	7	8	10	12	14	15	17	19	21	23	24	26	28	30	32	34	36	37	39	41	43	45	47	49	-	-	-	60
65	-	-	-	6	8	9	11	13	14	16	18	19	21	23	25	26	28	30	32	34	36	38	39	41	43	45	47	49	-	-	65
70	-	-	-	6	7	9	10	12	13	15	17	18	20	22	23	25	27	29	30	32	34	36	38	40	41	43	45	47	49	-	70
75	-	-	-	5	7	8	10	11	13	14	16	17	19	21	22	24	26	27	29	31	33	34	36	38	40	42	44	45	47	49	75
80	-	-	-	-	6	8	9	10	12	13	15	16	18	20	21	23	24	26	28	30	31	33	35	37	39	40	42	44	46	48	80
85	-	-	-	-	6	7	9	10	11	13	14	16	17	19	20	22	23	25	27	29	30	32	34	36	37	39	41	43	45	46	85
90	-	-	-	-	-	7	8	9	11	12	13	15	16	18	19	21	23	24	26	27	29	31	33	34	36	38	40	42	43	45	90
95	-	-	-	-	-	-	8	9	10	11	13	14	16	17	19	20	22	23	25	27	28	30	32	33	35	37	39	41	42	44	95
100	-	-	-	-	-	-	7	8	10	11	12	14	15	16	18	19	21	22	24	26	27	29	31	33	34	36	38	40	41	43	100
105	-	-	-	-	-	-	7	8	9	10	12	13	14	16	17	19	20	22	23	25	27	28	30	32	33	35	37	39	41	42	105
110	-	-	-	-	-	-	-	8	9	10	11	12	14	15	17	18	20	21	23	24	26	28	29	31	33	34	36	38	40	42	110
115	-	-	-	-	-	-	-	7	8	10	11	12	13	15	16	17	19	20	22	24	25	27	29	30	32	34	35	37	39	41	115
120	-	-	-	-	-	-	-	-	8	9	10	12	13	14	16	17	18	20	21	23	25	26	28	30	31	33	35	36	38	40	120
125	-	-	-	-	-	-	-	-	-	9	10	11	12	14	15	16	18	19	21	22	24	26	27	29	31	32	34	36	38	39	125
130	-	-	-	-	-	-	-	-	-	-	10	11	12	13	15	16	17	19	20	22	23	25	27	28	30	32	34	35	37	39	130
135	-	-	-	-	-	-	-	-	-	-	-	10	12	13	14	16	17	18	20	21	23	25	26	28	30	31	33	35	36	38	135
140	-	-	-	-	-	-	-	-	-	-	-	-	11	13	14	15	16	18	19	21	22	24	26	27	29	31	32	34	36	38	140
145	-	-	-	-	-	-	-	-	-	-	-	-	-	12	13	15	16	17	19	20	22	24	25	27	29	30	32	34	35	37	145
150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	14	16	17	19	20	22	23	25	26	28	30	31	33	35	37	150

Interior species: Pl - Lodgepole Pine

Site index equation: Goudie (1984) (dry site)

Date: Jan 27, 1999

Substituting growth intercept curves for ages 1-30

bh age (years)	Top height (m) 2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	bh age (years)
	Site Index (m)																														
5	12	23	30	36	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
10	8	15	20	25	29	32	35	38	41	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
15	6	11	16	20	23	26	29	32	35	37	39	42	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
20	4	9	13	16	19	22	25	28	30	33	35	37	40	42	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
25	4	8	11	14	17	20	22	25	27	29	32	34	36	38	40	42	44	-	-	-	-	-	-	-	-	-	-	-	-	-	25
30	3	6	9	12	15	17	20	22	25	27	29	31	34	36	38	40	42	44	-	-	-	-	-	-	-	-	-	-	-	-	30
35	2	5	8	10	13	15	18	20	22	24	27	29	31	33	35	37	40	42	44	-	-	-	-	-	-	-	-	-	-	-	35
40	-	5	7	9	12	14	16	18	21	23	25	27	29	31	33	35	37	39	41	44	-	-	-	-	-	-	-	-	-	-	40
45	-	4	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	38	40	42	44	-	-	-	-	-	-	-	-	-	45
50	-	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	-	-	-	-	-	-	-	-	50
55	-	4	6	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	-	-	-	-	-	-	-	55
60	-	4	5	7	9	11	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	41	43	45	-	-	-	-	-	-	60
65	-	3	5	7	8	10	12	14	15	17	19	21	23	25	27	29	31	33	35	37	39	40	42	44	-	-	-	-	-	-	65
70	-	-	5	6	8	10	11	13	15	17	19	20	22	24	26	28	30	32	34	36	38	40	42	44	-	-	-	-	-	-	70
75	-	-	4	6	7	9	11	12	14	16	18	20	22	23	25	27	29	31	33	35	37	39	41	43	45	-	-	-	-	-	75
80	-	-	4	6	7	9	10	12	14	16	17	19	21	23	25	27	29	30	32	34	36	38	40	42	44	-	-	-	-	-	80
85	-	-	4	5	7	8	10	12	13	15	17	19	20	22	24	26	28	30	32	34	36	38	40	41	43	45	-	-	-	-	85
90	-	-	4	5	7	8	10	11	13	15	16	18	20	22	24	26	27	29	31	33	35	37	39	41	43	45	-	-	-	-	90
95	-	-	4	5	6	8	9	11	12	14	16	18	20	21	23	25	27	29	31	33	35	37	39	40	42	44	-	-	-	-	95
100	-	-	4	5	6	7	9	11	12	14	16	17	19	21	23	25	27	28	30	32	34	36	38	40	42	44	-	-	-	-	100
105	-	-	-	5	6	7	9	10	12	13	15	17	19	21	22	24	26	28	30	32	34	36	38	40	42	44	45	-	-	-	105
110	-	-	-	4	6	7	8	10	12	13	15	17	18	20	22	24	26	28	30	32	33	35	37	39	41	43	45	-	-	-	110
115	-	-	-	4	5	7	8	10	11	13	15	16	18	20	22	24	25	27	29	31	33	35	37	39	41	43	45	-	-	-	115
120	-	-	-	4	5	7	8	9	11	13	14	16	18	20	21	23	25	27	29	31	33	35	37	39	41	43	44	-	-	-	120
125	-	-	-	4	5	6	8	9	11	12	14	16	18	19	21	23	25	27	29	31	33	34	36	38	40	42	44	-	-	-	125
130	-	-	-	4	5	6	8	9	11	12	14	16	17	19	21	23	25	27	28	30	32	34	36	38	40	42	44	-	-	-	130
135	-	-	-	4	5	6	7	9	10	12	14	15	17	19	21	23	24	26	28	30	32	34	36	38	40	42	44	-	-	-	135
140	-	-	-	4	5	6	7	9	10	12	13	15	17	19	20	22	24	26	28	30	32	34	36	38	40	42	43	45	-	-	140
145	-	-	-	-	5	6	7	8	10	11	13	15	17	18	20	22	24	26	28	30	32	34	35	37	39	41	43	45	-	-	145
150	-	-	-	-	5	6	7	8	10	11	13	15	16	18	20	22	24	26	28	29	31	33	35	37	39	41	43	45	-	-	150

Coastal species: Act - Black Cottonwood

Site index equation: Thrower (1992)

Date :Jan 27, 1999

bh age (years)	Top height (m) 2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	bh age (years)
	Site Index (m)																														
5	13	28	37	44	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
10	7	17	24	29	33	37	41	44	47	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
15	5	12	18	22	26	29	33	35	38	41	43	46	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
20	4	10	14	18	21	24	27	30	33	35	37	40	42	44	46	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
25	3	8	12	15	18	21	24	26	29	31	33	35	38	40	42	44	46	48	50	-	-	-	-	-	-	-	-	-	-	-	25
30	3	6	10	13	16	18	21	23	26	28	30	32	34	36	38	40	42	44	46	48	50	-	-	-	-	-	-	-	-	-	30
35	2	6	9	11	14	16	19	21	23	25	27	30	32	34	36	38	40	42	44	46	48	50	-	-	-	-	-	-	-	-	35
40	-	5	7	10	12	15	17	19	21	23	25	27	29	31	33	36	37	39	41	43	45	47	49	51	-	-	-	-	-	-	40
45	-	4	7	9	11	13	15	17	19	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	-	-	-	-	-	-	45
50	-	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	-	-	-	-	-	50
55	-	4	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	-	-	-	-	-	55
60	-	3	5	7	8	10	12	14	16	17	19	21	23	25	27	29	31	33	35	37	39	42	44	46	48	50	-	-	-	-	60
65	-	-	5	6	8	9	11	13	15	16	18	20	22	24	26	28	30	32	34	36	38	40	43	45	47	49	-	-	-	-	65
70	-	-	4	6	7	9	10	12	14	15	17	19	21	23	25	27	29	31	33	35	37	40	42	44	46	48	50	-	-	-	70
75	-	-	4	5	7	8	10	11	13	14	16	18	20	22	24	26	28	30	32	35	37	39	41	43	45	47	49	-	-	-	75
80	-	-	4	5	6	8	9	10	12	14	15	17	19	21	23	25	27	30	32	34	36	38	40	42	44	46	49	-	-	-	80
85	-	-	-	5	6	7	8	10	11	13	15	16	18	20	22	25	27	29	31	33	35	37	39	42	44	46	48	50	-	-	85
90	-	-	-	4	6	7	8	9	11	12	14	16	18	20	22	24	26	28	30	32	35	37	39	41	43	45	47	50	-	-	90
95	-	-	-	4	5	6	7	9	10	12	13	15	17	19	21	23	25	27	30	32	34	36	38	41	43	45	47	49	-	-	95
100	-	-	-	4	5	6	7	8	10	11	13	14	16	18	20	22	25	27	29	31	33	36	38	40	42	44	47	49	-	-	100
105	-	-	-	-	5	6	7	8	9	10	12	14	15	17	20	22	24	26	28	31	33	35	37	40	42	44	46	48	-	-	105
110	-	-	-	-	5	5	6	7	9	10	11	13	15	17	19	21	23	26	28	30	32	35	37	39	41	44	46	48	50	-	110
115	-	-	-	-	4	5	6	7	8	9	11	12	14	16	18	21	23	25	27	30	32	34	37	39	41	43	46	48	50	-	115
120	-	-	-	-	-	5	6	7	8	9	10	12	14	16	18	20	22	25	27	29	32	34	36	38	41	43	45	47	50	-	120
125	-	-	-	-	-	5	6	6	7	9	10	11	13	15	17	19	22	24	26	29	31	34	36	38	40	43	45	47	49	-	125
130	-	-	-	-	-	5	5	6	7	8	9	11	13	14	17	19	21	24	26	28	31	33	36	38	40	42	45	47	49	-	130
135	-	-	-	-	-	4	5	6	7	8	9	10	12	14	16	18	21	23	26	28	30	33	35	38	40	42	44	47	49	51	135
140	-	-	-	-	-	-	5	6	7	8	9	10	12	13	16	18	20	23	25	28	30	33	35	37	40	42	44	46	49	51	140
145	-	-	-	-	-	-	-	5	6	7	8	10	11	13	15	17	20	22	25	27	30	32	35	37	39	42	44	46	49	51	145
150	-	-	-	-	-	-	-	5	6	7	8	9	11	12	15	17	19	22	24	27	29	32	34	37	39	41	44	46	48	51	150

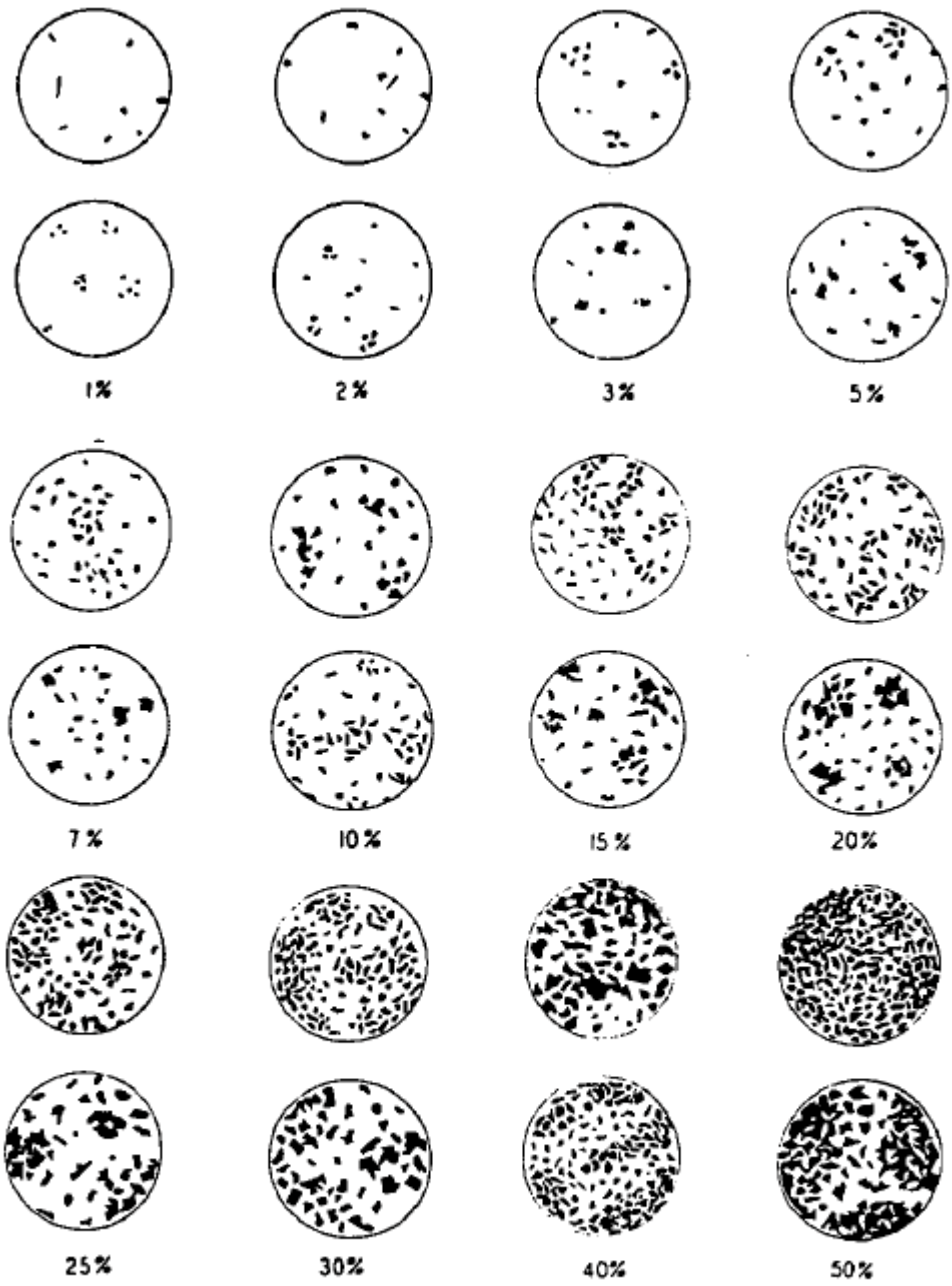
Coastal species: Dr - Red Alder

Site index equation: Harrington & Curtis (1986)

Date :Jan 27, 1999

bh age (years)	Top height (m) 2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	bh age (years)
	Site Index (m)																														
5	11	18	23	30	34	37	40	42	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
10	8	13	17	21	25	28	30	33	35	37	39	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
15	7	11	14	17	20	23	26	28	30	32	34	36	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
20	6	10	13	15	18	20	22	25	27	29	31	33	35	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
25	6	9	11	14	16	18	20	22	25	27	28	30	32	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25
30	5	8	10	13	15	17	19	21	23	25	27	28	30	32	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30
35	5	8	10	12	14	16	17	19	21	23	25	27	29	31	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35
40	5	7	9	11	13	15	16	18	20	22	24	26	28	30	32	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40
45	5	7	9	10	12	14	16	17	19	21	23	25	27	29	31	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45
50	5	6	8	10	12	13	15	17	18	20	22	24	26	28	30	32	34	-	-	-	-	-	-	-	-	-	-	-	-	-	50
55	5	6	8	10	11	13	14	16	18	19	21	23	25	27	29	31	34	36	-	-	-	-	-	-	-	-	-	-	-	-	55
60	4	6	8	9	11	12	14	15	17	19	21	22	25	27	29	31	33	35	38	-	-	-	-	-	-	-	-	-	-	-	60
65	4	6	7	9	10	12	13	15	16	18	20	22	24	26	28	31	33	35	37	40	-	-	-	-	-	-	-	-	-	-	65
70	4	6	7	9	10	11	13	14	16	18	19	21	23	26	28	30	33	35	37	40	-	-	-	-	-	-	-	-	-	-	70
75	4	6	7	8	10	11	12	14	15	17	19	21	23	25	28	30	32	35	37	40	42	-	-	-	-	-	-	-	-	-	75
80	-	5	7	8	9	11	12	14	15	17	19	20	23	25	27	30	32	35	37	39	42	44	-	-	-	-	-	-	-	-	80
85	-	5	7	8	9	10	12	13	15	16	18	20	22	25	27	30	32	35	37	39	42	44	-	-	-	-	-	-	-	-	85
90	-	5	6	8	9	10	11	13	14	16	18	20	22	24	27	29	32	35	37	39	42	44	46	-	-	-	-	-	-	-	90
95	-	-	6	7	9	10	11	13	14	16	17	19	22	24	27	29	32	35	37	39	42	44	46	48	-	-	-	-	-	-	95
100	-	-	6	7	8	10	11	12	14	15	17	19	21	24	26	29	32	34	37	39	42	44	46	48	-	-	-	-	-	-	100
105	-	-	6	7	8	9	11	12	13	15	17	19	21	24	26	29	32	34	37	39	42	44	46	48	50	-	-	-	-	-	105
110	-	-	-	7	8	9	10	12	13	15	17	19	21	24	26	29	32	34	37	39	42	44	46	48	50	-	-	-	-	-	110
115	-	-	-	7	8	9	10	12	13	15	16	18	21	23	26	29	32	34	37	39	42	44	46	48	50	-	-	-	-	-	115
120	-	-	-	7	8	9	10	11	13	14	16	18	21	23	26	29	32	34	37	39	42	44	46	48	50	-	-	-	-	-	120
125	-	-	-	-	8	9	10	11	13	14	16	18	20	23	26	29	32	34	37	39	42	44	46	48	50	-	-	-	-	-	125
130	-	-	-	-	8	9	10	11	12	14	16	18	20	23	26	29	32	34	37	39	42	44	46	48	50	-	-	-	-	-	130
135	-	-	-	-	7	8	10	11	12	14	16	18	20	23	26	29	32	34	37	39	42	44	46	48	50	-	-	-	-	-	135
140	-	-	-	-	7	8	9	11	12	14	15	18	20	23	26	29	32	34	37	39	42	44	46	48	50	-	-	-	-	-	140
145	-	-	-	-	-	8	9	10	12	13	15	17	20	23	26	29	32	34	37	39	42	44	46	48	50	-	-	-	-	-	145
150	-	-	-	-	-	8	9	10	12	13	15	17	20	23	26	29	32	34	37	39	42	44	46	48	50	-	-	-	-	-	150

Appendix E: Crown Closure Estimation Guide



Developed by Richard D. Terry and George V. Chillinger. Published by the Society of Economic Paleontologist and Minerologist in its journal of Sedimentary Petrology 25(3): 229 - 234, September 1955.

Appendix F: Table Compilation Method

Table 1: Basal Area

For each new tree species counted and recorded per polygon, a separate *Table 1 - Basal Area* is to be filled in and calculated in order to gain the basal area (BA in m^2/ha) per species and polygon. The tree records from the same species from all plots of one polygon will be entered on the same sheet.

- Field A: Enter the species code of the trees species to be calculated (see species codes in Appendix)
- Field B: Enter how many plots are in this particular polygon.
- Field C to F: Transfer from the field card for each tree record the plot #, the plot size in m^2 (only for fixed radius plots), the tree # and the respective DBH in cm.
- Field G: multiply value in Field F with factor 0.005
- Field H: multiply value in Field G with Field G
- Field J: multiply value in Field H with value in Field I with factor 10000 and divide by value in Field D
- Field K: in Divide value in Field J by the value in Field B (number of plots this polygon)
- Field L: Add all values of the above rows

The result of *Table 1* is the basal area (BA in m^2/ha) of a particular species in one polygon. Complete the above computation for each recorded species (on cruise card) in this polygon. Sort the *Table 1* pages in descending order of basal area values, so that the leading species is on the first page.

If variable plots were used (prism or relascope), the *Table 1* computation can be replaced by a simple calculation. For each tree recorded on the card, take the particular basal area factor (BAF) and add all BAFs of the same species in a polygon. Divide the sum by the number of plots sampled in this polygon to derive the basal area (BA in m^2/ha) of a particular species in this polygon.

Table 1 BASAL AREA

WOODLOT:	LOCATION:	POLYGON NO.:
W		

A
TREE SPECIES:

B
OF PLOTS IN POLYGON

C	D	E	F	G	H	I	J	K
PLOT #	PLOT SIZE in m^2	TREE #	DBH in cm	BASAL AREA CALCULATION				
				= 0.005 * F	= G * G	= π	= H * I * 10000/D	= J / B
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		
						3.1416		

L
BASAL AREA OF SPECIES IN POLYGON
= SUM OF K

Table 2: Species Composition

For each polygon, transfer the results from *Table 1*, Field L into Table 2, Fields B to K, with the tree species having the highest value as tree species 1 (Fields B and C), the tree species having the second highest values as tree species 2 (Fields D and E) and so forth.

- Field L: Add the values from Fields C, E, G, I and K, in order to calculate the total basal area of the particular polygon.
- Field M: Just transfer the species code from Field B.
- Field N: Divide the value from Field C by the value of Field L and multiply by factor 100
- Field O to V: Repeat steps for species 2, 3, 4, and 5 as described for species 1 (Fields M and N).

The percent numbers are to be rounded to full figures that add up to 100% in each polygon. The fields M to V represent the species composition in each polygon as sampled by plot measurements. This composition figure should be only reconsidered if there is a significant discrepancy with the walk through estimate of the species composition (difference of more than 20 %) and if there is an indication of bad representation of stand characteristics by the plot samples. This is more likely if there are too few plots (less than 4) within the polygon.

Table 2

SPECIES COMPOSITION

WOODLOT:	LOCATION:
W	

A	B	C	D	E	F	G	H	I	J	K	L
	SPECIES 1		SPECIES 2		SPECIES 3		SPECIES 4		SPECIES 5		
POLYGON NO.	CODE	BA	CODE	BA	CODE	BA	CODE	BA	CODE	BA	TOTAL BA
	TRANSFER FROM TABLE 1 (IN DESCENDING ORDER)										= C + E + G + I + K

M	N	O	P	Q	R	S	T	U	V
SPECIES 1		SPECIES 2		SPECIES 3		SPECIES 4		SPECIES 5	
CODE	%	CODE	%	CODE	%	CODE	%	CODE	%
= B	= C / L * 100	= D	= E /L * 100	= F	= G / L *100	= H	= I / L * 100	= J	= K / L * 100

Table 3: Top Height Trees

This table summarizes the values of the Top Height Trees which were recorded on the bottom of the Woodlot Inventory plot card. Consider all plots in a particular polygon and use one *Table 3* page for each polygon. Only Top Height Trees that have the same species as "species 1" in *Table 2* are to be considered. A further selection should dismiss trees that are not crown class D or C.

- Field A: Enter species code of leading species and confirm later that only trees of the same species are used for the calculation.
- Field B: Enter plot # of the plot in which the tree was sampled.
- Field C: Enter tree # of the Top Height Tree.
- Field D: Enter crown class of Top Height Tree and confirm that it is D or C.
- Field E: Enter total height of Top Height Tree.
- Field F: Enter the age of the Top Height Tree, counted at breast height (1.3 m on the high side of the tree).
- Field H: Look up the site index for the particular tree species in the site index tables in the *Appendix*. If necessary, interpolate between values. Round age to full figures and site index to one digit.
- Field G: Look up years to breast height from Table 5 in Chapter 5 and add to value of Field F
- Field I: Count the number of Top Height Trees entered in this table and enter value.
- Field J and K: Add all values of the above fields and enter sum.
- Field L: Divide value of Field J by value of Field I
- Field M: Divide value of Field K by value of Field I

Table 3

SAMPLE TREES

WOODLOT:	LOCATION:	POLYGON NO.:
W		

A
LEADING SPECIES:

B	C	D	E	F	G	H
PLOT #	TREE #	CROWN CLASS	HEIGHT	AGE (BH)	AGE TOTAL	SITE INDEX
FROM FIELD CARDS					LOOK UP FROM SI - TABLES	

I
OF TREES

	J	K
	= SUM OF G	= SUM OF H
TOTAL SUM		

	L	M
	= J / I	= K / I
AVERAGE		

Table 4: Summary or Stand Attribute Table

This table summarizes the stand attributes of the polygons in the woodlot or portions thereof.

- Field A: Enter the mapsheet number of the polygon, since the same polygon numbers might occur but on different mapsheets
- Field B: Enter polygon number. If a stand consists of two layers, use two rows and distinguish the layers by amending the polygon numbers with a letter (e.g. 254a and 254b).
- Field C: Enter the operable area from your area allocation table for each polygon. This should be the total polygon area within the woodlot boundaries, minus all mappable and measurable inoperable areas (e.g. road right-of-ways, reserve zones, unstable terrain, swamps, unproductive areas, etc.). Dispersed non-productive areas will be considered later and should have been recorded in the field under NP estimate.
- Field D: Enter the total age of the leading species from *Table 3*, Field L.
- Field E: Enter the average height of the stand from the 'Additional Data' estimates on the field cards.
- Field F: Enter the site index of the leading species from *Table 3*, Field M.
- Field G: Enter the total basal area of the polygon from *Table 1*, Field L.
- Field H: Enter species code of leading species from *Table 2*, Field M.
- Field I: Enter species percent of leading species from *Table 2*, Field N.
- Field J: Enter species code of second species from *Table 2*, Field O.
- Field K: Enter species percent of second species from *Table 2*, Field P.
- Field L: Enter species code of third species from *Table 2*, Field Q.
- Field M: Enter species percent of third species from *Table 2*, Field R.
- Field N: Enter species code of fourth species from *Table 2*, Field S.
- Field O: Enter species percent of fourth species from *Table 2*, Field T.
- Field P: Enter species code of fifth species from *Table 2*, Field U.
- Field Q: Enter species percent of fifth species from *Table 2*, Field V.
- Field R: Enter the average of your NP estimates for the particular polygon. Only the dispersed non-productive area not yet considered as area netdown in the area allocation calculation should be recorded as a percent of the operable polygon area.
- Field S: Enter the average of your crown closure estimates for the particular polygon. The crown closure estimate should be recorded as a percent of the coverage of tree canopy in relation to the operable polygon area.

Table 4

SUMMARY

WOODLOT:	LOCATION:
W	

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
MAPSHEET NO.	POLYGON NO.	OPER. AREA	TOTAL AGE	HEIGHT	SITE INDEX	BA	SPEC 1	SPEC 1 %	SPEC 2	SPEC 2 %	SPEC 3	SPEC 3 %	SPEC 4	SPEC 4 %	SPEC 5	SPEC 5 %	NP %	CROWN CLOSURE
			TRANSFER FROM TABLE 3			TRANFER FROM TABLE 2											FROM FIELD CARDS	