Appendices

Additional Sampling Information

Fixed Area Sample Size

The fixed area plot size must be consistent by timber type and count plots are not permitted in fixed area plots. Border plots are permitted in fixed area plots.

The standard method is sampling in a finite population without replacement. Once a plot has been measured on 0.08 ha, this particular 0.08 ha is withdrawn from the population and it is not permitted to be sampled again. If the sampling intensity is greater than 5 percent of the total merchantable area the basic equation for determining the number of plots required is:

$$\frac{t^2 x CV^2}{E^2}\left(\frac{N-n}{N}\right) where$$

t = probability factor

CV = coefficient of variation

E = error objective in percent

N = total possible number of plots in the sale

n = actual number of plots in the sale

N-n/N = the finite population multiplier

By algebraic manipulation the above equation for number of plots required can be transformed into the more familiar form of:

$$n = \frac{t^2 x CV^2 x N}{N x E^2 + t^2 x CV^2} where$$

n = number of plots required and the other terms are as defined above.

This equation may also be used for plot sampling, but only if the sampling intensity is 5 percent or less.

When stratified sampling is used, an average weighted coefficient of variation must be determined. This value is used in the equation to calculate the total number of plots required. For example:

	Type Area		Area X	Proportional	Weighted CV	
Type	**Hectares**	**Av. Volume/ha**	**Av. Vol.**	**(Area x Vol)**	**CV**	**(P x CV)**
F P1	12	272	3 264	0.43	30	12.9
P1	12	134	1 608	0.21	50	10.5
P1 F	16	171	2 736	0.36	40	14.4
	40		7 608	1.00		37.8

If this 40 ha timber sale is to be sampled with 0.1 ha plots and a sampling accuracy of *plus or minus* 15.0% at 2 SE, the required number of samples is:

$$n = \frac{t^2 xCV^2 xN}{NxE^2 + t^2 xCV^2} = \frac{(2)^2 x(38)^2 x400}{400x(15)^2 + (2)^2 x(38)^2}$$

$$= \frac{4x1444x400}{400x225+1444} = \frac{5776x400}{90000+5776} = \frac{2310400}{95776}$$

$$= 24$$

(Note N= 40 ha/ 0.1 ha = 400)

The probability factor (t=2.069) for n -1 (24-1=23) can be found in the Distribution of ‘t’ table in the appendices.

This new probability factor (t) replaces t=2 and is then used to calculate a new "n", which equals 26. These 26 samples are then distributed among the three types as follows:

$$n_1 = \frac{PCV_1}{PCV} x\, n \text{ etc.} = F-Pl; n = \frac{12.9}{37.8} x\, 26 = 9$$

$$Pl; n = \frac{10.5}{37.8} x\, 26 = 7 \qquad Pl-F; = \frac{14.4}{37.8} x\, 26 = 10$$

Exact estimates of type size, volume and coefficient of variation are not necessary in advance of cruising to predict sampling requirements. Reasonable approximations are sufficient (e.g. adjacent cruise information) to establish correct relative intensities of sampling for each type.

The sampling error objective (e.g., plus or minus 15 percent, 19 times out of 20) for scale based cruises is for the total net volume per hectare of the cutblocks, and the basis for estimating the number of samples required to meet this objective is the forest types within the area to be cut and their relative volumes.

Variable-Plot Sampling (Prism or Relascope)

In Variable-Plot (prism) cruising, every tree has its own plot size because the radius of the plot varies directly with the DBH of the tree. The area of the plot is directly proportional to the basal area of the tree DBH it represents. Therefore, the relationship of the basal area of one tree to its plot area is the same as the relationship on a per hectare basis. Basal area per hectare, for a given prism, is the same for every tree in the plot regardless of its DBH or plot size.

Supporting mathematical calculations are as follows.

For a 5.0 diopter prism:

Basal Area Factor (m^2/ha)	=	6.25
Plot Radius Factor	=	0.2
DBH	=	30 cm
DBH	=	90 cm
Basal Area of a 30 cm tree	=	0.07069 m^2
Basal Area of a 90 cm tree	=	0.63617 m^2

The plot radius for a 30 cm tree = 0.2 x 30 = 6.0 m. Therefore, a 30 cm tree is counted if it falls within 6.0 m of the sample point.

The area of 6 m radius plot is 113.098 m^2 or 0.01131 ha, hence there are 88.425 plots per hectare. Therefore, one counted tree represents 88.425 trees per hectare and a basal area per hectare of 88.425 x 0.07069 or 6.25 m^2.

Similarly, a 90 cm tree has a plot radius of 0.2 x 90 = 18.0 m and an area of 1017.878 m^2 or 0.10179 ha. Hence there are 9.824 plots per hectare and one counted tree represents 9.824 trees per hectare and a basal area per hectare of 9.824 x 0.63617 or 6.25 m^2.

In the foregoing example, it is shown that each tree regardless of DBH, contributed 6.25 m^2 of basal area per hectare. The Basal Area Factor of the prism used was 6.25 m^2/ha. Therefore, total basal area per hectare can be calculated directly by multiplying stem count per point x basal area factor. This value is all that can be calculated directly.

In order to obtain volume per hectare it is necessary to measure DBH on all or some of the samples. There are several possible methods of calculating volume per hectare, depending on the method of sampling used and the type of information required (e.g., total volume per hectare, volume per hectare by species).

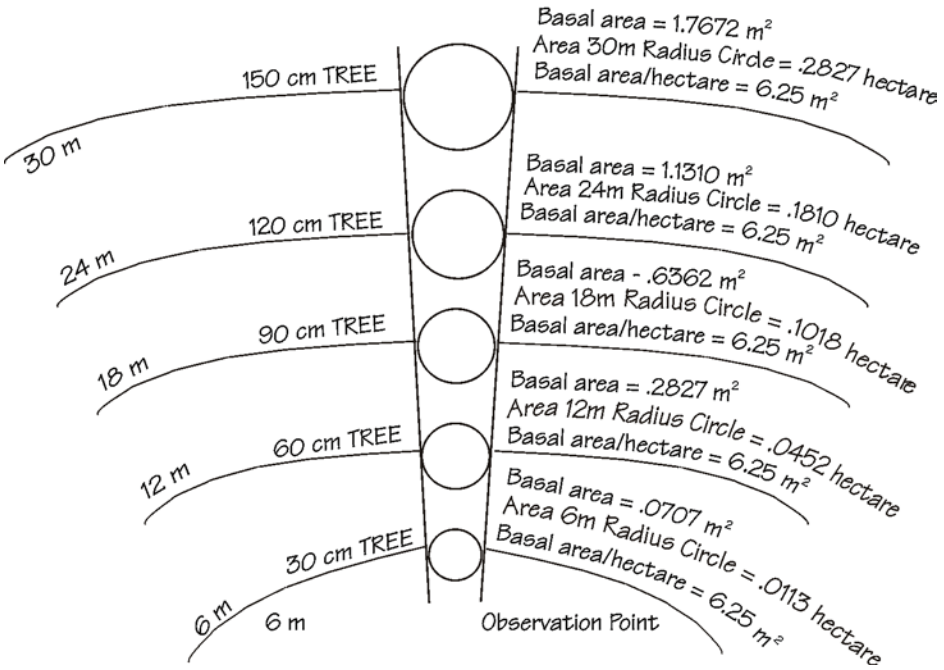


Figure A.1 Illustration of Basal Area/Hectare.

This figure shows why each tree tallied in a plot, regardless of its diameter, has an equal effect on the basal area per hectare. In this example, a 6.25 BAF (5.000 diopter) wedge prism was used, but any BAF or diopter size would still result in equal weighting for each tree.

Variable Plot Sample Size

The factors for selecting the prism basal area factor (BAF) are the size of the trees and the density of the stand.

Samples that include a small number of trees per point generally result in a higher variance than samples with larger numbers of trees. As the number of trees increase, a point is reached where a further decrease in basal area factor and a corresponding increase in tree count results in only a slight gain in precision. If a sample contains more than ten trees it is statistically inefficient because it only repeats the information that is obtained from a smaller sampling unit.

The choice of plot size (BAF) will influence the amount of sampling required to achieve the sampling error because sampling intensity depends on the coefficient of variation.

Prism sampling can be thought of as sampling in an infinite population, since there are an "infinite" number of prism points in the area to be cruised. Prism sampling can also be thought of as sampling in a finite population with replacement, since a given tree may be included in more than one sample. In either case the finite population multiplier is not required and the equation for determining the number of plots required becomes:

$$n = \frac{t^2 \text{ x } CV^2}{E^2}$$

t = probability factor

CV = coefficient of variation

E = error objective in percent

n = number of plots

A spreadsheet that can be used to calculate variable plot sample size can be accessed at the following website:

Cruisng Calculations

Coefficient of Variation (CV)

The coefficient of variation is the standard deviation expressed as a percentage of the mean volume.

The coefficient of variation is unique for each timber type and may also vary with the timber merchantability specifications.

The coefficient of variation may be estimated from:

1. Plots previously measured in the same timber types.
2. A pre-cruise of the stand.
3. A general knowledge of the timber types to be harvested.

The CV is calculated as shown in the following example:

Plot #	Plot Volume/ha	Plot Vol/ha Squared	
1	119	14161	Standard deviation (SD)
2	130	16900	$=\sqrt{\frac{\left(\sum\left(x^2\right)-\frac{\left(\sum x\right)^2}{n}\right)}{\left(n-1\right)}}$
3	79	6241	
4	215	46225	
5	46	2116	
6	223	49729	
7	164	26896	$=\sqrt{\frac{362145-\frac{2123^2}{16}}{16-1}}$
8	317	100489	
9	160	25600	
10	42	1764	Coefficient of Variation (CV)
11	77	5929	
12	105	11025	$=\frac{\text{SD}}{\text{mean}}\text{ x }100$
13	54	2916	
14	151	22801	$=\frac{73}{133}\text{ x }100\text{ = }55\,\text{percent}$
15	108	11664	
16	133	17689	
Sum	**2123**	**362145**	
Mean (x)	**133**		

Age and Height Class Limits

Age in Tens					
Age	**Limits**	**Age**	**Limits**	**Age**	**Limits**
1	1-10	10	91-100	19	181-190
2	11-20	11	101-110	20	191-200
3	21-30	12	111-120	21	201-210
4	31-40	13	121-130	22	211-220
5	41-50	14	131-140	23	221-230
6	51-60	15	141-150	24	231-240
7	61-70	16	151-160	25	241-250
8	71-80	17	161-170	26	251-260
9	81-90	18	171-180	27	261-270

Height Class Limits for Height in Threes					
Height	**Limits**	**Height**	**Limits**	**Height**	**Limits**
3	0.0-4.4	24	22.5-25.4	45	43.5-46.4
6	4.5-7.4	27	25.5-28.4	48	46.5-49.4
9	7.5-10.4	30	28.5-31.4	51	49.5-52.4
12	10.5-13.4	33	31.5-34.4	54	52.5-55.4
15	13.5-16.4	36	34.5-37.4	57	55.5-58.4
18	16.5-19.4	39	37.5-40.4	60	58.5-61.4
21	19.5-22.4	42	40.5-43.4	63	61.5-64.4

Circular Error Probability (CEP) Method

This procedure is used to test the precision of cruise plots established using GPS technology and may assist in determining whether plots should be re-cruised.

CEP, as it applies to cruise plots and GPS technology, is defined as the radius of a circle (n), centered around the mean, whose boundary is expected to include 50% of the cruise plot location attempts. The distance between the CEP (n) and two times this radius (2n) is where 43% of the plot location attempts would be expected. In addition, the distance between two times CEP (2n) and three times this radius (3n) is where the remaining 7% of the plot location attempts would be expected.

Figure A.2 Circular Error Probability demonstrates the CEP concept. In this diagram, there are a total of 100 plot location attempts (represented by stars). These stars do not represent the GPS coordinates or hits, but rather represent established plot locations. Fifty (50%) of the stars fall within the smallest circle, which has a radius of "n". An additional 43 (43%) of the stars fall in the space between the outer boundaries of the smallest and middle circle, or 93% fall within "2n". The remaining 7 (7%) of the stars fall in the space between the outer boundaries of the middle and largest circle, which means 100% of the stars fall within "3n".

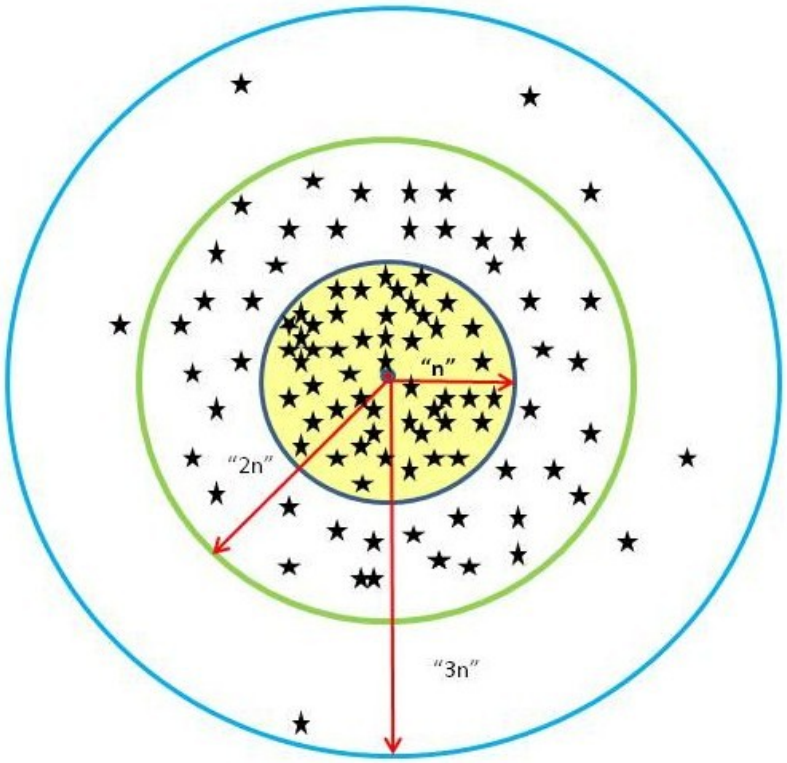


Figure A.2 Circular Error Probability

The CEP tolerance or "n" for check cruising purposes will be 2.5m. The check cruise plot location will be considered to be the mean. The CEP standard means that:

a) 50% of all cruise plots checked must be within 2.5 m of the respective check cruise plot location
b) 90% of all cruise plots checked must be within 5.0 m of the respective check cruise plot location

In addition, the absolute average variation of all cruise plot locations checked must be within 3.0 metres of the respective check cruise plot locations (see Section 3.5).

Although the CEP method states that 100% of the cruise plots checked should be within 7.5 m of their respective check cruise plot locations when the CEP is 2.5m, this standard will be omitted to allow for anomalies when greater than 10 cruise plot locations are checked.

Figure A.3 Example of Circular Error Probability Theory in Check Cruising diagrams show the location of 5 cruise plot locations in relation to their respective check cruise plots. The distances from the cruise plot locations to the check cruise plots are: 0.7 m, 1.9 m, 2.3 m, 3.9 m and 4.6 m.

In order for a cruise to be rejected on cruise plot location data using the CEP method, both standards in Section 3.5 (1&2) must be exceeded.

The variation of the cruise plot locations is 2.7 m ((0.7+1.9+2.3+3.9+4.6)/5). Sixty percent (60%) of the cruise plots (3/5) are within 2.5 m of their check cruise plot locations. In addition, 100% of the cruise plots are within 5.0 m of their check cruise plot locations. This cruise data would not be rejected based on plot location data using the CEP method.

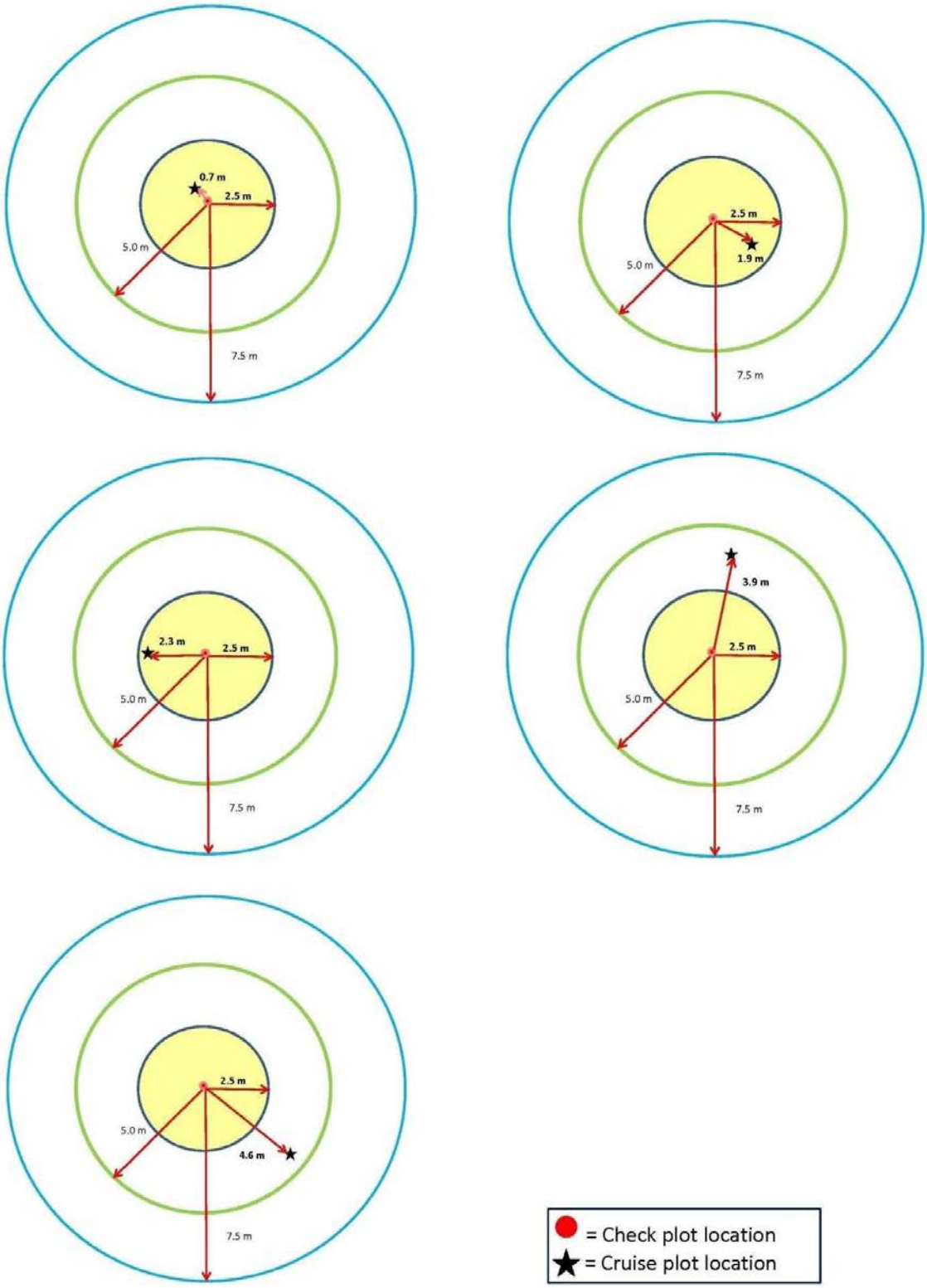


Figure A.3 Example of Circular Error Probability Theory in Check Cruising

Combined GPS and Conventional Traverse Procedure

To calculate the closing error for traverses which have a combination of conventional traversing (using a compass, clinometer and metric tape or electronic measuring device) and Global Positioning Systems (GPS) traversing:

1. Calculate the bearing and distance between the first GPS point (end of conventional traverse) and the last GPS point (beginning of conventional traverse).

   On the Internet go to:

   http://a100.gov.bc.ca/pub/mascotw/

   and:

   a. select Survey Utilities,

   b. select Computations on the Ellipsoid,

   c. select Compute Geodetic Observations using the Inverse Problem,

   d. input the latitude [Degrees (45-65), Minutes (00-59), Seconds (0.00000-59.99999)] of the first GPS point under OCCUPIED,

   e. input the longitude [Degrees (109-145), Minutes (00-59), Seconds (0.00000-59.99999) of the first GPS point under OCCUPIED,

   f. input the latitude [Degrees (45-65), Minutes (00-59), Seconds (0.00000-59.99999)] of the last GPS point under SIGHTED,

   g. input the longitude [Degrees (109-145), Minutes (00-59), Seconds (0.00000-59.99999) of the last GPS point under SIGHTED, and

   h. click on “Do Calculation” or hit the “Enter” key and the program will calculate the Azimuth bearing and the distance between the two GPS points.

2. Option to calculate the conventional azimuth bearings from UTM Northing and Easting GPS readings:

    a. select Survey Utilities,

    b. select Mapping Plane Computation,

    c. select Compute Grid Observations using the Inverse Problem,

    d. input the Northing of the first GPS point under OCCUPIED,

    e. input the Easting of the first GPS point under OCCUPIED,

    f. input the Northing of the last GPS point under SIGHTED,

    g. input the Easting of the last GPS point under SIGHTED, and

    h. click on “Do Calculation” or hit the Enter key, and the program will calculate the azimuth bearing and the distance between the two GPS points.

> There is a free MS-DOS executable file at this site that can be downloaded into your computer for future use.

3. Use the calculated bearing and distance between the first and last GPS points to close the conventional portion of the traverse and determine the closing error.

4. The closing error determined in Step 2 is used to determine if the traverse meets the closure error requirement in Section 3.5.

Cruise Compilation Loss Factor Table (Table 17)

The loss factor tables listed in this manual will be used for appraisal cruises. This list is the reference for Cruise Compilation and the auditing of Cruise Compilations. Refer to the following web utility to find the Forest Inventory Zone and Special Cruise Number to cross reference to Table 17.

Map View can be accessed on the Internet at:

http://webmaps.gov.bc.ca/imfs/imf.jsp?site=mapview

PSYU Cross Reference Procedure

1. Open MAPVIEW and follow one of the processes below:
   a) If the block mapping information has been uploaded:
      i) Find the Feature Search option from the '*Forest Tenures*' tab (e.g. Tenure Cut Block, Tenure Harvest Authority, etc). If you have access to FTA (Forest Tenures Administration) and the permit is in FTA, the cutblock screen has a link to MAPVIEW that will take you right to the block.
      ii) Enter the search criteria and select search. Letters used in the licence and and CP should be capitalized (i.e. A12345, not a12345).
   b) If the block mapping information has not been uploaded, or if a search is being completed for information purposes:
      i) Under the '*Navigation*' tab, select one of the search functions or zoom to the desired location.

2. Once the cutblock or area of interest has been located, follow these steps:
   a) Under the '*Navigation*' tab, select '*Map Layers*'.
   b) Expand the '*Administrative Boundaries*' category.
   c) Select the boxes beside '*Public Sustained Yield Units - Outlined*' and '*Forest Inventory Region Compartment- Outlined*'.
   d) Select the '*Identify*' symbol at the top up the page (under navigation tab).
   e) Click on the map location that you want to define.
   f) The results are displayed on the left side of the map.
   g) Among the results highlighted in blue at the left hand side of the map, there should be one or more 5 digit numbers for PSYU (e.g.10706). Select each number until the pop up screen indicates the Special Cruise Number under the '*Attributes*' tab.

h) Find the SCN in the Tabular Listing of Table Numbers in Table 17. The corresponding administrative unit (e.g., *PSYU #*) and *FIZ* are listed on the same row.

i) To check the FIZ, re-select '*Map Layers*' under the '*Navigation*' tab.

j) Expand the '*Land Cover*' category.

k) Select the box beside '*Vegetated Land Cover*'.

l) Select the '*Identify*' symbol at the top up the page (under navigation tab).

m) Click on the map location you want to define.

n) The results are displayed on the left side of the map.

o) Among the results highlighted in blue at the left hand side of the map, there should be one or more 7 digit numbers for PSYU (e.g.3391115). Select one of these numbers.

p) Scroll down the list under the attributes tab until you find FIZ Code.

A.17.1 Tree Farm Licences

The TFL loss factors are the same as those approved by the Chief Forester in the Management Plans (MP). This manual will be updated as new Management Plan's result in loss factors changes. All "local" factors noted below apply only to mature volumes (i.e., 121 years or greater). Timber Licences in the TFL's use the TFL loss factors and Timber Licences outside of the TFL will use the *Metric Diameter Class Decay, Waste And Breakage Factors 1976*.

All loss factors referenced in the following lists refer to the Ministry of Sustainable Resources Management publication entitled: *Metric Diameter Class Decay, Waste And Breakage Factors 1976*.

Coast Forest Region

TFL 6	Kingcome locals for Cedar and Hemlock. All others FIZ "B"
TFL 10	All FIZ "B"
TFL 19	Nootka local for mature Hemlock. All others FIZ "B"
TFL 25	Area #1 (Dean PSYU) - Kingcome locals for Cedar and Hemlock. All others FIZ "A" Area #2 (Quadra PSYU) - Kingcome locals for Cedar and Hemlock. All others FIZ "B" Area #3 (South Island) - All FIZ "B" Area #4 (Old TFL 24 – Queen Charlotte Is.) – use FIZ A for all species and maturity classes.

TFL 26	Vancouver locals for Hemlock and Balsam (*Abies* sp). All others FIZ "C".
TFL 37	Kingcome locals for mature cedar and hemlock for decay and waste. All other species use FIZ "B" decay and waste. Company breakage factors for all species and maturity classes.
TFL 38	Soo locals for Hemlock and Balsam (*Abies* sp). All others FIZ "B"
TFL 39 Blocks 1, 2, 4, 5	Company decay and waste factors for mature. All other maturity classes are FIZ "B". Mature is 121 years +.
Blocks 3, 6 and 7	Company decay and waste factors and FIZ "A" breakage factors for mature. All other maturity classes are FIZ "A" (Queen Charlotte Islands).
TFL 43	Northern Blocks - Use FIZ "A" - Kingcome locals for Cedar and Hemlock. Homathko Block - Use FIZ "B". Fraser Block - Dewdney (Chilliwack) locals for Hemlock and Balsam (*Abies* sp) . All others FIZ "C"
TFL 44	Company decay and waste factors and FIZ "B" breakage factors for mature. All other maturity classes are FIZ "B". Mature is 121 +.
TFL 45	Area #1 (old TFL 17) - Kingcome locals for Cedar and Hemlock. All others FIZ "A". Area #2 (old TFL 36) - All FIZ "B".
TFL 46	Nootka local for Hemlock. All others FIZ "B".
TFL 47	Area #1 (majority) - Kingcome locals for Cedar and Hemlock. All others FIZ "B". Area #2 (4 small islands) - Kingcome locals for Cedar and Hemlock. All others FIZ "A". Area #3 - Haida Gwaii (formerly Queen Charlottes) - All FIZ "A".
TFL 54	Nootka locals for hemlock. All others FIZ "B".

Northern Interior Forest Region

TFL 1	Skeena (Terrace) - locals for Balsam (*Abies* sp). All others FIZ "A" or "J".
TFL 41	Skeena (Terrace) - locals for Hemlock and Balsam (*Abies* sp). All others FIZ "A".
Old TFL 51	(Now Cranberry TSA).
Skeena (Kitwanga)	locals for Hemlock and Balsam (*Abies* sp). All others FIZ "J".
TFL 30	Monkman locals for Cedar, Hemlock, Balsam (*Abies* sp), and Spruce. All others FIZ "I"
TFL 42	Stuart locals for Balsam (*Abies* sp) and Spruce. All others FIZ "I"

TFL 48	All FIZ "L"
TFL 53	Naver locals for Hemlock, Balsam (*Abies* sp) and Spruce. All others FIZ "H, I"

Southern Interior Forest Region

TFL 15	All FIZ "D".
TFL 18	Raft locals for Cedar and Hemlock. All others FIZ "G".
TFL 33	Eagle locals for Cedar and Hemlock. All others FIZ "G".
TFL 35	All FIZ "D" or "G".
TFL 49	Area #1 (old TFL's 9 and 32) - Okanagan locals for Fir (*Pseudotsuga*), Cedar and Hemlock. All others FIZ "D". Area #2 (old TFL 16) - Kamloops local for Fir (*Pseudotsuga*). All others FIZ "D".
TFL 3	Slocan locals for Cedar and Hemlock. All others FIZ "G".
TFL 8	Kettle locals for Spruce and Lodgepole Pine. All others FIZ "E".
TFL 13	All FIZ "F".
TFL 14	Lardeau locals for mature Cedar and Hemlock. All others FIZ "G".
TFL 23 - as located South of Highway 1	Nakusp locals for Cedar and Hemlock. All others FIZ "G".
TFL 55	Arrowhead locals for Cedar and Hemlock. All others FIZ "G".
TFL 56	Arrowhead locals for Cedar and Hemlock. All others FIZ "G".
TFL 5	All FIZ "H".
TFL 52	Cottonwood locals for Cedar, Hemlock, Balsam (*Abies* sp.) and Spruce. All others FIZ "I".

A.17.2 Other Tenures

For all tenures other than TFL's the appropriate loss factor tables are determined as per: *Metric Diameter Class Decay Waste And Breakage Factors 1976.*

The only authorized exceptions are:

1. The deletion of Stum/Chilko locals for mature Lodgepole Pine. FIZ "H" factors now apply in the Stum and FIZ "B" or "H" in the Chilko PSYU.

2. The use of 10 percent decay, 0 percent waste and 5 percent breakage for all risk groups and diameter classes for cottonwood 41+ years in F.I.Z. A, B and C.

3. Special Cruise Number (SCN) #233 - is for Denman, Hornby, Gabriola, Valdes, Galiano, Thetis, Kuper, Mayne, Prevost, Saltspring, North Pender, South Pender, Saturna, Moresby, Portland, Sidney, James and the Saanich Peninsula. Use FIZ C and the Vancouver PSYU.

   SCN #234 - is for the E&N Lands within the Quadra PSYU. Use FIZ B and the Quadra PSYU.

   SCN #235 - is for the crown portion of the E&N Lands within the South Island Forest District and the Nootka PSYU with the exception of all the Gulf Islands. Use FIZ C and the Vancouver PSYU.

   Note - The southern boundary between SCN#233 and SCN #235 runs from the head of Finalyson Arm west for a short distance and then approximately S30W by Empress Mountain and Bluff Mountain to just east of Shirley. The northern boundary between SCN #235 and SCN #234 runs along the boundary between the Nootka and Quadra PSYUs.

4. The Greater Vancouver Water District uses the Vancouver PSYU locals for hemlock and balsam (*Abies* sp.).

5. Those portions of the old TFL 23 block located north of Highway 1 and not included in TFL's 55 and 56 will use the Arrowhead PSYU loss factors.

6. Any cruises that are in the areas that overlap between the Purden and Longworth PSYUs will use the PSYU with the greatest amount of area in the cruise. Contact the Northern Interior Forest Region Cruising Co-ordinator for the region and compartment numbers that occupy the overlap areas.

All references are to mature factors unless otherwise indicated.

A.17.3 Tabular Listing of Table Numbers

The following listing is provided for easy reference and compilation edit checks.

	Mature							OI.	MAT.	
PSYU/ SSA / TSA /TFL	**PSYU#**	**SCN#**	**F**	**C**	**H**	**B**	**S**	**PL**	**PL**	**FIZ**
Public Sustained Yield Units										
Adams	01	146		95	87					G
Alsek	02	266								K
Arrowhead	03	125		93	89					G
Ashnola	04	181	98							D
Babine	05	134				93	99			H, I
Barriere	06	113		95	87					G
Barton Hill	07	182	98							D
Bell Irving	08	190			91					J
Big Bar	09	142	99							D
Big Valley	10	152				92	98			I
Blueberry	11	178								L
Botanie	12	144	98							D
Boundary	13	199								A, K
Bowron	14	151		96	90	92	98			I
Burns Lake	15	154								H I
Canoe	16	184		92	86					G
Carp	17	116				91	97			I
Chilko	18	147						98		B, H
Cottonwood	19	122		98	90	92	98			I

Not all of the Tree Farm Licence "Identify Results" attributes are available at this time.

	Mature							OI.	MAT.	
PSYU/ SSA / TSA /TFL	**PSYU#**	**SCN#**	**F**	**C**	**H**	**B**	**S**	**PL**	**PL**	**FIZ**
Public Sustained Yield Units										
Cranbrook	20	186								E, F
Creston	21	130								E
Crooked River	22	117				91	97			I
Dean	23	165								A
Dease - Proposed	25	262								K
Dewdney: Chilliwack Portion Yale Portion Harrison Portion	26 - 1 - 2 - 3	193			 99 95 99	 99 98 99				 C, D C C
Eagle	27	150		94	85					G
Edgewood	28	126								E, G
Fernie	29	161								F
Finlay	30	189					96			I, K
Fontas - Proposed	31	198								L
Fort Nelson - Proposed	32	185								L
Granby	33	170								E
Hecate	34	173								A, J
Kamloops	35	261	98							D, G
Ketchika - Proposed	36	264								K
Kettle	37	124					95		97	E
Kinbasket	38	175		92	86					G

Not all of the Tree Farm Licence "Identify Results" attributes are available at this time.

	Mature							OI.	MAT.	
PSYU/ SSA / TSA /TFL	**PSYU#**	**SCN#**	**F**	**C**	**H**	**B**	**S**	**PL**	**PL**	**FIZ**
Public Sustained Yield Units										
Kingcome	39	195		99	98					A, B
Klappan - Proposed	40	127								K
Kluskus	41	289								H
Kotcho - Proposed	42	191								L
Lac La Hache	43	141	99	98						D, G, H
Lardeau	44	160		91	84					G
Liard - Proposed	45	145								L
Longworth	46	153		96	90	92	98			G
Moberly	47	177								L
Monkman	48	174		96	90	92	98			I
Morice	49	132		13	12	93	99			H, J
Nakusp	50	128		91	84					G
Narcosli - P.H.A. #5	51	137								H
Naver	52	121			90	92	98			H, I
Nechako - P.H.A #1	53	168								H, I
Nehalliston - P.H.A. #2	54	159								G
Nicola	55	111	98							D
Niskonlith - P.H.A. #2	56	114								D, G
Nootka	57	196			96					B
North Thompson	58	158		97	88					G
Okanagan	59	187	98	94	85					D, E

Not all of the Tree Farm Licence "Identify Results" attributes are available at this time.

	Mature							**OI.**	**MAT.**	
PSYU/ SSA / TSA /TFL	**PSYU#**	**SCN#**	**F**	**C**	**H**	**B**	**S**	**PL**	**PL**	**FIZ**
Public Sustained Yield Units										
Ootsa	60	155								H
Parsnip	61	149				91	97			I
Peace - P.H.A. #7	62	162								L
Purden	63	119		96	90	92	98			I
Quadra (includes all of the islands in Howe Sound)	64	194								B
Haida Gwaii (formerly Queen Charlotte)	65	166								A
Quesnel Lake	66	109		98	90	92	98			D, G, H
Raft	67	183		97	88					G
Rivers Inlet	68	103								A
Robson	69	176		96	90	92	98			G
Salmo	70	180								E, G
Salmon Arm	71	115		94	85					D, G
Shuswap	72	171		95	87					G, D
Sikanni - Proposed	73	197								L
Similkameen	74	110	98							D
Skeena	75	169								
Terrace Portion	-1				94	96				A, J
Kitwanga Portion	-2				93	95				J
Hazelton Portion	-3				92	94				J
Slocan	76	129		91	84					G
Smithers	77	133		13	12	93	99			I, J

Not all of the Tree Farm Licence "Identify Results" attributes are available at this time.

	Mature							OI.	MAT.	
PSYU/ SSA / TSA /TFL	**PSYU#**	**SCN#**	**F**	**C**	**H**	**B**	**S**	**PL**	**PL**	**FIZ**
Public Sustained Yield Units										
Soo	78	156			97	97				C
Spallumcheen	79	112		94	85					D, G
Stikine	80	172			91					K
Stuart Lake	81	135				91	97			I
Stum	82	140	99					98		H
Takla	83	188				91	97			I
Taku - Proposed	84	263								K
Upper Kootenay	85	131								F
Vancouver (includes Furry CK SSA)	86	179			99	99				C
Wapiti	87	192								L
Westlake	88	118				92	98			H, I
Williams Lake	89	123	99							D, H
Willow River	90	120			90	92	98			I
Windermere	91	136								F
Yalakom	92	143	99							D
Special Sale Area										
Dawson Creek	S05	265								L
Fort St James	S02	243				91	97			I
Prince George - Quesnel	S04	251	99			92	98			H, I, G
Tree Farm Licence										
TFL 1 - Terrace	01	301				96				A, J
TFL 3	03	303		91	84					G

Not all of the Tree Farm Licence "Identify Results" attributes are available at this time.

	Mature							**OI.**	**MAT.**	
PSYU/ SSA / TSA /TFL	**PSYU#**	**SCN#**	**F**	**C**	**H**	**B**	**S**	**PL**	**PL**	**FIZ**
Public Sustained Yield Units										
TFL 5	05	305								H
TFL 6	06	306		99	98					B
TFL 8	08	308					95		97	E
TFL 10	10	310								B
TFL 13	13	313								F
TFL 14	14	314		91	84					G
TFL 15	15	315								D
TFL 18	18	318		97	88					G
TFL 19	19	319			96					B
TFL 23	23	323		91	84					G
TFL 25	25	343								
Dean PSYU	-1			99	98					A
Quadra PSYU	-2			99	98					B
South Island	-3									B
Haida Gwaii (formerly Queen Charlotte Is.) (Old TFL 24)	-4									A
TFL 26	26	342			99	99				C
TFL 30	30	325		96	90	92	98			I
TFL 33	33	339		94	85					G
TFL 35	35	332								D, G
TFL 37	37	347		99	98	Kingcome Locals and company breakage factors				B

Not all of the Tree Farm Licence "Identify Results" attributes are available at this time.

	Mature							OI.	MAT.	
PSYU/ SSA / TSA /TFL	**PSYU#**	**SCN#**	**F**	**C**	**H**	**B**	**S**	**PL**	**PL**	**FIZ**
Public Sustained Yield Units										
TFL 38	38				97	97				B
TFL 39 Blks 1,2,4,5	39	344	Company DW & FIZ "B" breakage factors for mature.							B
Blks 3,6 & 7	39	344	Company DW & FIZ "A" breakage factors for mature.							A
TFL 41	41	341			94	96				A
TFL 42	42	458				91	97			I
TFL 43	43	469								
Northern Blocks	-1	469		99	98					A
Fraser Block	-2	469			99	99				C
Homathko Block	-3	469								B
TFL44	44	471	Company DW & FIZ "B" breakage factors for mature.							B
TFL 45	45	456								
old TFL 17	-1	456		99	98					A
old TFL 36	-2	456								B
TFL 46	46	457			96					B
TFL 47	47	470								
majority	-1	470		99	98					B
4 small islands	-2	470		99	98					A
Haida Gwaii (formerly Queen Charlottes)	-3	470								A

Not all of the Tree Farm Licence "Identify Results" attributes are available at this time.

	Mature							**OI.**	**MAT.**	
PSYU/ SSA / TSA /TFL	**PSYU#**	**SCN#**	**F**	**C**	**H**	**B**	**S**	**PL**	**PL**	**FIZ**
Public Sustained Yield Units										
TFL 48	48	474								L
TFL 49	49	472								
old TFL 9 & 32	-1		98	94	85					D
old TFL 16	-2		98							D
TFL 51 - Kitwanga (Cranberry TSA)	51	473	93	95						J
TFL 52	52	477		98	90	92	98			I
TFL 53	53	476			90	92	98			H, I
TFL 54	54	478			96					B
TFL 55	55	479		93	89					G
TFL 56	56	481		93	89					G
Watersheds										
G. Van. W. D.	01	354			99	99				C

Not all of the Tree Farm Licence "Identify Results" attributes are available at this time.

Parks	PSYU #	SCN #	FIZ	Parks	PSY U#	SCN #	FIZ
Apex Mountain	01	648	D	Manning	22	542	D
Birkenhead Lake	02	684	C	Monashee	23	666	G
Bowron Lake	03	650	G	Mount Assiniboine	24	548	F
Boya Lake	04	791	K	Mount Edziza	25	690	J
Cape Scott	05	1000	A	Mount Revelstoke	26	503	G
Cathedral	06	760	D	Mount Robson	27	549	G
Champion Lakes	07	511	E	Mount Seymour	28	550	C
Crooked River	08	774	I	Muncho Lake	29	595	L
Cultus Lake	09	515	C	Naikoon	30	1067	A
Darke Lake	10	516	D	Pacific Rim	31	676	B
Elk Falls	11	519	B	Sasquatch	32	619	C
Eneas Lakes	12	755	D	Silver Star	33	757	D
Garibaldi	13	525	C	Skagit River	34	688	C, D
Glacier	14	501	G	Stagleap	35	704	E
Golden Ears	15	674	C	Stone Mountain	37	596	L
Hamber	16	564	G	Strathcona	38	590	B
Kikomun Creek	17	698	F	Tweedsmuir	39	567	H
Kokanee Glacier	18	535	G	Wells Gray	40		G
Kootenay	19	502	G	White Pelican	41	568	H
Liard River Hot Springs	20	594	L	Yoho	42	504	G
Little Qualicum Falls	21	539	B	Other - not specified	99	675	

Not all of the Tree Farm Licence "Identify Results" attributes are available at this time.

A.17.4 Tree Class Modification of Loss Factor Tables

Tree Classes for Determination of Decay, Waste and Breakage Factors

Coniferous All Forest Inventory Zones				**Lodgepole Pine All Forest Inventory Zones**			
Age in	**Tree Classes**			**Age in**	**Tree Classes**		
10's	1, 2, 3, 4, 6	5, 7	8, 9	10's	1, 2, 3, 4, 6	5, 7	8, 9
2	YI	M	YI	2	YI	M	YI
3	YI	M	YI	3	YI	M	YI
4	YI	M	YI	4	YI	M	YI
5	YI	M	YI	5	YI	M	YI
6	YI	M	YI	6	YI	M	YI
7	YI	M	YI	7	OI	M	YI
8	YI	M	YI	8	OI	M	YI
9	OI	M	YI	9	OI	M	YI
10	OI	M	YI	10	OI	M	YI
11	OI	M	YI	11	OI	M	YI
12	OI	M	YI	12	OI	M	YI
13	M	M	OI	13	M	M	OI
14	M	M	OI	14	M	M	OI
15	M	M	OI	15	M	M	OI
16	M	M	OI	16	M	M	OI
25	M	M	OI	25	M	M	OI

Deciduous F.I.Z. A - L Except Aspen and Cottonwood F.I.Z. K & L				**Aspen & Cottonwood F.I.Z. K & L**			
Age in	**Tree Classes**			**Age in**	**Tree Classes**		
10's	1, 2, 3, 4, 6	5, 7	8, 9	10's	1, 2, 3, 4, 6	5, 7	8, 9
2	YI	M	YI	2	YI	M	YI
3	OI	M	YI	3	YI	M	YI
4	OI	M	YI	4	YI	M	YI
5	M	M	OI	5	OI	M	YI
6	M	M	OI	6	OI	M	YI
7	M	M	OI	7	OI	M	YI
8	M	M	OI	8	OI	M	YI
9	M	M	OI	9	M	OM	OI
10	M	M	OI	10	M	OM	OI
11	M	M	OI	11	M	OM	OI
12	M	M	OI	12	M	OM	OI
13	M	M	OI	13	M	OM	OI
14	M	M	OI	14	M	OM	OI
15	M	M	OI	15	M	OM	OI
16	M	M	OI	16	M	OM	OI
26	M	M	OI	26	OM	OM	OI

YI = Young Immature OI = Older Immature M = Mature OM = Over Mature

A.17.5 Forest Inventory Zone Series Number

FOREST INVENTORY ZONE SERIES NUMBERS SPECIES

	Douglas Fir			Western Red Cedar			Hemlock			Balsam			Spruce			Yellow Cedar			White Pine			Lodgepole Pine		
F.I.Z.	YI	OI	M	YI	OI	M	YI	OI	M	YI	OI	M	YI	OI	M	YI	OI	M	YI	OI	M	YI	OI	M
A	01	02	10	01	02	10	01	02	10	01	02	10	01	02	10	01	02	10	01	02	10	01	02	10
B	01	02	10	01	02	11	01	02	14	01	02	11	01	02	10	01	02	10	01	02	10	01	02	10
C	01	02	11	01	02	12	01	02	11	01	02	11	01	02	10	01	02	10	01	02	10	01	02	10
D	03	04	12	03	04	14	03	04	13	05	06	14	03	04	12	01	02	10	03	04	11	01	04	13
E	03	04	13	03	04	14	03	04	13	05	06	14	03	04	12	01	02	10	03	04	11	01	04	13
F	03	04	13	03	04	14	03	04	13	05	06	14	03	04	12	-	-	-	03	04	11	01	04	13
G	03	04	13	03	04	14	03	04	13	05	06	14	03	04	12	01	02	10	03	04	11	01	03	12
H	03	04	12	03	04	14	03	04	13	05	06	13	03	04	11	-	-	-	03	04	11	01	03	12
I	03	04	14	03	04	14	03	04	13	05	06	13	03	04	11	-	-	-	-	-	-	01	03	12
J	-	-	-	03	04	13	03	04	12	03	04	12	03	04	13	01	02	10	-	-	-	01	03	11
K	-	-	-	-	-	-	03	04	12	05	06	13	03	04	11	-	-	-	-	-	-	01	03	12
L	-	-	-	-	-	-	-	-	-	05	06	13	03	04	11	-	-	-	-	-	-	01	03	12

	Yellow Pine			White Bark Pine			Larch			Cottonwood				Alder			Broadleaf Maple			Birch			Aspen			
F.I.Z.	YI	OI	M	YI	OI	M	YI	OI	M	YI	OI	M	OM	YI	OI	M	YI	OI	M	YI	OI	M	YI	OI	M	OM
A	-	-	-	01	02	10	-	-	-	01	02	10	-	01	02	10	01	02	10	01	02	10	01	02	10	-
B	-	-	-	01	02	10	-	-	-	01	02	10	-	01	02	10	01	02	10	01	02	10	01	02	10	-
C	01	02	10	01	02	10	-	-	-	01	02	10	-	01	02	10	01	02	10	01	02	10	01	02	10	-
D	01	02	10	03	04	11	01	02	10	01	02	11	-	-	-	-	-	-	-	01	02	11	01	02	10	-
E	01	02	10	03	04	11	01	02	10	01	02	11	-	-	-	-	-	-	-	01	02	11	01	02	10	-
F	01	02	10	03	04	11	01	02	10	01	02	11	-	-	-	-	-	-	-	01	02	11	01	02	10	-
G	01	02	10	03	04	11	01	02	10	01	02	11	-	-	-	-	-	-	-	01	02	11	01	02	10	-
H	-	-	-	03	04	11	01	02	10	01	02	11	-	-	-	-	-	-	-	01	02	11	01	02	10	-
I	-	-	-	03	04	11	01	02	10	01	02	11	-	-	-	-	-	-	-	01	02	11	01	02	10	-
J	-	-	-	03	04	11	-	-	-	01	02	11	-	01	02	10	-	-	-	01	02	11	01	02	10	-
K	-	-	-	-	-	-	01	02	10	03	04	12	13	01	02	10	-	-	-	01	02	11	04	03	11	12
L	-	-	-	-	-	-	01	02	10	03	04	12	13	-	-	-	-	-	-	01	02	11	04	03	11	12

Note:
Species prefix codes are: Fir – 1/Cedar – 2/Hemlock – 3/Balsam – 4/Spruce – 5/Yellow Cedar – 6/White Pine – 7/Lodgepole Pine – 8/Yellow Pine – 9/Larch – 10/Cottonwood – 11/Alder – 12/Maple – 13/Birch – 14/Aspen – 15/Whitebark Pine – 16

Example – FIZ A, Mature Fir = Table 110
Aspen M (mature) and OM (over-mature)

See Table 17 for Local Loss Factor Table Numbers for a specific PSYU/SSA/TSA/TFL.

Damaged Stands (Appendix 6)

Trees are assigned damage codes for volume and value adjustments. Each tree is assessed and coded as it appears at the time of the cruise with no attempt to predict the future condition of the trees. Where damage is tallied, it will be compiled and reported.

Damaged tree volumes and LRF's are adjusted using the loss factors. In addition, the cruise compilation reports identify tree volume within the damage code categories to enable cost and value adjustments in appraisal.

Each code has a different effect in the compilation. Damage codes result in the modification of risk group and corresponding adjustments to net volume.

Depending on the patchiness of the damage, consider whether these patches should be treated as unique timber types when designing the sampling plan.

A.6.1 Pest Damage

The following insect damage codes apply to all appraisal cruises and will be entered in column 61 of the cruise tally sheet (Figure 4.1 Cruise Tally Sheet – FS 205C (front side).). Standard cruising methods as outlined in the *Cruising Manual* are to be followed with all beetle attack trees on the cutting authority coded with the appropriate Bark Beetle Code.

A.6.1.1 Bark Beetle Descriptions

The most common and destructive infestation the cruiser will encounter are caused by the following bark beetles:

Mountain pine beetle attacks Lodgepole, Ponderosa and White pine (however, Whitebark, Limber and exotic pines could also be infested).

Douglas fir beetle attacks Douglas fir and sometimes Western larch.

Spruce beetle attacks mainly White and Englemann spruce in the Interior.

Western pine beetle attacks Ponderosa pine.

Western balsam bark beetle attacks mainly Subalpine fir (*Abies lasiocarpa*).

See the following website for photos and descriptions of common forest pests:

https://www2.qa.gov.bc.ca/assets/gov/environment/air-land-water/land/forest-health-docs/field_guide_to_forest_damage_in_bc_web.pdf

A.6.1.2 Attack Codes for Balsam (*Abies* sp.), White Pine, Yellow Pine and Lodgepole Pine

Code	**Description**
1	Green Attack
2	Red Attack
3	Grey Attack

These attack codes (based on crown and bole symptoms) are applicable to the following insects:

- The mountain pine beetle (*Dendroctonus ponderosae*) and the lodgepole pine beetle (*Dendroctonus murrayannae*) in lodgepole pine (*Pinus contorta*-PL), yellow pine (*Pinus ponderosa*-PY) and white pine (*Pinus monticola*-PW).
- The western pine beetle (*Dendroctonus brevicomis*) in yellow pine (*Pinus ponderosa*-PY).
- The western balsam bark beetle (*Dryocoetes cofusus*) in alpine fir (*Abies lasiocarpa*-BL).

Green Attack Code 1

Since the mountain pine beetle and the western pine beetle normally complete their life cycles in one year, the Green Attack code will represent trees that have been infested ten to twelve months or less. The crown is green but pitch tubes are evident on the lower bole and the inner bark will contain characteristic gallery patterns and immature stages of the beetles. Successfully attacked trees usually die within a few weeks following initial attack even though their crowns may stay green up to twelve months. How long the crown of an infested tree stays green depends on climate, soil, topography and tree species. White pine and yellow pine infested by mountain pine beetle often start discolouring by fall or mid-spring.

Red Attack Code 2

This code represents trees that, on average, had been attacked during the previous two seasons. The crowns first fade to straw colour, then to red and finally to rust colour before the needles fall off the tree. By the time the foliage is rust coloured, the beetles have usually left these trees to infest green trees. The boles of many trees in this category may be heavily worked by woodpeckers, making them susceptible to checking.

Grey Attack Code 3

This code will represent trees that are dead and have grey needles except *Abies lasiocarpa*, which can have grey or red needles. The bole of the older kills will have much checking and loose bark. However, pitch tubes on the bark of the lower bole and/or bark beetle galleries under the bark will be readily discernible.

The western pine beetle has a different gallery pattern than the mountain pine beetle, but infested trees go through the same sequence of foliage changes after attacks by either beetle. Therefore, the same attack code is applicable.

The western balsam bark beetle usually completes its life cycle in two years. Therefore, both green and red attacked trees will contain brood. Also quite often there is no evidence of pitch tubes on the trunk of infected trees. Therefore, the boles of balsam fir need to be examined at close range for signs of boring dust in the crevices of the bark and/or small round holes in the bark that signify entry or emergence by this beetle. Thus, in the green infected stage, attacked trees are quite difficult to find.

Grey attack trees that have been dead for many years often no longer show evidence of beetle attack. In beetle attacked stands, it is acceptable for check cruisers to extend the "benefit of the doubt" on Grey Attack Code 3 classifications if these trees show signs of significant bark loss and other signs of long-time mortality but no remaining bark beetle signs (beetles, pitch-tubes, frass, exit holes, blue stain, etc.). Cruisers are still expected to look for beetle sign and to rationalize their damage codes if they suspect these sign to be removed, obscured, or faded.

Lodgepole Pine Beetle Attack Code Definition

Green Attack Code 1 (Risk Group 2)	Trees attacked have green needles, but other colours may also be present. Green attack must contain greater than or equal to 5% green coloured needles.
Red Attack Code 2 (Risk Group 2)	Trees attacked have red, fading and possibly some grey needles. Red includes straw to rust colour. Red attack must contain less than 5% green needles and greater than or equal to 5% red needles.
Grey Attack Code 3 (Risk Group 2)	Trees attacked have grey or no needles. Grey attack must have less than 5% red needles.

A.6.1.3 Blister Rust Code 4 (Risk Group 2, White Pine)

Normally used in stands where white pine is a major species (more than 20 percent of the volume) and is seriously infected with blister rust. This code can be used in a normal old growth H-C type containing a few scattered mature PW trees.

All other insect attack codes take precedence over Blister Rust, Code 4.

A.6.1.4 Attack Codes for Spruce, Douglas Fir

Code	Description
5	Green Strip Attack – S and F
6	Green Full Attack – S and F
7	Grey Attack – S and F
8	Red Attack – Fir only

The first three codes are applicable to the spruce and fir beetle.

Spruce foliage turns yellowish for a brief period in the winter season following an attack before the needles drop off the tree. Therefore, spruce was not included in the red attack. Infested trees with faded crowns should be included in the green (dead) full attack.

Green Strip Attack Code 5 (Path/Tree Class = Risk Group, Fir and Spruce)

The trees in this code will be infested in a strip on the lower bole where broods either failed or succeeded in completing their development. In either case, the attacks did not kill the trees. These trees will live on, at least until subsequent attacks (which can happen quite often) completely girdle the bole. Green strip attacked Douglas fir in well established infestations are usually much less common than green fully attacked trees. The loss factors are unaffected by this code.

Green Fully Attacked Code 6 (Risk Group 2, Fir and Spruce)

The trees in this code still have green foliage, but the attack by the bark beetles has completely girdled the tree. Some of these trees will have a considerable amount of their bark removed by woodpeckers lowering the value because of checks and splits.

In the case of Douglas fir, the beetle usually has a one year life cycle. The attack is usually in May and June. The crowns of infested trees stay green from a few months to a year after attack. Do not code as Tree Class 3. The compilation program will downgrade these trees to Risk Group 2.

Grey Attack Code 7 (Highest Risk Group and has to be dead, Fir and Spruce)

This code represents trees which are dead and have grey needles. Little or no foliage is left, the boles of the older kills may have much checking and loose bark. The compilation program downgrades these trees to the highest risk group.

Red Attack Code 8 (Risk Group 2, Fir)

This code is reserved for Douglas fir where the red foliage remains on the tree for an average of two years. The compilation program downgrades these trees to Risk Group 2. If they have conk or blind conk they will be compiled as Risk Group 3.

A.6.1.5 Defoliators (Path/Tree Class = Risk Group, All Species)

This damage category includes hemlock looper, budworms, moths and other defoliators. If the classification is doubtful, assess the cambium on the north side at DBH.

- Code X - trees with living cambium. Tree classes 1, 2, 5, 6, 8, and
- Code Y - trees with dry cambium. All tree classes are allowed.
- All other insect attack codes take precedence over defoliator, codes x and y except code 4, Blister Rust.

A.6.2 Fire Damage

The following fire damage codes apply to all appraisal cruises and will be entered in column 62 of the cruise tally sheet (Figure 4.1 Cruise Tally Sheet – FS 205C (front side).):

A.6.2.1 Light Damage - Code A

Damage consisting of scorched bark and foliage but no charring in the merchantable portion of the stem. Bark scorching greater than or equal to 5 years after the date that the fire was recorded by the Ministry of Forests, Lands and Natural Resource Operations does not qualify for the fire damage coding.

Classification: The risk group will be determined by the tree class and pathology.

A.6.2.2 Moderate Damage - Code B

Damage of any age consisting of some shallow charring of wood fibre in the merchantable portion of the stem.

Classification: Assign the tree class and record the pathological indicators as normal.

The compilation program will down grade risk group 1 trees to risk group 2.

A.6.2.3 Heavy Damage - Code C

Damage of any age consisting of extensive shallow charring or deep charring in the merchantable portion of the stem. Multiple deep checks in trees less than 30 cm DBH with fire damage also qualify for heavy damage.

Classification: Assign the tree class and record the pathological indicator as normal. The compilation program will down grade these trees to the highest risk group.

> Trees are coded as they appear at the time of the cruise only and not at the anticipated time of harvesting.

Definitions:

"**Merchantable section**" means the section of the stem between 30 cm stump and the 10 cm or 15cm top diameter inside bark as per the appropriate timber merchantability standards. Damage outside of these limits was not included in the loss factor data.

"**Charring**" means the actual destruction of wood by fire. There must be identifiable damage to a surface area greater than100 cm^2.

"**Shallow charring**" means charring which is greater than 100 cm^2 in surface area and less than one-third of the radius of the tree.

"**Extensive Shallow charring**" means charring in the bottom third of the tree that has 3 or more areas (each at least 100 cm^2) of exposed and charred wood fibre or the cumulative total of charred areas is greater than 300 cm^2.

"**Deep charring**" means where charring is deeper than one-third of the radius of the tree.

"**Multiple deep checks**" means where more than 1 check is deeper than one-third of the radius of the tree.

1. Surface checking may occur as the result of fire damage but this does not affect the tree classification.

2. Trees are coded as they appear at the time of the cruise and not at the anticipated time of harvesting.

A.6.3 Down Trees

The following Down Tree Codes apply to all appraisal cruises and will be entered in column 63 of the Tally Sheet (Figure 4.1 Cruise Tally Sheet – FS 205C (front side).) if they are located in the merchantable portion[1] of living or dead potential trees and the tree is:

Damage Code E

- Uprooted
- Uprooted with one clean break.
- Standing and one clean break in the bottom or middle third.
- Standing and any shattered breaks in the middle third.

A clean break is shorter in length than the diameter of the stem at the break. The compilation program will assign the risk group by tree class and pathological indicators.

A tree with a break below stump height will be considered uprooted.

Damage Code G

- Uprooted with more than one clean break .
- Uprooted with any shattered breaks.
- Standing with any shattered break in the bottom third.
- Standing with one clean break in the bottom third and an additional break in the merchantable portion of the tree.

A shattered break is longer in length than the diameter of the stem at the break. The length of shatter is measured from stump height (ie. only the length of the shatter in the merchantable portion of the stem is considered). The compilation program will down grade these trees to the highest risk group.

If the tree is partially uprooted or broken and supported by another standing tree, assign the appropriate down tree code (except Tree Classes 4 and 6). Blowdown codes are not asssigned to Tree Class 4 or 6 trees.

[1] *The merchantable portion of the tree is from 30cm stump height to a 10cm or 15cm top diameter inside bark as per the appropriate timber merchantability standards. Damage outside of these limits was not included in the loss factor data.*

If a shatter extends through DBH and either the standing or down portion of the tree fall outside of the plot, use the portion of the tree with greater than 50% of the basal area at breast height to determine if the tree is "in" or "out" and assign applicable damage codes (See Section 4.3.1.15).

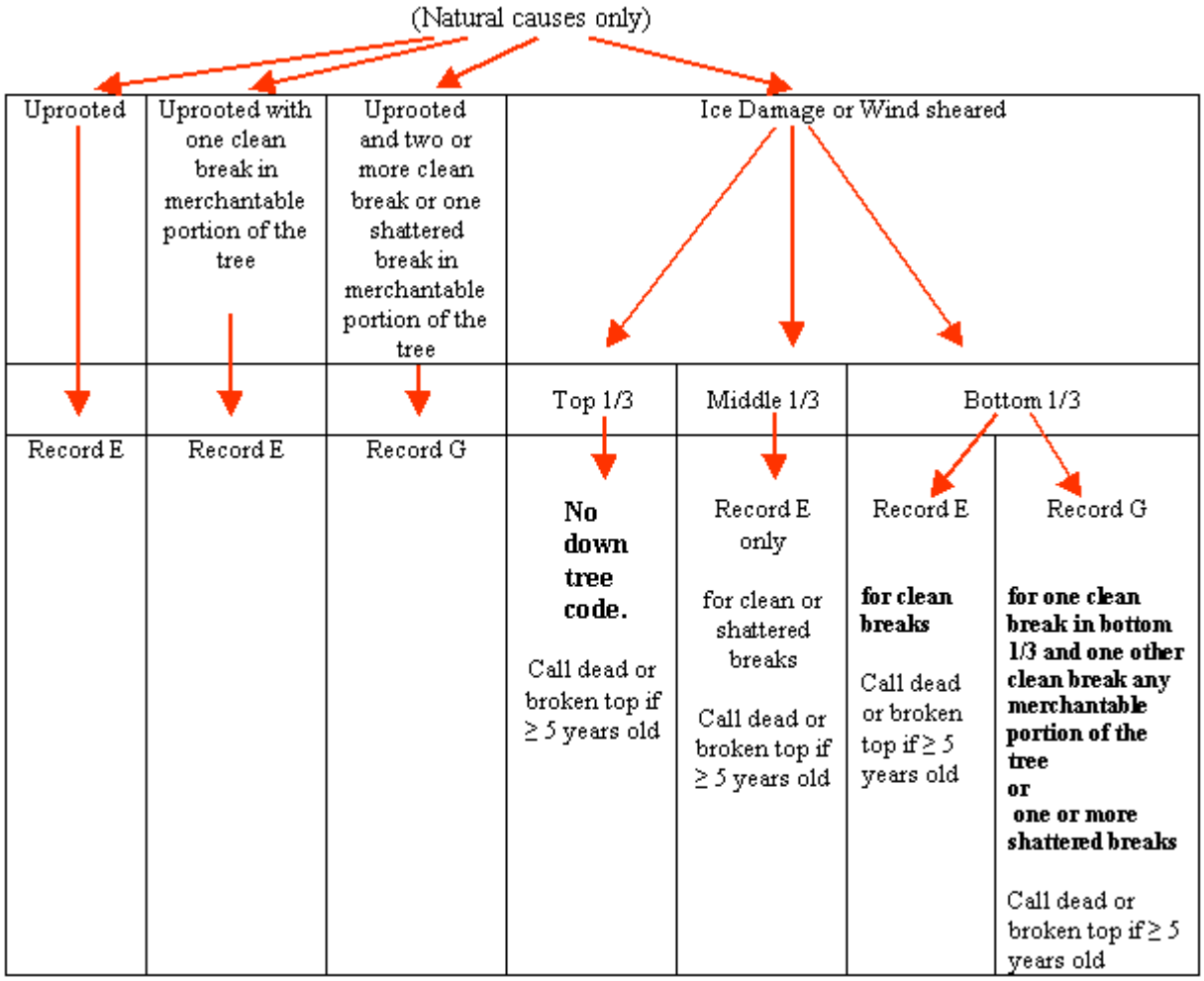


Figure A.4 Damage Call Matrix for Uprooted, Ice Damaged and Wind Sheared Trees

Figure A.5 Example of Mechanical Damage

Dead Potential 50% Threshold Calculations

Sound Wood Factors for Saprot (Table 19)

$$\%\ Sound\ Fibre = \left(\frac{DIB - 2 * Saprot\ Depth}{DIB}\right) \text{^}2$$

A spreadsheet to calculate sound wood using the above equation can be found at the following website:

Cruising Calculations

	Saprot Depth - cm														
*Diameter	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
20	**0.81**	**0.64**	0.49	0.36	0.25	0.16	0.09	0.04	0.01						
25	**0.85**	**0.71**	**0.58**	0.46	0.36	0.27	0.19	0.13	0.08	0.04	0.01				
30	**0.87**	**0.75**	**0.64**	**0.54**	0.44	0.36	0.28	0.22	0.16	0.11	0.07	0.04	0.02		
35	**0.89**	**0.78**	**0.69**	**0.60**	**0.51**	0.43	0.36	0.29	0.24	0.18	0.14	0.10	0.07	0.04	0.02
40	**0.90**	**0.81**	**0.72**	**0.64**	**0.56**	0.49	0.42	0.36	0.30	0.25	0.20	0.16	0.12	0.09	0.06
45	**0.91**	**0.83**	**0.75**	**0.68**	**0.60**	**0.54**	0.47	0.42	0.36	0.31	0.26	0.22	0.18	0.14	0.11
50	**0.92**	**0.85**	**0.77**	**0.71**	**0.64**	**0.58**	**0.52**	0.46	0.41	0.36	0.31	0.27	0.23	0.19	0.16
55	**0.93**	**0.86**	**0.79**	**0.73**	**0.67**	**0.61**	**0.56**	**0.50**	0.45	0.40	0.36	0.32	0.28	0.24	0.21
60	**0.93**	**0.87**	**0.81**	**0.75**	**0.69**	**0.64**	**0.59**	**0.54**	0.49	0.44	0.40	0.36	0.32	0.28	0.25
65	**0.94**	**0.88**	**0.82**	**0.77**	**0.72**	**0.66**	**0.62**	**0.57**	**0.52**	0.48	0.44	0.40	0.36	0.32	0.29
70	**0.94**	**0.89**	**0.84**	**0.78**	**0.73**	**0.69**	**0.64**	**0.60**	**0.55**	**0.51**	0.47	0.43	0.40	0.36	0.33
75	**0.95**	**0.90**	**0.85**	**0.80**	**0.75**	**0.71**	**0.66**	**0.62**	**0.58**	**0.54**	**0.50**	0.46	0.43	0.39	0.36
80	**0.95**	**0.90**	**0.86**	**0.81**	**0.77**	**0.72**	**0.68**	**0.64**	**0.60**	**0.56**	**0.53**	0.49	0.46	0.42	0.39
85	**0.95**	**0.91**	**0.86**	**0.82**	**0.78**	**0.74**	**0.70**	**0.66**	**0.62**	**0.58**	**0.55**	**0.52**	0.48	0.45	0.42
90	**0.96**	**0.91**	**0.87**	**0.83**	**0.79**	**0.75**	**0.71**	**0.68**	**0.64**	**0.60**	**0.57**	**0.54**	**0.51**	0.47	0.44
95	**0.96**	**0.92**	**0.88**	**0.84**	**0.80**	**0.76**	**0.73**	**0.69**	**0.66**	**0.62**	**0.59**	**0.56**	**0.53**	**0.50**	0.47
100	**0.96**	**0.92**	**0.88**	**0.85**	**0.81**	**0.77**	**0.74**	**0.71**	**0.67**	**0.64**	**0.61**	**0.58**	**0.55**	**0.52**	0.49
105	**0.96**	**0.93**	**0.89**	**0.85**	**0.82**	**0.78**	**0.75**	**0.72**	**0.69**	**0.66**	**0.62**	**0.60**	**0.57**	**0.54**	**0.51**
110	**0.96**	**0.93**	**0.89**	**0.86**	**0.83**	**0.79**	**0.76**	**0.73**	**0.70**	**0.67**	**0.64**	**0.61**	**0.58**	**0.56**	**0.53**

* Use estimated diameter inside bark at the top of first third of tree.

Useful Formulas

Volume of Tree = 1/3 $\pi R^2 L$, where R = tree dbh and L = tree length
Volume of Cylindrical Rot = $\pi R^2 L$, where R = the radius of the rot and L = rot length
Volume of Conical Rot = 1/3 $\pi R^2 L$, where R = the radius of the rot and L = rot length

$$\%\ Sound = 100 - \frac{Volume\ of\ Rot}{Volume\ of\ Tree\ or\ Log}$$

Ten Meter Log Table

The purpose of these tables is to assist timber cruisers in calculating the 50% firmwood threshold for dead potential trees. Timber cruisers may choose to either use a general or species/maturity specific table to calculate the 50% firmwood threshold, but should document which tables they use.

The following gross 10m log volume table is a general table for all species and top size based on a weighted average volume for a range of 10cm DBH classes and 5m tree height classes.

Volume % by 10m Log						
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6
15	96	4				
20	84	16				
25	72	27	1			
30	65	30	5			
35	57	31	11	1		
40	52	31	15	2		
45	49	29	17	5		
50	46	28	18	7	1	
55	42	27	19	10	2	
60	40	25	19	11	4	1

The following tables are specific to species, maturity and top size.

Douglas Fir/Larch/White Pine							
10m Log % - 10cm Top (Coast Immature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	97	3					100
20	81	19					100
25	69	31					100
30	60	34	6				100
35	53	33	14				100
40	47	32	18	3			100
45	43	30	20	7			100
50	40	28	20	10	2		100
55	38	27	20	12	3		100
60	35	25	20	13	6	1	100

Douglas fir used to generate the table.

Western & Mountain Hemlock							
10m Log % - 10cm Top (Coast Immature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	100						100
20	85	15					100
25	74	26					100
30	65	31	4				100
35	56	34	10				100
40	51	32	15	2			100
45	47	31	17	5			100
50	44	30	18	7	1		100
55	43	28	18	9	2		100
60	39	27	19	11	4		100

Western hemlock used to generate the table.

Spruce							
10m Log % - 10cm Top (Coast Immature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	100						100
20	85	15					100
25	74	26					100
30	65	30	5				100
35	58	31	11				100
40	52	31	15	2			100
45	47	30	17	6			100
50	43	28	19	9	1		100
55	45	27	17	9	2		100
60	42	25	18	10	4	1	100

Sitca spruce used to generate the table.

Cypress							
10m Log % - 10cm Top (Coast Immature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	100						100
20	83	17					100
25	72	28					100
30	64	31	5				100
35	59	30	11				100
40	53	30	15	2			100
45	49	28	18	5			100
50	46	27	18	8	1		100
55	43	26	18	10	3		100
60	40	24	18	12	5	1	100

Cypress used to generate the table.

Western Red Cedar							
10m Log % - 10cm Top (Coast Immature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	100						100
20	86	14					100
25	75	25					100
30	68	28	4				100
35	61	29	10				100
40	55	29	14	2			100
45	52	27	16	5			100
50	53	25	15	6	1		100
55	49	25	16	8	2		100
60	46	24	16	10	4		100

Western red cedar used to generate the table.

Balsam							
10m Log % - 10cm Top (Coast Immature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	100						100
20	84	16					100
25	71	29					100
30	62	32	6				100
35	55	33	12				100
40	48	33	16	3			100
45	45	31	18	6			100
50	42	30	19	8	1		100
55	40	28	19	10	3		100
60	37	27	19	11	5	1	100

Balsam genus used to generate the table.

Lodgepole, Ponderosa and Whitebark Pine							
10m Log % - 10cm Top (Coast Immature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	100						100
20	72	28					100
25	74	26					100
30	67	28	5				100
35	60	30	10				100
40	53	30	15	2			100
45	50	29	16	5			100
50	48	28	16	7	1		100
55	48	27	16	7	2		100
60	45	26	17	9	3		100

Lodgepole pine used to generate the table.

Deciduous							
10m Log % - 10cm Top (Coast Immature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	100						100
20	87	13					100
25	76	24					100
30	68	29	3				100
35	59	31	10				100
40	54	31	14	1			100
45	48	31	17	4			100
50	44	29	18	8	1		100
55	47	27	17	7	1		100
60	44	27	17	9	3	1	100

Alder/Aspen/Maple/Cottonwood used to generate the table.

Douglas Fir/Larch/White Pine							
10m Log % - 15cm Top (Coast Mature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	100						100
20	84	16					100
25	70	30					100
30	61	34	5				100
35	53	34	13				100
40	47	32	18	3			100
45	43	30	20	7			100
50	40	28	20	10	2		100
55	38	27	20	12	3		100
60	35	25	20	13	6	1	100

Douglas fir used to generate the table.

Western & Mountain Hemlock							
10m Log % - 15cm Top (Coast Mature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	100						100
20	85	15					100
25	74	26					100
30	65	31	4				100
35	56	34	10				100
40	51	32	15	2			100
45	47	31	17	5			100
50	44	30	18	7	1		100
55	43	28	18	9	2		100
60	39	27	19	11	4		100

Western hemlock used to generate the table.

Spruce							
10m Log % - 15cm Top (Coast Immature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	100						100
20	88	12					100
25	76	24					100
30	66	30	4				100
35	59	31	10				100
40	53	31	15	1			100
45	47	30	18	5			100
50	44	28	19	9			100
55	45	27	17	9	2		100
60	42	26	18	10	4		100

Sitca spruce used to generate the table.

Cypress							
10m Log % - 15cm Top (Coast Mature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	100						100
20	86	14					100
25	73	27					100
30	65	31	4				100
35	59	31	10				100
40	53	30	15	2			100
45	49	28	18	5			100
50	46	27	18	8	1		100
55	43	25	18	11	3		100
60	40	24	18	12	5	1	100

Cypress used to generate the table.

Western Red Cedar							
10m Log % - 15cm Top (Coast Mature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	100						100
20	90	10					100
25	77	23					100
30	68	29	3				100
35	61	30	9				100
40	55	29	15	1			100
45	52	28	16	4			100
50	53	26	15	6			100
55	49	25	16	8	2		100
60	46	24	16	10	4		100

Western red cedar used to generate the table.

Balsam							
10m Log % - 15cm Top (Coast Mature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	100						100
20	86	14					100
25	72	28					100
30	62	33	5				100
35	55	33	12				100
40	49	33	16	2			100
45	45	31	18	6			100
50	42	30	19	8	1		100
55	40	28	19	10	3		100
60	37	27	19	11	5	1	100

Balsam genus used to generate the table.

Lodgepole, Ponderosa and Whitebark Pine							
10m Log % - 15cm Top (Coast Mature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	100						100
20	89	11					100
25	76	24					100
30	69	28	3				100
35	60	30	10				100
40	53	30	15	2			100
45	50	29	16	5			100
50	43	28	19	9	1		100
55	48	27	16	7	2		100
60	45	26	17	9	3		100

Lodgepole pine used to generate the table.

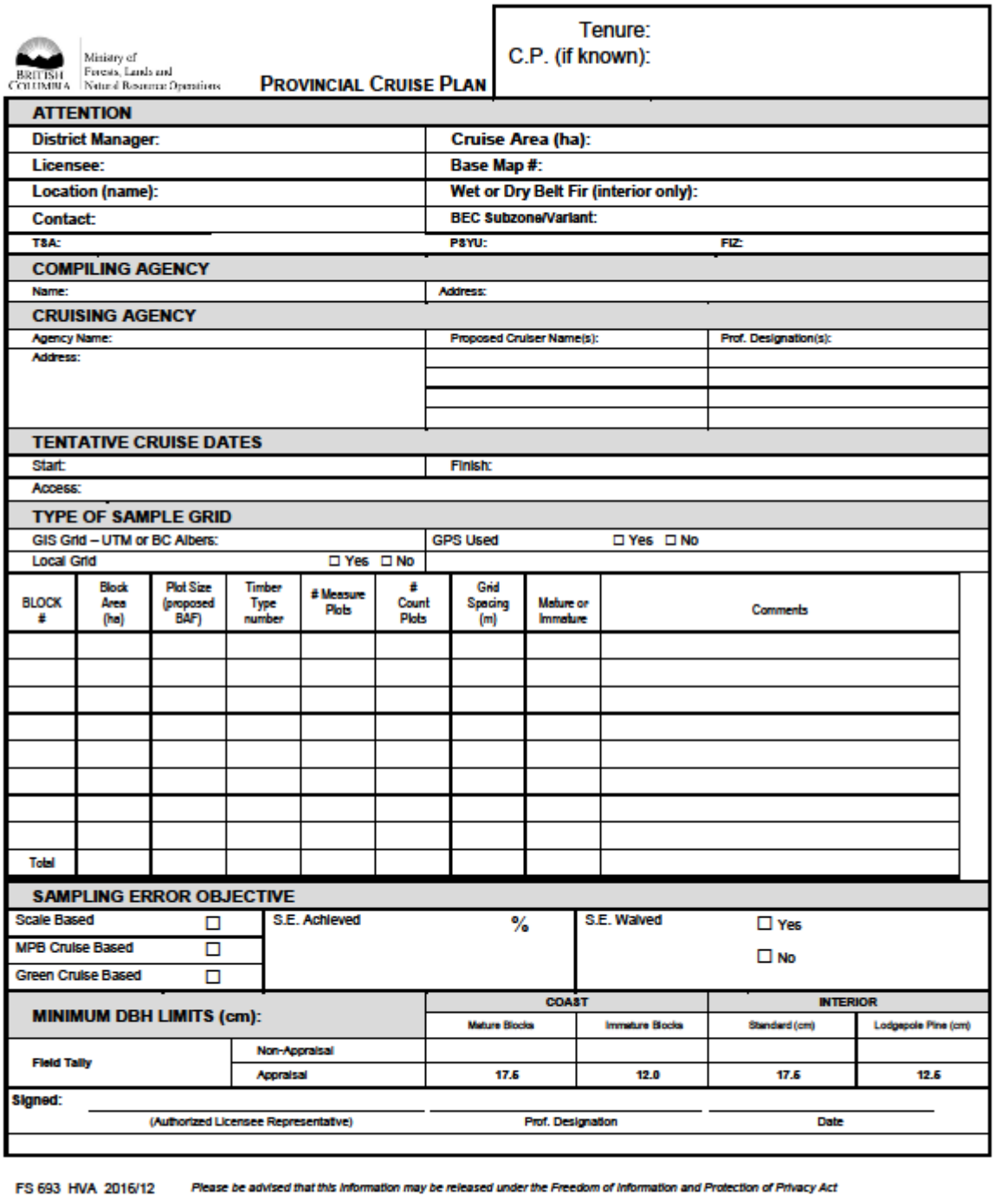
Deciduous							
10m Log % - 15cm Top (Coast Mature)							
Total Height (m)	Log 1	Log 2	Log 3	Log 4	Log 5	Log 6	
15	100						100
20	91	9					100
25	77	23					100
30	66	29	4				100
35	59	32	9				100
40	53	32	14	1			100
45	48	31	17	4			100
50	44	29	19	8			100
55	46	26	16	11	1		100
60	43	27	17	9	3		100

Alder/Aspen/Maple/Cottonwood used to generate the table.

Distribution of "t"

Degrees of Freedom	0.05 (95 % Confidence Interval)
1	12.706
2	4.303
3	3.182
4	2.776
5	2.571
6	2.447
7	2.365
8	2.306
9	2.262
10	2.228
11	2.201
12	2.179
13	2.160
14	2.145
15	2.131
16	2.120
17	2.110
18	2.101
19	2.093
20	2.086
21	2.080
22	2.074
23	2.069
24	2.064
25	2.060
26	2.056
27	2.052
28	2.048
29	2.045
30	2.042
31 – 67	2.000
68 – 112	1.980
113 +	1.960

FS 693 Provincial Cruise Plan



Ministry of Forests, Lands and Natural Resource Operations

PROVINCIAL CRUISE PLAN

Tenure:
C.P. (if known):

ATTENTION

District Manager:	Cruise Area (ha):
Licensee:	Base Map #:
Location (name):	Wet or Dry Belt Fir (interior only):
Contact:	BEC Subzone/Variant:
TSA:	PSYU: FIZ:

COMPILING AGENCY

Name:	Address:

CRUISING AGENCY

Agency Name:	Proposed Cruiser Name(s):	Prof. Designation(s):
Address:		

TENTATIVE CRUISE DATES

Start:	Finish:
Access:	

TYPE OF SAMPLE GRID

GIS Grid – UTM or BC Albers:	GPS Used ☐ Yes ☐ No
Local Grid ☐ Yes ☐ No	

BLOCK #	Block Area (ha)	Plot Size (proposed BAF)	Timber Type number	# Measure Plots	# Count Plots	Grid Spacing (m)	Mature or Immature	Comments
Total								

SAMPLING ERROR OBJECTIVE

Scale Based ☐	S.E. Achieved %	S.E. Waived	☐ Yes
MPB Cruise Based ☐			☐ No
Green Cruise Based ☐			

MINIMUM DBH LIMITS (cm):		COAST		INTERIOR	
		Mature Blocks	Immature Blocks	Standard (cm)	Lodgepole Pine (cm)
Field Tally	Non-Appraisal				
	Appraisal	17.5	12.0	17.5	12.5

Signed: _____ (Authorized Licensee Representative) _____ Prof. Designation _____ Date

FS 693 HVA 2016/12 *Please be advised that this information may be released under the Freedom of Information and Protection of Privacy Act*

Figure A.6 FS 693 - Provincial Cruise Plan (Page 1 of 2)

MARKING	Ribbon Colour	Paint Colour	Axe Blaze	Other (tags)
Baseline				
Boundaries				
Harvest Methods				
Strips				
Plot Centre				
Tie Points				
Non Forest Types				
Riparian Areas				
Wildlife Tree Patches				
Other				
Comments				

Figure A.7 FS 693 - Provincial Cruise Plan (Page 2 of 2)

Link: ***www.for.gov.bc.ca/pscripts/isb/forms/forms.asp***

FS 694 Provincial Cruise Plan and Map Check List

BRITISH COLUMBIA

Ministry of
Forests, Lands and
Natural Resource Operations

PROVINCIAL CRUISE PLAN AND MAP CHECK LIST

TENURE: _____
C.P.: _____
CRUISE AREA (ha): _____
BASE MAP #: _____

A.	TENURE and CRUISING AGENCY INFORMATION	YES	NO	N/A
1.	Licensee's name:			
2.	Tenure and Cutting Permit & Block numbers:			
3.	Forest Region & District:			
4.	Name(s) of persons who completed the cruise fieldwork:			
5.	Name(s) of persons who completed the cruise plan and map:			
B.	**AREA INFORMATION**			
6.	Cutting Boundaries and Block Net Areas:			
7.	Timber Type Net Areas:			
8.	Harvesting Method & Net Areas for Heli-Logging:			
9.	Non-Forest Type & Forest Reserve Areas:			
C.	**CRUISE PLAN MAP**			
10.	Tenure information adequate:			
11.	Acceptable map scale (1:5 000; 1:10 000):			
12.	Cruise based/Scale based indicator (Coast Only)			
13.	Timber type lines and identifier. A forest cover map included for the cruise and surrounding area if PI is present:			
14.	Minimum number of plots per timber type polygon:			
15.	Sufficient number of plots per type or 1.0 plots per hectare and SE waived:			
16.	Maximum grid - 200m if cruise < 250 ha or 250m if cruise ≥ 250 ha:			
17.	Prism and/or fixed area plot size consistent in each type?			
18.	Cut block boundaries and forest types clearly delineated on map?			
19.	Point of Commencement established:			
20.	Strips tied to cutblock boundaries (unless GPS is used):			
21.	Measure & Count Plots identified and numbered:			
22.	Legal Survey Features (if they affect sampling):			
23.	Portions of Cutting Boundaries that will be Stubbed (if applicable):			
24.	Existing & Proposed Roads identified:			

Note: The cruise plan map may contain all of the information in lieu of using the form too.

Remarks:

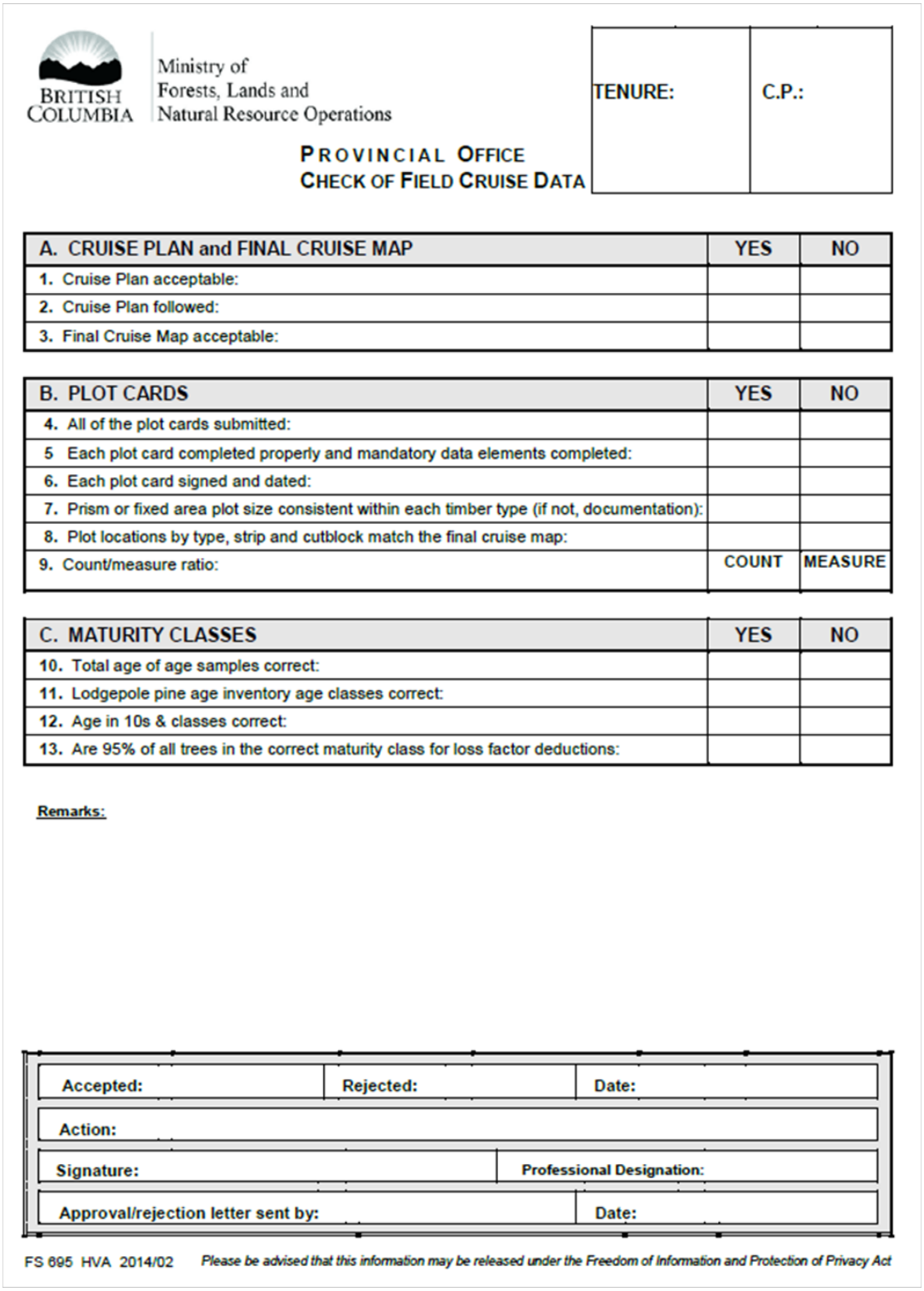
Action:	
Signature:	**Professional Designation:**

FS 694 HVA 2016/12 *Please be advised that this information may be released under the Freedom of Information and Protection of Privacy Act*

Figure A.8 FS 694 - Provincial Cruise Plan and Map Check List

Link https://www.for.gov.bc.ca/isb/forms/lib/FS694.pdf

FS 695 Provincial Office Check of Field Cruise Data



BRITISH COLUMBIA

Ministry of
Forests, Lands and
Natural Resource Operations

PROVINCIAL OFFICE
CHECK OF FIELD CRUISE DATA

TENURE:	C.P.:

A. CRUISE PLAN and FINAL CRUISE MAP	YES	NO
1. Cruise Plan acceptable:		
2. Cruise Plan followed:		
3. Final Cruise Map acceptable:		

B. PLOT CARDS	YES	NO
4. All of the plot cards submitted:		
5 Each plot card completed properly and mandatory data elements completed:		
6. Each plot card signed and dated:		
7. Prism or fixed area plot size consistent within each timber type (if not, documentation):		
8. Plot locations by type, strip and cutblock match the final cruise map:		
9. Count/measure ratio:	COUNT	MEASURE

C. MATURITY CLASSES	YES	NO
10. Total age of age samples correct:		
11. Lodgepole pine age inventory age classes correct:		
12. Age in 10s & classes correct:		
13. Are 95% of all trees in the correct maturity class for loss factor deductions:		

Remarks:

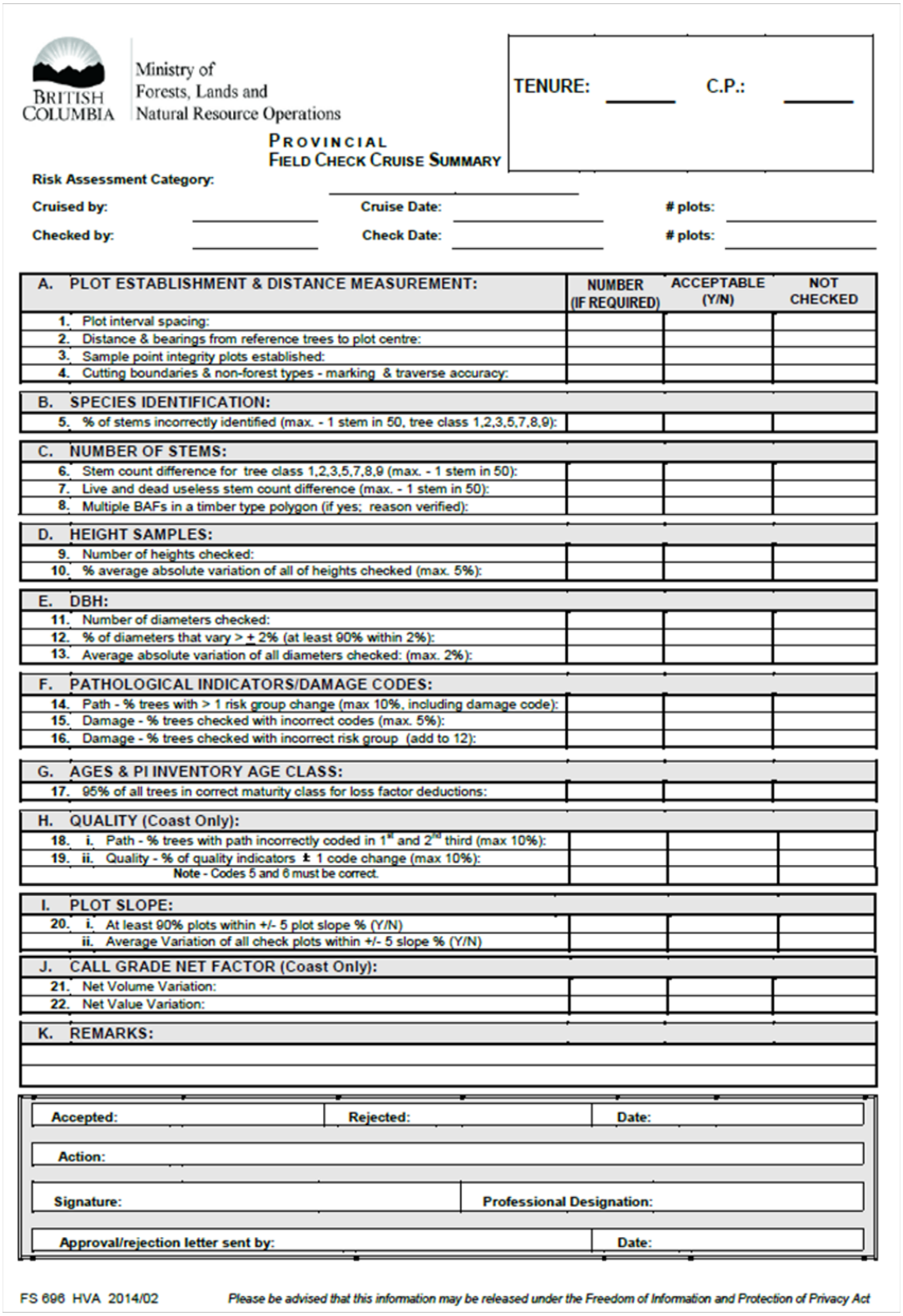
Accepted:	Rejected:	Date:
Action:		
Signature:	Professional Designation:	
Approval/rejection letter sent by:		Date:

FS 695 HVA 2014/02 *Please be advised that this information may be released under the Freedom of Information and Protection of Privacy Act*

Figure A.9 FS 695 - Provincial Office Check of Field Cruise Data

Link: ***https://www.for.gov.bc.ca/isb/forms/lib/FS695.pdf***

FS 696 Provincial Field Check Cruise Summary



BRITISH COLUMBIA

Ministry of
Forests, Lands and
Natural Resource Operations

PROVINCIAL
FIELD CHECK CRUISE SUMMARY

TENURE: _____ **C.P.:** _____

Risk Assessment Category: _____

Cruised by: _____ **Cruise Date:** _____ **# plots:** _____

Checked by: _____ **Check Date:** _____ **# plots:** _____

A. PLOT ESTABLISHMENT & DISTANCE MEASUREMENT:	NUMBER (IF REQUIRED)	ACCEPTABLE (Y/N)	NOT CHECKED
1. Plot interval spacing:			
2. Distance & bearings from reference trees to plot centre:			
3. Sample point integrity plots established:			
4. Cutting boundaries & non-forest types - marking & traverse accuracy:			
B. SPECIES IDENTIFICATION:			
5. % of stems incorrectly identified (max. - 1 stem in 50, tree class 1,2,3,5,7,8,9):			
C. NUMBER OF STEMS:			
6. Stem count difference for tree class 1,2,3,5,7,8,9 (max. - 1 stem in 50):			
7. Live and dead useless stem count difference (max. - 1 stem in 50):			
8. Multiple BAFs in a timber type polygon (if yes; reason verified):			
D. HEIGHT SAMPLES:			
9. Number of heights checked:			
10. % average absolute variation of all of heights checked (max. 5%):			
E. DBH:			
11. Number of diameters checked:			
12. % of diameters that vary > ± 2% (at least 90% within 2%):			
13. Average absolute variation of all diameters checked: (max. 2%):			
F. PATHOLOGICAL INDICATORS/DAMAGE CODES:			
14. Path - % trees with > 1 risk group change (max 10%, including damage code):			
15. Damage - % trees checked with incorrect codes (max. 5%):			
16. Damage - % trees checked with incorrect risk group (add to 12):			
G. AGES & PI INVENTORY AGE CLASS:			
17. 95% of all trees in correct maturity class for loss factor deductions:			
H. QUALITY (Coast Only):			
18. i. Path - % trees with path incorrectly coded in 1st and 2nd third (max 10%):			
19. ii. Quality - % of quality indicators ± 1 code change (max 10%):			
Note - Codes 5 and 6 must be correct.			
I. PLOT SLOPE:			
20. i. At least 90% plots within +/- 5 plot slope % (Y/N)			
ii. Average Variation of all check plots within +/- 5 slope % (Y/N)			
J. CALL GRADE NET FACTOR (Coast Only):			
21. Net Volume Variation:			
22. Net Value Variation:			
K. REMARKS:			

Accepted: **Rejected:** **Date:**

Action:

Signature: **Professional Designation:**

Approval/rejection letter sent by: **Date:**

FS 696 HVA 2014/02 *Please be advised that this information may be released under the Freedom of Information and Protection of Privacy Act*

Figure A.10 FS 696 - Provincial Field Check Cruise Summary

Link: ***https://www.for.gov.bc.ca/isb/forms/lib/FS696.pdf***

FS 697 Provincial Compilation Check Form

BRITISH COLUMBIA
Ministry of Forests, Lands and Natural Resource Operations

PROVINCIAL COMPILATION CHECK FORM

TENURE: _____ C.P.: _____

A. CRUISE/TENURE INFORMATION	YES	NO
1. Field checked:		
2. Licensee:		
3. Forest District:		
4. a) Forest Inventory Zone (FIZ) correct:		
5. b) Forest Sustained Yield Unit (PSYU) correct:		
B. MAP AREA STATEMENT	**YES**	**NO**
6. Net merchantable area match appraisal:		
7. Do the final cruise map merchantable areas agree with the compilation and appraisal:		
8. Do the number and area of the cutblocks on the final cruise map agree with the compilation and appraisal:		
9. Do the number and area of the timber types on the final cruise map agree with compilation:		
10. Type of compilation correct (Wet or dry belt fir = BEC Subzone with most fir):		
C. COMPILATION VERSION	**YES**	**NO**
11. Is the compilation version correct:		
D. SAMPLE ERROR (Pre-reduction Compilation)	**YES**	**NO**
12. Sampling error % (SE) achieved:		
13. If SE % not achieved, minimum average # trees/plot and plots/ha been achieved:		
F. PLOT SUMMARIES AND LOSS FACTORS	**YES**	**NO**
14. Have the correct loss factors been used for each species:		
15. Are the plots in the compilation and appraisal only from the harvest area:		
G. REDUCTION COMPILATIONS (Factored, Partial Cut, etc)	**YES**	**NO**
16. Pre-reduction compilation submitted:		
17. Percent reduction input consistent with the selection harvest source documentation and surveys:		
H. APPRAISAL	**YES**	**NO**
18. All pages of the compilation reporting '*For Appraisal Purposes*':		
19. Cruise data entered in ECAS the same as the compilation:		
20. ASCII cruise data file and CSV file attached in ECAS:		

REMARKS :

Accepted:	Rejected:	Date:
Action:		
Signature:	Professional Designation:	
Approval/rejection letter sent by:		Date:

FS 697 HVA 2014/02 *Please be advised that this information may be released under the Freedom of Information and Protection of Privacy Act*

Figure A.11 FS 697 - Provincial Compilation Check Form

Link: ***https://www.for.gov.bc.ca/isb/forms/lib/FS697.pdf***

Horizontal Distance Correction

Slope Correction Formula

All distances (strip and base lines, plot radii and closed traverses) must be corrected for slope to obtain horizontal distance and measured to the standards listed in Section 3.5.

The formula used to correct for slope is:

$$\text{COS}\left[\text{TAN}^{-1}\left(\frac{\text{slope\%}}{100}\right)\right] = \text{slope correction factor} \leq 1.000$$

The resulting number is multiplied by a measured slope distance to obtain the equivalent horizontal distance. For example:

- slope of 59 percent and measured slope distance of 8.62 m to tie point,
  - $\text{COS}\left[\text{TAN}^{-1}\left(\frac{59}{100}\right)\right] = 0.8613$, and
- 8.62 m x 0.8613 = 7.42 m horizontal distance to the tie point.

To obtain a slope distance, the specified horizontal distance is multiplied by the inverse of the slope correction factor. For example:

- slope of 74 percent and specified horizontal distance of 50 m,
  - $\text{COS}\left[\text{TAN}^{-1}\left(\frac{74}{100}\right)\right] = 0.8038 \qquad 0.8038^{-1} = 1.2441$, and
- 50 m x 1.2441 = 62.205 m slope distance will equal 50 m horizontal distance. Refer to the Correction Table for Chaining.

A spreadsheet to calculate horizontal distance can be found at the following website:

Cruising Calculations

Correction Table for Chaining

% Slope	Horizontal Distance in Metres (5m intervals) – Chainage Plus Slope Allowance									
	5	10	15	20	25	30	35	40	45	50
10	5.02	10.05	15.07	20.10	25.12	30.15	35.17	40.20	45.22	50.25
12	5.04	10.07	15.11	20.14	25.18	30.22	35.25	40.29	45.32	50.36
14	5.05	10.10	15.15	20.20	25.24	30.29	35.34	40.39	45.44	50.49
16	5.06	10.13	15.19	20.25	25.32	30.38	35.45	40.51	45.57	50.64
18	5.08	10.16	15.24	20.32	25.40	30.48	35.56	40.64	45.72	50.80
20	5.10	10.20	15.30	20.40	25.50	30.59	35.69	40.79	45.89	50.99
22	5.12	10.24	15.36	20.48	25.60	30.72	35.84	40.96	46.08	51.20
24	5.14	10.28	15.43	20.57	25.71	30.85	35.99	41.14	46.28	51.42
26	5.17	10.33	15.50	20.66	25.83	31.00	36.16	41.33	46.50	51.66
28	5.19	10.38	15.58	20.77	25.96	31.15	36.35	41.54	46.73	51.92
30	5.22	10.44	15.66	20.88	26.10	31.32	36.54	41.76	46.98	52.20
32	5.25	10.50	15.75	21.00	26.25	31.50	36.75	42.00	47.25	52.50
34	5.28	10.56	15.84	21.12	26.41	31.69	36.97	42.25	47.53	52.81
36	5.31	10.63	15.94	21.26	26.57	31.88	37.20	42.51	47.83	53.14
38	5.35	10.70	16.05	21.40	26.74	32.09	37.44	42.79	48.14	53.49
40	5.39	10.77	16.16	21.54	26.93	32.31	37.70	43.08	48.47	53.85
42	5.42	10.85	16.27	21.69	27.12	32.54	37.96	43.38	48.81	54.23
44	5.46	10.93	16.39	21.85	27.31	32.78	38.24	43.70	49.16	54.63
46	5.50	11.01	16.51	22.01	27.52	33.02	38.53	44.03	49.53	55.04
48	5.55	11.09	16.64	22.18	27.73	33.28	38.82	44.37	49.92	55.46
50	5.59	11.18	16.77	22.36	27.95	33.54	39.13	44.72	50.31	55.90
52	5.64	11.27	16.91	22.54	28.18	33.81	39.45	45.08	50.72	56.36
54	5.68	11.36	17.05	22.73	28.41	34.09	39.78	45.46	51.14	56.82
56	5.73	11.46	17.19	22.92	28.65	34.38	40.11	45.84	51.58	57.31
58	5.78	11.56	17.34	23.12	28.90	34.68	40.46	46.24	52.02	57.80
60	5.83	11.66	17.49	23.32	29.15	34.99	40.82	46.65	52.48	58.31
62	5.88	11.77	17.65	23.53	29.42	35.30	41.18	47.06	52.95	58.83
64	5.94	11.87	17.81	23.75	29.68	35.62	41.55	47.49	53.43	59.36
66	5.99	11.98	17.97	23.96	29.95	35.94	41.94	47.93	53.92	59.91
68	6.05	12.09	18.14	24.19	30.23	36.28	42.33	48.37	54.42	60.46
70	6.10	12.21	18.31	24.41	30.52	36.62	42.72	48.83	54.93	61.03
72	6.16	12.32	18.48	24.64	30.81	36.97	43.13	49.29	55.45	61.61
74	6.22	12.44	18.66	24.88	31.10	37.32	43.54	49.76	55.98	62.20
76	6.28	12.56	18.84	25.12	31.40	37.68	43.96	50.24	56.52	62.80
78	6.34	12.68	19.02	25.36	31.71	38.05	44.39	50.73	57.07	63.41
80	6.40	12.81	19.21	25.61	32.02	38.42	44.82	51.22	57.63	64.03
82	6.47	12.93	19.40	25.86	32.33	38.80	45.26	51.73	58.19	64.66
84	6.53	13.06	19.59	26.12	32.65	39.18	45.71	52.24	58.77	65.30
86	6.59	13.19	19.78	26.38	32.97	39.57	46.16	52.76	59.35	65.95
88	6.66	13.32	19.98	26.64	33.30	39.96	46.62	53.28	59.94	66.60
90	6.73	13.45	20.18	26.91	33.63	40.36	47.09	53.81	60.54	67.27
92	6.79	13.59	20.38	27.18	33.97	40.76	47.56	54.35	61.15	67.94
94	6.86	13.72	20.59	27.45	34.31	41.17	48.04	54.90	61.76	68.62
96	6.93	13.86	20.79	27.72	34.66	41.59	48.52	55.45	62.38	69.31
98	7.00	14.00	21.00	28.00	35.00	42.00	49.00	56.01	63.01	70.01
100	7.07	14.14	21.21	28.28	35.36	42.43	49.50	56.57	63.64	70.71
102	7.14	14.28	21.43	28.57	35.71	42.85	49.99	57.14	64.28	71.42
104	7.21	14.43	21.64	28.86	36.07	43.28	50.50	57.71	64.92	72.14
106	7.29	14.57	21.86	29.15	36.43	43.72	51.00	58.29	65.58	72.86
108	7.36	14.72	22.08	29.44	36.80	44.16	51.52	58.87	66.23	73.59
110	7.43	14.87	22.30	29.73	37.17	44.60	52.03	59.46	66.90	74.33

Correction Table for Plot Radii

Table 2 - Plot Radius - Page T-3									
% Slope	**Plot Radii Plus Slope Allowance**								
	0.005 ha	0.008 ha	.010 ha	0.02 ha	0.04 ha	0.06 ha	0.08 ha	0.1 ha	0.2 ha
	3.99	5.05	5.64	7.98	11.28	13.82	15.96	17.84	25.23
10	4.01	5.08	5.67	8.02	11.34	13.89	16.04	17.93	25.36
12	4.02	5.09	5.68	8.04	11.36	13.92	16.07	17.97	25.41
14	4.03	5.10	5.70	8.06	11.39	13.95	16.12	18.01	25.48
16	4.04	5.11	5.71	8.08	11.42	14.00	16.16	18.07	25.55
18	4.05	5.13	5.73	8.11	11.46	14.04	16.22	18.13	25.64
20	4.07	5.15	5.75	8.14	11.50	14.09	16.28	18.19	25.73
22	4.09	5.17	5.77	8.17	11.55	14.15	16.34	18.27	25.83
24	4.10	5.19	5.80	8.21	11.60	14.21	16.41	18.35	25.95
26	4.12	5.22	5.83	8.25	11.66	14.28	16.49	18.43	26.07
28	4.14	5.24	5.86	8.29	11.71	14.35	16.57	18.53	26.20
30	4.17	5.27	5.89	8.33	11.78	14.43	16.66	18.63	26.34
32	4.19	5.30	5.92	8.38	11.84	14.51	16.76	18.73	26.49
34	4.21	5.33	5.96	8.43	11.91	14.60	16.86	18.84	26.65
36	4.24	5.37	5.99	8.48	11.99	14.69	16.96	18.96	26.82
38	4.27	5.40	6.03	8.54	12.07	14.78	17.07	19.08	26.99
40	4.30	5.44	6.07	8.59	12.15	14.88	17.19	19.21	27.17
42	4.33	5.48	6.12	8.66	12.23	14.99	17.31	19.35	27.36
44	4.36	5.52	6.16	8.72	12.32	15.10	17.44	19.49	27.56
46	4.39	5.56	6.21	8.78	12.42	15.21	17.57	19.64	27.77
48	4.43	5.60	6.26	8.85	12.51	15.33	17.70	19.79	27.99
50	4.46	5.65	6.31	8.92	12.61	15.45	17.84	19.95	28.21
52	4.50	5.69	6.36	8.99	12.71	15.58	17.99	20.11	28.44
54	4.53	5.74	6.41	9.07	12.82	15.71	18.14	20.27	28.67
56	4.57	5.79	6.46	9.15	12.93	15.84	18.29	20.45	28.92
58	4.61	5.84	6.52	9.23	13.04	15.98	18.45	20.62	29.17
60	4.65	5.89	6.58	9.31	13.15	16.12	18.61	20.80	29.42
62	4.69	5.94	6.64	9.39	13.27	16.26	18.78	20.99	29.69
64	4.74	6.00	6.70	9.47	13.39	16.41	18.95	21.18	29.95
66	4.78	6.05	6.76	9.56	13.52	16.56	19.12	21.38	30.23
68	4.83	6.11	6.82	9.65	13.64	16.71	19.30	21.57	30.51
70	4.87	6.16	6.88	9.74	13.77	16.87	19.48	21.78	30.80
72	4.92	6.22	6.95	9.83	13.90	17.03	19.67	21.98	31.09
74	4.96	6.28	7.02	9.93	14.03	17.19	19.85	22.19	31.39
76	5.01	6.34	7.08	10.02	14.17	17.36	20.05	22.41	31.69
78	5.06	6.40	7.15	10.12	14.31	17.53	20.24	22.63	32.00
80	5.11	6.47	7.22	10.22	14.45	17.70	20.44	22.85	32.31
82	5.16	6.53	7.29	10.32	14.59	17.87	20.64	23.07	32.63
84	5.21	6.60	7.37	10.42	14.73	18.05	20.84	23.30	32.95
86	5.26	6.66	7.44	10.53	14.88	18.23	21.05	23.53	33.28
88	5.31	6.73	7.51	10.63	15.03	18.41	21.26	23.76	33.61
90	5.37	6.79	7.59	10.74	15.18	18.59	21.47	24.00	33.94
92	5.42	6.86	7.66	10.84	15.33	18.78	21.69	24.24	34.28
94	5.48	6.93	7.74	10.95	15.48	18.97	21.90	24.48	34.63
96	5.53	7.00	7.82	11.06	15.64	19.16	22.12	24.73	34.97
98	5.59	7.07	7.90	11.17	15.79	19.35	22.35	24.98	35.33
100	5.64	7.14	7.98	11.29	15.95	19.54	22.57	25.23	35.68
102	5.70	7.21	8.06	11.40	16.11	19.74	22.80	25.48	36.04
104	5.76	7.29	8.14	11.51	16.27	19.94	23.03	25.74	36.40
106	5.81	7.36	8.22	11.63	16.44	20.14	23.26	26.00	36.77
108	5.87	7.43	8.30	11.75	16.60	20.34	23.49	26.26	37.14
110	5.93	7.51	8.38	11.86	16.77	20.54	23.73	26.52	37.51
112	5.99	7.58	8.47	11.98	16.94	20.75	23.96	26.79	37.88
114	6.05	7.66	8.55	12.10	17.11	20.96	24.20	27.05	38.26
116	6.11	7.73	8.64	12.22	17.28	21.17	24.44	27.32	38.64
118	6.17	7.81	8.72	12.34	17.45	21.38	24.69	27.59	39.02
120	6.23	7.89	8.81	12.47	17.62	21.59	24.93	27.87	39.41
122	6.29	7.97	8.90	12.59	17.79	21.80	25.18	28.14	39.80

Table 2 - Plot Radius - Page T-3									
% Slope	**Plot Radii Plus Slope Allowance**								
124	6.36	8.04	8.98	12.71	17.97	22.02	25.42	28.42	40.19
126	6.42	8.12	9.07	12.84	18.15	22.23	25.67	28.70	40.59
128	6.48	8.20	9.16	12.96	18.32	22.45	25.92	28.98	40.98
130	6.54	8.28	9.25	13.09	18.50	22.67	26.18	29.26	41.38
132	6.61	8.36	9.34	13.22	18.68	22.89	26.43	29.54	41.78
134	6.67	8.44	9.43	13.34	18.86	23.11	26.69	29.83	42.18
136	6.74	8.52	9.52	13.47	19.04	23.33	26.94	30.12	42.59
138	6.80	8.61	9.61	13.60	19.22	23.55	27.20	30.40	43.00
140	6.86	8.69	9.70	13.73	19.41	23.78	27.46	30.69	43.41

A spreadsheet to calculate Plot Radii Slope Allowance can be found at the following website:

Cruising Calculations

Interior Lumber Recovery Factor (LRF) Algorithms (Appendix 7)

For additional information on these algorithms, please refer to the *Cruise Compilation Manual*.

A.7.1 Dead Potential White Pine Log Grade Algorithm

A.7.1.1 Assumption

Pathology and surface characteristics on the tree can predict grade (see figure below).

A.7.1.2 Procedures

1. The compilation program utilizes a matrix for allocation of path in thirds to the 5 metre logs (see Appendix A.10.2 of the *Cruise Compilation Manual*).

2. Pathological indicators are collected as per the manual.

3. Saprot/checks are recorded in the root rot column. At least 50 percent of the log must be suitable for lumber. Sound cores must be at least 10 cm top diameter, and logs less than 15 cm top diameter are allowed only one check 4 cm deep or more to be classified as sawlog. Code the pathological indicator tree third positions 1 to 7 for each third that *does not* qualify as lumber.

A.7.1.3 Flowchart

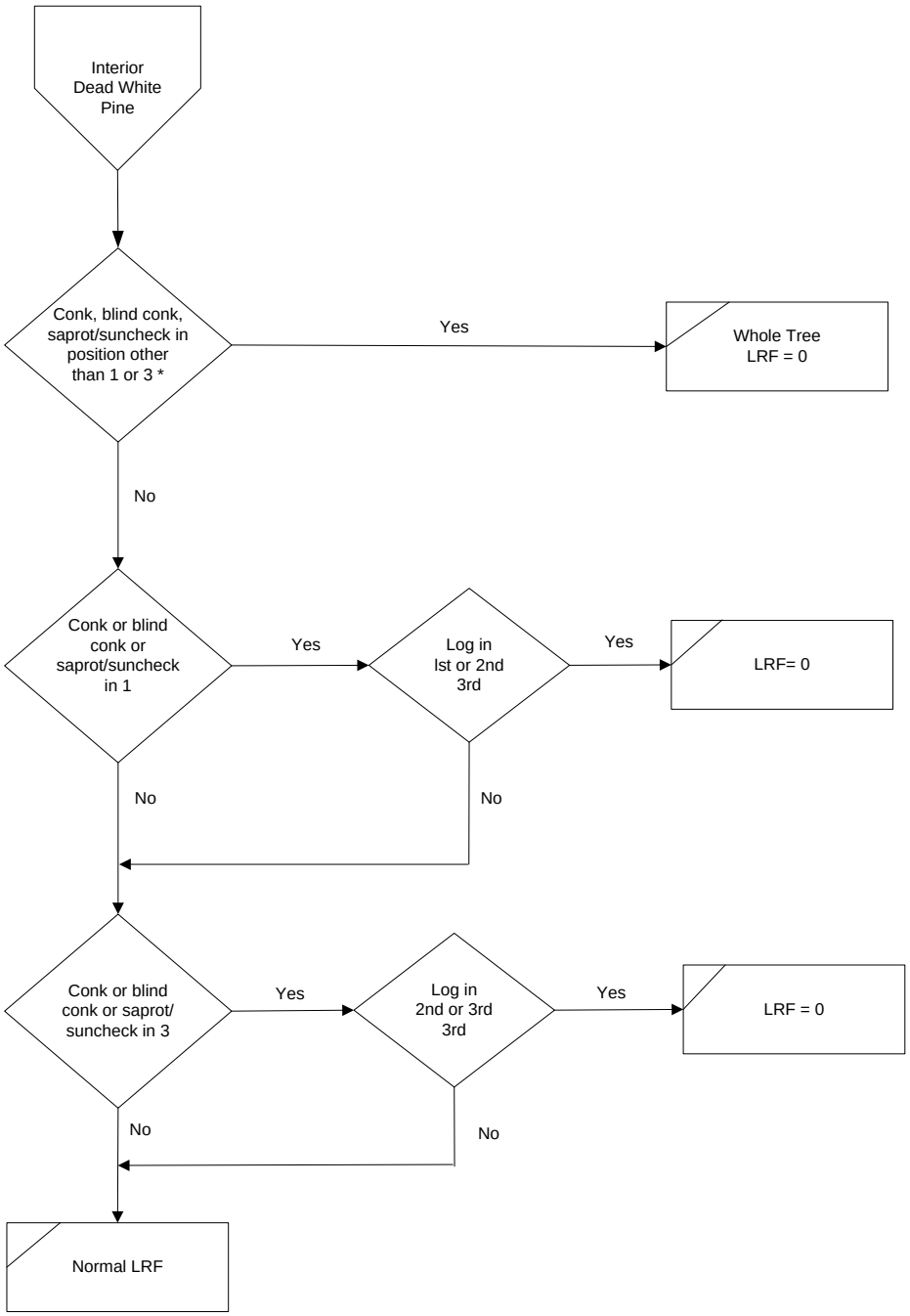


Figure A.12 Dead Potential White Pine Log Grade Algorithm

A.7.2 Interior Hemlock Algorithm Flowchart

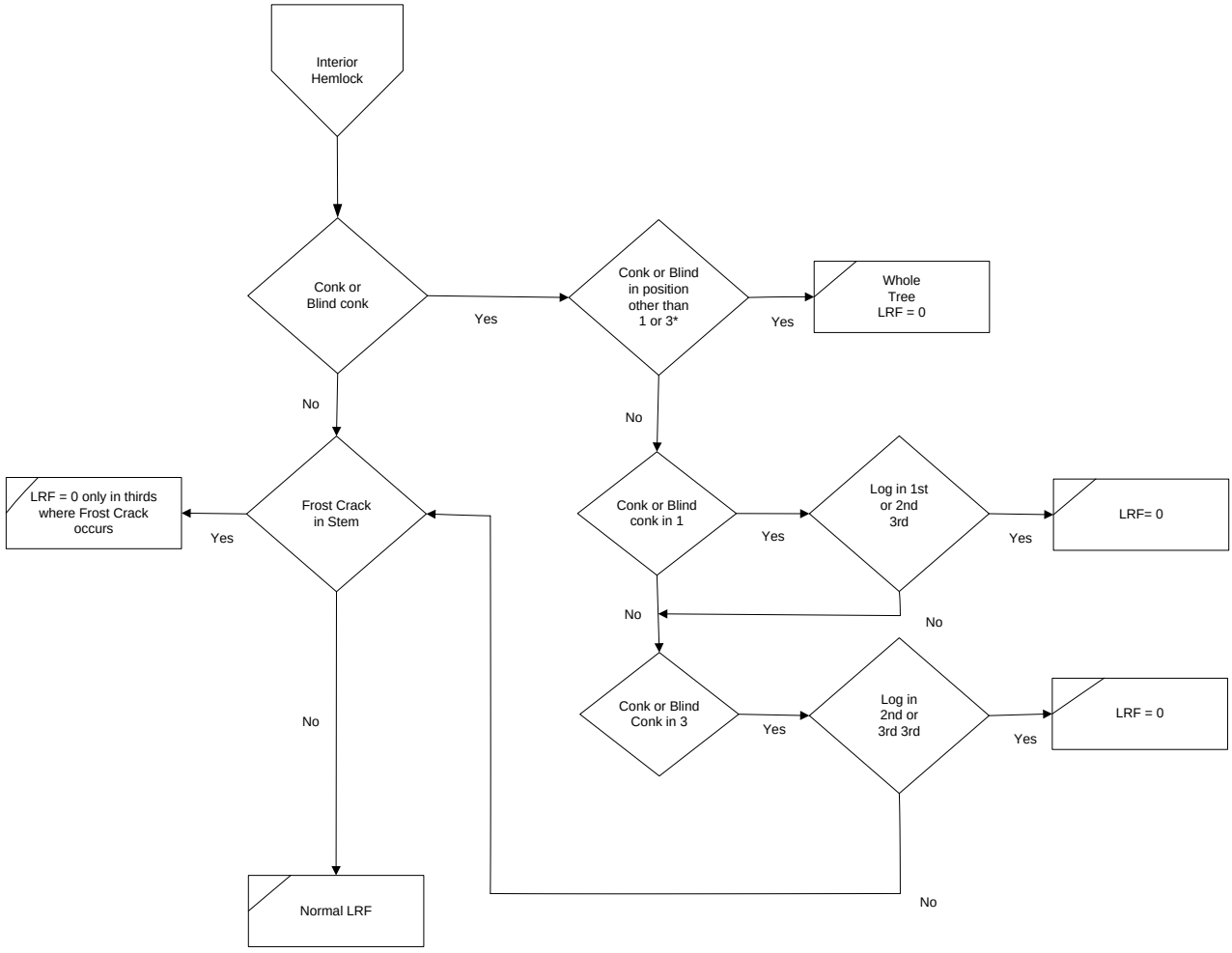


Figure A.13 Interior Hemlock Algorithm

A.7.3 Interior Balsam (*Abies* sp.) Process

The LRF compiled for balsam is based on the sawlog component only. The compilation will assess each balsam tree and segregate those with decay, waste and breakage (DWB) of less than 48% as all sawlogs. Those balsam trees with greater than or equal to 48% DWB will have zero LRF assigned to the complete volume of the tree. The average LRF's will be lowered due to the reduction of the sawlog net volume over the total net volume.

Magnetic Declination – September 2016

Region	Location	Latitude (in degrees, minutes)	Longitude (in degrees, minutes)	Declination	
				Degrees, Minutes	Decimal Degrees
Coastal	Chilliwack	49 ° 10'	121 ° 57'	16° 13' E	16.2° E
Coastal	Haney	49 ° 13'	122 ° 36'	16° 21' E	16.4° E
Coastal	Abbotsford	49 ° 03'	122 ° 17'	16° 15' E	16.3° E
Coastal	Vancouver	49 ° 15'	123 ° 07'	16° 27' E	16.5° E
Coastal	Squamish	49 ° 45'	123 ° 07'	16° 35' E	16.6° E
Coastal	Powell River	49 ° 51'	124 ° 32'	16° 50' E	16.8° E
Coastal	Campbell River	50 ° 01'	125 ° 20'	17° 00' E	17.0° E
Coastal	Port McNeill	50 ° 35'	127 ° 06'	17° 21' E	17.4° E
Coastal	Gold River	49 ° 41'	126 ° 07'	17° 00' E	17.0° E
Coastal	Nanaimo	49 ° 10'	123 ° 56'	16° 34' E	16.6° E
Coastal	Tofino	49 ° 07'	125 ° 53'	16° 50' E	16.8° E
Coastal	Duncan	48 ° 47'	123 ° 42'	16° 26' E	16.4° E
Coastal	Port Alberni	49 ° 14'	124 ° 48'	16° 43' E	16.7° E
Coastal	Sayward	50 ° 23'	125 ° 58'	17° 10' E	17.2° E
Coastal	Holberg	50 ° 39'	128 ° 01'	17° 26' E	17.4° E
Coastal	Port Renfrew	48 ° 33'	124 ° 25'	16° 29' E	16.5° E
Coastal	Massett	54 ° 01'	132 ° 06'	18° 29' E	18.5° E
Coastal	The Village of Queen Charlotte	53 ° 15'	132 ° 07'	18° 16' E	18.3° E
Coastal	Klemtu	52 ° 35'	128 ° 31'	18° 0’ E	18.0° E
Coastal	Hagensborg	52 ° 23'	126 ° 33'	17° 47' E	17.8° E
Coastal	Security Bay	51 ° 22'	127 ° 28'	17° 35' E	17.6° E
Coastal	Alison Sound	51 ° 15'	127 ° 00'	17° 31' E	17.5° E
Coastal	Pemberton	50 ° 19'	122 ° 48'	16° 41' E	16.7° E
Coastal	Boston Bar	49 ° 52'	121 ° 26'	16° 17' E	16.3° E
Coastal	Stuart Island	50 ° 22'	125 ° 08'	17° 04' E	17.1° E

Region	Location	Latitude (in degrees, minutes)	Longitude (in degrees, minutes)	Declination	
				Degrees, Minutes	Decimal Degrees
Coastal	Sewell Inlet	52 ° 53'	131 ° 59'	18° 11' E	18.2° E
Coastal	Franklin River	49 ° 00'	124 ° 45'	16° 39' E	16.7° E
Coastal	Rivers Inlet	51 ° 41'	127 ° 15'	17° 40' E	17.7° E
Coastal	Prince Rupert	54 ° 18'	130 ° 20'	18° 33' E	18.6° E
Northern	Burns Lake	54 ° 14'	125 ° 46'	18°13' E	18.2° E
Northern	Houston	54 ° 27'	126 ° 37'	18° 22' E	18.4° E
Northern	Smithers	54 ° 47'	127 ° 11'	18° 31' E	18.5° E
Northern	Hazelton	55 ° 14'	127 ° 35'	18° 41' E	18.7° E
Northern	Terrace	54 ° 31'	128 ° 36'	18° 33' E	18.5° E
Northern	Stewart	55 ° 57'	130 ° 00'	19° 01' E	19.0° E
Northern	Lower Post	59 ° 55'	128 ° 30'	20° 07' E	20.1° E
Northern	Bob Quinn Lake	56 ° 58'	130 ° 15'	19° 19' E	19.3° E
Northern	Dease Lake	58 ° 26'	130 ° 00'	19° 44' E	19.7° E
Northern	Atlin	59 ° 35'	133 ° 41'	19° 57' E	20.0° E
Northern	Hixon	53 ° 25'	122 ° 35'	17° 28' E	17.5° E
Northern	Prince George	53 ° 55'	122 ° 45'	17° 38' E	17.6° E
Northern	Bear Lake (Hart Hwy)	54 ° 30'	122 ° 41'	17° 47' E	17.8° E
Northern	Vanderhoof	54 ° 01'	124 ° 01'	17° 54' E	17.9° E
Northern	Kenny Dam	53 ° 35'	124 ° 57'	17° 55' E	17.9° E
Northern	Ft. St. James	54 ° 26'	124 ° 15'	18° 03' E	18.1° E
Northern	Takla Landing	55 ° 29'	125 ° 58'	18° 36' E	18.6° E
Northern	Manson Creek	55 ° 40'	124 ° 29'	18° 27' E	18.4° E
Northern	Aiken Lake	56 ° 26'	125 ° 45'	18° 51' E	18.8° E
Northern	Bear Lake (Driftwood)	56 ° 12'	126 ° 51'	18° 54' E	18.9° E
Northern	Mackenzie	55 ° 18'	123 ° 10'	18° 07' E	18.1° E

Region	Location	Latitude (in degrees, minutes)	Longitude (in degrees, minutes)	Declination	
				Degrees, Minutes	Decimal Degrees
Northern	Fort Ware	57 ° 26'	125 ° 38'	19° 08' E	19.1° E
Northern	Ingenika Point	56 ° 47'	124 ° 54'	18° 50' E	18.8° E
Northern	Ingenika Mine	56 ° 42'	125 ° 11'	18° 51' E	18.9° E
Northern	Dawson Creek	55 ° 46'	120 ° 14'	17° 34' E	17.6° E
Northern	Chetwynd	55 ° 42'	121 ° 38'	17° 54' E	17.9° E
Northern	Tumbler Ridge	55 ° 07'	121 ° 00'	17° 35' E	17.6° E
Northern	Fort St. John	56 ° 15'	120 ° 51'	17° 52' E	17.9° E
Northern	Beaton River (settl.)	57 ° 23'	121 ° 25'	18° 19' E	18.3° E
Northern	Pink Mountain	57 ° 02'	122 ° 31'	18° 29' E	18.5° E
Northern	Fort Nelson	58 ° 48'	122 ° 43'	19° 02' E	19.0° E
Northern	Muncho Lake	58 ° 56'	125 ° 46'	19° 35' E	19.6° E
Northern	Nelson Forks	59 ° 30'	124 ° 01'	19° 30' E	19.5° E
Southern	Chase	50 ° 49'	119 ° 41'	16° 06' E	16.1° E
Southern	Lillooet	50 ° 40'	121 ° 56'	16° 36' E	16.6° E
Southern	Merritt	50 ° 07'	120 ° 47'	16° 12' E	16.2° E
Southern	Princeton	49 ° 28'	120 ° 30'	15° 59' E	16.0° E
Southern	Penticton	49 ° 30'	119 ° 35'	15° 45' E	15.8° E
Southern	Vernon	50 ° 16'	119 ° 16'	15° 52' E	15.9° E
Southern	Salmon Arm	50 ° 42'	119 ° 16'	15° 58' E	16.0° E
Southern	Kamloops	50 ° 40'	120 ° 19'	16° 14' E	16.2° E
Southern	Clearwater	51 ° 39'	120 ° 02'	16° 25' E	16.4° E
Southern	Beaverdell	49 ° 26'	119 ° 05'	15° 37' E	15.6° E
Southern	Valemount	52 ° 50'	119 ° 15'	16° 30' E	16.5° E
Southern	McBride	53 ° 18'	120 ° 10'	16° 53' E	16.9° E
Southern	Castlegar	49 ° 19'	117 ° 39'	15° 10' E	15.2° E
Southern	Cranbrook	49 ° 30'	115 ° 46'	14° 35' E	14.6° E

Region	Location	Latitude (in degrees, minutes)	Longitude (in degrees, minutes)	Declination	
				Degrees, Minutes	Decimal Degrees
Southern	Creston	49 ° 06'	116 ° 31'	14° 46' E	14.8° E
Southern	Flathead	49 ° 22'	114 ° 37'	14° 08' E	14.1° E
Southern	Golden	51 ° 18'	116 ° 58'	15° 25' E	15.4° E
Southern	Grand Forks	49 ° 02'	118 ° 27'	15° 20' E	15.3° E
Southern	Invermere	50 ° 31'	116 ° 02'	14° 55' E	14.9° E
Southern	Kaslo	49 ° 55'	116 ° 54'	15° 04' E	15.1° E
Southern	Mica Creek	52 ° 00'	118 ° 34'	16° 05' E	16.1° E
Southern	Nakusp	50 ° 14'	117 ° 48'	15° 26' E	15.4° E
Southern	Nelson	49 ° 29'	117 ° 17'	15° 06' E	15.1° E
Southern	Revelstoke	50 ° 59'	118 ° 12'	15° 44' E	15.7° E
Southern	Sparwood	49 ° 43'	114 ° 53'	14° 19' E	14.3° E
Southern	Quesnel Townsite	52 ° 59'	122 ° 30'	17° 20' E	17.3° E
Southern	Farwell Canyon	51 ° 49'	122 ° 34'	17° 02' E	17.0° E
Southern	Mid - Horsefly Lake	52 ° 24'	121 ° 02'	16° 39' E	16.7° E
Southern	100 Mile House Townsite	51 ° 39'	121 ° 17'	16° 43' E	16.7° E
Southern	Chilanko Forks Settlement	52 ° 07'	124 ° 04'	17° 23' E	17.4° E

Link: http://geomag.nrcan.gc.ca/apps/mdcal-eng.php

Pathological Classification of Trees (Appendix 4)

Within mature stands, or stands approaching maturity, (i.e., older immature stands) individual trees contain varying amounts of decay. In stands of this type the estimation of cull is subject to considerable error. Therefore, it would be advantageous to know which trees are likely to contain decay, particularly those which are likely to contain excessive amounts of decay. Pathological studies have shown that two broad classes of living trees are clearly recognizable in stands of this character. The classification of trees is made on the basis of the presence or absence of external signs of decay, and each class of tree will represent a different potential loss factor within the stand.

A.4.1 Class of Trees

All living trees measured on each sample plot will be classed as:

- Residual, or
- Suspect.

A.4.1.1 Residual Trees

Residual trees are living trees which bear none of the external indicators of decay listed in A.4.1.2.

Examples of signs and defects on residual trees are listed in Section A.4.3 and Figure A.40 Illustrates Forks and Crooks Which are Not Suspect.

A.4.1.2. Suspect Trees

Suspect trees are living trees which bear one or more of the following external indications of decay, on or immediately adjacent to the trunk of the tree within the limits specified in this appendix:

1. Conks.
2. Blind conks (swollen knots).
3. Scars.
4. Fork or pronounced crook.
5. Frost crack.
6. Mistletoe trunk infections.
7. Rotten branches.
8. Dead or broken top.

The amount of decay indicated by signs will be subject to considerable variation within species and individual trees. For example, frost cracks may be highly significant as indicators of decay on a particular species in the stand as a whole, but not as significant on individual trees.

"Suspect" classifications will be made on the basis of the above listed signs of decay only; no other abnormalities are to be used.

See Risk Group Ratings by Pathological Indicators (Table 18) for Pathological Occurrence by Species and Forest Inventory Zones.

1 **Conk**

2 **Trunk Mistletoe**

3 **Frost Crack**

4 **Fork**

5 **Scar**

6 **Dead or Broken Top**

Figure A.14 Suspect Trees.

A.4.2 Signs and Defects Indicative of Decay in Standing Trees

The following is a brief description and explanation of the external indications of decay listed in this Appendix.

Coast – Pathological indicators must be recorded on all live and dead potential trees.

Interior – Pathological indicators must be recorded on:

i. All live trees, and
ii. dead potential white pine, balsam (*Abies* sp.) and hemlock trees, and
iii. dead potential lodgepole pine trees with conk and blind conk.

Do not record pathological indicators occurring above the top diameter timber merchantability specification[2].

Secondary Leaders

Record all pathological indicators on secondary leaders if the leader is alive and of merchantable size. Conks of an identifiable heart rot fungi may be called on non-merchantable live secondary leaders. Do not record any pathological indicators on non-merchantable dead secondary leaders.

Record pathological indicators on dead, merchantable secondary leaders for cedar and cypress only.

Record all pathological indicators on dead potential trees for the coastal log grade algorithm, however do not record sap rot fungi as conk.

A.4.2.1 Conks

Conks are the fruiting bodies (sporophores) of decay fungi, and are definite and reliable indicators of decay. Conks can occur anywhere on the main stem, branches, and exposed roots of the tree, but appear most frequently around knots and on the underside of both dead branch stubs and live branches. Fruiting bodies can also occur on slash, however slash conks are not suspect indicators. It is important to be able to differentiate between the fruiting bodies of slash fungi that occur on live and dead branches, wounds and roots of living trees and those of suspect indicators found on living conifers and hardwoods. For cruising purposes, only specific root, butt and heart rot conks are suspect indicators (see Figure A.19 Residual and Suspect Indicators and Their Host Species for a list of Residual and Suspect indicators, as well as their host species native to British Columbia).

On conifers, the suspect indicators which must be recognized are *Echinodontium tinctorium, Phellinus (Fomes) pini, Phaeolus (Polyporous) schweinitzii* and *Fomitopsis pinicola*. On hardwoods, the suspect indicators to recognize are *Phellinus igniarius* and *Phellinus tremulae*.

---

[2] *The merchantable portion of the tree is from 30cm stump height to a 10cm or 15cm top diameter inside bark as per the appropriate timber merchantability standards. Pathological factors outside of these limits were not included in the loss factor data.*

The major hear rot conks are hard, thick, woody-like perennial structures, and form singly at branch stubs or in small clusters on the underside of living branches. An exception to this is the mushroom-shaped to bracket-like sporophore of *P. schweinitzii* which is annual, but may persist for more than two years. Conks vary in size and shape and therefore are hard to spot, particularly when they are just developing, or when they occur on the upper trunk.

Before recording suspect conks on living branches in the upper crown, there must be conks of the suspect indicator heart rot fungi evident in the stand.

Conks of *E. tinctorium* and *P. pini* frequently appear as small hoof-like or shelf-like structures on the underside of dead branch stubs and/or lower trunk of an infected tree. Moss-covered branch stubs and burls often resemble conks, particularly when viewed from directly below; it is important, therefore, to view the tree from the side before making a decision.

Slash conks that occur on dead wood of living trees can be both annual (small, thin, leathery) and perennial, and are often more numerous, and occur anywhere on the tree. Slash conks that occur on old exposed wounds are not acceptable as suspect indicators with the exception of *F. pinicola*, which is considered a suspect indicator only when occurring on large, old wounds on live trees, as studies have found that its presence indicates significant decay. *F. pinicola* is common on dead trees, and when it occurs on dead branches, it is not considered a suspect indicator.

Conks of *Phaeolus schweinitzii*

P. schweinitzii is the cause of brown cubical rot and butt rot of most conifers, however Douglas-fir and spruce are the most susceptible. The fruiting bodies may occur:

- on the base of a tree,
- on the ground up to 2 m from the tree where no exposed roots are evident, or
- on the exposed roots.

If a *P. schweinitzii* conk is located mid-way between:

1. Two living susceptible trees, only one tree is considered to be infected. If one tree is a highly susceptible species (e.g. Douglas-fir) and the other is a less susceptible tree (e.g. western red cedar), the most susceptible species is considered to be infected.
2. A living tree and a stump showing brown cubical rot, and it is not on a root of the live tree, it is assumed to be associated with the stump.

Conks of *Phaeolus schweinitzii* Vs. conks of *Inonotus tomentosus*

It may be easy to confuse conks of *P. schweinitzii* (shown in Figure A.19 Residual and Suspect Indicators and Their Host Species and Figure A.41 Suspect Indicators) with those of *I. tomentosus* (Figure A.42 Residual Indicators), as the fruiting bodies can be somewhat similar in appearance. Particular care should be taken in identification of these pathogens.

Young conks of *P. schweinitzii* may often look the same as young conks of *I. tomentosus*, however conks of *I. tomentosus* are usually smaller (usually < 10 cm in diameter than those of *P. schweinitzii*, which can be up to 25 cm in diameter. In addition, conks of *P. schweinitzii* are often darker than those of *I. tomentosus*. *P. schweinitzii* usually appears shelf-like when growing on a stem, stalked and stipate when growing on the ground. Its upper surface has concentric rings, and is red-brown and velvety in appearance. The lower surface of the fruiting body can appear a tan yellow-green in colour, and can turn a brown colour when bruised. In contrast, the fruiting bodies of *I. tomentosus* are stalked and found on the ground and around infected trees. The upper surface usually appears yellow-brown to rust-brown in colour, and becomes a darker brown with age and when wet.

Figure A.15 Example of P. schweinitzii.

A.4.2.2 Blind Conks

Blind conks are pronounced swellings or depressions around knots caused mainly by *P. pini* on conifers and *P. tremulae* on aspen (see Figure A.16 Example of Blind Conk in a Knot. to Figure A.18 Blind Conk and Sound Knot.). If identified correctly, blind conks are definite indicators of decay. The swelling or depression results from the tree attempting to heal over an abortive conk, a newly developing conk, or a point from which an old conk has dropped. Non-typical forms may appear as small branch holes or branch stubs at the base of trees. This form is often found in over-mature Douglas-fir and balsam (*Abies*) species in the coast-interior transition zone (e.g. Boston Bar). Consequently, over-mature trees with basal branch stubs should be examined for blind conk.

Calling Blind Conks

Accessible indicators:

- Must be verified by cutting with an axe or equivalent implement. This will reveal a bright yellow or buff-colour of the conk.

Inaccessible indicators:

- Record only those indicators which have a high chance of being blind conk, such as large swollen knots and large caved-in knots. They must be similar to the ones that have been identified in the stand.
- Do not call small knots and knot indicators on any species.

Figure A.16 Example of Blind Conk in a Knot.

Figure A.17 Non-blind Conk in a Knot.

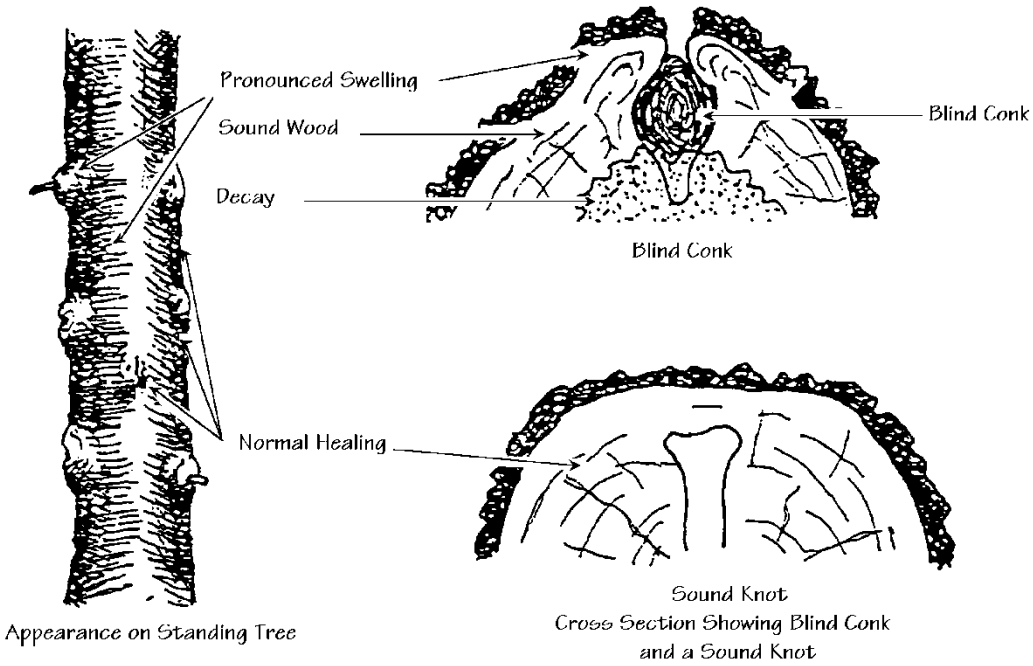


Figure A.18 Blind Conk and Sound Knot.

Residual Trees (Do not record these indicators – See Figure A.42 Residual Indicators)

Root and Butt Rots

Species	Common BC Native Host Species
Armillaria spp.	Ba, Bg, Bl, Lw, Se, Sw, Ss, Pl, Pw, Py, Fd, Tw, Cw, Hw, Ep, At, Act, Qg, W spp.
Heterobasidion annaosum	Ba, Bg, Sw, Ss, Fd, Cw, Hw, Mb, Dr
Inonotus tomentosus	Ba, Bl, Fd, Hw, Lw, Pa, Pl, Py, Se, Sw, Ss
Phellinus weirii	Fd, Bg, Hm, Se, Ss, Bl, Hw, Lw, Pl, Pw, Py
Rhizina undulata	Cw, Fd, Hw, Lw, Pl, Se, Ss, Sw

Heart Rots

Ceriporiopsis rivulosa	Ba, Cw, Fd, Hw, Sw, Ss
*Fomes fomentarius**	D spp., Act, Acb, E spp.
Fomitopsis officinalis	Ba, Bg, Fd, Hw, Lw, Pl, Pw, Py, Se, Ss
Fomitopsis pinicola - **Found anywhere other than on large, old scar**	Ba, Bg, Bl, Cw, Fd, Hm, Hw, He, Lw, Pl, Pw, Py, Se, Ss, Sw, Dr, Ep, A spp., Act
Ganoderma applanatum	Ba, Bg, Cw, Fd, Hm, Hw, Se, Sw, D spp., A spp., E spp., M spp., Q spp., W spp.
Hericium abietis	Ba, Bg, Bl, Hm, Hw, Ss
Laetiporus sulphureus	Ba, Bg, Bl, Bp, Cw, Fd, Hw, L spp., Py, Pw, S spp., Qg
Neolentinus kauffmanii	Ss
Perenniporia subacida	Ba, Bg, Bl, Cw, Fd, Hw, Lt, Pl, Pw, Se, Ss, Sw, D spp., R spp., Act, E spp., M spp., W spp.
Phellinus hartigii	Ba, Bl, Fd, Hw
*Pholiota populnea**	Act
*Piptoporus betulinus**	Ep
Postia sericeomollis	Ba, Cw, Yc, Fd, Hw, Lw, Pl, Py, Se, Ss, Sw
*Spongipellis delectans**	Act
Sterium sanguinolentum	Ba, Bg, Bl, Cw, Fd, Hm, Hw, Lt, Lw, Pl, Pw, Py, Se, Sw
Veluticeps fimbriata	Ba, Bg, Bl, Fd, Hm, Hw, Se, Ss

Suspect Trees (Record these indicators – See Figure A.41 Suspect Indicators)

Root and Butt Rots **

Species	Common BC Native Host Species
Phaeolus schweinitzii	Ba, Bl, Cw, Fd, Hw, Lt, Lw, Pl, Pw, Py, Ss, Sw, Qg

Heart Rots

Echinodontium tinctorium	Ba, Bg, Bl, Cw, Fd, Hw, Hm, Ss, Sw
Fomitopsis pinicola - **Only if found on large, old scar**	Ba, Bg, Bl, Cw, Fd, Hm, Hw, He, Lw, Pl, Pw, Py, Se, Ss, Sw, Dr, Ep, A spp., Act
Phellinus igniarius*	D spp., R spp., Act, E spp., G spp., M spp., W spp.
Phellinus tremulae*	At
Phellinus pini	Ba, Bg, Bl, Cw, Yc, Fd, Hm, Hw, Lw, Pj, Pl, Pw, Py, Sb, Se, Ss, Sw

** deciduous hosts only*

*** Root rots can be recorded (codes J, K and L), but they do not affect the appraisal compilation.*

Figure A.19 Residual and Suspect Indicators and Their Host Species

A.4.2.3 Scars

A scar is an injury caused by external forces which has damaged the cambial layers of the tree and exposes either the sap wood or heartwood (or both) to potential attack by wood rotting fungi. These wood rotting fungi are ever present in forest stands and are carried widely by air currents.

Forms of scars - both open and closed scars will be recorded.

Open scars:

- open scars appear as areas of exposed wood of varying sizes and shapes (see Figure A.20 Open Scars), and
- scars are slow to heal over and the wood tissues of the tree may remain exposed for a considerable time allowing entrance of wood rotting fungi.

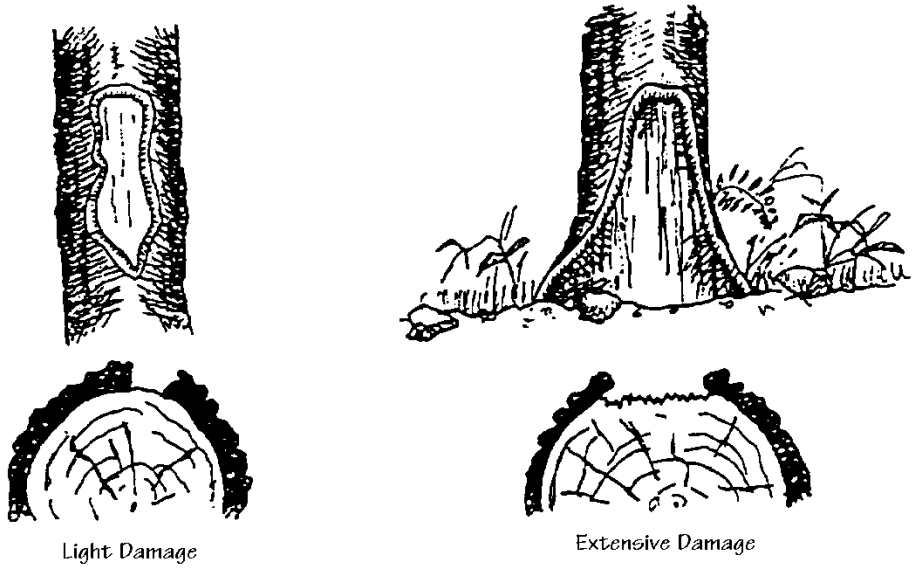


Figure A.20 Open Scars

For root scars to be eligible calls, the scar must be on the portion of the root that is exposed before it enters the ground (see Figure A.21 Root Scars.).

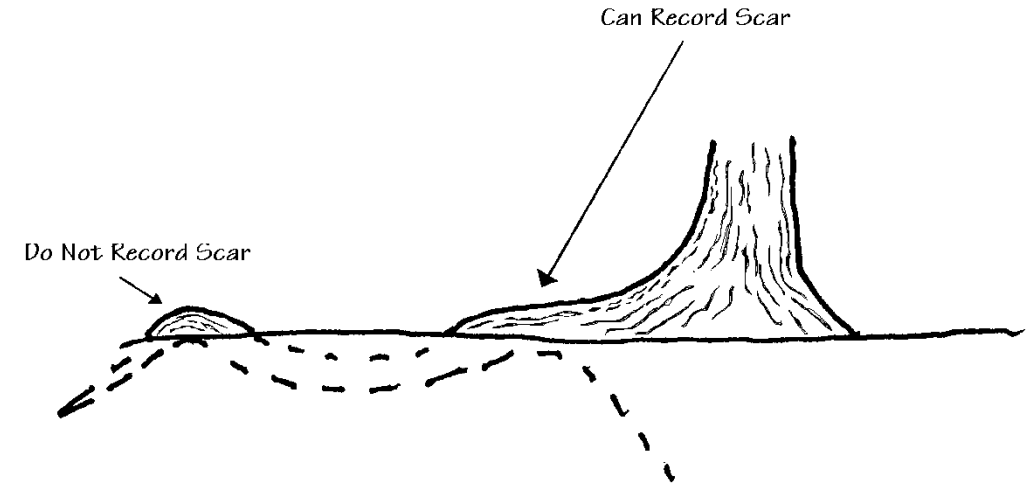


Figure A.21 Root Scars.

Closed scars:

- closed scars appear as slight to pronounced indentations of the bark in the case of early scarring which has healed over, or as pronounced scar tissue or callous growth in the case of later scarring. The latter type of scars frequently show considerable resin flow (see Figure A.22 Closed Scars.).

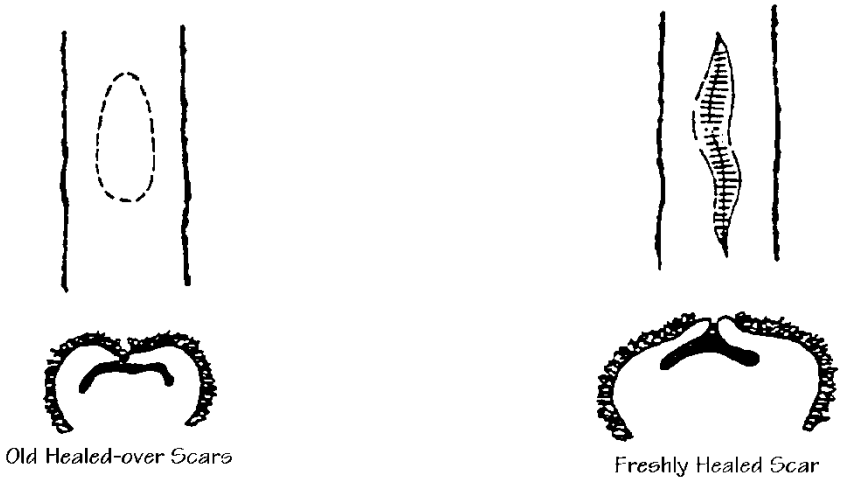


Figure A.22 Closed Scars.

The volume and decay studies of the past thirty years identified only scars visible to the naked eye without the use of binoculars or other lens. The scars were assessed without chopping into the

indicator. To be compatible with these initial assessments, the same methodology must therefore be followed today. This also is the most practical method of observation at present.

A scar may or may not have visible decay associated with it.

The decay studies have scars with both decay and no decay in the data base.

Age of scar:

- a scar shall not be recent in origin. This is interpreted as the injury having not occurred within approximately the past five years[3],
- the scar or catface should show greyed or weathered wood. Weathered wood shall be described as:
    - dried and some "sun checking" evident,
    - usually associated with change of wood colour to a greyish tone,
    - callous growth should also be evident where the tree is attempting to grow over the scar, and
    - decay does not have to be evident.

Location of scar:

- a scar should be recorded if the damage occurs on any portion of the trunk of the main stem or on the secondary leader (only if the secondary leader contains a merch log),
- a scar which extends from the first third of the tree into the upper 1/3 of the tree on which the top is dead will be recorded as a scar "4" by convention. The objective is not to double call the pathological indicators in the upper 1/3 of the tree,
- scars occurring completely below the point of germination, either on the trunk or an exposed root adjacent to the trunk, will be recorded as a scar, and
- do not record scars above 10 cm top diameter[4].

[3] *Recent pathological damage was not included in the loss factor data.*

[4] P*athological factors above 10 cm top diameter were not included in the loss factor data.*

Causes of scars:

Scars may be caused by many external forces, such as:

1. Fire:

    - old fire scars that have healed over appear typically as slight ridging of the bark and may have very old callous tissue on the bark, whereas more recent fire scars or ones resulting from severe damage appear as open catfaces or hollowing of the stem,
    - fire scars are usually confined to the base of the tree, and
    - fire scars may be important indicators of decay. Trees growing in forest stands (i.e., south or west facing slopes with pioneer species such as Douglas fir or Lodgepole Pine) having a history of fire should be examined carefully for evidence of charred wood in root crotches or on exposed roots.

    See Section A.6.2 in Damaged Stands (Appendix 6).

2. Lightning:

    - lightning can cause extensive damage to the top and stem of the tree. It typically appears as narrow to wide strips of torn wood, often extending down the entire length of the tree and often in the form of a spiral around the stem.

3. Damage by a falling tree:

    - trees are frequently scarred by other trees falling against them. Scars of this type are common in selectively logged stands or decadent stands where windfall trees are more common. Look for evidence that a fallen tree might have rubbed off the branches along the side of the tree.

4. Machinery damage:

    - machinery can cause extensive damage, especially where selective logging has occurred, and
    - these scars are usually confined to the lower trunk, but they may also occur on the upper trunk when damage is caused by rigging lines.

5. Blazes:

    - blazes are entry points for decay fungi if they penetrate into the cambium layer.

6. Breakage of branches, secondary leaders or suckers from the bole of the tree:

    - high winds or heavy snow may cause the branches to break from the main stem creating exposed wood on the bole of the tree.

7. Falling rocks (see Figure A.23 Scars Caused by Rock Slides and Falling Rocks)

   - rock slides or individual rock movement can cause extensive damage to trees in their path,
   - scars caused by rocks are usually confined to the basal portion of the trunk on the uphill side, and
   - falling rocks may scar trees a considerable height above the ground, either due to snow levels at the time of injury or bouncing rocks on steeper slopes. Rock damage is often evident on trees adjacent to road construction where blasting has occurred.

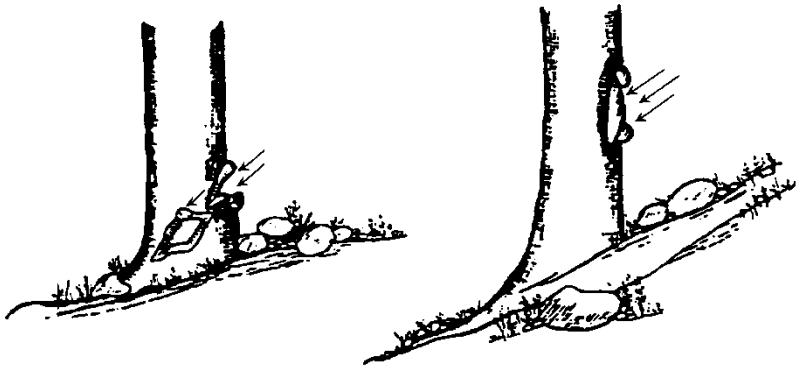


Figure A.23 Scars Caused by Rock Slides and Falling Rocks

8. Animal/bird damage:

   - wood must be exposed,
   - bear, moose, deer etc. can cause damage by removing areas of bark and cambium from the trunks of many trees,
   - rodents and beavers also cause damage to trees by gnawing on areas of the trunk,
   - woodpecker holes of considerable size provide entrance for wood rotting fungi, however, sap sucker holes are not scars, and
   - care must be taken to exclude superficial damage caused by these agents.

9. Cankers caused by fungi (see Figure A.24 Cankers Caused by Fungi.):

   - only cankers with exposed weathered wood are called, and
   - cankers caused by fungi result in the death of localized areas of bark and cambium on the trunks of trees. Eventually the dead bark is sloughed off exposing the underlying wood. There is usually evidence of repeated callous growth, and for this reason cankers are frequently mistaken for mechanical scars. Cankers are usually flattened

and elongated, and may be indefinite in contour. The exposed wood is often stained and impregnated with resin. Fruiting bodies of the fungus may also be in evidence.

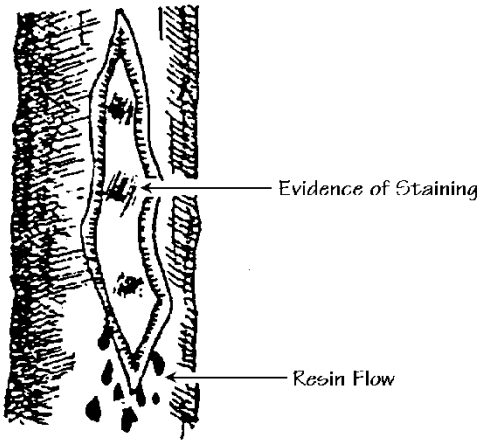


Figure A.24 Cankers Caused by Fungi.

Abnormalities similar to scars but not classified as scars:

Black knots:

- black knots frequently develop around unhealed knots and wounds. A superficial saprophytic fungus, which feeds on the exuded sap, causes the blackness. Black knots are quite sound and when cut into with an axe do not signify decay.

Burls and galls:

- burls and galls develop from abnormal cell growth in trees and are not associated with scarring, however scars occurring on burls and galls will be recorded.

Dry side:

- dry side results from the death of the cambium through bruising by other trees or by other physiological causes. Dry side may appear as a narrow to wide strip or as a localized area on the side of a tree. The bark remains over the affected area and provides protection against wood rotting fungi. Dry side is not a scar unless the bark has sloughed (is missing).

Sap sucker holes:

- sap sucker holes are superficial in extent and have no established significance for causing decay.

Insect borings:

- borings by bark beetles or other insects are generally recent in origin and they are not pathological indicators.

A.4.2.4 Fork or Pronounced Crook

A fork or crook is the result of damage to the main leader of the tree where one or more lateral limbs take over as the main stem. Fork or crook is called if severe enough to indicate that the original injury exposed the wood and provided an entrance point for decay fungi. Fork or crook is to be recorded between the root collar and the minimum top diameter specified in the cutting authority document.

Forks are recorded for any of the following conditions:

1. The main stem is markedly forked to indicate that 2 or more leaders have resulted from serious damage to the original leader (see Figure A.25 Types of Forks and Crooks Which are Recorded, Example A and B).

2. The diameter of the main stem changes excessively from its normal taper to indicate that a serious injury has occurred. For cruising purposes, the diameter change must be at least 10 percent (Figure A.25 Types of Forks and Crooks Which are Recorded, Example C and D).

3. Where there is no evidence of a broken top in the stem at the fork/crook position and neither of the leaders are merchantable, record fork/crook.

Crooks are recorded if:

1. There is at least a 10 percent diameter change in the bole above and below the crook (see Figure A.25 Types of Forks and Crooks Which are Recorded, Example F).

2. The offset is severe enough to indicate that damage occurred to the main stem. For cruising purposes, the offset must be at least 50 percent of the diameter of the tree at the crook (see Figure A.25 Types of Forks and Crooks Which are Recorded, Example E).

Some forks and crooks are not recorded (see Figure A.40 Illustrates Forks and Crooks Which are Not Suspect). Forks and Crooks may be a growth characteristic of the tree species (for example deciduous species) or may have developed from malformation of the terminal leader due to insect or mistletoe attack. In addition, a fork may be confused with a branch. Forks or crooks which are not recorded are as follows:

1. Crooks with a minor offset (for cruising purposes, an offset less than 50 percent of the diameter of the tree at the crook).

2. Small sharply angled branches or spikes (for cruising purposes, less than a 10 percent change in the diameter of the main stem).

3. Natural forking in deciduous tree species.

4. If the damage is less than 5 years old and/or occurs above the minimum timber merchantability specifications specified in the Timber Utilization Policy (Coast or Interior)[5].

5. Flattening of the top of the tree caused by wind or natural outgrowth.

6. Candelabra branches in coniferous species.

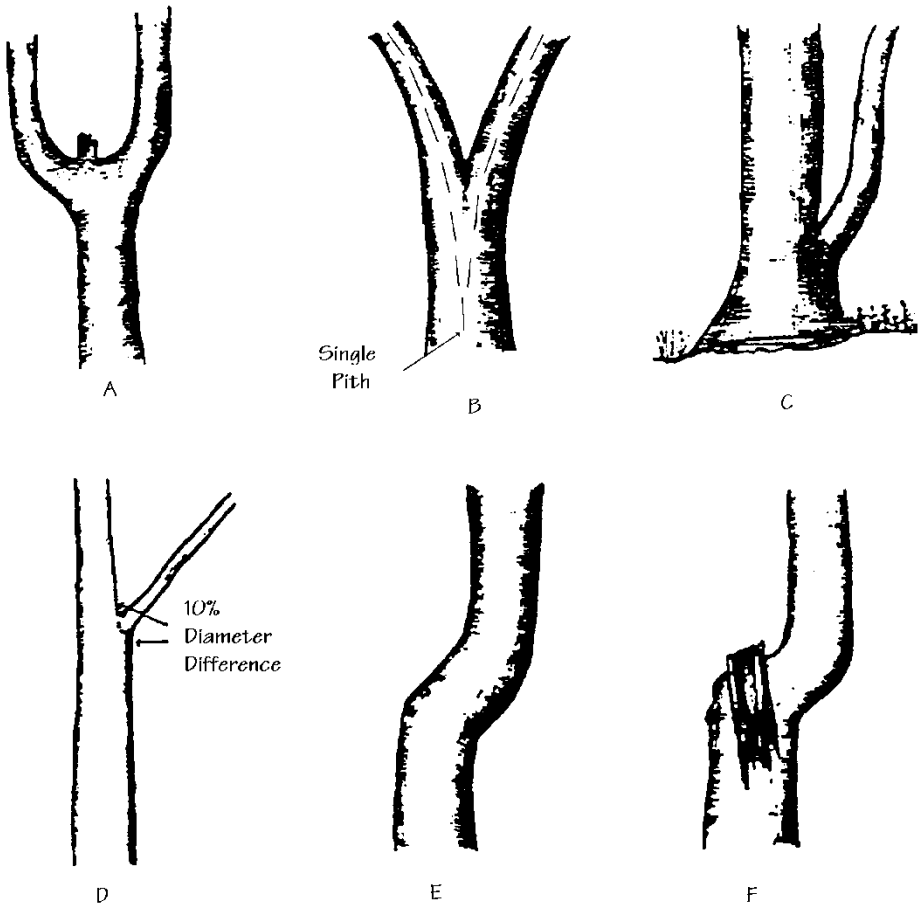


Figure A.25 Types of Forks and Crooks Which are Recorded

Examples A and B illustrate forks which occur in the merchantable portion of the trunk. Example C illustrates forks which occur on the basal portion of trees. Examples E and F illustrate pronounced crook.

[5] *Recent pathological damage and pathological factors above 10 cm top diameter were not included in the loss factor data.*

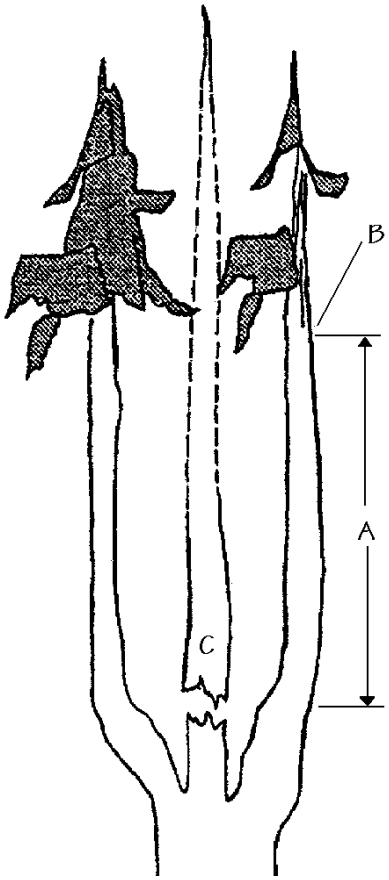


Figure A.26 Fork or Crook and/or Dead or Broken Top

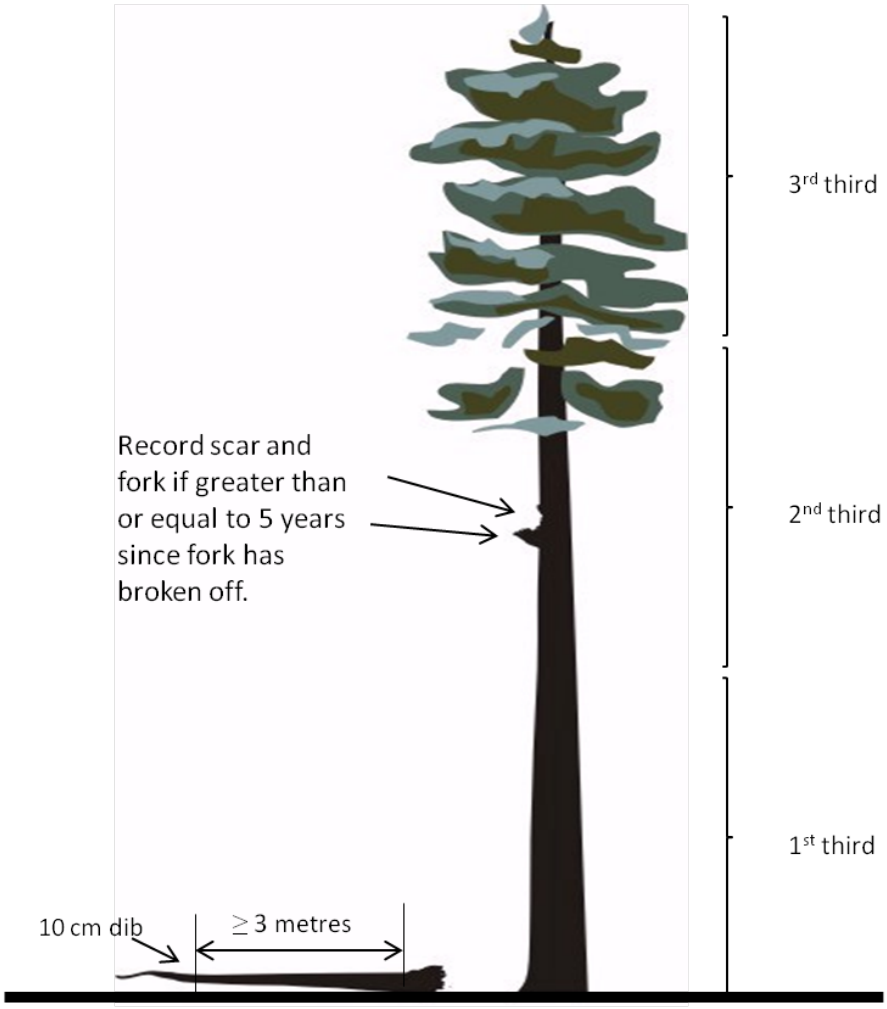
1. If the 'forked' leaders exceed the dimensions of a log as defined by the merchantability specifications (i.e., "A" is estimated to be greater than 3 m, and "B" is greater than 10 cm dib) record the pathological defect as a 'fork'.

2. If the leader material is relatively small in size (i.e., less than 3 m in length) record the defect as a "dead or broken top".

3. In no instance should you "double call" any pathological indicators (i.e., either call a fork or a dead top, not both!).

   'A' is estimated length of log that could be obtained from the 'forked' leader.
   'B' is estimated to 10 cm top.
   'C' is dead top or broken top.

If a merchantable fork has broken off and has been on the ground for greater than or equal to 5 years, the fork and scar may be recorded.



Record down tree code if fork broke from first or second third of tree.

Segment of Cruise Tally Card (FST 205)

Tree Number	Height	Species	DBH	Tree Class	Conk	Blind Conk	Scar	Fork/Crook	Frost Crack	Mistletoe	Rotten Branch	Dead/Broken Top	Down Tree
01	40.0	F	60.0	2			2	2					E

Figure A.27 Fork/crook.

Record a down tree code (clean break) since the fork is long enough to produce a merchantable log. Record fork and scar if the injury is at least 5 years old. See Section A.6.3 in Damaged Stands (Appendix 6) for the down tree codes. See Section A.4.2.3 for details regarding the coding of scars and see Section A.4.2 for details regarding the coding of pathology on secondary leaders.

A.4.2.5 Frost Cracks

- frost cracks result from deep radial splitting of the trunk caused by uneven expansion of the wood after sudden and pronounced drops in temperature,
- the cracks usually originate at the base of the trunk and extend up the tree following the longitudinal grain of the tree (see Figure A.28 Appearance of Frost Crack on Standing Trees),
- frost cracks are often repeatedly opened by wind stresses or by low temperatures which freeze the moisture within the cracks and expands and splits the tree further,
- repeated healing of the wood produces considerable callous tissue giving the wood a pronounced ribbed appearance, and
- frost cracks must have occurred at least 5 years previously before they can be recorded[6].

Frost cracks are often associated with severe basal decay.

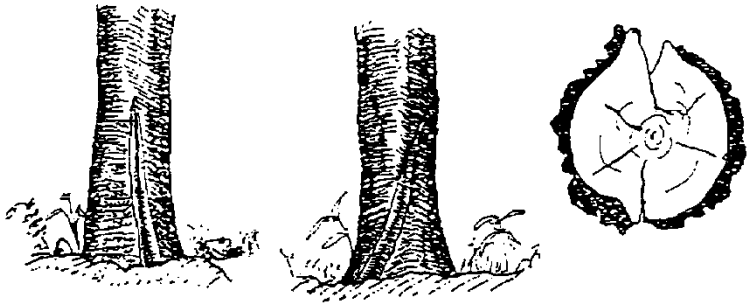


Figure A.28 Appearance of Frost Crack on Standing Trees

[6] *Recent pathological damage and pathological factors above 10 cm top diameter were not included in the loss factor data.*

A.4.2.6 Mistletoe Trunk Infections

Trunk infections of mistletoe are indicated either by abnormal swelling or malformations of the trunk at the point of infection, or by clusters of dead and broken branches on the trunk or on hypertrophied branches immediately adjacent to the trunk (see Figure A.29 Trunk Infections of Mistletoe).

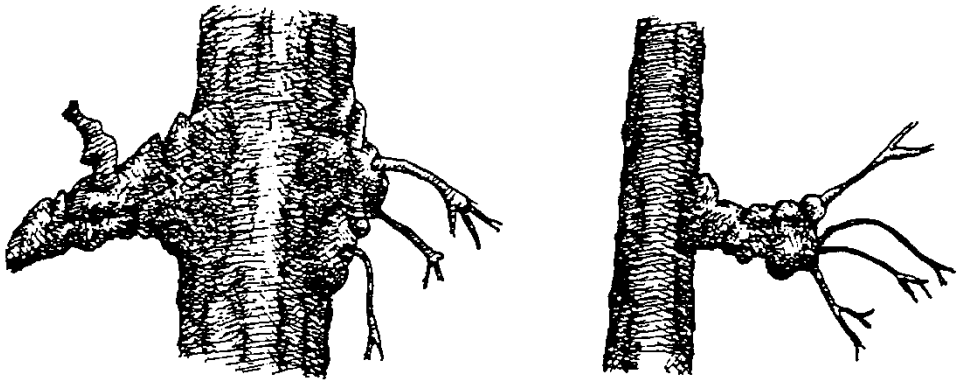


Figure A.29 Trunk Infections of Mistletoe

Wood-rotting fungi gain entrance to the trunk through the dead hypertrophied branches or branch stubs where the swelling is on, or adjacent to the trunk.

Do not record mistletoe on living limbs or limbs that are swollen only at some distance from the trunk. Record only those branch infections in which the swelling has clearly extended to trunk (see Figure A.30 Branch Infections of Mistletoe).

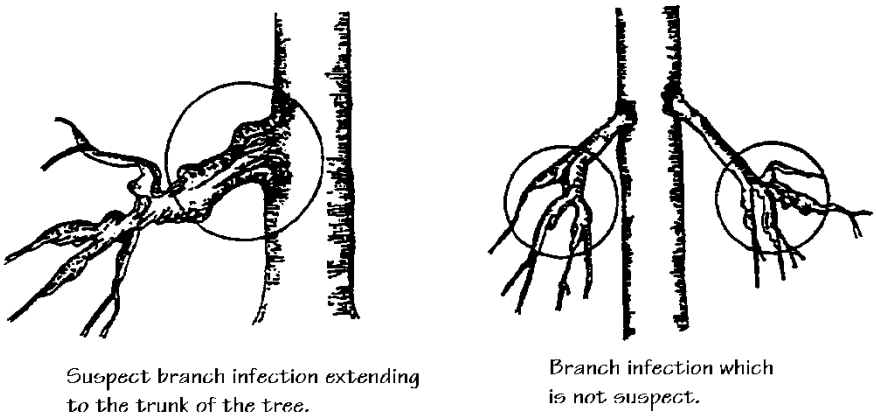


Figure A.30 Branch Infections of Mistletoe

A.4.2.7 Large Rotten Branches

Large rotten branches are dead branches that are large (over 10 cm DIB) and are clearly decayed. These branches are usually broken off within a couple of metres of the trunk. Decayed heartwood close to or at the branch base should be obvious. The branches may be found at any position on the tree, but are generally confined to a position below the base of the live crown. This indicator is typically found on over-mature trees (see Figure A.31 Rotten Branches.).

Large rotten branches should not be confused with the normal decay of dead branches. It should be associated with large branches that have broken off, exposing a large heartwood surface to decay producing fungi, thereby potentially infecting the adjacent trunk.

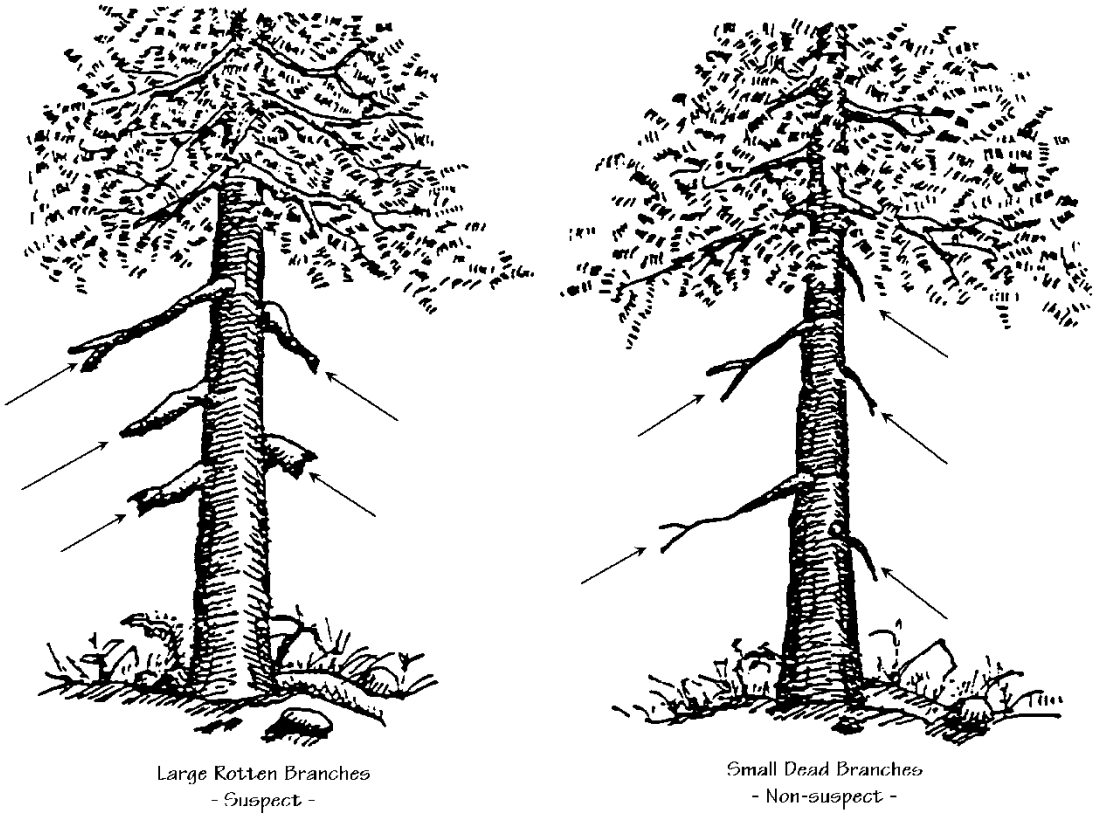


Figure A.31 Rotten Branches.

A.4.2.8 Dead or Broken Top

Definition:

- where the tree top or complete stem has died due to various physiological causes.

Causes of dead tops

Dead tops may be caused by several factors such as:

- insect attack,
- drought conditions,
- sun scald, and
- physiological death.

The recording of dead tops:

- a dead top must be obviously weathered, indicating that death occurred at least five (5) years ago and below the 10 cm top before it will be recorded as a pathological indicator[7].

Causes of broken tops

- wind breakage,
- snow damage, and
- damage from falling trees, etc.

Standing trees that are broken in the bottom third will have a windthrow damage code assigned. In this instance, do not record a dead or broken top in the first third unless the broken top occurred at least 5 years previously.

If a fork is present at a broken top position, record the fork if a merchantable log (3 m long and 10 cm top) can be recovered from the fork. If the fork is not of merchantable size, record the d or b top. Do not call both indicators (see Figure A.26 Fork or Crook and/or Dead or Broken Top).

If a candelabra is present at a broken top position, record d or b top.

[7] *Recent pathological damage and pathological factors above 10 cm top diameter were not included in the loss factor data.*

Flat topped trees

When trees attain their potential height for a specific site, the tendency for the top of the crown to flatten out is prevalent especially in certain species such as Douglas fir. This flattening of the crown is not indicative of damage to the tree and will not be recorded as a pathological indicator.

A.4.3 Abnormalities which are not Recorded

The following abnormalities are not indicative of decay and are, therefore, not recorded.

A.4.3.1 External Evidence of Butt Rot not Associated with Suspect Abnormalities

Butt rot may be evident in exposed roots or within root crotches. However, unless one or more of the suspect abnormalities appears on the tree, such trees will not be classed as suspect. It is defect of this nature which contributes to the decay loss factor associated with the residual tree class.

A.4.3.2 Flutes

Pronounced flutes on the trunk are a common growth characteristic of many species. They have no decay significance except in the case of interior cedar where the fold may hide an open scar leading to a hollow or decayed tree centre (see Figure A.32 Flutes).

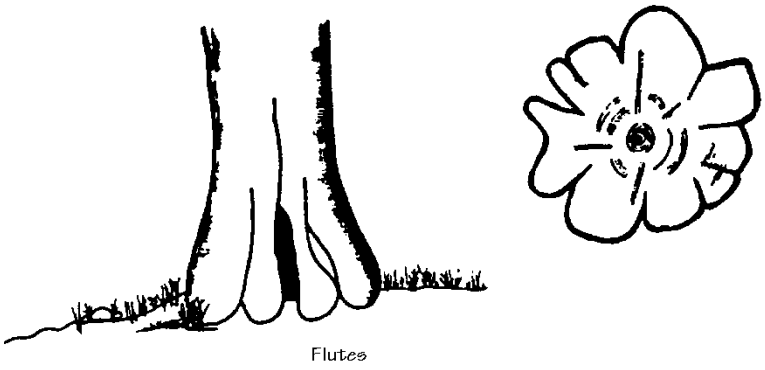


Figure A.32 Flutes

A.4.3.3 Candelabra Branches

"Candelabra" branches develop as a result of abnormal branch growth and as such are confused with suspect forking. Branching of this type has no decay significance. It is important to note that candelabra branches do not originate as a fork in the trunk of a tree (see Figure A.33 Candelabra Branches). Do not record defect on candelabras.

Figure A.33 Candelabra Branches

A.4.3.4 Branch Fans

Branch fans which appear most commonly as 'fans' of branches originating from burl-like swellings on the trunks (see Figure A.34 Branch Fans) are not suspect.

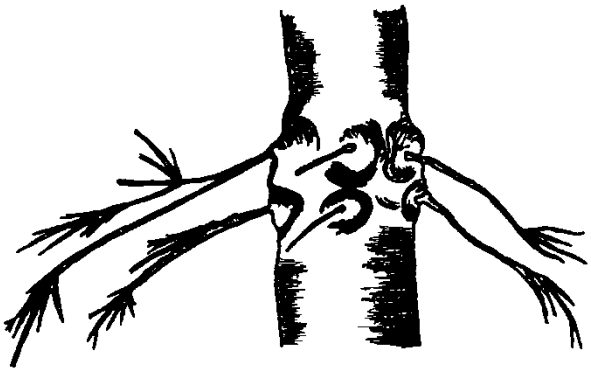


Figure A.34 Branch Fans

A.4.3.5 Black Knots

Black knots frequently develop around unhealed knots and wounds. The blackened appearance develops from a superficial saprophytic fungus which feeds on the exuded sap. Black knots are quite sound when cut into with an axe and have no decay significance (see Figure A.35 Black Knots).

Figure A.35 Black Knots

A.4.3.6 Burls and Galls

Burls and galls develop from abnormal cell growth in trees and although formidable in appearance, have no decay significance (see Figure A.36 Burls and Galls).

Scars on burls will be recorded.

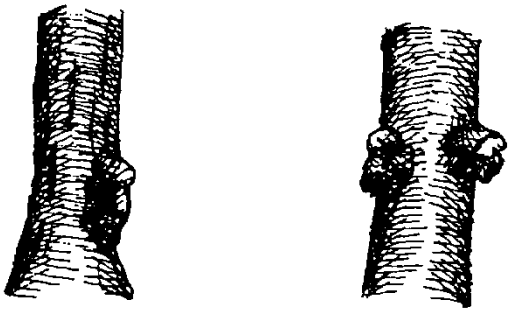


Figure A.36 Burls and Galls

A.4.3.7 Sweep

Sweep which is a slight curvature or distortion of the trunk has no decay significance (see Figure A.37 Sweep.).

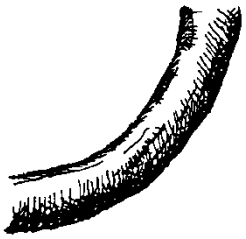


Figure A.37 Sweep.

A.4.3.8 Exposed Roots

Exposed roots and buttress roots have no established decay significance unless scarring is present above ground level (see Figure A.38 Exposed Roots.).

Figure A.38 Exposed Roots.

A.4.3.9 Other

Spiral Grain

Spiral grain is a growth characteristic of trees and has no decay significance.

Dry Side

Dry side results from the death of the cambium resulting from bruising by other trees or from other physiological causes. Dry side appears as a narrow to wide strip down the side of the tree or as small localized areas. The bark often remains intact over the dead areas. Although dry side may be responsible for the complete rejection, or degrade of a pole tree, it has no established decay significance. Dry side is not a scar unless the bark has sloughed (is missing).

Sap Sucker Holes

Sap sucker holes are superficial in extent and have no established decay significance. They are in marked contrast to suspect scarring caused by woodpeckers (see Figure A.39 Bird Damage.).

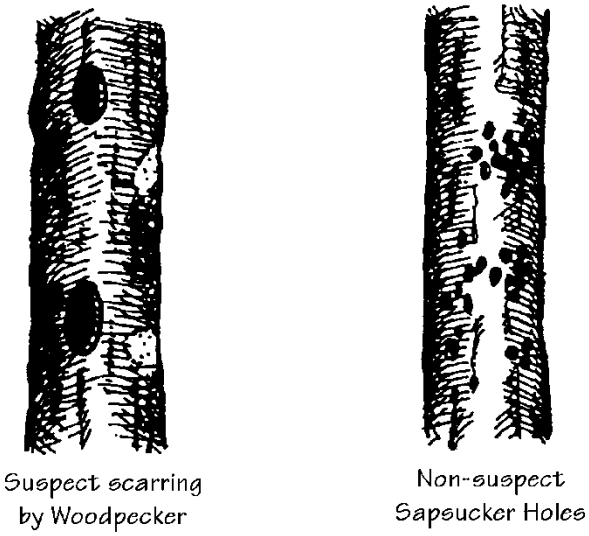


Figure A.39 Bird Damage.

Insect Borings

Borings by bark beetles or other insects have no established decay significance and will not be classed as suspect.

Non- suspect Forking

Figure A.40 Illustrates Forks and Crooks Which are Not Suspect shows two types of non- suspect forking most commonly occurring in deciduous trees. Deciduous trees with "U" shaped forks containing a dead branch are definitely suspect. Non- suspect forking is more "V" shaped.

Trees growing in clumps, such as birch, should not be classed as suspect on this characteristic alone.

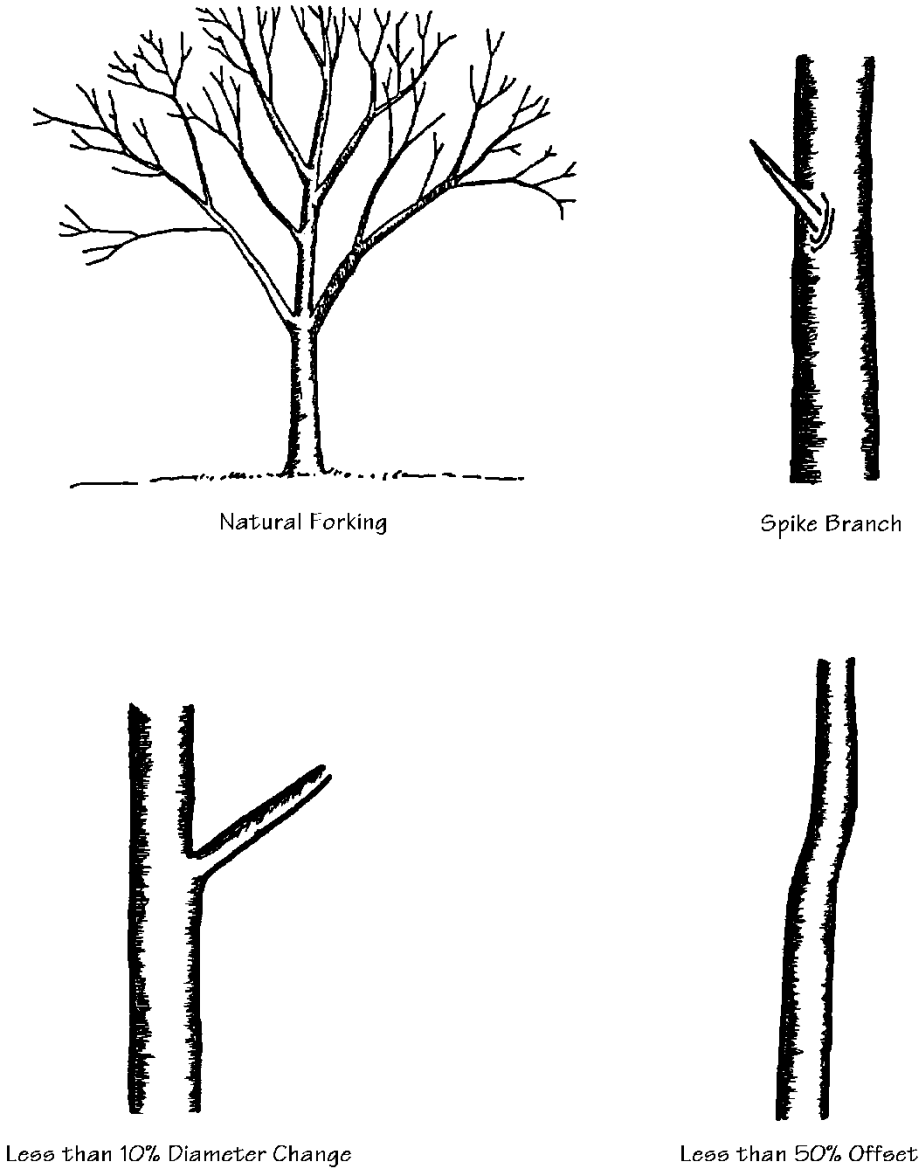


Figure A.40 Illustrates Forks and Crooks Which are Not Suspect

A.4.4 Some Common Decays of Forest Tree Species in British Columbia

Brief descriptions of the major root diseases, heart rots, sap rots and canker diseases of coniferous and deciduous tree species in British Columbia have been included in Figure A.41 Suspect Indicators and Figure A.42 Residual Indicators as an aid to their identification in the field. Pathological studies have shown that although most tree species are subject to attack by a large number of wood-rotting fungi, only a few are treated as suspect indicators. Suspect as well as residual pathogens are described in this comprehensive table.

Refer to Section A.4.2.1 for additional information.

Suspect Indicators (Figure A.40 – Record these indicators)

Root and Butt Rots

Current (left) and previous year's (right) sporophores of *P. schweinitzii* (Photo credit R. Reich).

Shelf-like conk of *P. schweinitzii* and brown cubical decay (Photo credit R. Reich).

***Phaeolus schweinitzii* (Fr.:Fr.) Pat.**

Schweinitzii Butt Rot, Brown Cubical Butt Rot

Hosts: Ba, Bl, Cw, Fd, Hw, Lt, Lw, Pl, Pw, Py, Ss, Sw, Qg

On conifers, common in Douglas-fir, spruce and pine. Occasionally found on hardwoods in all regions of BC.

Sporophores: Annual, spongy to leathery, stipate. Upper surface reddish-brown, velvety with concentric rings and light yellowish margin. Context yellow-green to light brown, lower surface yellow-green, turning brown when bruised. Pores regular to daedaloid.

Decay: The incipient stage may be difficult to detect, often appearing as a light yellow stain. At a late stage the wood becomes brittle and breaks into large cubes which are reddish-brown in colour. An odour of anise is often associated with advanced decay.

Entrance: Roots.

Activity: A cellulose-destroying heart rot, generally confined to the roots and basal log.

Remarks: Very general distribution throughout North America. Occurs in trees of all ages. Young trees may be killed outright, older trees become subject to windfall. Sporophores develop on roots and freshly felled trees, and provide a valuable index of infection.

Heart Rots

Sporophore of *E. tinctorium* (Photo credit R. Reich).

Sporophore of *E. tinctorium* *in lower light conditions.*

Brown stringy rot cause by *E. tinctorium* on Mountain hemlock (Photo credit R. Reich).

***Echinodontium tinctorium* (Ell. & Ever).**

Brown Stringy Trunk Rot

Hosts: Ba, Bg, Bl, Cw, Fd, Hw, Hm, Ss, Sw

Reported on a large number of coniferous hosts. Of major importance in British Columbia on western hemlock, alpine fir and amabilis fir. Reported on the coast only at higher elevations and in the north.

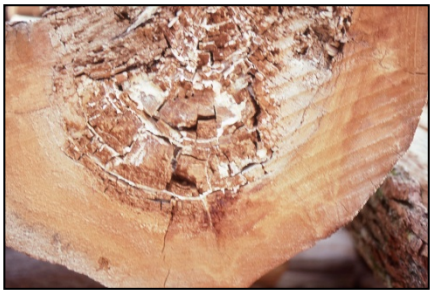
Sporophores: Perennial, hard, woody, sessile, ungulate. Upper surface black and furrowed. Context brick-red. Lower surface grey.

Decay: The incipient stage may appear as light yellow to brown or water-soaked stain. Later, the wood darkens to a reddish-brown to brownish-yellow colour. Small rust coloured spots, and occasionally red streaks may develop. Finally, the wood is reduced to a brown, fibrous, string mass.

Entrance: Infections occur on living branches after 35 to 45 years, but normally do not become established in the trunk for another 100 years. Conditions affecting entry into the trunk are unknown.

Sporophores of *F. pinicola on interior spruce* (Photo credit R. Reich).

Fruiting bodies of *F. pinicola on subalpine fir* (Photo credit R. Reich).



Brown crumbly rot decay with white mycelium.

***Fomitopsis pinicola* (Sw.:Fr.) P. Karst.**

(*Fomes pinicola* (Sw.:Fr.) Cooke)

Brown Crumbly Rot, Red Belt Fungus

Note: This is only a suspect indicator on a living tree if found on a large, old scar.

Hosts: Ba, Bg, Bl, Cw, Fd, Hm, Hw, Lw, Pl, Pw, Py, Se, Ss, Sw, Dr, Ep, Ac, At

Common on most conifers and hardwood species in BC.

Sporophores: Perennial, woody to leathery, sessile, variable, ungulate, bracket-like, occasionally effused-reflexed. Upper surface dark brown to black. Outer margin often reddish or otherwise lighter in colour. Context cream to light brown. Lower surface white, often tinged with yellow. Poroid, pores small and regular.

Decay: The incipient stage may appear as a light brown discolouration. Later the wood breaks into small brown cubes which are soft and crumbly. White felts of mycelium may be formed in the shrinkage cracks.

Entrance: Scars, dead tops, insect injuries, etc.

Activity: A cellulose-destroying trunk rot, occurring in the heartwood or sapwood.

Remarks: Very common in dead trees, slash, and other forest litter, thus occasionally known as the scavenger fungus. May be associated with decay in living trees, frequently gaining entrance through scars. Also an important rot contributing to the deterioration of killed stands, especially by fire and insects. Sporophores develop infrequently on living trees.

Sporophore of *P. igniarius* (Photo credit R. Reich).

Hardwood trunk decay of *P. igniarius.*

Phellinus igniarius (L.:Fr.) Quél.

(_Fomes igniarius_ (L.) Gill.)

White Trunk Rot, White Heart Rot, Hardwood Trunk Rot

Hosts: D spp., R spp., Act, E spp., G spp., M spp., W spp.

Occurs mainly in hardwoods. Common in aspen and birch.

Sporophores: Perennial conks are usually hoof-shaped, but sometimes shelf-like and may obtain a width of 20 cm or more. The upper surface is greyish-black to black, dull or shiny, smooth when younger, becoming rough and cracked with age. The under surface is brown with mouths of tubes small and circular in outline. Context is rusty-brown, often interspersed with grey or white mycelium flecks.

Decay: Incipient stage has yellowish-white spots, streaks, or larger areas in the heartwood, the whole usually surrounded by a yellowish-green to brownish-black zone. In the advanced stage the wood is light in weight, soft, whitish and rather uniform in texture, with fine black lines running throughout. In aspen, the incipient wood is faintly coloured from light pink to straw-brown, in the intermediate stage of decay, the wood is straw to chocolate-brown, but is still hard and firm. In the advanced stage, all soft, punky wood irrespective of colour is included.

Entrance: Unknown – probably on branches and wounds.

Activity: Sporophores form on standing trees and on slash. The presence of a single sporophore generally indicates a considerable volume of decay.

Sporophore of *Phellinus tremulae* (Photo credit R. Reich).

Section of decay caused by *P. tremulae* (Photo credit R. Reich).

Phellinus tremulae (Bondarzev) Bondarzev & Borisov in Bondarzev

(_Fomes igniarius_ (L.:Fr.) J. Kickx fil. f. _tremulae_ Bondarzev)

(_Fomes igniarius_ var. _populinus_ (Neuman) Camp.)

Aspen Trunk Rot

Hosts: At

Found only in trembling aspen.

Sporophores: Perennial, hard, woody, growing up to 20 cm wide and 10 cm thick. Generally triangular shaped in longitudinal section with upper and lower surfaces at angles of about 45º from horizontal. Upper surface is grey-black to black, deeply zoned, and appears roughened when old. Lower surface has small, regular pores. Context is rust-brown, often interspersed with white mycelium flecks.

Decay: Incipient stage appears as yellow-white zone in heartwood, usually surrounded by yellowish-green zone. In the advanced stage, the soft yellow-white zone usually contains black zone lines running throughout. Zone lines often surround the decay column as well.

Entrance: Unknown – probably on branches.

Activity: Sporophores form on branch scars, on living and dead standing trees, as well as on slash.

Sporophore of *P. pini*.

Longitudinal section of decay caused by *P. pini* (Photo credit R. Reich).

Cross section of decay caused by *P. pini* (Photo credit R. Reich).

***Phellinus pini* (Thore:Fr.) Ames**

***Fomes pini* (Thore:Fr.) Fr.**

Red Ring Rot, Conk Rot, White-pitted rot, Pecky Rot, Honeycomb Rot

Hosts: Ba, Bg, Bl, Cw, Yc, Fd, Hm, Hw, Lw, Pj, Pl, Pw, Py, Sb, Se, Ss, Sw

Occurs essentially on all conifers in British Columbia, very common in hemlock, spruce and Douglas-fir. Also known to occur on hardwoods.

Sporophores: Perennial, woody to punky, sessile, ungulate, occasionally effused-reflexed if on branches. Upper surface dark brown and furrowed. Context cinnamon brown. Lower surface light brown. Poroid, pores regular to daedaloid.

Decay: The incipient stage may appear as a reddish stain. Later small white, spindle-shaped pits develop parallel to the grain.

Entrance: Unknown – probably branches and wounds.

Activity: A lignin destroying heart rot, mostly occurring in the trunk.

Remarks: One of the most important decay fungi in British Columbia. Of greater importance on good sites. Conks develop on living trees and provide a valuable index to hidden defect. Also recognized through the occurrence of blind conks (punk knots) which constitute early or abortive stages in the development of sporophores.

Figure A.41 Suspect Indicators

Residual Indicators (Figure A.41 – Do not record these as conk, but may be recorded in root rot column 60 of the cruise tally sheet)

Root and Butt Rots

Clusters of *Armillaria* mushrooms.

Roots and base of tree affected by armillaria root rot.

***Armillaria* spp.**

***Armillaria ostoyae* (Romagnesi) Herink**

***Armillaria sinapina* (Bérubé & Dessureault)**

***Armillaria gallica* Marxmüller & Romagnesi**

***Armillaria cepistipes* Velanovsky**

***Armillaria nabsnona* Volk & Burdsall**

Armillaria Root Disease

Hosts: *Armillaria ostoyae* - Ba, Bg, Bl, Lw, Se, Sw, Ss, Pl, Pw, Py, Fd, Tw, Cw, Hw, Ep, At, Act, Qg, W spp.

Armillaria species are found on a broad range of conifers and deciduous trees in British Columbia.

Armillaria ostoyae has the greatest impact on conifer management. Other *Armillaria* species are considered weakly pathogenic on live broadleaved trees, and do not kill healthy conifers.

Sporophores: Mushrooms occur at the base of infected live and dead trees, as well as colonized stumps. Also commonly found on scar-associated dead wood on living trees. Mushrooms appear cream to brown coloured with a distinct ring on the stem. Caps grow 5-10 cm wide. Most obvious on resinous tress, where fungus is present at the root collar, resin exudes through the bark of the lower bole, and under bark showing resin sis, and white mycelial fans occur in the bark and cambial zone. Another aid in the identification of *Armillaria* is the presence of rhizomorphs. The rhizomorphs of parasitic *A. ostoyae* are observed as being Y-shaped, and the rhizomorphs of saprophytic *A. sinapina* are T-shaped in appearance.

Decay: Incipient decay is yellow to brown in colour,

	roots often appear water-soaked. Decayed wood later becomes stringy, gelatinous and very wet. **Remarks:** Dead and diseased trees can occur scattered throughout stands, however they most commonly occur in disease centres. These centres appear as openings in the canopy, and can range in size, potentially reaching approximately 0.1 ha in mature stands.

Sporophores of *H. annosum* at base of tree.

Incipient decay caused by *H. annosum*.

Stringy root decay caused by *H. annosum*.

Heterobasidion annosum (Fr.:Fr.) Bref.

Fomes annosus (Fr.:Fr.) Cooke

Annosus Root and Butt Rot, Pine Root Fungus

Hosts: Ba, Bg, Sw, Ss, Fd, Cw, Hw, Mb, Dr

Occurs on most hardwoods and conifers. Common in western hemlock. Range is generally west of the coast mountains and in the ICH biogeoclimatic zones.

Sporophores: Perennial, woody to leathery, sessile, ungulate or bracket-like to resupinate. The upper surface is dark-coloured to black, zonal with acute margins. The context is white to cream coloured. Poroid, pores small and regular.

Decay: The incipient stage may appear as a reddish-brown stain. In the advanced stage the wood is reduced to a white stringy or spongy mass containing numerous black flecks running parallel to the grain. In the final stage the wood may be completely destroyed.

Entrance: Roots and scars.

Activity: Heartwood and occasionally sapwood decomposition of lignin, and to a lesser and slower extent, cellulose. Generally confined to root and butt sections.

Remarks: Sporophores are generally produced on dead material or on the under-surface of roots exposed to the atmosphere. Capable of causing extensive root rot in young stands. Also occurs as a common decay of mature timber.

***O. tomentosa* fruiting bodies (Photo credit R. Reich).**

Wet *O. tomentosa* fruiting body on forest floor (Photo credit R. Reich).

Tangential view of advanced honeycomb decay caused by *O. tomentosa* (Photo credit R. Reich).

End view of decay caused by *O. Tomentosa* (Photo credit R. Reich).

***Onnia tomentosa* (Fr.) P. Karst**

***Inonotus tomentosus* (Fr.:Fr.) S. Teng.**

***Polyporus tomentosus* (Fr.:Fr.)**

(Fr.) P. Karst.

Tomentosus Root Rot

Hosts: Ba, Bl, Fd, Hw, Lw, Pa, Pl, Py, Se, Sw, Ss

Occurs on a broad range of conifers in British Columbia, found most frequently in northern and central spruce-pine forests, and at higher elevations in southern British Columbia.

Sporophores: Found on ground around infected trees. Annual, leathery, stalked. Small fruiting bodies (usually < 10 cm diameter). Shelf-like fruiting bodies sometimes found on dead roots and base of infected trees. Upper yellow-brown to rust-brown, velvety, becomes dark brown with age and when wet.

Decay: Incipient stage can appear as reddish-brown stain in heartwood. In the advanced stage, the elongated or rectangular-shaped pits appear in the heartwood which are separated by reddish-brown firm wood. Stem cross-sections display honeycombed appearance which can also often be observed on stump surfaces.

Entrance: From tree to tree at points of root contact, and by airborne basidiospores through fine roots.

Activity: Extensive butt call, reduced increment growth, windthrow. Disease and mortality often appears in groups and results in stand openings.

***P. weirii* fruiting body on Douglas-fir.**

Black stain on base of Douglas-fir caused by *P. weirii*.

Incipient decay caused by *P. weirii* in Douglas-fir.

***Phellinus weirii* (Murrill) R.L. Gilbertson**

***Poira weirii* (Murrill) Murrill**

***Inonotus weirii* (Murrill) Kotl. & Pozar**

Laminated Root Rot

Hosts: *Highly susceptible* – Fd, Bg, Hm. *Susceptible* – Se, Ss, Bl, Hw, Lw. *Tolerant* – Pl, Pw, Py. *Resistant* – Cw

Two forms of the disease have been identified – the Douglas-fir and cedar forms. They can be distinguished by symptoms and host preference. Described above are hosts of the Douglas-fir form of the disease.

Fruiting Bodies: White or tawny to mauve mycelium often found at root collar on or in bark. Crust-like brown mycelium growth often occurs over ectotrophic mycelium at root collar with appearance of blistering paint. Fruiting bodies annual, nut rare. Appear as brown crust-like layers. Light buff with narrow white margins when fresh. Uniformly dark brown when aged, and may remain for up to 2 or 3 years. Exposed surface poroid, pores small and irregular.

Decay: Incipient stage may appear as red-brown stain on fresh stump tops, or cross sections of major roots. In living trees infection rarely extends past 1 m up the stem. In advanced stage stained wood softens and annual rings separate to form laminated sheets of decay with accumulations of reddish-brown mycelium forming between the layers. Decayed wood becomes pitted.

Entrance: Root contact. Fungus has potential to remain viable in dead stumps and roots for decades.

Heart Rots

Decay caused by *C. rivulosa* in western red cedar.

***Ceriporiopsis rivulosa* (Berk. & Curtis) Gilb. & Ryvarden**

***Poria rivulosa* (Burk. & Curtis) Cooke**

***Poria albipellucida* D. Baxter**

White Butt Rot, White Laminated Rot

Hosts: Ba, Cw, Fd, Hw, Sw, Ss

Widely distributed throughout the range of these conifer hosts in British Columbia.

Sporophores: White, annual, thin, resupinate and poroid. Fruiting bodies are rare, not especially useful for identification of presence of decay. Occur mostly on slash.

Decay: Incipient stage appears as yellow discoloration in heartwood. This discolouration is sometimes surrounded by a blue to red stain. As the wood dries radial cracks may form. Annual rings separate in late stage of decay to form a crumbly mass or coarse laminations. Decay symptoms are sometimes not evident in freshly cut wood, but become more conspicuous as wood dries.

Remarks: Considered the most important butt rot of western red cedar in coastal regions of BC. Decay symptoms are most useful for identification of this disease. If decay is present butt logs of mature trees are often significantly damaged since decay develops readily in early life of the tree.

Sporophores of *F. Fomentarius* (Photo credit R. Reich).

Cross section of *F. fomentarius* sporophore and advanced stage of trunk decay.

Fomes fomentarius (L.:Fr.) J. Kicks fil.

White Spongy Trunk Rot

Hosts: D spp., Acb, Act, E spp.

Occurs on and is widely distributed throughout its deciduous hosts in British Columbia.

Sporophores: Perennial, can be woody or leathery, usually hoof-shaped. Upper surface smooth with a thick crust, zoned, and is grey to brown or black in colour. Context is a thin brown layer located between the upper crust and the old tube layers. The lower surface is pale brown, concave and poroid. Pores are small and regular. Conk age can be estimated relatively accurately by counting the distinct layers of tubes which are laid down annually.

Decay: In the incipient stage the wood remains firm and signs of decay appear as light brown discoloration. In the advanced stage of decay the wood is yellow-white in colour, often containing brown or black zone lines. Wood in the advanced stage is softy and spongy. Decayed wood may have a mottled appearance as small radial cracks are filled with a yellow mycelium.

Entrance: Infection occurs through exposed dead wood tissue by spread of airborne spores.

Activity: Rot can be present in sapwood and heartwood in living and dead timber. Fruiting bodies can be found on living trees, dead trees, and on slash. Presence of fruiting bodies often indicates heartwood is not merchantable.

Sporophore of *F. officinalis* (Photo credit R. Reich).

Sporophore of *F. officinalis.*

Advanced decay caused by *F. officinalis* in western larch.

Fomitopsis officinalis (Villars.:Fr.) Bondartsev & Singer

Fomes officinalis (Villars.:Fr.) Faull.

Fomes laricis (Jacq.) Murrill

Brown Trunk Rot, Quinine Fungus

Hosts: Ba, Bg, Fd, Hw, Lw, Pl, Pw, Py, Se, Ss

Distributed widely throughout host range in British Columbia.

Sporophores: Hoof-shaped to long and pendulous. Variable in size, can be up to 40 cm in diameter. Upper surface is zoned and white when fresh, turning dark grey or light brown when dried. A white powdery or chalky coating can be present. The context is white or grey, and toughens with age. The lower surface is poroid, and is also white when fresh, and dries to a light brown color. Pores are small and uniform.

Decay: During the incipient stage of decay a light yellow to red-brown stain appears, and in Douglas-fir can be seen as a purple discolouration. The stain may extend considerably beyond the advanced decay. In advanced stages of decay the wood will break into thick cubes with mycelia felts which are white in colour often forming in the shrinkage cracks.

Activity: Fungus is capable of destroying most of the wood volume of a tree, and fruiting bodies present are indicative of this. Fruiting bodies appear frequently on larch, but are less common on other species. The sporophore context has a characteristic bitter taste, which is what gives the fungus one of its common names ‘quinine fungus’.

Typical sporophores of *G. apllanatum*.

Section of white mottled rot caused by *G. applanatum*.

***Ganoderma applanatum* (Pers.) Pat.**

***Fomes applanatus* (Pers.) Gill.**

***Polyporus applanatus* (pers.) Wallr.**

White Mottled Rot, Applanatus Rot, Picture Conk

Hosts: Ba, Bg, Cw, Fd, Hm, Hw, Se, Sw, D spp., A spp., E spp., M spp., Q spp., W spp.

Occurs commonly on deciduous trees, but also on a broad range of conifers in British Columbia, affecting trees in all regions of BC.

Sporophores: Perennial, leathery to woody, sessile, applanate. Upper surface is light brown to grey and often shiny. Context is dark brown. The lower surface is white, turning dark brown when bruised. Poroid, with regular pores.

Decay: The incipient stage may appear as a light stain or infected wood may have a bleached appearance and be difficult to detect. In the advanced stage the decay is characterized by a mottled appearance. The wood is white or light coloured, soft and spongy, and often contains zone lines and accumulations of mycelium.

Entrance: Scars.

Activity: Heartwood and sapwood decomposition of lignin and to a lesser and slower extent cellulose. May occur in the butt or trunk.

Remarks: Sporophores develop infrequently on living trees. The lower surface of fresh sporophores may be permanently marked on contact. Brownish spores may be carried to the upper surface giving a dusty brown appearance to the sporophore.

Coral-like fruiting body of *Hericium abietis*.

Advanced stage of decay caused by *H. abietis*.

***Hericium abietis* (Weir ex Hubert) K. A. Harrison**

***Hydnum abietis* Weir ex Hubert**

Yellow Pitted Rot

Hosts: Ba, Bg, Bl, Hm, Hw, Ss

Host range restricted to west of the rocky mountains in British Columbia.

Sporophores: Annual, soft, fleshy. White with many downward-directed coral-like spines which are 1-2 cm long when developed fully.

Decay: Incipient stage appears as yellow to brown stain in heartwood. Elongated pits appear in advanced stage of decay which may contain yellow to white mycelium. In cross section, the decay pits appear irregular to honeycomb.

Entrance: Wounds.

Activity: Fruiting bodies are generally found on slash and on ends of cut logs. May for on wounds of living trees. Presence of fruiting bodies indicates extensive stem decay.

Sporophores of *L. sulphureus*.

Decay caused by *L. sulphureus*.

***Laetiporus sulphureus* (Bull.:Fr.) Murrill**

***Polyporus sulphurous* (Bull.:Fr.) Fr.**

Brown Cubical Rot, Sulphur Fungus

Hosts: Ba, Bg, Bl, Bp, Cw, Fd, Hw, L spp., Py, Pw, S spp., Qg

Common on most hardwoods and conifers, including oak, true fir and spruce in all regions of British Columbia.

Sporophores: Annual, spongy to leathery, sessile or stalked (stem eccentric), applanate to bracket-like. The upper surface is orange-yellow. The context is white to yellow. The lower surface is a sulphur-yellow colour and poroid with regular pores. Old sporophores appear white and brittle.

Decay: The incipient stage may appear as a light brown stain. Later the wood breaks into small brown cubes. The decay may have a 'rippled' appearance in longitudinal section and white mycelia felts may develop in the shrinkage cracks.

Entrance: Scars, dead branch stubs.

Activity: A cellulose decomposing heart rot and occasionally sap rot. May occur in the butt or trunk, but generally in the trunk.

Remarks: Sporophores develop infrequently on living trees but are easily recognized by their shape, size and colour. They decompose quickly following insect attack and weathering and seldom remain on the host past one season.

Sporophores of *N. kauffmanii*.

Pocket rot decay caused by *N. kauffmanii*.

***Neolentinus kauffmanii* (A. H. Smith) Redhead & Ginns**

***Lentinus kauffmanii* A. H. Sm. in Bier and Nobles.**

Brown Pocket Rot of Sitka Spruce

Hosts: Ss

Restricted to the range of Sitka spruce in British Columbia.

Sporophores: Pinkish-tan mushrooms, small in size. Usually occurring on areas of exposed, advanced decay of fallen or split dead trees.

Decay: Boundaries of advanced decay are often delimited by wood that appears sound, however adjacent pockets may occasionally merge to form a continuous decay column. Wood breaks down within the pockets to form small, soft brown cubes. In advanced stages of decay wood crumbles away completely leaving hollow pockets which are well-defined.

Remarks: Decay cannot be detected in standing timber since fruiting bodies form only on infected wood which is exposed to air.

The Spongy Butt Rot Complex:

***Perenniporia subacida* (Peck) Donk, *Corticum galactinum* (Fries) Bur, *Odontia bicolor* (Alb. & Schw. Ex. Fr.) Bres.**

Stringy Butt Rot, Spongy Butt Rot, Feather Rot

Hosts: Ba, Bg, Bl, Cw, Fd, Hw, Lt, Pl, Pw, Se, Ss, Sw, D spp., R spp., Act, E spp., M spp., W spp.

Widely distributed through its range of deciduous and coniferous species found in all ranges of British Columbia.

Sporophores: Superficially similar in the three species: Annual to perennial and resupinate. White, yellow or buff in colour. The surface of *C. galactinum* is smooth and waxy. *O. bicolor* becomes cracked with age and covered with short fragile evenly-distributed teeth. *P. subacida* has small circular pores and is leathery to crust-like.

Sporophores of *P. subacida*.

Decay: The incipient stage may appear as a light stain. Later, small white pits develop and coalesce to form masses of spongy white fibres containing small black flecks. The annual rings may separate to form a laminate decay. Finally, the wood is reduced to a spongy mass.

Entrance: Roots.

Activity: A lignin and to a slower and lesser extent, cellulose, decomposing heart rot and sap rot which is generally confined to the roots and butt.

Remarks: *P. subacida* which was formerly considered the sole causal fungus in some hosts is now believed to be the least important of the fungi commonly associated with the disease. White spongy butt rot is widely distributed throughout North America, and is common in mature age classes. Sporophores of the three fungi associated with this rot are generally found on the under-surfaces of old logs.

Sporophores of *P. hartigii*.

Advanced decay caused by *P. hartigii*.

Phellinus hartigii (Allesch. & Schnabl.) Bondartsev

Fomes hartigii Allesch. & Schnabl.

Fomes robustus P. Karst

Phellinus robustus (P. Karst.) Bourd. & Galzin

White Trunk Rot of Conifers

Hosts: Ba, Bl, Fd, Hw

Widely distributed throughout host range in British Columbia.

Sporophores: Perennial. Hoof-shaped, usually 5-15 cm wide when formed on stem and generally resupinate when formed on lowers surfaces of branches. The upper surface is dark brown to black. The lower surface is brown and poroid, with small circular pores.

Decay: Incipient stages of decay often appear as a straw-coloured to purple stain which may be irregular in shape. In the advanced stages, wood often appears bleached with occasional light brown areas or streaks, usually numerous zone lines are present. Decay sometimes occurs in a section of wood which extends in from the sapwood, and is often associated with wounds, dead branches, or with dwarf mistletoe infections which have killed part of the cambium.

Entrance: Wounds, dead branches, mistletoe infections.

Activity: Usually kills tissues localized near the point of infection, but can spread upwards and downwards 1-2m from each fruiting body. Decayed trees are prone to wind damage, and often breakage occurs up to 6m from the ground.

Mushrooms of *P. populnea* on a cut log.

***P. populnea* mushrooms.**

***Pholiota populnea* (Pers.:Fr.) Kuyper & Tjall.-Buekers**

***Pholiota destruens* (Brond)**

Yellow Laminated Butt Rot of Poplars

Hosts: Act

Widely distributed throughout its host's range in British Columbia.

Sporophores: Large gilled mushrooms which often occur in clusters. Mushroom cap is light brown and covered with white scales when fresh. Gills white when immature, turning to dark brown as spores mature. The stem is white or light brown, also covered with scales, and a white annulus (small ring) is present.

Decay: In the incipient stage the decay appears as buff to dark brown streaks in the heartwood. In the advanced stages of decay white patches for which give the wood a slight mottled appearance. Wood becomes uniformly yellow to tan and laminated in the final stage of decay.

Remarks: Thought to be the most damaging decay fungus found in cottonwood. It is found on living trees as well as on slash, however it tends to persist for longer on living trees, and will only remain active in stumps and logs for a few years.

Sporophores of *P. betulinus*. Young sporophore (above), older sporophore (below).

Cubical decay caused by *P. betulinus*.

***Piptoporus betulinus* (Bull.:Fr.) P. Karst.**

***Polyporus betulinus* (Bull.:Fr.) Fr.**

Brown Cubical Rot of Birch

Hosts: Ep

Found throughout the range of birch in British Columbia.

Sporophores: Annual, leathery, stout stipe. Can have a fairly large cap, up to 15 cm deep, 25 cm wide, and 6 cm high. The upper surface is light brown and becomes darker brown and scaly with a margin extending below the pore surface. The pore surface is white when fresh, and becomes light brown and tooth-like with age. Pores are circular. The context is white and easily separates from the tube layer when fresh.

Decay: The decayed wood is yellowish-brown in colour, and will crack into cubes. In the cracks thin, white mats of mycelium will form. In the advanced stages of decay, the wood is light weight and will easily crumble into powder.

Entrance: Dead branches.

Activity: A bark, sapwood and heartwood rot, only attacking hardwoods. Often present in dead branches of dying trees.

Advanced decay in western red cedar caused by *P. sericeomollis*.

Longitudinal section of brown cubical decay.

***Postia sericeomollis* (Romell) Jülich**

***Oligoporus sericeomollis* (Romell) Pouz.**

***Polyporus sericeomollis* Romell**

***Poria sericeomollis* (Romell) Egeland**

***Poria asiatica* (Pilát) Overh.**

Brown Cubical Butt and Pocket Rot of Cedar, Pecky Rot

Hosts: Ba, Cw, Yc, Fd, Hw, Lw, Pl, Py, Se, Ss, Sw

Reported on most conifers and is widely distributed throughout the range of its hosts in British Columbia.

Sporophores: Annual, resupinate, white in colour, growing up to 15 cm wide. Sporophores appear as thin crusts on the outer surfaces of dead wood or slash. Fruiting bodies rarely occur on living trees, but are more commonly found on the ends of logs or on slash.

Decay: The incipient stage of decay is characterized by straw coloured to pale yellow-brown wood. In the advanced stage of decay, the wood turns light brown in colour and brittle. It breaks down into cubes and usually forms a cylinder or rot when in the butt. It can also form a series of isolated pockets which can run together to form arcs or concentric rings. Sometimes a thin, white mycelium weft will form between the cubes of decayed wood.

Entrance: Unknown.

Remarks: This decay is common in the butt logs of western red cedar, and though it has a broad host range, it seldom infects live trees other than western red cedar. The fungus is most common in the butt, but can develop at all levels in the stem.

Sporophores of *S. delectans*.

***Spongipellis delectans* (Peck) Murrill**

***Polyporus delectans* Peck**

Brown Stringy Trunk Rot of Hardwoods

Hosts: Act

Has only been found on black cottonwood in British Columbia, but has been reported on maple, alder and oak in other parts of North America.

Sporophores: Annual, fleshy to leathery. Grow in various shapes, but are usually shelved. The upper surface, context and lower surface is white when fresh, and dries to a light brown colour. Poroid with small regular pores.

Decay: During the incipient stage buff to light brown streaks appear in the heartwood. During the advanced stage of decay the wood becomes dark brown and light-weight. It is usually stringy, but can be laminate. The decay will at first form pockets of various size, and will usually merge to form a column in time.

Entrance: Branch stubs and/or branch scars.

Activity: In living and dead trees, the fungus occurs mainly as a trunk rot, and rarely as a butt rot. Decay is usually confined to the heartwood in living trees.

Sporophores of *S. sanguinolentum*.

Red heart rot caused by *S. sanguinolentum*.

Stereum sanguinolentum (Albertini & Schwein.:Fr.) Fr.

Haematostereum sanguinolentum (Albertini & Scwein.:Fr.) Pouzar

Stereum balsameum Peck

Red Heart Rot, Bleeding Conk

Hosts: Ba, Bg, Bl, Cw, Fd, Hm, Hw, Lt, Lw, Pl, Pw, Py, Se, Sw

Occurs on conifers, and is very common in true fir, pine and white spruce. It is widely distributed throughout its range of hosts in British Columbia.

Sporophores: Annual, leathery, resupinate to effused-reflexed, forms in this crust-like layers. The upper surface is zoned, and grey to light brown in the effused-reflexed form. The lower surface is roughened or wrinkled, and is also grey to light brown, but turns blood-red when bruised (only when fresh).

Decay: The incipient stage is firm and appears as a reddish-brown stain. In the advanced stage the wood becomes light brown to reddish-brown, dry and friable, the wood becoming a fibrous, stringy mass. Mycelial sheets, white to buff in colour, may develop during advanced decay.

Entrance: Broken tops and scars of living trees.

Activity: A lignin and generally, to a slower or lesser extent, cellulose, destroying heart rot.

Remarks: A very important decay-producing fungus, also occurs commonly as a slash destroyer. Sporophores develop occasionally on living trees, but are of limited value as indicators of defect, owing to their infrequent occurrence, small size, and colour.

	***Veluticeps fimbriata* (Ellis & Everh.) Nakas.** ***Hymenochaete fimbriata* Ellis & Everh.** ***Stereum rugisporum* (Ellis & Everh.) Burt** **Brown Cubical Pocket Rot** **Hosts:** Ba, Bg, Bl, Fd, Hm, Hw, Se, Ss Distributed widely throughout its host ranges in British Columbia. **Sporophores:** Perennial, small, resupinate or shelf-like. Upper surfaces are dark brown to black. Context is brown. Lower surfaces are grey to light brown and roughened. The hymenial (spore producing) surface can be smooth to warted and usually cracked. **Decay:** The incipient stage of decay produces a wet dark brown to black stain which occurs in streaks or patches. The advanced stage of decay develops in pockets which are enclosed by apparently sound wood. In the final stages, the pockets merge to form an almost continuous column of decay. The decayed wood is friable and often associated with dark stain and cobweb-like mycelium, often with an odour which resembles stored apples. **Activity:** A commonly occurring trunk rot in conifers. Once thought of as only a destroyer of slash. Fruiting bodies may form on old logs and dead material on the ground, as well as on the scarred faces of living trees. If present, it can also continue to develop in seasoned timber.

Sap Rots

Sporophores of *C. purpureum*.

Stain associated with decay caused by *C. purpureum*.

***Chondrostereum purpureum* (Pers.:Fr.) Pouzar**

***Stereum purpureum* Pers.:Fr.**

Silver Leaf Disease

Hosts: Bl, Cw, Fd, Hw, Dr, At, Act, Acb. Ep, M spp., W spp.

Found on conifers, hardwoods and common on angiosperms. Widely distributed throughout its host range in British Columbia.

Sporophores: Annual, resupinate to semi-pileate, often occurring in groups. Extend out from surface 2-4cm. Upper surface is greyish white to purple and tomentose with indistinct, light coloured marginal zones. The spore producing surface is smooth to wrinkled, is bright purple when fresh and a brown-violet colour when it is old. Fruiting bodies are thin (1-2.5 mm) and contain a black line in cross section.

Foliar Identification: Silver/leaden lustre occurring on leaves of some hosts. Midribs and margins of affected leaves will become brown.

Damage: A weak parasite on some hardwoods, killing some branches or trees of some hosts, however *C. purpureum* is largely a saprophyte, and is not considered an economically important pathogen to conifer species in BC.

Sporophores of *C. volvatus*.

Cross section of *C. volvatus* sporophore.

Sap rot decay caused by *C. volvatus* in an MPB affected tree.

Cryptoporus volvatus (Peck) Shear

Polyporus volvatus Peck

Grey-Brown Sap Rot

Hosts: Ba, Bg, Bl, Fd, Hw, Pl, Pw, Py, Ss, Sw

Widely distributed throughout its host range in British Columbia, but most commonly found on beetle-killed and fire-killed Douglas-fir.

Sporophores: Annual, leathery, pouch-like. The upper surface is smooth, yellow to light brown, and turns white with age. The lower surface, is brown, poroid, but is covered with a membrane that continues from the upper surface (forming a pouch), until later, when an opening forms at the base and spores are released.

Decay: Causes narrow bands of cream to light grey discolorations in the outer sapwood. In the advanced stages the decayed wood becomes light brown, cubical and crumbly.

Activity: Causes damage to the outer 1-2 cm of sapwood, therefore volume losses are not large, or are nonexistent. The fungus develops rapidly in dead standing trees, usually the year after death. The fungus can also be used as an indicator of beetle-kill in Douglas-fir.

Sporophore of *G. sepiarium*.

Sporophores of *G. sepiarium*.

***Gleophyllum sepiarium* (Wulfen:Fr.) P. Karst.**

***Lenzites saepiaria* (Wulfen:Fr.) Fr.**

Brown Cubical Sap Rot

Hosts: Ba, Bg, Bl, Cw, Fd, Hw, Pl, Pw, Py, Sb, Se, Ss, Sw, A spp., Ep

Widely distributed throughout its host range in British Columbia.

Sporophores: Annual, leathery, small, shelf-like, occasionally stalked. Form in cracks and checks on fallen logs and slash. The upper surface is light to dark cinnamon-brown and zoned. At first it appears velvety, but becomes roughened as it matures. The context is brown. The lower surface is brown and contains gill-like structures (lamellae).

Decay: In the incipient stage decay appears as yellow to yellow-brown pockets of discolouration located in the sapwood or outer heartwood. In the advanced stage of decay, a typical brown cubical rot is present with yellow to yellow-brown mycelia located in the shrinkage cracks.

Activity: Presence of fruiting bodies usually indicates extensive decay, affecting the entire sapwood and some heartwood. Most commonly found on slash and fire-killed trees. Sometimes found on living trees, and dead sapwood under scars. Also found occasionally on fence posts or other wooden structures.

Sporophores of *T. abietinum* (Photo credit R. Reich).

Sporophores of *T. abietinum* (Photo credit R. Reich).

***Trichaptum abietinum* (Dickson:Fr.) Ryvarden**

***Hirschioporus abietinus* (Dickson:Fr.) Donk**

***Polyporus abietinus* (Dickson:Fr.) Donk**

Pitted Sap Rot

Hosts: Ba, Bg, Bl, Cw, Fd, Hw, Lw, Pa, Pl, Pw, Py, Sb, Ss, Sw, Ra

Found on a wide range of coniferous hosts in British Columbia, and affects trees in all ranges of BC.

Sporophores: Annual, small and thin, effused-reflexed or shelf-like. Form in abundance in crevices of bark. The upper surface is somewhat hairy, zoned and light grey when fresh. Upper surfaces may appear green or black in older specimens due to algal growth. When fresh the lower surface is purple, and turns light brown with age. Pores are angular, and tissue between them becomes elongated and splits into irregular spines or ridges.

Decay: In the incipient stage the wood becomes soft and light yellow to tan coloured. Small pits develop in the advanced stage of decay which are elongated in the direction of the grain. They may be filled with fibrous material but will later become void. Cross section of decay appears as honeycombed.

Activity: Causes sapwood decay, fruiting bodies found abundantly on dead trees and forest litter. Primarily a saprophytic deteriorating agent, but also capable of casing sap rot and heart rot in living trees.

Black fungal mass of *I. obliquus* (Photo credit R. Reich).

Trunk rot caused by *I. obliquus*.

***Inonotus obliquus* (Pers.:Fr.) Pilát**

***Polyporus obliquus* (Pers. :Fr.) Fr.**

***Poria obliqua* (Pers. :Fr.) P. Karst**

Sterile Conk Trunk Rot of Birch

Hosts: Ep, rarely on Act.

Widely distributed throughout host range in British Columbia, but also occurs on other hardwood species elsewhere in North America.

Conks: Sterile. Conspicuous perennial black fungal masses erupting from bark cankers, commonly 20-30 cm diameter. The surface of the conk is rough and cracked, and internal tissue is yellow-brown to rust-brown, having a punky texture.

Sporophores: Small, annual. Form under bark or outer layers of wood surrounding sterile conks on dead standing or fallen trees. Quickly degraded through insect and weather damage, making them less conspicuous.

Decay: A heart rot in living birches similar to that caused by *Phellinus (Fomes) igniarius*. Incipient decay is whitish-yellow and in irregular zones. Advanced heartwood decay produces alternating zones of white and light reddish-brown wood, and moves to the sapwood after the tree dies. White mycelium veins can often be found near cankers, and dark zone lines are a feature of decayed wood.

Entrance: Dead branch stubs, trunk wounds and pre-existing cankers.

Activity: Extensive sapwood and heartwood decay. Infected trees often severely damaged.

Subtle, resinous *E. deformans* stem infection (left), and subtle, non-resinous stem infection (right) (Photo credits R. Reich).

Cross section of *Elytroderma* infected trunk (Photo credit R. Reich).

Advanced *Elytroderma* stem infection (left), and spinning stem infection with associated live lower limb (right) (Photo credit R. Reich).

Elytroderma deformans (Weir) Darker
Hypoderma deformans Weir
Elytroderma Stem Canker, Elytroderma Needle and Shoot Disease

Hosts: Pl, Py

Restricted to hard, 2 and 3 needle pines. Found throughout the interior of British Columbia on lodgepole pine.

Remarks: Although typically noted as a disease affecting the needles and shoots of hard pines, *E. deformans* also causes stem infections, which have not been described in the literature to date. This section will describe the stem infections of *E. deformans* for identification in the field.

Stem Infections: Typically sunken, somewhat diamond-shaped cankered portions of the stem, which may be somewhat spiralled or straight depending on the grain of the tree. Outer bark is usually rough and cracked, and sometimes slightly resinous. Cankers may persist to rotation or may result in the premature mortality of the tree through chronic growth loss in completely girdled stems. Older cankers may develop ridges and become flared at the sides.

Damage: Infected trees can be girdled completely, though the inner bark typically remains live. Stem infections appear to have little impact on survival of young trees, but over time cankers appear to increase in severity. Most stem infections appear to occur before age 10, and spread at a fairly even rate both horizontally and vertically. Cankers on mature trees can be several meters in length and may resemble stalactiform blister rust infections.

Entrance: Infection is by windborne ascospores, which mature and are discharged in late summer and early fall under favourable (wet) conditions. Infection typically occurs on the current year's foliage, with symptoms of flagging foliage by the following spring. Infection can spread to the bark and cambium becoming a perennial canker infection of the stem and/or branches.

Sporulating diamond-shaped *C. coleosporioides* stem infections on young lodgepole pine (Photo credit R. Reich).

Long diamond shaped cankers of C. coleosporioides with concentric strips of squirrel feeding damage to bark (Photo credits R. Reich).

Cronartium coleosporioides Arthur

Cronartium stalactiforme Arth. & Kern

Stalactiform Blister Rust

Hosts: Pl, Py, Pj in natural forests.

Restricted to 2 and 3 needle hard pines in British Columbia. Also found on introduced hard pine varieties in BC.

Alternate (telial) Hosts: Paintbrush (*Castilleja miniata*), cow-wheat (*Melampyrum lineare*), and yellow rattle (*Rhinanthus minor*). Yellow owl's clover (*Orthocarpus luteus*) and bracted lousewort (*Pedicularis bracteosa*) have been found to be alternate hosts through artificial inoculation.

Identification: Perennial cankers can be found on the branches or stems of living hosts. Cankers are elongate, often diamond-shaped, and may display thickened bark due to swelling. Squirrel feeding damage on cankered areas of mature trees is common leaving areas of exposed wood. During late spring and summer, swollen areas produce white to orange aecial blisters which rupture and orange aeciospores are released to be disseminated by wind, rain and animals. During the fall and winter the presence of *C. coleosporioides* can be recognized due to size and shape of cankers, as well as their sunkeness, dead bark, and associated resinosis.

Entrance: Basidiospores which are produced on the telial horns of alternate hosts germinate in appropriate climatic conditions, infecting the tree through the stomatal openings of needles. Infection travels down the branch, and eventually into the stem.

Damage: Stem defects in older trees may result in decreased wood quality and increased susceptibility to abiotic damage such as caused by wind and heavy snow, as well as other pathogens such as stem decays.

Comandra blister rust stem infection (Photo credit R. Reich).

Stem canker caused by *C. Comandrae* with associated squirrel feeding on infected bark (Photo credit R. Reich).

***Cronartium comandrae* Peck**

Comandra Blister Rust

Hosts: Pl, Py

Found in British Columbia where alternate host and host ranges overlap.

Alternate (telial) Hosts: False/bastard/northern toadflax (*Geocaulon lividum or Comandra livida*), Pale comandra (*Comandra umbellata*).

Identification: Perennial cankers can be found on the branches or stems of living hosts. Cankers grow radially as well as vertically, often girdling small branches and stems. Cankers of *C. comandrae*, similar to those of *C. coleosporioides*, are also prone to chewing by rodents and lagomorphs. During late spring and summer, swollen areas produce orange aecial blisters which rupture releasing orange aeciospores to be disseminated by wind, rain and animals.

Entrance: Basidiospores infect the tree through the stomatal openings of needles, travelling down the branch, and eventually into the stem.

Damage: Mortality usually occurs at an early age resulting in few mature trees with cankers.

Remarks: Cankers of *C. comandrae* and *C. coleosporioides* may appear similar to the untrained eye, however they can be distinguished by canker shape and size, as well as by microscopic examination of aecia. Cankers of *C. comandrae* usually tend to grow faster radially than they do vertically, therefore *C. coleosporioides* cankers are more elongate, and tend to be larger, as well as have a characteristic diamond shape to them.

Stem swelling and hypertrophied ridges of sweetfern blister rust on young lodgepole pine (Photo credit R. Reich).

Hypertrophied ridges caused by sweetfern blister rust on lodgepole pine (Photo credit R. Reich).

Cronartium comptoniae Arthur

Sweetfern Blister Rust

Hosts: Pl, Pj, Py in natural forests.

Restricted to 2 and 3 needle hard pines in British Columbia. Restricted to areas where host and alternate host ranges overlap.

Alternate Host: Sweet gale (*Myrica gale*).

Identification: Appears as an elongate, diamond-shaped swelling on stems and branches, often girdling small branches and stems. During late spring and summer, swollen areas produce white to orange aecial blisters which rupture and orange aeciospores are released to be disseminated by wind, rain and animals. At other times of the year non-sporulating cankers can be identified by their size and shape, sunken dead bark and resin sis. Cankers of *C. comptoniae*, similar to those of *C. coleosporioides* and *C. comandrae*, are not as prone to chewing by rodents and lagomorphs.

Entrance: Basidiospores which are produced on the telial horns of alternate hosts germinate in appropriate climatic conditions, infecting the tree through the stomatal openings of needles, travelling down the branch, and eventually into the stem.

Damage: Severe losses in plantations of pine located near swampy sweet gale habitats can occur, however these habitats are rare in BC.

Remarks: Distinguishing between *C. comptoniae* and *C. coleosporioides* can be difficult, as cankers and scars may appear similar to the untrained eye. The distinguishing feature is the hypertrophied ridges of *C. comptoniae*.

Stem and branch gall caused by *E. harknessii* (Photo credit R. Reich).

Cobra-shaped tree resulting from an *E. harknessii* hip gall (Photo credit R. Reich).

Western gall rust affected tree (Photo credit R. Reich).

Endocronartium harknessii (J. P. Moore) Y. Hiratsuka

Peridermium harknessii J. P. Moore

Western Gall Rust

Hosts: Pl, Py, Pj in natural forests.

Restricted to hard 2 needle pines in British Columbia. Also found on introduced 2 needle hard pine species in BC. The disease is widespread throughout BC, affecting hosts throughout their ranges.

Identification: Woody swellings (galls) are formed on branches and stems of infected trees. Galls are generally globose, but may be deeply fissured and irregularly shaped. In late spring blisters form beneath the bark of galls which contain orange coloured spores. Spores are exposed when bark sloughs off of the calls.

Entrance: Trees are infected by the spores of the fungus through the epidermis on elongating shoots, therefore all galls are formed initially on one-year-old growth.

Damage: Damage is not usually significant when occurring on branches, however stem galls can lead to serious growth losses and malformations as well as mortality. Malformations due to galls present on the main stem, especially in younger trees can predispose the tree to damage by abiotic factors such as wind or heavy snow.

Remarks: *E. harknessii*, unlike other stem rusts, does not require an alternate host to complete its life cycle. Optimal climatic conditions for infection often occur every several years, as with other rust pathogens. This is known as the “wave year” phenomenon.

Figure A.42 Residual Indicators

References:

Allen et al. – Common tree Diseases of BC

P. sericeomollis – US Forest Service -
http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5187351.pdf

Photos taken from websites

1. *Fomitopsis pinicola*
   Decay
   NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/18

2. Phellinus igniarius
   Decay (2 photos)
   NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/332

3. Armillaria
   Tree roots and base rot
   NRC http://tidcf.rncan.gc.ca/en/diseases/factsheet/16

4. Heterobasidion annosum
   Sporphores at base of tree
   NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/19

   Incipient trunk decay
   Bugwood USDA forest service archive
   http://www.forestryimages.org/browse/detail.cfm?imgnum=2250054

   Stringy root decay
   Bugwood USDA forest service archive
   http://www.forestryimages.org/browse/detail.cfm?imgnum=2250051

5. Phellinus weirii
   Fruiting bodies
   Black stain
   Incipient decay
   NRC http://aimfc.rncan.gc.ca/en/diseases/factsheet/1000027

6. Rhizina undualta
   Seedling with black sporophore
   Young brown fruiting bodies
   NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/1000042

7. Ceriporiopsis rivulosa
   Decay
   NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/1000006

8. Fomes fomentarius
   Decay
   NRC http://aimfc.rncan.gc.ca/en/diseases/factsheet/183

9. Fomtipsis officinalis
   Sporophore
   Decay
   NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/1000019

10. Ganoderma applanatum
    Sporophores
    Decay
    NRC http:/tidcf.nrcan.gc.ca/en/diseases/factsheet/191

11. Hericium abietis
    Fruting body
    Decay
    NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/1000025

12. Laettiporus sulphurous
    Sporophores
    NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/1000014

    Decay
    Bugwood Daniel H. Brown USDA Forest Service
    http://www.forestryimages.org/browse/detail.cfm?imgnum=1503080

13. Neolentinus kauffmanii
    Sporophores
    Decay
    NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/1000012

14. Phellinus hartigii
    Sporophores
    Bugwood Andrej Kunca National Forest Centre – Slovakia USDA
    http://www.forestryimages.org/browse/detail.cfm?imgnum=1415109

    Decay
    NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/1000007

15. Pholiota populnea
    Mushrooms on cut log
    NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/1000029

    Close up mushrooms
    Bugwood Andrej Kunca National Forest Centre- Slovakia USDA
    http://www.forestryimages.org/browse/detail.cfm?imgnum=1415248

16. Piptoporus betulinus
    Sporophores (2photos)
    NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/354

    Decay
    Bugwood Frantisek Soukup
    http://www.forestryimages.org/browse/detail.cfm?imgnum=0534044

17. Postia sericeomollis
    Decay (2 photos)
    NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/1000018

18. Spongipellis delectans
    Sporophores
    NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/1000021

19. Stereum sanguinolentum
    Sporophores
    NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/418

    Decay
    Bugwood Andrej Kunca National Forest Centre –Slovakia
    http://www.forestryimages.org/browse/detail.cfm?imgnum=5382917

20. Chondrostereum purpureum
    Sprophores
    Decay
    NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/1000040

21. Cryptoporus volvatus
    Sprophores (2 photos)
    NRC http://tidcf.nrcan.gc.ca/en/diseases/factsheet/1000024

    Decay
    Bugwood Russ Hogan
    http://www.forestryimages.org/browse/detail.cfm?imgnum=1241533

22. Gleophyllum sepiarium
    Sporophores (2 photos)
    Bugwood Joseph O'Brien USDA Forest Service
    http://www.forestryimages.org/browse/detail.cfm?imgnum=5299042

Region and District Codes

Area	Natural Resource Region	Natural Resource District
Coast	South Coast (RSC)	Chilliwack Sea to Sky (previously Squamish) Sunshine Coast
	West Coast (RWC)	Campbell River North Island – Central Coast Haida Gwaii South Island
South	Thompson-Okanagan (RTO)	Thompson Rivers (includes previous Kamloops and part of previous Headwaters district) Cascades Okanagan Shuswap
	Cariboo (RCB)	100 Mile House Cariboo Chilcotin (previously Central Cariboo and Chilcotin) Quesnel
	Kootenay-Boundary (RKB)	Selkirk (previously Arrow Boundary, Columbia and Kootenay Districts) Rocky Mountain
North	Skeena (RSK)	Coast Mountain (previously North Coast and Kalum) Nadina Skeena Stikine
	Northeast (RNO)	Fort Nelson Peace
	Omenica (ROM)	Fort St. James Mackenzie Prince George (includes part of previous Headwaters district) Vanderhoof

British Columbia Timber Sales Offices

Burns Lake	Chilliwack
Kamloops	Nelson
Terrace	Vanderhoof

Campbell River	Dawson Creek
Prince George	Port McNeill
Vernon	Williams Lake

Access the BCTS map at: http://www.for.gov.bc.ca/bcts/maps

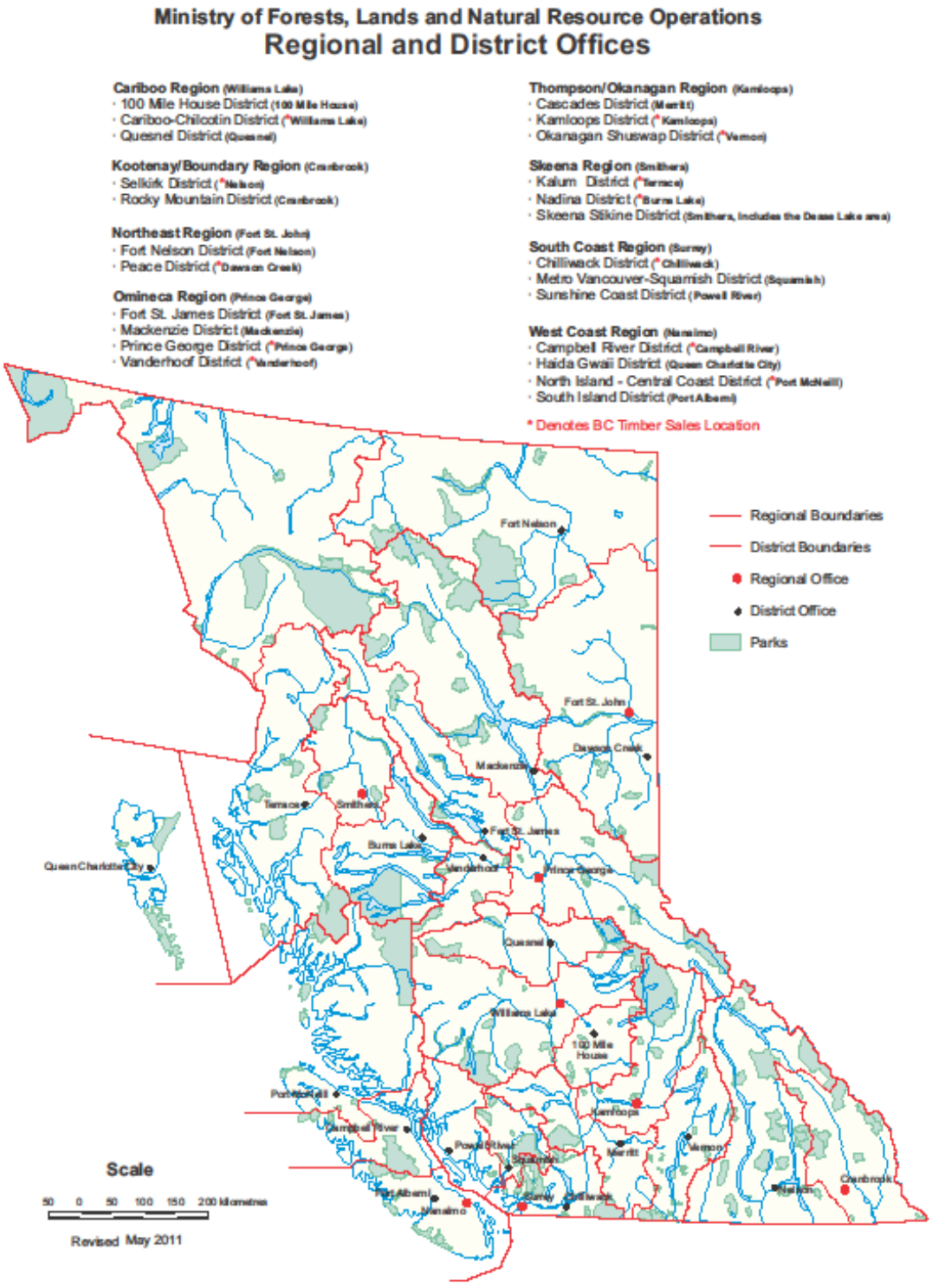


Figure A.43 Forest Region and District Boundaries

Risk Group Ratings by Pathological Indicators (Table 18)

Species	Location	Age Group	Age Range	Risk Group 1	Risk Group 2	Risk Group 3
Cw	All FIZ	Immature	1-80	Any indicator		
		Old Immature	81-120	No indicators	Any indicator	
	FIZ D to I	Mature	121+	No indicators or large rotten branch	Any other indicators	
	FIZ A, B, C, J	Mature	121+	No indicators or either frost crack or fork/crook	Any other indicator(s)	
	*Exceptions	Mature	121+	Height ≥ 40.5 m.	Height < 40.5 m.	
CY	All FIZ	Immature	1-80	Any indicator		
	All FIZ	Old Immature	81-120	No indicators	Any indicator	
	All FIZ	Mature	121+	No indicators	Any indicator	

*Applies to the following PSYUs and TFL 30:

Bowron
Longworth
Monkman
Purden
Robson

Species	Location	Age Group	Age Range	Risk Group 1	Risk Group 2	Risk Group 3
Fd	All FIZ	Immature	1-80	Any indicator		
	FIZ A, B, C	Old Immature	81-120	Any indicator		
	FIZ D to I	Old Immature	81-120	No indicators	Any indicator	
	FIZ A, B, C	Mature	121+	No Indicators or 1 of dead/broken top or large rotten branch or frost crack	Any other indicator other than conk or blind conk	Conk or blind conk
	FIZ D, H	Mature	121+	No Indicators or 1 of mistletoe or large rotten branch or frost crack	Any other category or combination	
	FIZ E, F, G	Mature	121+	No Indicators or 1 of large rotten branch or mistletoe.	Any other category or combination	
	FIZ I	Mature	121+	No Indicators or 1 of dead/broken top, mistletoe, large rotten branch, or frost crack	Any other category or combination(s) other than conk or blind conk	Conk or blind conk

Species	Location	Age Group	Age Range	Risk Group 1	Risk Group 2	Risk Group 3
B	All FIZ	Immature	1-80	Any indicator		
		Old Immature	81-120	No indicators	Any indicator	
		Mature	121+	No indicator or forks/crooks	3 or less indicators	Conk or blind conk or 4 or more other indicators
H	All FIZ	Immature	1-80	Any Indicator		
	All FIZ	Old Immature	81-120	No indicators	Any indicator	
	FIZ A	Mature	121 +	D or B Top, large rotten branch, mistletoe, frost crack, fork/crook or scar	2 or 3 indicators	4 or more categories or conk or blind conk
	FIZ B, C	Mature	121 +	D or B Top and/or mistletoe	frost crack or fork/crook or scar or indicators in 2 or 3 categories	4 or more categories or rotten branch, conk, or blind conk
	Kingcome Local & TFLs 6, 25, 37, 43, 45, and 47	Mature	121 +	No indicators or one or both of D or B top or mistletoe	frost crack, fork/crook, scar or rotten branch or 2 or more categories	4 or more categories or conk or blind conk

Species	Location	Age Group	Age Range	Risk Group 1	Risk Group 2	Risk Group 3
	FIZ D to K	Mature	121 +	No indicators	No more than 3 of any indicator other than conk/blind conk	Conk/blind conk or 4 or more of any other indicators

Species	Location	Age Group	Age Range	Risk Group 1	Risk Group 2	Risk Group 3
S	All FIZ	Immature	1 - 80	Any indicator		
	FIZ A, B, C	Old Immature	81 - 120	Any indicator		
	FIZ D to L	Old Immature	81 - 120	No indicators	Any indicator	
	FIZ A, B, C	Mature	121 +	D or B Top, rotten branch, mistletoe, frost crack, fork/crook, scar	More than 1 indicator or Conk or Blind conk	
	FIZ D to L	Mature	121 +	No indicators	Any other than conk/blind conk	Conk/blind conk
L	All FIZ	Immature	1 - 80	Any indicator		
		Old Immature	81 - 120	No indicators	Any indicator	
		Mature	121 +	No indicators	Any other than conk or blind conk	Conk or blind conk

Species	Location	Age Group	Age Range	Risk Group 1	Risk Group 2	Risk Group 3
PL	All FIZ	Immature	1 - 60	Any indicator		
	All FIZ	Old Immature	61 - 120	No indicators	Any indicator	
	FIZ A, B, C	Mature	121 +	No indicators	Any indicator	
	FIZ D to L	Mature	121 +	No indicators	Any other than conk/blind conk	Conk/blind conk
Pw and Pa	All FIZ	Immature	1 - 80	Any indicator		
		Old Immature	81 - 120	No indicators	Any indicator	
		Mature	121 +	No indicators	Any indicator	
Py	All FIZ	Immature	1 - 80	Any indicator		
		Old Immature	81 - 120	No indicators	Any indicator	
		Mature	121 +	Fork/crook	Any indicator other than fork/crook	

Species	Location	Age Group	Age Range	Risk Group 1	Risk Group 2	Risk Group 3
Ac	FIZ A to J	Immature	1-20	Any indicator		
	FIZ K, L	Immature	1-40	Any indicator		
	FIZ A to J	Old Immature	21 - 40	Any indicator		
	FIZ K, L	Old Immature	41 - 80	Fork/crook	Any other than fork/crook	
	FIZ A to J	Mature	41 +	Any indicator		
	FIZ K, L	Mature	81 - 140	Fork/crook	Any other than fork/crook	
	FIZ K, L	Over Mature	141 +	Any indicator		
At	FIZ A to J	Immature	1-20	Any indicator		
	FIZ K, L	Immature	1-40	Any indicator		
	FIZ A to J	Old Immature	21 - 40	Any indicator		
	FIZ K, L	Old Immature	41 - 80	Any indicators other than conk or blind conk	Conk or blind conk	
	FIZ A to J	Mature	41 +	No indicators	Any	

Species	Location	Age Group	Age Range	Risk Group 1	Risk Group 2	Risk Group 3
	FIZ K, L	Mature	81 - 140	Fork/crook	Any other than fork/crook or conk or blind conk	Conk or Blind Conk
	FIZ K, L	Over Mature	141 +	Any indicator		
E	All FIZ	Immature	1 - 20	Any indicator		
		Old Immature	21 - 40	Any indicator		
		Mature	41 +	No indicators	Any Indicator	
D	All FIZ	Immature	1 - 20	Any indicator		
		Old Immature	21 - 40	Any indicator		
		Mature	41 +	Any indicator		
Mb	All FIZ	Immature	1 - 20	Any indicator		
		Old Immature	21 - 40	Any indicator		
		Mature	41 +	No indicators	Any indicator	

Site Index Tables for British Columbia – All Species (Appendix 9)

The site index tables must be used for appraisal cruising.

The tables may be purchased on a waterproof paper from:

Crown Publications
563 Superior St
Victoria, BC V8V 1T7
Phone: (250) 387-6409
Toll Free: 1-800-663-6105

Website: http://www.crownpub.bc.ca/

A.9.1 Use of Site Index Tables for BC to Determine the Age Corrections at Breast Height

1. Refer to the most recent Coast and Interior site index tables for the target tree species.

2. Bore the tree at breast-height (1.3 m) above the high-side.

3. Count the growth rings between the cambium and the pith (count the pith as one ring). Enter under "Counted Age" on Card Type 3 (Figure 4.1 Cruise Tally Sheet – FS 205C (front side).).

4. From top height and boring height age, determine the site index. Then go to the bottom of the Site Index Table to obtain the "Years to bh" (boring height) age correction.

5. Add this age correction to "Counted Age" to get the total age.

Table of Site Index by Breast Height Age and Height
Species: Fdc – Coastal Douglas-fir

Age @ bh	Top Height (m) 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	Site Index (m)																
5	35	45	53	59	62	65	67	69									
10	15	20	24	29	33	38	42	47	51	54	57	59	61	63			
15	10	13	16	19	22	24	27	30	33	36	39	42	45	47	50	52	55
20	8	10	12	15	17	19	21	23	25	27	29	31	34	36	38	40	42
25	7	9	10	12	14	16	17	19	21	22	24	26	27	29	31	33	34
30	6	8	9	11	12	14	15	17	18	19	21	22	24	25	27	28	30
35	6	7	8	10	11	12	14	15	16	17	19	20	21	23	24	25	26
40	5	7	8	9	10	11	12	14	15	16	17	18	19	21	22	23	24
45	5	6	7	8	9	11	12	13	14	15	16	17	18	19	20	21	22
50	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
55	5	6	7	8	9	10	10	11	12	13	14	15	16	17	18	19	20
60	5	6	6	7	8	9	10	11	12	13	14	15	15	16	17	18	19
65	5	5	6	7	8	9	10	11	11	12	13	14	15	16	17	17	18
70		5	6	7	8	9	9	10	11	12	13	13	14	15	16	17	18
75		5	6	7	8	8	9	10	11	11	12	13	14	15	15	16	17
80		5	6	7	7	8	9	10	10	11	12	13	13	14	15	16	17
85		5	6	6	7	8	9	9	10	11	12	12	13	14	15	15	16
90		5	6	6	7	8	9	9	10	11	11	12	13	14	14	15	16
95		5	6	6	7	8	8	9	10	10	11	12	13	13	14	15	15
100		5	5	6	7	8	8	9	10	10	11	12	12	13	14	14	15
105		5	5	6	7	7	8	9	9	10	11	11	12	13	13	14	15
110		5	5	6	7	7	8	9	9	10	11	11	12	13	13	14	15
115		5	5	6	7	7	8	9	9	10	10	11	12	12	13	14	14
120		5	5	6	7	7	8	8	9	10	10	11	12	12	13	14	14
125		5	5	6	6	7	8	8	9	10	10	11	11	12	13	13	14
130		5	5	6	6	7	8	8	9	9	10	11	11	12	13	13	14
135			5	6	6	7	8	8	9	9	10	11	11	12	12	13	14
140			5	6	6	7	7	8	9	9	10	10	11	12	12	13	13
145			5	6	6	7	7	8	9	9	10	10	11	12	12	13	13
150			5	6	6	7	7	8	8	9	10	10	11	11	12	13	13
155			5	6	6	7	7	8	8	9	10	10	11	11	12	12	13
160			5	5	6	7	7	8	8	9	9	10	11	11	12	12	13
165			5	5	6	7	7	8	8	9	9	10	11	11	12	12	13
170			5	5	6	7	7	8	8	9	9	10	10	11	12	12	13
175			5	5	6	6	7	8	8	9	9	10	10	11	12	12	13
180			5	5	6	6	7	8	8	9	9	10	10	11	11	12	13
185			5	5	6	6	7	8	8	9	9	10	10	11	11	12	12
190			5	5	6	6	7	7	8	9	9	10	10	11	11	12	12
195			5	5	6	6	7	7	8	8	9	10	10	11	11	12	12
200			5	5	6	6	7	7	8	8	9	10	10	11	11	12	12

Years to Boring Height

Site Index	Up to 10	11-16	17-22	23-28	29-35	36-41	42-47	48+
Correct yrs	12	11	10	9	8	7	6	5

SiteTools Version 3.2m – Research Branch, British Columbia Ministry of Forests
Date: February 28, 2002
Site Index Equation: Bruce (1981)

Table of Site Index by Breast Height Age and Height
Species: Fdc – Coastal Douglas-fir

Top Height (m) 22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	Age @ bh
Site Index (m)																
																5
																10
57	59		62													15
44	46	49	50	52	54	56										20
36	38	40	41	43	45	47	48	50	52	53	55					25
31	33	34	36	37	39	40	42	43	45	46	47	49	50	52	53	30
28	29	30	32	33	34	35	37	38	39	41	42	43	45	46	47	35
25	26	28	29	30	31	32	33	35	36	37	38	39	41	42	43	40
23	25	26	27	28	29	30	31	32	33	34	35	36	37	39	40	45
22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	50
21	22	23	24	25	26	27	27	28	29	30	31	32	33	34	35	55
20	21	22	23	23	24	25	26	27	28	29	30	31	32	32	33	60
19	20	21	22	23	23	24	25	26	27	28	29	29	30	31	32	65
18	19	20	21	22	23	23	24	25	26	27	27	28	29	30	31	70
18	19	19	20	21	22	23	23	24	25	26	27	27	28	29	30	75
17	18	19	20	20	21	22	23	24	24	25	26	27	27	28	29	80
17	18	18	19	20	21	21	22	23	24	24	25	26	27	27	28	85
17	17	18	19	19	20	21	22	22	23	24	25	25	26	27	27	90
16	17	18	18	19	20	20	21	22	23	23	24	25	25	26	27	95
16	17	17	18	19	19	20	21	21	22	23	24	24	25	26	26	100
16	16	17	18	18	19	20	20	21	22	22	23	24	24	25	26	105
15	16	17	17	18	19	19	20	21	21	22	23	23	24	25	25	110
15	16	16	17	18	18	19	20	20	21	22	22	23	24	24	25	115
15	15	16	17	17	18	19	19	20	21	21	22	23	23	24	25	120
15	15	16	17	17	18	18	19	20	20	21	22	22	23	24	24	125
14	15	16	16	17	18	18	19	20	20	21	21	22	23	23	24	130
14	15	16	16	17	17	18	19	19	20	21	21	22	22	23	24	135
14	15	15	16	17	17	18	18	19	20	20	21	22	22	23	23	140
14	15	15	16	16	17	18	18	19	19	20	21	21	22	23	23	145
14	14	15	16	16	17	17	18	19	19	20	21	21	22	22	23	150
14	14	15	15	16	17	17	18	18	19	20	20	21	22	22	23	155
14	14	15	15	16	17	17	18	18	19	20	20	21	21	22	23	160
13	14	15	15	16	16	17	18	18	19	19	20	21	21	22	22	165
13	14	15	15	16	16	17	17	18	19	19	20	20	21	22	22	170
13	14	14	15	16	16	17	17	18	18	19	20	20	21	21	22	175
13	14	14	15	15	16	17	17	18	18	19	19	20	21	21	22	180
13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	185
13	14	14	15	15	16	16	17	17	18	19	19	20	20	21	21	190
13	13	14	15	15	16	16	17	17	18	19	19	20	20	21	21	195
13	13	14	14	15	16	16	17	17	18	18	19	20	20	21	21	200

Years to Boring Height

Site Index	Up to 10	11-16	17-22	23-28	29-35	36-41	42-47	48+
Correct yrs	12	11	10	9	8	7	6	5

BACK

Table of Site Index by Breast Height Age and Height
Species: Fdc – Coastal Douglas-fir

Age @ bh	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
	Top Height (m) / Site Index (m)															
5																
10																
15																
20																
25																
30																
35	49	50	51													
40	44	45	46	48	49	50	51									
45	41	42	43	44	45	46	47	48	49	50						
50	38	39	40	41	42	43	44	45	46	47	48	49	50			
55	36	37	38	39	40	41	42	42	43	44	45	46	47	48	49	50
60	34	35	36	37	38	39	39	40	41	42	43	44	45	46	47	47
65	33	34	34	35	36	37	38	39	39	40	41	42	43	44	44	45
70	32	32	33	34	35	36	36	37	38	39	40	40	41	42	43	44
75	31	31	32	33	34	34	35	36	37	38	38	39	40	41	41	42
80	30	30	31	32	33	33	34	35	36	36	37	38	39	39	40	41
85	29	30	30	31	32	33	33	34	35	35	36	37	38	38	39	40
90	28	29	30	30	31	32	32	33	34	35	35	36	37	37	38	39
95	28	28	29	30	30	31	32	32	33	34	34	35	36	36	37	38
100	27	28	28	29	30	30	31	32	32	33	34	34	35	36	36	37
105	27	27	28	29	29	30	31	31	32	33	33	34	34	35	36	36
110	26	27	27	28	29	29	30	31	31	32	33	33	34	34	35	36
115	26	26	27	28	28	29	30	30	31	31	32	33	33	34	35	35
120	25	26	27	27	28	28	29	30	30	31	32	32	33	33	34	35
125	25	26	26	27	27	28	29	29	30	31	31	32	32	33	34	34
130	25	25	26	26	27	28	28	29	30	30	31	31	32	33	33	34
135	24	25	26	26	27	27	28	29	29	30	30	31	32	32	33	33
140	24	25	25	26	26	27	28	28	29	29	30	31	31	32	32	33
145	24	24	25	26	26	27	27	28	29	29	30	30	31	31	32	33
150	24	24	25	25	26	27	27	28	28	29	29	30	31	31	32	32
155	23	24	25	25	26	26	27	27	28	29	29	30	30	31	31	32
160	23	24	24	25	25	26	27	27	28	28	29	29	30	31	31	32
165	23	23	24	25	25	26	26	27	28	28	29	29	30	30	31	31
170	23	23	24	24	25	26	26	27	27	28	28	29	30	30	31	31
175	23	23	24	24	25	25	26	27	27	28	28	29	29	30	30	31
180	22	23	24	24	25	25	26	26	27	27	28	29	29	30	30	31
185	22	23	23	24	24	25	26	26	27	27	28	28	29	29	30	31
190	22	23	23	24	24	25	25	26	27	27	28	28	29	29	30	30
195	22	22	23	24	24	25	25	26	26	27	27	28	29	29	30	30
200	22	22	23	23	24	25	25	26	26	27	27	28	28	29	29	30

Years to Boring Height

Site Index	Up to 10	11-16	17-22	23-28	29-35	36-41	42-47	48+
Correct yrs	12	11	10	9	8	7	6	5

Page 3

Table of Site Index by Breast Height Age and Height
Species: Fdc – Coastal Douglas-fir

54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	Age @ bh
Top Height (m) / Site Index (m)																
																5
																10
																15
																20
																25
																30
																35
																40
																45
																50
																55
48	49															60
46	47	48	49	49												65
44	45	46	47	47	48	49										70
43	44	44	45	46	47	47	48	49								75
42	42	43	44	44	45	46	47	47	48	49						80
40	41	42	42	43	44	45	45	46	47	47	48	49				85
39	40	41	41	42	43	43	44	45	45	46	47	47	48			90
39	39	40	40	41	42	42	43	44	44	45	46	46	47	48	48	95
38	38	39	40	40	41	42	42	43	43	44	45	45	46	47	47	100
37	38	38	39	40	40	41	41	42	43	43	44	44	45	46	46	105
36	37	38	38	39	39	40	41	41	42	42	43	44	44	45	45	110
36	36	37	38	38	39	39	40	41	41	42	42	43	44	44	45	115
35	36	36	37	38	38	39	39	40	41	41	42	42	43	43	44	120
35	35	36	37	37	38	38	39	39	40	41	41	42	42	43	43	125
34	35	36	36	37	37	38	38	39	39	40	41	41	42	42	43	130
34	35	35	36	36	37	37	38	38	39	40	40	41	41	42	42	135
34	34	35	35	36	36	37	37	38	39	39	40	40	41	41	42	140
33	34	34	35	35	36	37	37	38	38	39	39	40	40	41	41	145
33	33	34	35	35	36	36	37	37	38	38	39	39	40	40	41	150
33	33	34	34	35	35	36	36	37	37	38	38	39	39	40	40	155
32	33	33	34	34	35	35	36	37	37	38	38	39	39	40	40	160
32	33	33	34	34	35	35	36	36	37	37	38	38	39	39	40	165
32	32	33	33	34	34	35	35	36	36	37	37	38	38	39	39	170
32	32	33	33	34	34	35	35	36	36	37	37	38	38	39	39	175
31	32	32	33	33	34	34	35	35	36	36	37	37	38	38	39	180
31	32	32	33	33	34	34	35	35	36	36	37	37	38	38	39	185
31	31	32	32	33	33	34	34	35	35	36	36	37	37	38	38	190
31	31	32	32	33	33	34	34	35	35	36	36	37	37	38	38	195
30	31	31	32	33	33	34	34	35	35	35	36	36	37	37	38	200

Years to Boring Height

Site Index	Up to 10	11-16	17-22	23-28	29-35	36-41	42-47	48+
Correct yrs	12	11	10	9	8	7	6	5

Page 4

Figure A.44 Fdc – Coastal Douglas-Fir.

Table of Site Index by Breast Height Age and Height
Species: Hwc – Western Hemlock - Coast

Age @ bh	Top Height (m) 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	Site Index (m)																
10	26	30	33	36	39	42	44	47	49	51	52	54	56	57	58	60	
15	18	20	23	26	28	31	33	35	37	39	41	43	45	46	48	49	51
20	13	15	18	20	22	24	26	28	30	32	33	35	37	38	40	41	43
25	11	13	14	16	18	20	21	23	25	26	28	29	31	32	34	35	37
30	9	11	12	14	15	17	18	20	21	23	24	25	27	28	30	31	32
35	8	9	11	12	13	15	16	17	19	20	21	23	24	25	26	28	29
40	7	8	10	11	12	13	14	16	17	18	19	20	21	23	24	25	26
45	6	8	9	10	11	12	13	14	15	16	17	18	20	21	22	23	24
50	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
55	6	7	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
60	5	6	7	8	9	10	10	11	12	13	14	15	16	17	17	18	19
65	5	6	7	7	8	9	10	11	12	12	13	14	15	16	17	17	18
70	5	6	6	7	8	9	9	10	11	12	13	13	14	15	16	16	17
75	5	5	6	7	8	8	9	10	10	11	12	13	13	14	15	16	17
80		5	6	7	7	8	9	9	10	11	11	12	13	14	14	15	16
85		5	6	6	7	8	8	9	10	10	11	12	12	13	14	14	15
90		5	5	6	7	7	8	9	9	10	11	11	12	13	13	14	15
95		5	5	6	6	7	8	8	9	10	10	11	12	12	13	13	14
100		5	5	6	6	7	7	8	9	9	10	11	11	12	12	13	14
105			5	6	6	7	7	8	8	9	10	10	11	11	12	13	13
110			5	5	6	7	7	8	8	9	9	10	11	11	12	12	13
115			5	5	6	6	7	7	8	9	9	10	10	11	11	12	13
120			5	5	6	6	7	7	8	8	9	10	10	11	11	12	12
125			5	5	6	6	7	7	8	8	9	9	10	10	11	11	12
130			5	5	6	6	7	7	8	8	9	9	10	10	11	11	12
135				5	5	6	6	7	7	8	8	9	9	10	10	11	12
140				5	5	6	6	7	7	8	8	9	9	10	10	11	11
145				5	5	6	6	7	7	8	8	9	9	10	10	11	11
150				5	5	6	6	7	7	7	8	8	9	9	10	10	11
155				5	5	6	6	6	7	7	8	8	9	9	10	10	11
160				5	5	5	6	6	7	7	8	8	9	9	10	10	11
165				5	5	5	6	6	7	7	8	8	9	9	9	10	10
170					5	5	6	6	7	7	8	8	8	9	9	10	10
175					5	5	6	6	7	7	7	8	8	9	9	10	10
180					5	5	6	6	6	7	7	8	8	9	9	10	10
185					5	5	6	6	6	7	7	8	8	9	9	9	10
190					5	5	5	6	6	7	7	8	8	8	9	9	10
195					5	5	5	6	6	7	7	8	8	8	9	9	10
200					5	5	5	6	6	7	7	7	8	8	9	9	10

Years to Boring Height

Site Index	10-13	14-20	21-27	28-34	35-42	43-49	50+
Correct yrs	8	7	6	5	4	3	2

SiteTools Version 3.2m – Research Branch, British Columbia Ministry of Forests
Date: February 27, 2002
Site Index Equation: Wiley (1978)

Table of Site Index by Breast Height Age and Height
Species: Hwc – Western Hemlock - Coast

Top Height (m) 23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	Age @ bh
Site Index (m)																
																10
52	54	55	56													15
44	46	47	48	50	51	52	54	55								20
38	40	41	42	44	45	46	47	49	50	51	52	53	54			25
34	35	36	37	39	40	41	42	43	45	46	47	48	49	50	51	30
30	31	32	34	35	36	37	38	39	41	42	43	44	45	46	47	35
27	28	29	31	32	33	34	35	36	37	38	39	40	41	43	44	40
25	26	27	28	29	30	31	32	33	34	35	36	37	39	40	41	45
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	50
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	55
20	21	22	23	24	25	26	27	27	28	29	30	31	32	33	34	60
19	20	21	22	22	23	24	25	26	27	28	29	30	30	31	32	65
18	19	20	21	21	22	23	24	25	26	26	27	28	29	30	31	70
17	18	19	20	20	21	22	23	24	24	25	26	27	28	29	29	75
17	17	18	19	20	20	21	22	23	24	24	25	26	27	28	28	80
16	17	17	18	19	20	20	21	22	23	23	24	25	26	27	27	85
15	16	17	17	18	19	20	20	21	22	23	23	24	25	26	26	90
15	16	16	17	18	18	19	20	20	21	22	23	23	24	25	26	95
14	15	16	16	17	18	18	19	20	20	21	22	23	23	24	25	100
14	15	15	16	17	17	18	19	19	20	21	21	22	23	23	24	105
14	14	15	15	16	17	17	18	19	19	20	21	21	22	23	24	110
13	14	14	15	16	16	17	18	18	19	20	20	21	22	22	23	115
13	14	14	15	15	16	17	17	18	18	19	20	20	21	22	22	120
13	13	14	14	15	16	16	17	17	18	19	19	20	21	21	22	125
12	13	14	14	15	15	16	16	17	18	18	19	20	20	21	21	130
12	13	13	14	14	15	16	16	17	17	18	19	19	20	20	21	135
12	12	13	14	14	15	15	16	16	17	18	18	19	19	20	21	140
12	12	13	13	14	14	15	16	16	17	17	18	18	19	20	20	145
11	12	13	13	14	14	15	15	16	16	17	18	18	19	19	20	150
11	12	12	13	13	14	14	15	16	16	17	17	18	18	19	20	155
11	12	12	13	13	14	14	15	15	16	16	17	18	18	19	19	160
11	11	12	12	13	13	14	15	15	16	16	17	17	18	18	19	165
11	11	12	12	13	13	14	14	15	15	16	17	17	18	18	19	170
11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	19	175
11	11	11	12	12	13	13	14	14	15	16	16	17	17	18	18	180
10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	185
10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	190
10	11	11	12	12	12	13	13	14	14	15	15	16	17	17	18	195
10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	200

Years to Boring Height

Site Index	10-13	14-20	21-27	28-34	35-42	43-49	50+
Correct yrs	8	7	6	5	4	3	2

BACK

Table of Site Index by Breast Height Age and Height
Species: Hwc – Western Hemlock - Coast

Age @ bh	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
	Top Height (m) / Site Index (m)															
10																
15																
20																
25																
30	53	54														
35	48	49	50	51	53											
40	45	46	47	48	49	50	51	52								
45	42	43	44	45	46	47	48	49	50	51	52					
50	39	40	41	42	43	44	45	46	47	48	49	50	51	52		
55	37	38	39	40	41	42	43	44	45	46	47	48	48	49	50	51
60	35	36	37	38	39	40	41	41	42	43	44	45	46	47	48	49
65	33	34	35	36	37	38	39	40	41	41	42	43	44	45	46	47
70	32	33	33	34	35	36	37	38	39	40	41	42	43	43	44	45
75	30	31	32	33	34	35	36	36	37	38	39	40	41	42	43	44
80	29	30	31	32	33	33	34	35	36	37	38	39	40	40	41	42
85	28	29	30	31	31	32	33	34	35	36	36	37	38	39	40	41
90	27	28	29	30	30	31	32	33	34	35	35	36	37	38	39	40
95	26	27	28	29	29	30	31	32	33	33	34	35	36	37	38	39
100	26	26	27	28	29	29	30	31	32	33	33	34	35	36	37	38
105	25	26	26	27	28	29	29	30	31	32	33	33	34	35	36	37
110	24	25	26	26	27	28	29	29	30	31	32	33	33	34	35	36
115	24	24	25	26	27	27	28	29	29	30	31	32	33	33	34	35
120	23	24	24	25	26	27	27	28	29	30	30	31	32	33	33	34
125	23	23	24	25	25	26	27	27	28	29	30	30	31	32	33	34
130	22	23	23	24	25	26	26	27	28	28	29	30	31	31	32	33
135	22	22	23	24	24	25	26	26	27	28	29	29	30	31	32	32
140	21	22	23	23	24	25	25	26	27	27	28	29	30	30	31	32
145	21	22	22	23	23	24	25	25	26	27	28	28	29	30	30	31
150	21	21	22	22	23	24	24	25	26	26	27	28	29	29	30	31
155	20	21	21	22	23	23	24	25	25	26	27	27	28	29	30	30
160	20	21	21	22	22	23	24	24	25	26	26	27	28	28	29	30
165	20	20	21	21	22	23	23	24	25	25	26	27	27	28	29	29
170	19	20	21	21	22	22	23	24	24	25	26	26	27	28	28	29
175	19	20	20	21	21	22	23	23	24	25	25	26	27	27	28	29
180	19	19	20	21	21	22	22	23	24	24	25	26	26	27	28	28
185	19	19	20	20	21	22	22	23	23	24	25	25	26	27	27	28
190	18	19	20	20	21	21	22	22	23	24	24	25	26	26	27	28
195	18	19	19	20	20	21	22	22	23	23	24	25	25	26	27	27
200	18	19	19	20	20	21	21	22	23	23	24	24	25	26	26	27

Years to Boring Height

Site Index	10-13	14-20	21-27	28-34	35-42	43-49	50+
Correct yrs	8	7	6	5	4	3	2

Page 3

Table of Site Index by Breast Height Age and Height
Species: Hwc – Western Hemlock - Coast

55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	Age @ bh
Top Height (m) / Site Index (m)																
																10
																15
																20
																25
																30
																35
																40
																45
																50
																55
50	51															60
48	49	50	51													65
46	47	48	49	50	51											70
45	46	47	47	48	49	50										75
43	44	45	46	47	48	49	50	51								80
42	43	44	45	46	46	47	48	49	50							85
41	41	42	43	44	45	46	47	48	49	50						90
39	40	41	42	43	44	45	46	47	48	49	50	51				95
38	39	40	41	42	43	44	45	46	47	47	48	49	50			100
37	38	39	40	41	42	43	44	45	45	46	47	48	49	50		105
37	37	38	39	40	41	42	43	44	45	45	46	47	48	49	50	110
36	37	37	38	39	40	41	42	43	44	45	45	46	47	48	49	115
35	36	37	38	38	39	40	41	42	43	44	45	45	46	47	48	120
34	35	36	37	38	38	39	40	41	42	43	44	45	46	47	47	125
34	34	35	36	37	38	39	39	40	41	42	43	44	45	46	47	130
33	34	35	35	36	37	38	39	40	41	41	42	43	44	45	46	135
33	33	34	35	36	36	37	38	39	40	41	42	42	43	44	45	140
32	33	34	34	35	36	37	38	38	39	40	41	42	43	44	45	145
31	32	33	34	35	35	36	37	38	39	40	40	41	42	43	44	150
31	32	33	33	34	35	36	36	37	38	39	40	41	42	42	43	155
31	31	32	33	34	34	35	36	37	38	38	39	40	41	42	43	160
30	31	32	32	33	34	35	35	36	37	38	39	40	40	41	42	165
30	30	31	32	33	33	34	35	36	37	37	38	39	40	41	42	170
29	30	31	32	32	33	34	35	35	36	37	38	39	40	40	41	175
29	30	30	31	32	33	33	34	35	36	37	37	38	39	40	41	180
29	29	30	31	32	32	33	34	35	35	36	37	38	39	39	40	185
28	29	30	30	31	32	33	33	34	35	36	37	37	38	39	40	190
28	29	29	30	31	32	32	33	34	35	35	36	37	38	39	40	195
28	28	29	30	31	31	32	33	34	34	35	36	37	37	38	39	200

Years to Boring Height

Site Index	10-13	14-20	21-27	28-34	35-42	43-49	50+
Correct yrs	8	7	6	5	4	3	2

Page 4

Figure A.45 Hwc – Western Hemlock - Coast.

A.9.3 Interior

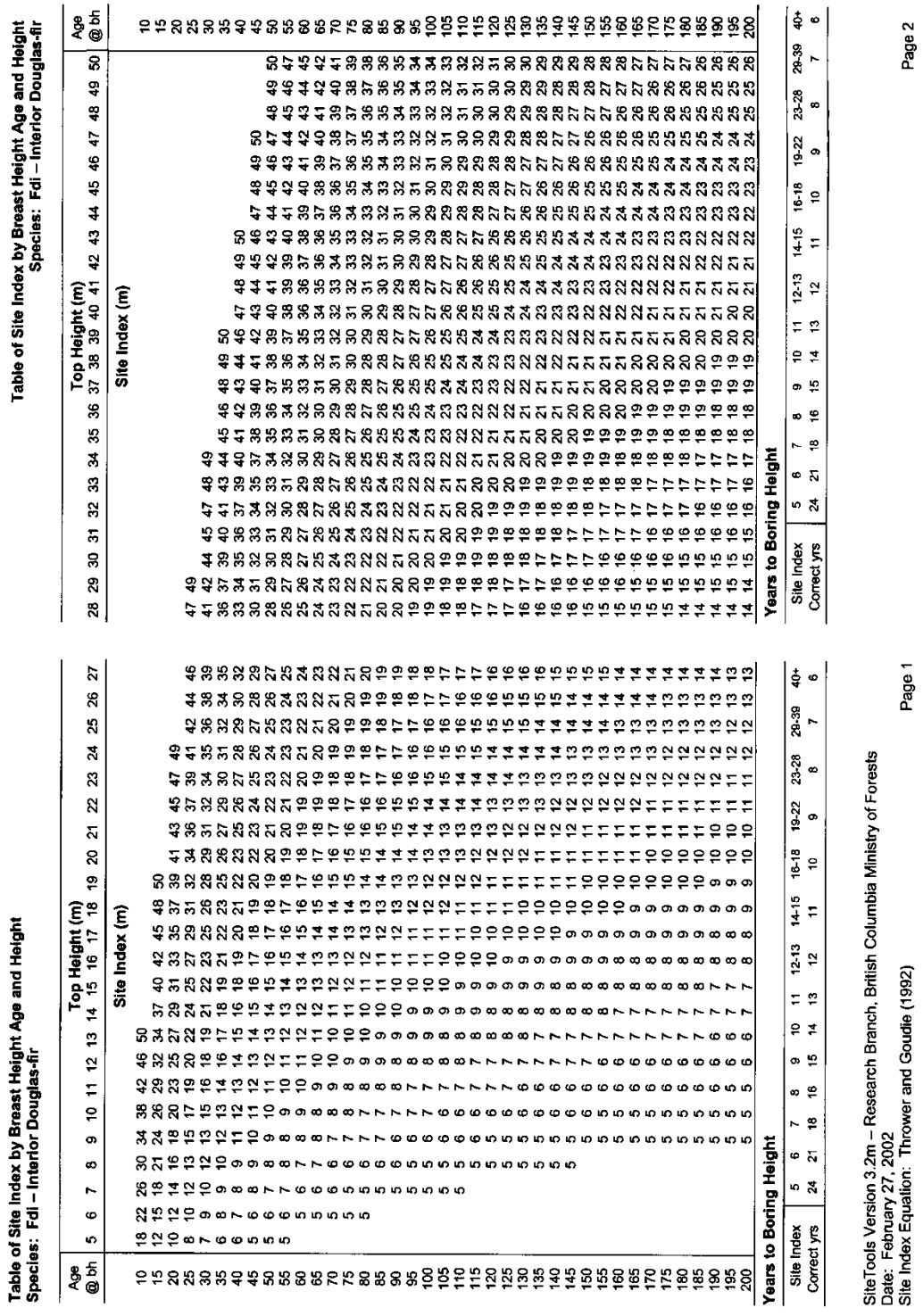


Figure A.46 Fdi – Interior Douglas-Fir

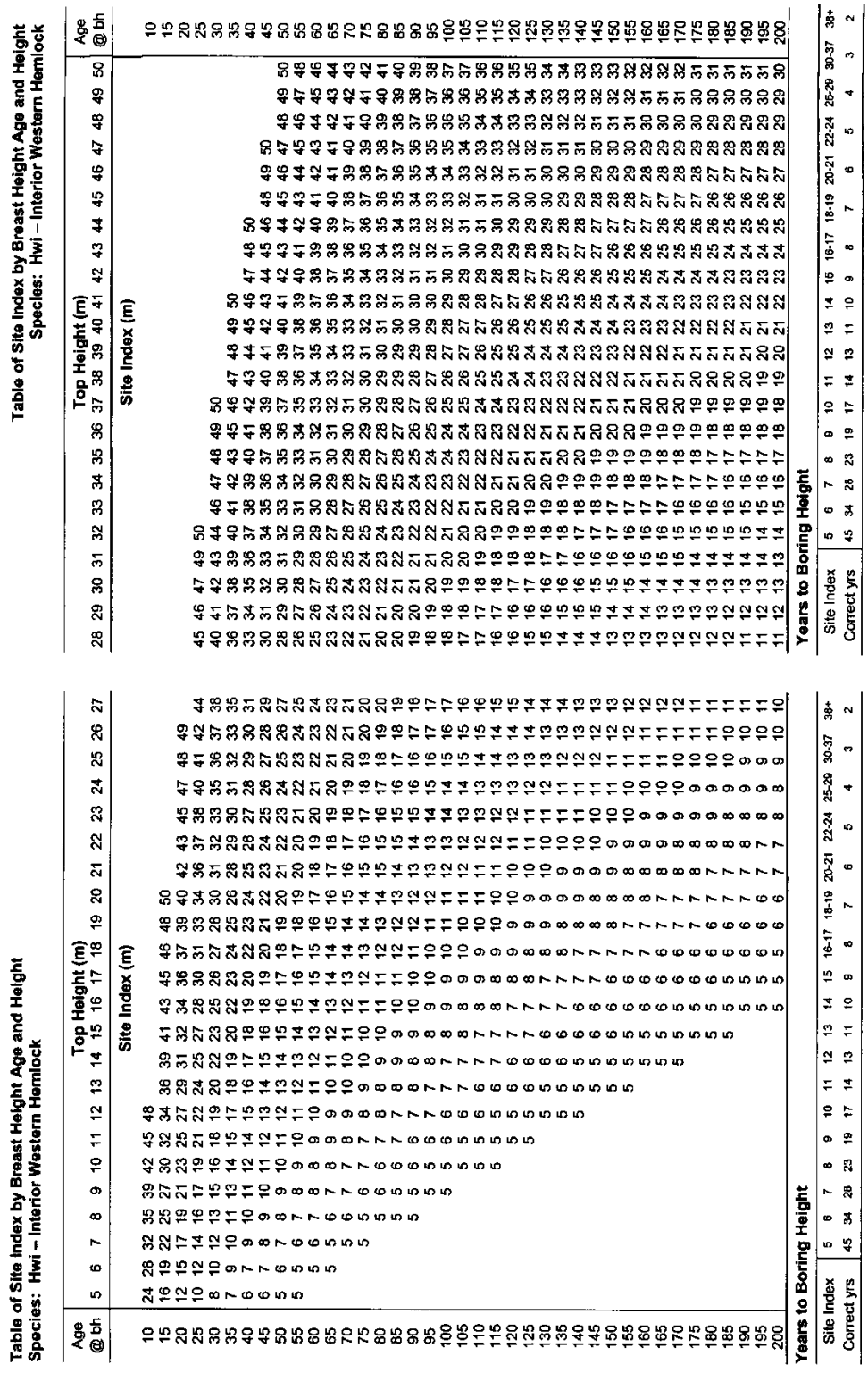


Figure A.47 Hwi – Interior Western Hemlock

Table of Site Index by Breast Height Age and Height
Species: Act – Black Cottonwood - Provincial

Age @ bh	Top Height (m) 6	7	8	9	10	11	12	13	14	15	16	17
	Site Index (m)											
10	24	27	29	31	33	35	37	39	41	43	44	46
15	18	20	22	24	26	28	29	31	33	34	35	37
20	14	16	18	20	21	23	24	26	27	29	30	31
25	12	13	15	17	18	20	21	22	24	25	26	27
30	10	11	13	14	16	17	18	20	21	22	23	24
35	9	10	11	13	14	15	16	17	19	20	21	22
40	7	9	10	11	12	13	15	16	17	18	19	20
45	7	8	9	10	11	12	13	14	15	16	17	18
50	6	7	8	9	10	11	12	13	14	15	16	17
55	5	6	7	8	9	10	11	12	13	14	15	16
60	5	6	7	8	8	9	10	11	12	13	14	15
65	5	5	6	7	8	9	9	10	11	12	13	14
70		5	6	6	7	8	9	9	10	11	12	13
75		5	5	6	7	7	8	9	10	10	11	12
80			5	6	6	7	8	8	9	10	10	11
85			5	5	6	6	7	8	8	9	10	11
90				5	6	6	7	7	8	9	9	10
95				5	5	6	6	7	7	8	9	9
100				5	5	5	6	7	7	8	8	9
105					5	5	6	6	7	7	8	8
110					5	5	5	6	6	7	7	8
115						5	5	6	6	7	7	8
120						5	5	5	6	6	7	7
125							5	5	6	6	6	7
130							5	5	5	6	6	7
135								5	5	6	6	6
140								5	5	5	6	6
145									5	5	5	6
150									5	5	5	6
155										5	5	5
160										5	5	5
165											5	5
170											5	5
175												5
180												5
185												5
190												
195												
200												

Years to Boring Height

Site Index (m)	All S.I.'s
Correct yrs	2

SiteTools Version 3.2m – Research Branch, British Columbia Ministry of Forests
Date: February 27, 2002
Site Index Equation: Thrower (1992)

Table of Site Index by Breast Height Age and Height
Species: Act – Black Cottonwood - Provincial

Top Height (m) 18	19	20	21	22	23	24	25	26	27	28	Age @ bh
Site Index (m)											
47	49	50	52	53	55	56	57	59	60	61	10
38	40	41	42	43	45	46	47	48	49	51	15
33	34	35	36	37	39	40	41	42	43	44	20
29	30	31	32	33	34	35	37	38	39	40	25
26	27	28	29	30	31	32	33	34	35	36	30
23	24	25	26	27	29	30	31	32	33	34	35
21	22	23	24	25	26	27	28	29	30	31	40
19	21	22	23	24	25	26	27	28	29	30	45
18	19	20	21	22	23	24	25	26	27	28	50
17	18	19	20	21	22	23	24	25	26	27	55
16	17	17	18	19	20	21	22	23	24	25	60
15	15	16	17	18	19	20	21	22	23	24	65
14	14	15	16	17	18	19	20	21	22	23	70
13	14	14	15	16	17	18	19	20	21	22	75
12	13	14	15	15	16	17	18	19	20	21	80
11	12	13	14	15	16	16	17	18	19	20	85
11	11	12	13	14	15	16	17	18	19	20	90
10	11	12	12	13	14	15	16	17	18	19	95
10	10	11	12	13	13	14	15	16	17	18	100
9	10	10	11	12	13	14	15	15	16	17	105
9	9	10	11	11	12	13	14	15	16	17	110
8	9	9	10	11	12	12	13	14	15	16	115
8	8	9	10	10	11	12	13	14	15	16	120
7	8	9	9	10	11	11	12	13	14	15	125
7	8	8	9	9	10	11	12	13	14	14	130
7	7	8	8	9	10	10	11	12	13	14	135
7	7	8	8	9	9	10	11	12	12	13	140
6	7	7	8	8	9	10	10	11	12	13	145
6	6	7	7	8	9	9	10	11	12	12	150
6	6	7	7	8	8	9	10	10	11	12	155
6	6	6	7	7	8	8	9	10	11	12	160
5	6	6	7	7	8	8	9	9	10	11	165
5	6	6	6	7	7	8	8	9	10	11	170
5	5	6	6	7	7	8	8	9	9	10	175
5	5	6	6	6	7	7	8	8	9	10	180
5	5	5	6	6	7	7	8	8	9	10	185
5	5	5	6	6	6	7	7	8	8	9	190
5	5	5	5	6	6	7	7	8	8	9	195
	5	5	5	6	6	6	7	7	8	9	200

Years to Boring Height

Site Index (m)	All S.I.'s
Correct yrs	2

BACK

BACK

Table of Site Index by Breast Height Age and Height
Species: Act – Black Cottonwood - Provincial

Age @ bh	Top Height (m) 29	30	31	32	33	34	35	36	37	38	39
	Site Index (m)										
10	62	64	65	66	67	68	70	71	72	73	74
15	52	53	54	55	56	57	58	59	61	62	63
20	45	46	47	48	50	51	52	53	54	55	56
25	41	42	43	44	45	46	47	48	49	50	51
30	37	38	39	40	41	42	43	44	45	46	47
35	35	36	37	38	39	40	41	42	43	44	45
40	32	33	35	36	37	37	38	39	40	41	42
45	31	32	33	34	35	36	37	38	39	40	41
50	29	30	31	32	33	34	35	36	37	38	39
55	28	29	30	31	32	33	34	35	36	37	38
60	26	27	28	29	30	31	32	33	34	35	36
65	25	26	27	28	29	30	31	32	33	34	35
70	24	25	26	27	28	29	30	31	32	33	34
75	23	24	25	26	27	28	29	30	31	32	34
80	22	23	24	25	26	27	28	30	31	32	33
85	21	22	23	25	26	27	28	29	30	31	32
90	21	22	23	24	25	26	27	28	29	30	31
95	20	21	22	23	24	25	26	27	28	30	31
100	19	20	21	22	23	25	26	27	28	29	30
105	19	20	21	22	23	24	25	26	27	28	30
110	18	19	20	21	22	23	24	26	27	28	29
115	17	18	19	21	22	23	24	25	26	27	29
120	17	18	19	20	21	22	23	25	26	27	28
125	16	17	18	19	21	22	23	24	25	26	28
130	16	17	18	19	20	21	22	24	25	26	27
135	15	16	17	18	20	21	22	23	24	26	27
140	14	16	17	18	19	20	22	23	24	25	26
145	14	15	16	17	19	20	21	22	24	25	26
150	13	15	16	17	18	19	21	22	23	24	26
155	13	14	15	16	18	19	20	22	23	24	25
160	12	14	15	16	17	18	20	21	22	24	25
165	12	13	14	15	17	18	19	21	22	23	25
170	12	13	14	15	16	18	19	20	22	23	24
175	11	12	13	15	16	17	19	20	21	23	24
180	11	12	13	14	15	17	18	20	21	22	24
185	10	11	12	14	15	16	18	19	21	22	24
190	10	11	12	13	15	16	17	19	20	22	23
195	10	11	12	13	14	16	17	19	20	22	23
200	9	10	11	12	14	15	17	18	20	21	23

Years to Boring Height

Site Index (m)	All S.I.'s
Correct yrs	2

Page 3

Table of Site Index by Breast Height Age and Height
Species: Act – Black Cottonwood - Provincial

Top Height (m) 40	41	42	43	44	45	46	47	48	49	50	Age @ bh
Site Index (m)											
75	76	78	79	80	81	82	83	84	85	86	10
64	65	66	67	68	69	70	71	72	73	74	15
57	58	59	60	61	62	63	64	65	66	67	20
52	53	54	55	56	57	58	59	60	61	62	25
48	49	50	51	52	53	54	55	56	57	58	30
46	47	48	49	50	51	52	53	54	55	55	35
43	44	45	46	47	48	49	50	51	52	53	40
42	43	44	45	46	47	48	49	50	51	52	45
40	41	42	43	44	45	46	47	48	49	50	50
39	40	41	42	43	44	45	46	47	48	49	55
37	38	39	40	42	43	44	45	46	47	48	60
36	37	38	39	40	42	43	44	45	46	47	65
35	36	37	39	40	41	42	43	44	45	46	70
35	36	37	38	39	40	41	42	43	44	45	75
34	35	36	37	38	39	40	41	42	43	44	80
33	34	35	36	37	38	39	41	42	43	44	85
32	33	35	36	37	38	39	40	41	42	43	90
32	33	34	35	36	37	38	39	41	42	43	95
31	32	33	35	36	37	38	39	40	41	42	100
31	32	33	34	35	36	37	38	40	41	42	105
30	31	32	34	35	36	37	38	39	40	41	110
30	31	32	33	34	35	37	38	39	40	41	115
29	30	32	33	34	35	36	37	38	40	41	120
29	30	31	32	34	35	36	37	38	39	40	125
28	30	31	32	33	34	36	37	38	39	40	130
28	29	30	32	33	34	35	36	38	39	40	135
28	29	30	31	33	34	35	36	37	38	40	140
27	29	30	31	32	33	35	36	37	38	39	145
27	28	29	31	32	33	34	36	37	38	39	150
27	28	29	30	32	33	34	35	37	38	39	155
26	28	29	30	31	33	34	35	36	38	39	160
26	27	29	30	31	32	34	35	36	37	39	165
26	27	28	30	31	32	33	35	36	37	38	170
26	27	28	29	31	32	33	35	36	37	38	175
25	27	28	29	31	32	33	34	36	37	38	180
25	26	28	29	30	32	33	34	35	37	38	185
25	26	27	29	30	31	33	34	35	37	38	190
24	26	27	29	30	31	33	34	35	36	38	195
24	26	27	28	30	31	32	34	35	36	37	200

Years to Boring Height

Site Index (m)	All S.I.'s
Correct yrs	2

Page 4

Figure A.48 Act – Black Cottonwood - Provincial

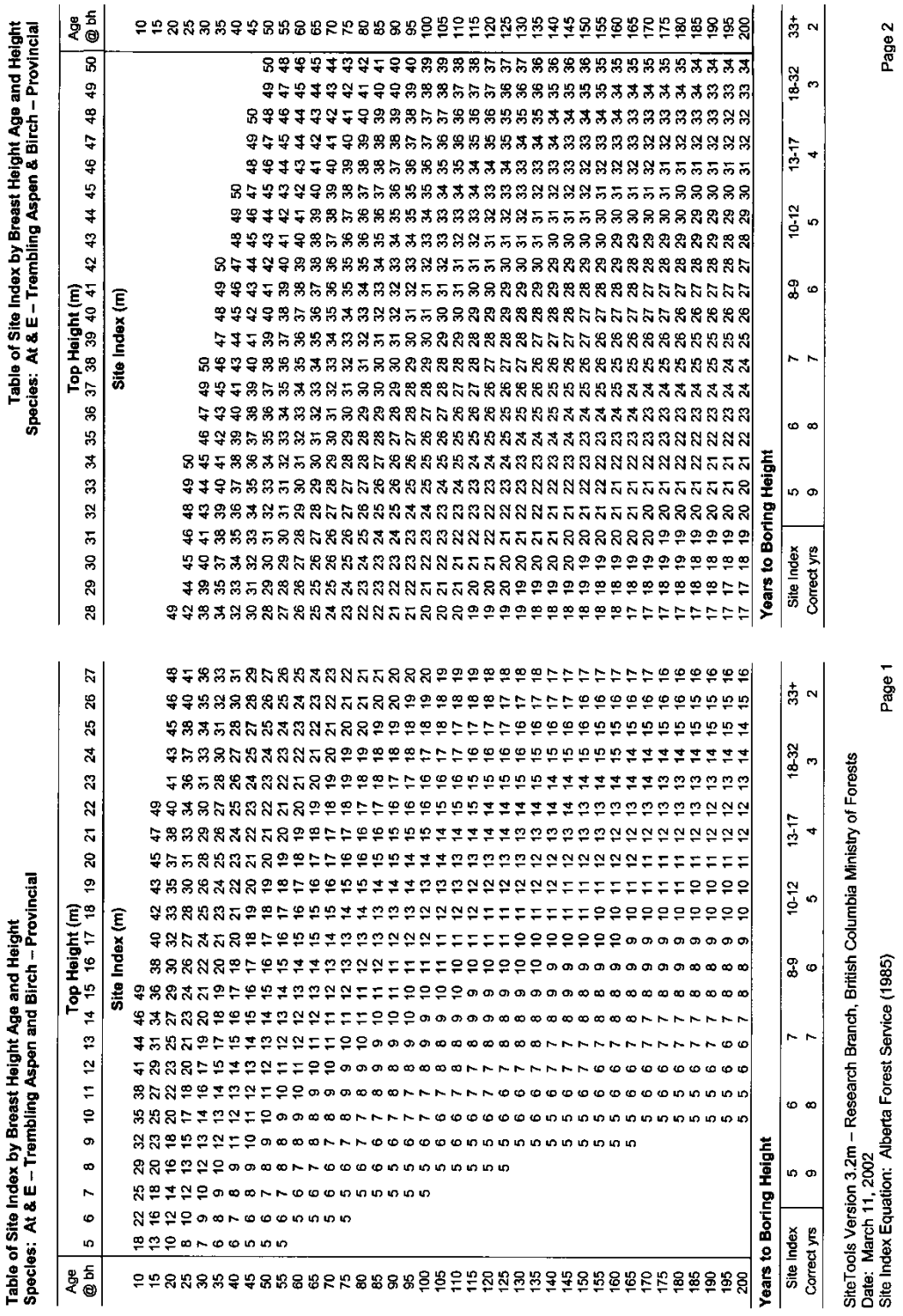


Table of Site Index by Breast Height Age and Height
Species: At & E – Trembling Aspen and Birch – Provincial

Age @ bh	Top Height (m) 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
	Site Index (m)																						
10	18	22	25	29	32	35	38	41	44	46	49												
15	13	16	18	20	23	25	27	29	31	34	36	38	40	42	43	45	47	49					
20	10	12	14	16	18	20	22	23	25	27	29	30	32	33	35	37	38	40	41	43	45	46	48
25	8	10	12	13	15	17	18	20	21	23	24	26	27	28	30	31	33	34	36	37	38	40	41
30	7	9	10	12	13	14	16	17	19	20	21	22	24	25	26	28	29	30	31	33	34	36	36
35	6	8	9	10	12	13	14	15	17	18	19	20	21	23	24	25	26	27	28	30	31	32	33
40	6	7	8	9	11	12	13	14	15	16	17	18	20	21	22	23	24	25	26	27	28	30	31
45	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
50	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
55	5	6	7	8	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
60		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	25
65		5	6	7	8	9	10	11	12	13	14	15	15	16	17	18	19	20	21	22	23	24	24
70		5	6	6	7	8	9	10	11	12	13	14	15	15	16	17	18	19	20	21	22	23	23
75		5	5	6	7	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	22	22
80			5	6	7	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	21	22	21
85			5	6	6	7	8	9	10	11	12	13	14	15	16	17	18	18	19	20	20	21	21
90			5	5	6	7	8	8	9	10	11	12	13	14	15	16	17	18	19	19	20	20	20
95			5	5	6	7	7	8	9	10	10	11	12	13	14	15	16	17	18	18	19	19	20
100			5	5	6	6	7	8	9	9	10	11	12	13	14	15	16	16	17	18	18	19	20
105				5	6	6	7	8	8	9	10	11	12	13	14	14	15	16	17	17	18	18	19
110				5	6	6	7	8	8	9	10	10	11	12	13	13	14	15	16	17	17	18	19
115				5	5	6	7	7	8	9	9	10	11	12	13	14	15	15	16	17	18	18	19
120				5	5	6	6	7	8	8	9	10	11	11	12	13	14	14	15	16	17	18	18
125				5	5	6	6	7	8	8	9	10	11	11	12	13	14	14	15	16	17	17	18
130					5	6	6	7	8	8	9	10	10	11	12	13	13	14	15	16	16	17	18
135					5	6	6	7	8	8	9	10	10	11	12	12	13	14	15	15	16	17	18
140					5	5	6	7	7	8	9	9	10	11	12	12	13	14	14	15	16	17	17
145					5	5	6	7	7	8	9	9	10	11	11	12	13	14	14	15	16	17	17
150					5	5	6	7	7	8	8	9	10	11	11	12	13	13	14	15	16	16	17
155					5	5	6	6	7	8	8	9	10	10	11	12	12	13	14	15	15	16	17
160					5	5	6	6	7	8	8	9	9	10	11	12	12	13	14	15	15	16	17
165					5	5	6	6	7	8	8	9	9	10	11	12	12	13	14	14	15	16	17
170						5	6	6	7	7	8	9	9	10	11	11	12	13	14	14	15	16	17
175						5	6	6	7	7	8	9	9	10	11	11	12	13	13	14	15	16	16
180						5	5	6	7	7	8	8	9	10	11	11	12	13	13	14	15	16	16
185						5	5	6	7	7	8	8	9	10	11	12	13	13	14	15	15	15	16
190						5	5	6	7	7	8	8	9	10	10	11	12	13	14	15	15	15	16
195						5	5	6	6	7	8	8	9	10	10	11	12	12	13	14	15	15	16
200						5	5	6	6	7	8	8	9	10	10	11	12	12	13	14	14	15	16

Years to Boring Height				
Site Index	5	6	7	8-9	10-12	13-17	18-32	33+
Correct yrs	9	8	7	6	5	4	3	2

SiteTools Version 3.2m – Research Branch, British Columbia Ministry of Forests
Date: March 11, 2002
Site Index Equation: Alberta Forest Service (1985)

Page 1

Table of Site Index by Breast Height Age and Height
Species: At & E – Trembling Aspen & Birch – Provincial

Age @ bh	Top Height (m) 28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	Age @ bh
	Site Index (m)																							
10																								10
15	49																							15
20	42	44	45	46	48	49	50																	20
25	38	39	40	41	43	44	45	46		47	49	50												25
30	34	35	37	38	39	40	41	42	43	44	45	46	47	48	49	50								30
35	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50					35
40	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50			40
45	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	45
50	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
55	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	55
60	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	60
65	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	65
70	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	70
75	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	75
80	22	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	80
85	21	22	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	85
90	21	21	22	23	24	25	26	27	28	29	30	31	32	32	33	34	35	36	37	38	39	40	41	90
95	20	21	22	23	24	25	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	95
100	20	20	21	22	23	24	25	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	100
105	19	20	21	22	23	24	24	25	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	105
110	19	19	20	21	22	23	24	24	25	25	26	27	28	29	30	31	32	33	34	35	36	37	38	110
115	18	19	20	21	22	23	23	24	25	25	26	27	28	28	29	30	31	32	33	34	35	36	37	115
120	18	18	19	20	21	22	23	24	24	25	26	26	27	28	29	30	31	31	32	33	34	36	37	120
125	17	18	19	20	21	22	22	23	24	25	25	26	27	28	29	30	30	31	32	33	34	35	36	125
130	17	17	18	19	20	21	22	22	23	24	25	25	26	27	28	29	30	30	31	32	33	34	35	130
135	16	17	18	19	20	21	21	22	23	24	24	25	26	26	27	28	29	30	31	32	33	34	35	135
140	16	16	17	18	19	20	21	21	22	23	24	25	25	26	27	28	29	29	30	31	32	33	34	140
145	15	16	17	18	19	20	20	21	22	23	24	24	25	26	27	28	28	29	30	31	32	33	33	145
150	15	15	16	17	18	19	20	20	21	22	23	24	25	25	26	27	28	29	30	31	32	33	34	150
155	14	15	16	17	18	19	19	20	21	22	23	24	24	25	26	27	28	28	29	30	31	32	33	155
160	14	14	15	16	17	18	19	19	20	21	22	23	24	24	25	26	27	28	29	29	30	31	32	160
165	13	14	15	16	17	18	18	19	20	21	22	23	23	24	25	26	27	28	28	29	30	31	32	165
170	13	13	14	15	16	17	18	18	19	20	21	22	23	23	24	25	26	27	28	28	29	30	31	170
175	12	13	13	14	15	16	17	17	18	19	20	21	22	22	23	24	25	26	27	27	28	29	30	175
180	12	12	13	13	14	15	16	16	17	18	19	20	21	21	22	23	24	25	26	26	27	28	29	180
185	11	12	12	13	13	14	15	15	16	17	18	19	20	21	21	22	23	24	25	25	26	27	28	185
190	11	11	12	12	13	13	14	14	15	16	17	18	19	20	20	21	22	23	24	24	25	26	27	190
195	10	11	11	12	12	13	13	14	14	15	16	17	18	19	19	20	21	22	23	23	24	25	26	195
200	10	10	11	11	12	12	13	13	14	15	15	16	17	18	18	19	20	21	22	22	23	24	25	200

Years to Boring Height				
Site Index	5	6	7	8-9	10-12	13-17	18-32	33+
Correct yrs	9	8	7	6	5	4	3	2

Page 2

Figure A.49 At - Trembling Aspen - Provincial

Table of Site Index by Breast Height Age and Height
Species: Ba – Amabilis fir – All Balsam Species - Provincial

Age @ bh	Top Height (m) 5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Site Index (m)													
10	21	24	27	31	33	36	38	41						
15	14	17	20	22	25	27	29	31	33	35	37			
20	11	13	15	18	19	21	23	25	27	29	30	32	33	35
25	9	11	13	15	16	18	20	21	23	24	26	27	29	30
30	8	9	11	13	14	15	17	18	20	21	22	24	25	26
35	7	8	10	11	12	14	15	16	17	19	20	21	22	24
40	6	8	9	10	11	12	13	15	16	17	18	19	20	21
45	6	7	8	9	10	11	12	13	14	15	17	18	19	20
50	5	6	7	8	9	10	11	12	13	14	15	16	17	18
55	5	6	7	7	8	9	10	11	12	13	14	15	16	17
60		5	6	7	8	9	10	10	11	12	13	14	15	16
65		5	6	7	7	8	9	10	11	12	12	13	14	15
70		5	6	6	7	8	9	9	10	11	12	13	13	14
75		5	5	6	7	7	8	9	10	10	11	12	13	13
80			5	6	6	7	8	9	9	10	11	11	12	13
85			5	6	6	7	8	8	9	10	10	11	12	12
90			5	5	6	7	7	8	9	9	10	11	11	12
95			5	5	6	6	7	8	8	9	9	10	11	11
100				5	6	6	7	7	8	9	9	10	10	11
105				5	5	6	7	7	8	8	9	9	10	11
110				5	5	6	6	7	7	8	9	9	10	10
115				5	5	6	6	7	7	8	8	9	10	10
120				5	5	6	6	7	7	8	8	9	9	10
125					5	5	6	6	7	7	8	8	9	10
130					5	5	6	6	7	7	8	8	9	9
135					5	5	6	6	7	7	8	8	9	9
140					5	5	6	6	6	7	7	8	8	9
145					5	5	5	6	6	7	7	8	8	9
150						5	5	6	6	7	7	8	8	9
155						5	5	6	6	7	7	7	8	8
160						5	5	6	6	6	7	7	8	8
165						5	5	5	6	6	7	7	8	8
170						5	5	5	6	6	7	7	8	8
175						5	5	5	6	6	7	7	7	8
180							5	5	6	6	6	7	7	8
185							5	5	6	6	6	7	7	8
190							5	5	5	6	6	7	7	7
195							5	5	5	6	6	7	7	7
200							5	5	5	6	6	6	7	7

Years to Boring Height

Site Index	5-7	8-9	10-12	13-14	15-17	18-19	20-21	22-24	25-26	27-29	30-31	32+
Correct yrs	16	15	14	13	12	11	10	9	8	7	6	5

SiteTools Version 3.2m – Research Branch, British Columbia Ministry of Forests
Date: February 27, 2002
Site Index Equation: Kurucz (1992)

Table of Site Index by Breast Height Age and Height
Species: Ba – Amabilis fir – All Balsam Species - Provincial

Top Height (m) 19	20	21	22	23	24	25	26	27	28	29	30	31	32	Age @ bh
Site Index (m)														
														10
														15
36														20
31	33	34												25
28	29	30	32	33	34									30
25	26	27	28	30	31	32	33	34						35
23	24	25	26	27	28	29	30	31	32	34				40
21	22	23	24	25	26	27	28	29	30	31	32	33		45
19	20	21	22	23	24	25	26	27	28	29	30	31	32	50
18	19	20	21	22	22	23	24	25	26	27	28	29	30	55
17	18	18	19	20	21	22	23	24	25	26	27	28	29	60
16	17	17	18	19	20	21	22	23	24	24	25	26	27	65
15	16	17	17	18	19	20	21	22	22	23	24	25	26	70
14	15	16	17	17	18	19	20	21	21	22	23	24	25	75
14	14	15	16	17	17	18	19	20	21	21	22	23	24	80
13	14	14	15	16	17	17	18	19	20	21	21	22	23	85
13	13	14	15	15	16	17	18	18	19	20	21	21	22	90
12	13	13	14	15	16	16	17	18	18	19	20	21	21	95
12	12	13	14	14	15	16	16	17	18	18	19	20	21	100
11	12	13	13	14	15	15	16	17	17	18	19	19	20	105
11	12	12	13	13	14	15	15	16	17	17	18	19	19	110
11	11	12	12	13	14	14	15	16	16	17	18	18	19	115
10	11	12	12	13	13	14	15	15	16	16	17	18	18	120
10	11	11	12	12	13	14	14	15	15	16	17	17	18	125
10	10	11	12	12	13	13	14	14	15	16	16	17	18	130
10	10	11	11	12	12	13	14	14	15	15	16	17	17	135
9	10	10	11	12	12	13	13	14	14	15	16	16	17	140
9	10	10	11	11	12	12	13	14	14	15	15	16	16	145
9	10	10	11	11	12	12	13	13	14	14	15	16	16	150
9	9	10	10	11	11	12	12	13	14	14	15	15	16	155
9	9	10	10	11	11	12	12	13	13	14	14	15	16	160
9	9	9	10	10	11	11	12	13	13	14	14	15	15	165
8	9	9	10	10	11	11	12	12	13	13	14	14	15	170
8	9	9	10	10	11	11	12	12	13	13	14	14	15	175
8	9	9	9	10	10	11	11	12	12	13	13	14	15	180
8	8	9	9	10	10	11	11	12	12	13	13	14	14	185
8	8	9	9	10	10	11	11	12	12	13	13	14	14	190
8	8	9	9	10	10	10	11	11	12	12	13	13	14	195
8	8	9	9	9	10	10	11	11	12	12	13	13	14	200

Years to Boring Height

Site Index	5-7	8-9	10-12	13-14	15-17	18-19	20-21	22-24	25-26	27-29	30-31	32+
Correct yrs	16	15	14	13	12	11	10	9	8	7	6	5

BACK

Table of Site Index by Breast Height Age and Height
Species: Ba – Amabilis fir – All Balsam Species - Provincial

Age @ bh	33	34	35	36	37	38	39	40	41	42	43	44	45	46
	Top Height (m) — Site Index (m)													
10														
15														
20														
25														
30														
35														
40														
45														
50	33													
55	31	32	33											
60	30	30	31	32										
65	28	29	30	31	32	33								
70	27	28	29	29	30	31	32							
75	26	27	27	28	29	30	31	32						
80	25	25	26	27	28	29	30	31	32	32				
85	24	25	25	26	27	28	29	30	30	31	32			
90	23	24	24	25	26	27	28	29	29	30	31	32		
95	22	23	24	24	25	26	27	28	29	29	30	31	32	
100	21	22	23	24	25	25	26	27	28	29	29	30	31	32
105	21	22	22	23	24	25	25	26	27	28	29	29	30	31
110	20	21	22	22	23	24	25	25	26	27	28	29	30	30
115	20	20	21	22	23	23	24	25	26	26	27	28	29	30
120	19	20	21	21	22	23	23	24	25	26	27	27	28	29
125	19	19	20	21	21	22	23	24	24	25	26	27	27	28
130	18	19	20	20	21	22	22	23	24	25	25	26	27	28
135	18	18	19	20	20	21	22	23	23	24	25	26	26	27
140	17	18	19	19	20	21	21	22	23	24	24	25	26	27
145	17	18	18	19	20	20	21	22	22	23	24	25	25	26
150	17	17	18	19	19	20	21	21	22	23	23	24	25	26
155	16	17	18	18	19	20	20	21	22	22	23	24	24	25
160	16	17	17	18	19	19	20	21	21	22	23	23	24	25
165	16	16	17	18	18	19	20	20	21	21	22	23	24	24
170	16	16	17	17	18	19	19	20	20	21	22	23	23	24
175	15	16	16	17	18	18	19	20	20	21	21	22	23	24
180	15	16	16	17	17	18	19	19	20	21	21	22	23	23
185	15	15	16	17	17	18	18	19	20	20	21	22	22	23
190	15	15	16	16	17	17	18	19	19	20	21	21	22	23
195	14	15	15	16	17	17	18	18	19	20	20	21	22	22
200	14	15	15	16	16	17	18	18	19	19	20	21	21	22

Years to Boring Height

Site Index	5-7	8-9	10-12	13-14	15-17	18-19	20-21	22-24	25-26	27-29	30-31	32+
Correct yrs	16	15	14	13	12	11	10	9	8	7	6	5

Page 3

Table of Site Index by Breast Height Age and Height
Species: Ba – Amabilis fir – All Balsam Species - Provincial

47	48	49	50	51	52	53	54	55	56	57	58	59	60	Age @ bh
Top Height (m) — Site Index (m)														
														10
														15
														20
														25
														30
														35
														40
														45
														50
														55
														60
														65
														70
														75
														80
														85
														90
														95
														100
32														105
31	32													110
30	31	32												115
30	31	31	32											120
29	30	31	32											125
29	29	30	31	32										130
28	29	30	30	31										135
27	28	29	30	31	32									140
27	28	28	29	30	31	32								145
26	27	28	29	30	30	31								150
26	27	27	28	29	30	31	32							155
26	26	27	28	29	29	30	31							160
25	26	27	27	28	29	30	31	32						165
25	25	26	27	28	29	29	30	31						170
24	25	26	27	27	28	29	30	31	32					175
24	25	25	26	27	28	29	29	30	31					180
24	24	25	26	27	27	28	29	30	31	32				185
23	24	25	25	26	27	28	29	30	30	31				190
23	24	24	25	26	27	27	28	29	30	31	32			195
23	23	24	25	26	26	27	28	29	30	30	31	32	33	200

Years to Boring Height

Site Index	5-7	8-9	10-12	13-14	15-17	18-19	20-21	22-24	25-26	27-29	30-31	32+
Correct yrs	16	15	14	13	12	11	10	9	8	7	6	5

Page 4

Figure A.50 Ba – Amabilis Fir – All Balsam Species - Provincial

Table of Site Index by Breast Height Age and Height
Species: Cw – Western Redcedar - Provincial

Age @ bh	Top Height (m) 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	Site Index (m)																
10	22	26	29	32	36	39	41	44	47	49	52	54	56	58			
15	15	18	21	23	26	28	31	33	35	38	40	42	44	46	48	50	52
20	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	41	43
25	10	12	13	15	17	19	20	22	24	25	27	29	30	32	33	35	37
30	9	10	12	13	15	16	18	19	20	22	23	25	26	28	29	31	32
35	8	9	10	12	13	14	16	17	18	19	21	22	23	25	26	27	28
40	7	8	9	11	12	13	14	15	16	18	19	20	21	22	23	25	26
45	6	7	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24
50	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
55	6	7	8	8	9	10	11	12	13	14	15	16	17	18	19	20	21
60	5	6	7	8	9	10	11	12	12	13	14	15	16	17	18	19	20
65	5	6	7	8	9	9	10	11	12	13	14	14	15	16	17	18	19
70	5	6	7	7	8	9	10	11	11	12	13	14	15	15	16	17	18
75	5	6	6	7	8	9	9	10	11	12	12	13	14	15	15	16	17
80	5	5	6	7	8	8	9	10	11	11	12	13	13	14	15	16	16
85	5	5	6	7	7	8	9	9	10	11	12	12	13	14	14	15	16
90		5	6	6	7	8	9	9	10	11	11	12	13	13	14	15	15
95		5	6	6	7	8	8	9	10	10	11	12	12	13	14	14	15
100		5	6	6	7	7	8	9	9	10	11	11	12	13	13	14	15
105		5	5	6	7	7	8	9	9	10	10	11	12	12	13	14	14
110		5	5	6	7	7	8	8	9	10	10	11	11	12	13	13	14
115		5	5	6	6	7	8	8	9	9	10	11	11	12	12	13	14
120		5	5	6	6	7	7	8	9	9	10	10	11	12	12	13	13
125		5	5	6	6	7	7	8	8	9	10	10	11	11	12	13	13
130			5	6	6	7	7	8	8	9	9	10	11	11	12	12	13
135			5	5	6	7	7	8	8	9	9	10	10	11	12	12	13
140			5	5	6	7	7	8	8	9	9	10	10	11	11	12	13
145			5	5	6	6	7	7	8	9	9	10	10	11	11	12	12
150			5	5	6	6	7	7	8	8	9	10	10	11	11	12	12
155			5	5	6	6	7	7	8	8	9	9	10	10	11	12	12
160			5	5	6	6	7	7	8	8	9	9	10	10	11	11	12
165			5	5	6	6	7	7	8	8	9	9	10	10	11	11	12
170			5	5	6	6	7	7	8	8	9	9	10	10	11	11	12
175			5	5	6	6	7	7	8	8	9	9	10	10	11	11	12
180			5	5	6	6	6	7	7	8	8	9	9	10	10	11	11
185			5	5	5	6	6	7	7	8	8	9	9	10	10	11	11
190				5	5	6	6	7	7	8	8	9	9	10	10	11	11
195				5	5	6	6	7	7	8	8	9	9	10	10	11	11
200				5	5	6	6	7	7	8	8	9	9	10	10	11	11

Years to Boring Height

Site Index	5-10	11-16	17-22	23-28	29-35	36-41	42-47	48+
Correct yrs	12	11	10	9	8	7	6	5

SiteTools Version 3.2m – Research Branch, British Columbia Ministry of Forests
Date: February 27, 2002
Site Index Equation: Kurucz (1985)

Table of Site Index by Breast Height Age and Height
Species: Cw – Western Redcedar - Provincial

Age @ bh	Top Height (m) 23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	Age @ bh
	Site Index (m)																
10																	10
15	54	56															15
20	45	47	48	50	52	53	55										20
25	38	40	41	43	44	46	47	49	50	52	53						25
30	33	35	36	38	39	40	42	43	44	46	47	48	50	51	52		30
35	30	31	32	34	35	36	37	39	40	41	42	44	45	46	47	48	35
40	27	28	29	30	32	33	34	35	36	37	39	40	41	42	43	44	40
45	25	26	27	28	29	30	31	32	33	34	35	37	38	39	40	41	45
50	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	50
55	22	23	23	24	25	26	27	28	29	30	31	32	33	34	35	36	55
60	20	21	22	23	24	25	26	27	28	28	29	30	31	32	33	34	60
65	19	20	21	22	23	24	25	25	26	27	28	29	30	30	31	32	65
70	19	19	20	21	22	23	23	24	25	26	27	28	28	29	30	31	70
75	18	19	19	20	21	22	22	23	24	25	26	26	27	28	29	30	75
80	17	18	19	19	20	21	22	22	23	24	25	25	26	27	28	29	80
85	17	17	18	19	19	20	21	22	22	23	24	25	25	26	27	28	85
90	16	17	17	18	19	20	20	21	22	22	23	24	25	25	26	27	90
95	16	16	17	18	18	19	20	20	21	22	22	23	24	25	25	26	95
100	15	16	17	17	18	19	19	20	21	21	22	23	23	24	25	25	100
105	15	16	16	17	17	18	19	19	20	21	21	22	23	23	24	25	105
110	15	15	16	16	17	18	18	19	20	20	21	22	22	23	23	24	110
115	14	15	15	16	17	17	18	19	19	20	20	21	22	22	23	24	115
120	14	15	15	16	16	17	18	18	19	19	20	21	21	22	23	23	120
125	14	14	15	16	16	17	17	18	19	19	20	20	21	22	22	23	125
130	14	14	15	15	16	16	17	18	18	19	19	20	21	21	22	22	130
135	13	14	14	15	16	16	17	17	18	18	19	20	20	21	21	22	135
140	13	14	14	15	15	16	17	17	18	18	19	19	20	21	21	22	140
145	13	13	14	15	15	16	16	17	17	18	19	19	20	20	21	21	145
150	13	13	14	14	15	16	16	17	17	18	18	19	19	20	21	21	150
155	13	13	14	14	15	15	16	16	17	18	18	19	19	20	20	21	155
160	12	13	14	14	15	15	16	16	17	17	18	18	19	20	20	21	160
165	12	13	13	14	14	15	16	16	17	17	18	18	19	19	20	20	165
170	12	13	13	14	14	15	15	16	16	17	17	18	19	19	20	20	170
175	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	175
180	12	12	13	14	14	15	15	16	16	17	17	18	18	19	19	20	180
185	12	12	13	13	14	14	15	15	16	16	17	18	18	19	19	20	185
190	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	190
195	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	195
200	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	200

Years to Boring Height

Site Index	5-10	11-16	17-22	23-28	29-35	36-41	42-47	48+
Correct yrs	12	11	10	9	8	7	6	5

BACK

Table of Site Index by Breast Height Age and Height
Species: Cw – Western Redcedar - Provincial

Age @ bh	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
	Top Height (m) — Site Index (m)															
10																
15																
20																
25																
30																
35	50	51														
40	45	46	48	49	50	51										
45	42	43	44	45	46	47	48	49	50							
50	39	40	41	42	43	44	45	46	47	48	49	50				
55	37	38	39	40	40	41	42	43	44	45	46	47	48	49	50	
60	35	36	37	37	38	39	40	41	42	43	44	45	46	47	47	48
65	33	34	35	36	37	37	38	39	40	41	42	43	44	44	45	46
70	32	32	33	34	35	36	37	37	38	39	40	41	42	43	43	44
75	30	31	32	33	34	34	35	36	37	38	38	39	40	41	42	42
80	29	30	31	32	32	33	34	35	35	36	37	38	39	39	40	41
85	28	29	30	31	31	32	33	34	34	35	36	37	37	38	39	40
90	27	28	29	30	30	31	32	33	33	34	35	36	36	37	38	38
95	27	27	28	29	30	30	31	32	32	33	34	35	35	36	37	37
100	26	27	27	28	29	29	30	31	32	32	33	34	34	35	36	36
105	25	26	27	27	28	29	29	30	31	31	32	33	34	34	35	36
110	25	25	26	27	27	28	29	29	30	31	31	32	33	33	34	35
115	24	25	26	26	27	28	28	29	29	30	31	31	32	33	33	34
120	24	24	25	26	26	27	28	28	29	30	30	31	31	32	33	33
125	23	24	25	25	26	26	27	28	28	29	30	30	31	32	32	33
130	23	24	24	25	25	26	27	27	28	29	29	30	30	31	32	32
135	23	23	24	24	25	26	26	27	27	28	29	29	30	31	31	32
140	22	23	23	24	25	25	26	26	27	28	28	29	29	30	31	31
145	22	23	23	24	24	25	25	26	27	27	28	28	29	30	30	31
150	22	22	23	23	24	25	25	26	26	27	28	28	29	29	30	30
155	21	22	23	23	24	24	25	25	26	27	27	28	28	29	30	30
160	21	22	22	23	23	24	25	25	26	26	27	27	28	29	29	30
165	21	21	22	23	23	24	24	25	25	26	27	27	28	28	29	29
170	21	21	22	22	23	23	24	25	25	26	26	27	27	28	29	29
175	21	21	22	22	23	23	24	24	25	25	26	27	27	28	28	29
180	20	21	21	22	23	23	24	24	25	25	26	26	27	27	28	29
185	20	21	21	22	22	23	23	24	24	25	26	26	27	27	28	28
190	20	21	21	22	22	23	23	24	24	25	25	26	26	27	28	28
195	20	20	21	21	22	22	23	24	24	25	25	26	26	27	27	28
200	20	20	21	21	22	22	23	23	24	24	25	26	26	27	27	28

Years to Boring Height

Site Index	5-10	11-16	17-22	23-28	29-35	36-41	42-47	48+
Correct yrs	12	11	10	9	8	7	6	5

Page 3

Table of Site Index by Breast Height Age and Height
Species: Cw – Western Redcedar - Provincial

55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	Age @ bh
Top Height (m) — Site Index (m)																
																10
																15
																20
																25
																30
																35
																40
																45
																50
																55
49																60
47	48	49														65
45	46	47	48	48	49											70
43	44	45	46	47	47	48	49									75
42	43	43	44	45	46	47	47	48	49							80
40	41	42	43	44	44	45	46	47	47	48						85
39	40	41	41	42	43	44	45	45	46	47	48	48				90
38	39	40	40	41	42	43	43	44	45	46	46	47	48	49		95
37	38	39	39	40	41	42	42	43	44	44	45	46	47	47	48	100
36	37	38	38	39	40	41	41	42	43	43	44	45	46	46	47	105
36	36	37	38	38	39	40	40	41	42	42	43	44	45	45	46	110
35	35	36	37	37	38	39	40	40	41	42	42	43	44	44	45	115
34	35	35	36	37	37	38	39	39	40	41	41	42	43	44	44	120
34	34	35	35	36	37	37	38	39	39	40	41	41	42	43	43	125
33	34	34	35	36	36	37	37	38	39	39	40	41	41	42	43	130
32	33	34	34	35	36	36	37	38	38	39	39	40	41	41	42	135
32	33	33	34	34	35	36	36	37	38	38	39	40	40	41	41	140
32	32	33	33	34	35	35	36	36	37	38	38	39	40	40	41	145
31	32	32	33	34	34	35	35	36	37	37	38	38	39	40	40	150
31	31	32	33	33	34	34	35	36	36	37	37	38	39	39	40	155
30	31	32	32	33	33	34	35	35	36	36	37	38	38	39	39	160
30	31	31	32	32	33	34	34	35	35	36	37	37	38	38	39	165
30	30	31	31	32	33	33	34	34	35	36	36	37	37	38	39	170
29	30	31	31	32	32	33	33	34	35	35	36	36	37	38	38	175
29	30	30	31	31	32	33	33	34	34	35	36	36	37	37	38	180
29	29	30	31	31	32	32	33	33	34	35	35	36	36	37	38	185
29	29	30	30	31	31	32	33	33	34	34	35	36	36	37	37	190
28	29	30	30	31	31	32	32	33	34	34	35	35	36	36	37	195
28	29	29	30	30	31	32	32	33	33	34	34	35	36	36	37	200

Years to Boring Height

Site Index	5-10	11-16	17-22	23-28	29-35	36-41	42-47	48+
Correct yrs	12	11	10	9	8	7	6	5

Page 4

Figure A.51 Cw – Westerm Redcedar - Provincial

BACK

BACK

Table of Site Index by Breast Height Age and Height
Species: Dr – Red Alder - Provincial

Age @ bh	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	Top Height (m)													
	Site Index (m)													
10	13	16	18	21	23	26	28	31	33	36	38			
15	10	12	13	15	17	19	21	22	24	26	28	30	31	33
20	8	10	11	13	14	16	17	19	20	22	23	25	26	28
25	7	9	10	11	13	14	15	17	18	19	21	22	23	25
30	7	8	9	11	12	13	14	15	17	18	19	20	21	23
35	7	8	9	10	11	12	13	15	16	17	18	19	20	21
40	6	7	9	10	11	12	13	14	15	16	17	18	19	20
45	6	7	8	9	10	11	12	13	14	15	16	18	19	20
50	6	7	8	9	10	11	12	13	14	15	16	17	18	19
55	6	7	8	9	10	11	12	13	14	15	16	17	18	19
60	6	7	8	9	10	11	12	12	13	14	15	16	17	18
65	6	7	8	9	9	10	11	12	13	14	15	16	17	18
70	6	7	7	8	9	10	11	12	13	14	15	16	17	18
75	6	6	7	8	9	10	11	12	13	14	15	16	17	17
80	6	6	7	8	9	10	11	12	13	14	15	15	16	17
85	5	6	7	8	9	10	11	12	13	14	14	15	16	17
90	5	6	7	8	9	10	11	12	13	13	14	15	16	17
95	5	6	7	8	9	10	11	12	12	13	14	15	16	17
100	5	6	7	8	9	10	11	11	12	13	14	15	16	17

Years to Boring Height

Site Index	≤ 6	7-14	15-21	22-28	29+
Correct yrs	5	4	3	2	1

SiteTools Version 3.2m – Research Branch, British Columbia Ministry of Forests
Date: February 27, 2002
Site Index Equation: Nigh and Courtin (1998)   Page 1

Table of Site Index by Breast Height Age and Height
Species: Dr – Red Alder - Provincial

20	21	22	23	24	25	26	27	28	29	30	31	32	33	Age @ bh
Top Height (m)														
Site Index (m)														
														10
														15
29	31	32												20
26	27	28	30											25
24	25	26	27	29	30									30
22	24	25	26	27	28	29								35
21	22	24	25	26	27	28	29							40
21	22	23	24	25	26	27	28	29						45
20	21	22	23	24	25	26	27	28	29					50
20	21	21	22	23	24	25	26	27	28					55
19	20	21	22	23	24	25	26	27	28	29				60
19	20	21	22	23	24	24	25	26	27	28				65
19	19	20	21	22	23	24	25	26	27	28	29			70
18	19	20	21	22	23	24	25	26	27	27	28			75
18	19	20	21	22	23	24	24	25	26	27	28			80
18	19	20	21	22	22	23	24	25	26	27	28	29		85
18	19	20	20	21	22	23	24	25	26	27	28	28		90
18	19	19	20	21	22	23	24	25	26	26	27	28		95
18	18	19	20	21	22	23	24	25	25	26	27	28	29	100

Years to Boring Height

Site Index	≤ 6	7-14	15-21	22-28	29+
Correct yrs	5	4	3	2	1

Page 2

Figure A.52 Dr - Red Alder - Provincial

Table of Site Index by Breast Height Age and Height
Species: Lw – Western Larch - Provincial

Age @ bh	Top Height (m) 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
	Site Index (m)																						
10	20	23	26	29	32	35	38	41	44	47	50												
15	15	17	19	22	24	26	28	30	32	34	36	39	41	43	45	47	49						
20	13	14	16	18	19	21	23	25	26	28	30	31	33	35	36	38	40	41	43	45	47	48	50
25	11	12	14	15	17	18	20	21	22	24	25	27	28	30	31	33	34	35	37	38	40	41	43
30	9	11	12	13	15	16	17	18	20	21	22	24	25	26	27	29	30	31	33	34	35	36	38
35	8	9	11	12	13	14	15	16	18	19	20	21	22	23	25	26	27	28	29	30	32	33	34
40	7	8	9	10	12	13	14	15	16	17	18	19	20	21	22	23	25	26	27	28	29	30	31
45	6	7	8	9	10	11	12	13	14	15	17	18	19	20	21	22	23	24	25	26	27	28	29
50	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
55	5	6	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	23	24	25
60		5	6	7	8	8	9	10	11	12	13	14	15	16	17	18	18	19	20	21	22	23	24
65			5	6	7	8	9	9	10	11	12	13	14	15	16	17	17	18	19	20	21	22	23
70				5	6	7	8	9	10	10	11	12	13	14	15	16	17	17	18	19	20	21	22
75				5	5	6	7	8	9	10	11	11	12	13	14	15	16	17	17	18	19	20	21
80					5	6	6	7	8	9	10	11	12	12	13	14	15	16	17	17	18	19	20
85						5	6	7	8	8	9	10	11	12	13	13	14	15	16	17	18	18	19
90						5	5	6	7	8	9	9	10	11	12	13	14	14	15	16	17	18	19
95							5	6	6	7	8	9	10	11	11	12	13	14	15	15	16	17	18
100								5	6	7	8	8	9	10	11	12	12	13	14	15	16	17	17
105								5	6	6	7	8	9	10	10	11	12	13	14	14	15	16	17
110									5	6	7	8	8	9	10	11	12	12	13	14	15	16	16
115									5	6	6	7	8	9	10	10	11	12	13	13	14	15	16
120										5	6	7	8	8	9	10	11	11	12	13	14	15	15
125										5	6	6	7	8	9	10	10	11	12	13	14	14	15
130											5	6	7	8	8	9	10	11	12	12	13	14	15
135											5	6	7	7	8	9	10	11	11	12	13	14	14
140											5	6	6	7	8	9	9	10	11	12	13	13	14
145												5	6	7	8	8	9	10	11	12	12	13	14
150												5	6	7	7	8	9	10	10	11	12	13	14
155												5	6	6	7	8	9	9	10	11	12	13	13
160												5	5	6	7	8	9	9	10	11	12	12	13
165													5	6	7	8	8	9	10	11	11	12	13
170													5	6	7	7	8	9	10	10	11	12	13
175													5	6	6	7	8	9	10	10	11	12	13
180													5	5	6	7	8	9	9	10	11	12	12
185													5	5	6	7	8	8	9	10	11	12	12
190														5	6	7	8	8	9	10	11	11	12
195														5	6	7	7	8	9	10	11	11	12
200														5	6	7	7	8	9	10	10	11	12

Years to Boring Height

Site Index	5	6	7	8	9	10	11-12	13-14	15-16	17-21	22-27	28-40	41+
Correct yrs	21	18	16	14	13	12	11	10	9	8	7	6	5

SiteTools Version 3.2m – Research Branch, British Columbia Ministry of Forests
Date: March 11, 2002
Site Index Equation: Milner (1992)

Table of Site Index by Breast Height Age and Height
Species: Lw – Western Larch - Provincial

Top Height (m) 28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	Age @ bh
Site Index (m)																							
																							10
																							15
																							20
44	46	47	48	50																			25
39	40	41	43	44	45	47	48	49	50														30
35	36	37	39	40	41	42	43	45	46	47	48	49	50										35
32	33	34	35	37	38	39	40	41	42	43	44	45	46	47	49	50							40
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50			45
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	50
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	40	41	42	43	44	45	46	47	55
25	26	27	28	29	29	30	31	32	33	34	35	36	37	38	39	40	40	41	42	43	44	45	60
24	25	25	26	27	28	29	30	31	32	33	33	34	35	36	37	38	39	40	41	42	42	43	65
23	23	24	25	26	27	28	29	30	30	31	32	33	34	35	36	37	37	38	39	40	41	42	70
22	23	23	24	25	26	27	28	28	29	30	31	32	33	34	34	35	36	37	38	39	40	40	75
21	22	22	23	24	25	26	27	28	28	29	30	31	32	33	33	34	35	36	37	38	39	39	80
20	21	22	23	23	24	25	26	27	28	28	29	30	31	32	33	33	34	35	36	37	38	38	85
19	20	21	22	23	23	24	25	26	27	28	28	29	30	31	32	33	33	34	35	36	37	37	90
19	20	20	21	22	23	24	24	25	26	27	28	28	29	30	31	32	33	33	34	35	36	37	95
18	19	20	21	21	22	23	24	25	25	26	27	28	29	29	30	31	32	33	34	34	35	36	100
18	18	19	20	21	22	22	23	24	25	26	26	27	28	29	30	30	31	32	33	34	34	35	105
17	18	19	20	20	21	22	23	24	24	25	26	27	28	28	29	30	31	32	32	33	34	35	110
17	17	18	19	20	21	21	22	23	24	25	25	26	27	28	29	29	30	31	32	33	33	34	115
16	17	18	19	19	20	21	22	23	23	24	25	26	27	27	28	29	30	31	31	32	33	34	120
16	17	17	18	19	20	21	21	22	23	24	25	25	26	27	28	29	29	30	31	32	32	33	125
16	16	17	18	19	19	20	21	22	23	23	24	25	26	27	27	28	29	30	31	31	32	33	130
15	16	17	18	18	19	20	21	22	22	23	24	25	25	26	27	28	29	29	30	31	32	33	135
15	16	16	17	18	19	20	20	21	22	23	24	24	25	26	27	27	28	29	30	31	31	32	140
15	15	16	17	18	19	19	20	21	22	22	23	24	25	26	26	27	28	29	30	30	31	32	145
14	15	16	17	18	18	19	20	21	21	22	23	24	25	25	26	27	28	28	29	30	31	32	150
14	15	16	17	17	18	19	20	20	21	22	23	24	24	25	26	27	27	28	29	30	31	31	155
14	15	16	16	17	18	19	19	20	21	22	23	23	24	25	26	26	27	28	29	30	30	31	160
14	15	15	16	17	18	18	19	20	21	22	22	23	24	25	25	26	27	28	29	29	30	31	165
14	14	15	16	17	17	18	19	20	21	21	22	23	24	25	25	26	27	28	28	29	30	31	170
13	14	15	16	17	17	18	19	20	20	21	22	23	24	24	25	26	27	27	28	29	30	31	175
13	14	15	16	16	17	18	19	19	20	21	22	23	23	24	25	26	26	27	28	29	30	30	180
13	14	15	15	16	17	18	19	19	20	21	22	22	23	24	25	26	26	27	28	29	29	30	185
13	14	15	15	16	17	18	18	19	20	21	22	22	23	24	25	25	26	27	28	29	29	30	190
13	14	14	15	16	17	18	18	19	20	21	21	22	23	24	25	25	26	27	28	28	29	30	195
13	14	14	15	16	17	17	18	19	20	21	21	22	23	24	24	25	26	27	28	28	29	30	200

Years to Boring Height

Site Index	5	6	7	8	9	10	11-12	13-14	15-16	17-21	22-27	28-40	41+
Correct yrs	21	18	16	14	13	12	11	10	9	8	7	6	5

Figure A.53 Lw – Western Larch – Provincial

BACK

BACK

Table of Site Index by Breast Height Age and Height
Species: Pli – Lodgepole Pine - Provincial

Top Height (m) — Site Index (m)

Age @ bh	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
10	19	22	25	28	31	33	36	38	41	43	45	47	49										
15	13	16	18	20	22	24	26	28	30	32	34	35	37	39	40	42	44	45	47	48	50		
20	11	12	14	16	18	20	21	23	24	26	27	29	30	32	33	35	36	38	39	40	42	43	44
25	9	10	12	14	15	17	18	19	21	22	24	25	26	28	29	30	31	33	34	35	36	38	39
30	8	9	10	12	13	14	16	17	18	20	21	22	23	25	26	27	28	29	30	32	33	34	35
35	7	8	9	11	12	13	14	15	17	18	19	20	21	22	23	25	26	27	28	29	30	31	32
40	6	7	8	9	11	12	13	14	15	16	17	18	19	21	22	23	24	25	26	27	28	29	30
45	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
50	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
55	5	6	7	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
60		5	6	7	8	9	10	11	12	12	13	14	15	16	17	18	19	20	21	22	23	24	25
65		5	6	7	7	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23	24
70		5	5	6	7	8	9	10	10	11	12	13	14	15	16	17	18	19	20	20	21	22	23
75			5	6	7	8	8	9	10	11	12	13	13	14	15	16	17	18	19	20	21	22	23
80			5	6	6	7	8	9	10	10	11	12	13	14	15	16	17	17	18	19	20	21	22
85			5	5	6	7	8	8	9	10	11	12	13	13	14	15	16	17	18	19	20	21	22
90			5	5	6	7	7	8	9	10	11	11	12	13	14	15	16	17	17	18	19	20	21
95				5	6	6	7	8	9	9	10	11	12	13	14	14	15	16	17	18	19	20	21
100				5	6	6	7	8	8	9	10	11	12	12	13	14	15	16	17	18	18	19	20
105				5	5	6	7	7	8	9	10	11	11	12	13	14	15	16	16	17	18	19	20
110				5	5	6	6	7	8	9	9	10	11	12	13	14	14	15	16	17	18	19	20
115					5	6	6	7	8	8	9	10	11	12	12	13	14	15	16	17	18	18	19
120					5	5	6	7	8	8	9	10	11	11	12	13	14	15	16	16	17	18	19
125					5	5	6	7	7	8	9	10	10	11	12	13	14	15	15	16	17	18	19
130					5	5	6	7	7	8	9	9	10	11	12	13	13	14	15	16	17	18	19
135					5	5	6	6	7	8	8	9	10	11	12	12	13	14	15	16	17	18	18
140						5	6	6	7	8	8	9	10	11	11	12	13	14	15	16	16	17	18
145						5	5	6	7	7	8	9	10	10	11	12	13	14	15	15	16	17	18
150						5	5	6	7	7	8	9	10	10	11	12	13	14	14	15	16	17	18
155						5	5	6	7	7	8	9	9	10	11	12	13	13	14	15	16	17	18
160						5	5	6	6	7	8	9	9	10	11	12	12	13	14	15	16	17	18
165						5	5	6	6	7	8	8	9	10	11	12	12	13	14	15	16	17	17
170							5	6	6	7	8	8	9	10	11	11	12	13	14	15	16	16	17
175							5	6	6	7	7	8	9	10	10	11	12	13	14	15	15	16	17
180							5	5	6	7	7	8	9	10	10	11	12	13	14	14	15	16	17
185							5	5	6	7	7	8	9	9	10	11	12	13	14	14	15	16	17
190							5	5	6	7	7	8	9	9	10	11	12	13	13	14	15	16	17
195							5	5	6	6	7	8	9	9	10	11	12	12	13	14	15	16	17
200							5	5	6	6	7	8	8	9	10	11	12	12	13	14	15	16	17

Years to Boring Height

Site Index	5	6	7	8	9	10-11	12-14	15-17	18-21	22-26	27-36	37+
Correct yrs	16	14	12	11	10	9	8	7	6	5	4	3

SiteTools Version 3.2m – Research Branch, British Columbia Ministry of Forests
Date: March 11, 2002
Site Index Equation: Nigh (1999)

Page 1

Table of Site Index by Breast Height Age and Height
Species: Pli – Lodgepole Pine - Provincial

Top Height (m) — Site Index (m)

28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	Age @ bh
																							10
																							15
46	47	48	49																				20
40	41	42	44	45	46	47	48	50															25
36	37	38	40	41	42	43	44	45	46	47	49	50											30
33	34	36	37	38	39	40	41	42	43	44	45	46	47	48	49								35
31	32	33	34	35	36	37	39	40	41	42	43	44	45	46	47	48	49	50					40
29	30	31	32	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50			45
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	50
27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	55
26	27	28	29	30	31	32	33	34	35	36	37	37	38	39	40	41	42	43	44	45	46	47	60
25	26	27	28	29	30	31	32	33	34	35	36	37	37	38	39	40	41	42	43	44	45	46	65
24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	40	41	42	43	44	45	70
24	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	75
23	24	25	26	27	28	29	30	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	80
22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	38	39	40	41	42	43	85
22	23	24	25	26	27	28	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	90
22	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	37	38	39	40	41	42	95
21	22	23	24	25	26	27	28	29	29	30	31	32	33	34	35	36	37	38	39	40	41	42	100
21	22	23	24	25	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	40	41	105
21	21	22	23	24	25	26	27	28	29	30	31	32	33	33	34	35	36	37	38	39	40	41	110
20	21	22	23	24	25	26	27	28	28	29	30	31	32	33	34	35	36	37	38	39	40	41	115
20	21	22	23	24	25	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	40	120
20	21	22	22	23	24	25	26	27	28	29	30	31	32	33	34	35	35	36	37	38	39	40	125
20	20	21	22	23	24	25	26	27	28	29	30	31	31	32	33	34	35	36	37	38	39	40	130
19	20	21	22	23	24	25	26	27	27	28	29	30	31	32	33	34	35	36	37	38	39	40	135
19	20	21	22	23	24	25	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	140
19	20	21	22	23	23	24	25	26	27	28	29	30	31	32	33	34	35	36	36	37	38	39	145
19	20	21	21	22	23	24	25	26	27	28	29	30	31	32	33	33	34	35	36	37	38	39	150
19	19	20	21	22	23	24	25	26	27	28	29	30	30	31	32	33	34	35	36	37	38	39	155
18	19	20	21	22	23	24	25	26	27	28	28	29	30	31	32	33	34	35	36	37	38	39	160
18	19	20	21	22	23	24	25	26	26	27	28	29	30	31	32	33	34	35	36	37	38	39	165
18	19	20	21	22	23	24	25	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	170
18	19	20	21	22	23	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	37	38	175
18	19	20	21	22	22	23	24	25	26	27	28	29	30	31	32	33	34	35	35	36	37	38	180
18	19	20	21	21	22	23	24	25	26	27	28	29	30	31	32	33	33	34	35	36	37	38	185
18	19	20	20	21	22	23	24	25	26	27	28	29	30	31	31	32	33	34	35	36	37	38	190
18	19	19	20	21	22	23	24	25	26	27	28	29	29	30	31	32	33	34	35	36	37	38	195
18	18	19	20	21	22	23	24	25	26	27	28	28	29	30	31	32	33	34	35	36	37	38	200

Years to Boring Height

Site Index	5	6	7	8	9	10-11	12-14	15-17	18-21	22-26	27-36	37+
Correct yrs	16	14	12	11	10	9	8	7	6	5	4	3

Page 2

Figure A.54 Pli – Lodgepole Pine - Provincial

Table of Site Index by Breast Height Age and Height
Species: Pw – Western White Pine - Provincial

Site Index (m) by Top Height (m)

Age @ bh	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
10	25	29	32	35	37	40	42	44	46	48	50												
15	18	21	24	26	28	30	32	34	36	38	39	41	42	44	45	47	48	49					
20	14	17	19	21	23	25	26	28	30	31	33	34	35	37	38	39	41	42	43	44	45	46	48
25	11	13	15	17	19	20	22	24	25	26	28	29	30	32	33	34	35	36	38	39	40	41	42
30	9	11	13	14	16	17	19	20	22	23	24	25	27	28	29	30	31	32	34	35	36	37	38
35	8	9	11	12	14	15	16	17	19	20	21	22	24	25	26	27	28	29	30	31	32	33	34
40	6	8	9	10	12	13	14	15	16	18	19	20	21	22	23	24	25	26	27	28	30	31	32
45	6	7	8	9	10	11	12	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
50	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
55		5	6	7	8	9	10	11	12	13	14	14	15	16	17	18	19	20	21	22	23	24	25
60		5	6	6	7	8	9	10	11	11	12	13	14	15	16	17	18	19	20	20	21	22	23
65			5	6	7	7	8	9	10	10	11	12	13	14	14	15	16	17	18	19	20	21	22
70			5	5	6	7	7	8	9	9	10	11	12	13	13	14	15	16	17	18	19	20	20
75				5	6	6	7	7	8	9	9	10	11	12	12	13	14	15	16	16	17	18	19
80				5	5	6	6	7	7	8	9	9	10	11	11	12	13	14	14	15	16	17	18
85					5	5	6	6	7	7	8	9	9	10	11	11	12	13	14	14	15	16	17
90						5	5	6	6	7	7	8	9	9	10	11	11	12	13	13	14	15	16
95						5	5	6	6	6	7	8	8	9	9	10	10	11	12	13	13	14	15
100							5	5	6	6	7	7	8	8	9	9	10	10	11	12	13	13	14
105							5	5	5	6	6	7	7	8	8	9	9	10	10	11	12	13	13
110								5	5	5	6	6	7	7	8	8	9	9	10	10	11	12	13
115									5	5	6	6	6	7	7	8	8	9	9	10	11	11	12
120									5	5	5	6	6	6	7	7	8	8	9	9	10	11	11
125										5	5	5	6	6	7	7	7	8	8	9	9	10	11
130											5	5	5	6	6	7	7	7	8	8	9	10	10
135											5	5	5	6	6	6	7	7	8	8	9	9	10
140												5	5	5	6	6	6	7	7	8	8	9	9
145												5	5	5	5	6	6	6	7	7	8	8	9
150													5	5	5	6	6	6	7	7	7	8	8
155														5	5	5	6	6	6	7	7	8	8
160														5	5	5	5	6	6	6	7	7	8
165															5	5	5	6	6	6	7	7	7
170															5	5	5	5	6	6	6	7	7
175																5	5	5	5	6	6	6	7
180																	5	5	5	6	6	6	7
185																	5	5	5	5	6	6	6
190																		5	5	5	5	6	6
195																		5	5	5	5	6	6
200																			5	5	5	5	6

Years to Boring Height

Site Index	5	6	7	8	9	10	11	12-13	14-15	16-17	18-20	21-25	26-33	34-47	48+
Correct yrs	26	23	20	18	16	15	14	13	12	11	10	9	8	7	6

SiteTools Version 3.2m – Research Branch, British Columbia Ministry of Forests
Date: March 11, 2002
Site Index Equation: Curtis, Diaz, and Clendenen (1990)

Page 1

Table of Site Index by Breast Height Age and Height
Species: Pw – Western White Pine - Provincial

Site Index (m) by Top Height (m)

28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	Age @ bh
																							10
																							15
49	50																						20
43	44	45	46	47	48	49	50																25
39	40	41	42	43	44	45	46	47	48	48	49	50											30
35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50								35
33	34	35	36	37	37	38	39	40	41	42	43	44	45	46	47	48	49	50					40
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50			45
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	50
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	44	45	46	47	48	49	55
24	25	26	27	28	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	47	48	60
23	24	25	26	27	28	29	30	31	32	33	34	36	37	38	39	40	41	42	43	44	46	47	65
21	22	23	24	26	27	28	29	30	31	32	33	34	35	37	38	39	40	41	42	44	45	46	70
20	21	22	23	24	25	26	28	29	30	31	32	33	34	36	37	38	39	40	42	43	44	45	75
19	20	21	22	23	24	25	26	27	29	30	31	32	33	35	36	37	38	40	41	42	43	44	80
18	19	20	21	22	23	24	25	26	28	29	30	31	33	34	35	36	38	39	40	41	43	44	85
17	18	19	20	21	22	23	24	25	27	28	29	30	32	33	34	36	37	38	39	41	42	43	90
16	17	18	19	20	21	22	23	24	26	27	28	30	31	32	34	35	36	38	39	40	42	43	95
15	16	17	18	19	20	21	22	24	25	26	27	29	30	31	33	34	36	37	38	40	41	42	100
14	15	16	17	18	19	20	21	23	24	25	27	28	29	31	32	34	35	36	38	39	40	42	105
13	14	15	16	17	18	19	21	22	23	24	26	27	29	30	32	33	34	36	37	39	40	41	110
13	13	14	15	16	17	18	20	21	22	24	25	26	28	29	31	32	34	35	37	38	40	41	115
12	13	14	15	16	17	18	19	20	21	23	24	26	27	29	30	32	33	35	36	38	39	40	120
11	12	13	14	15	16	17	18	19	21	22	24	25	27	28	30	31	33	34	36	37	39	40	125
11	12	12	13	14	15	16	17	19	20	21	23	24	26	28	29	31	32	34	35	37	38	40	130
10	11	12	13	13	14	16	17	18	19	21	22	24	25	27	28	30	32	33	35	36	38	39	135
10	10	11	12	13	14	15	16	17	19	20	22	23	25	26	28	29	31	33	34	36	37	39	140
9	10	11	11	12	13	14	15	17	18	19	21	22	24	26	27	29	31	32	34	35	37	38	145
9	10	10	11	12	13	14	15	16	17	19	20	22	23	25	27	28	30	32	33	35	36	38	150
9	9	10	10	11	12	13	14	15	17	18	20	21	23	25	26	28	29	31	33	34	36	37	155
8	9	9	10	11	12	12	14	15	16	17	19	21	22	24	26	27	29	31	32	34	35	37	160
8	8	9	10	10	11	12	13	14	15	17	18	20	22	23	25	27	28	30	32	33	35	36	165
8	8	9	9	10	11	11	12	14	15	16	18	19	21	23	25	26	28	30	31	33	35	36	170
7	8	8	9	9	10	11	12	13	14	16	17	19	21	22	24	26	27	29	31	32	34	36	175
7	7	8	8	9	10	11	11	12	14	15	17	18	20	22	23	25	27	29	30	32	34	35	180
7	7	8	8	9	9	10	11	12	13	14	16	18	19	21	23	25	26	28	30	32	33	35	185
7	7	7	8	8	9	10	11	12	13	14	15	17	19	21	22	24	26	28	29	31	33	34	190
6	7	7	8	8	9	9	10	11	12	13	15	16	18	20	22	24	25	27	29	31	32	34	195
6	6	7	7	8	8	9	10	11	12	13	14	16	18	19	21	23	25	27	28	30	32	33	200

Years to Boring Height

Site Index	5	6	7	8	9	10	11	12-13	14-15	16-17	18-20	21-25	26-33	34-47	48+
Correct yrs	26	23	20	18	16	15	14	13	12	11	10	9	8	7	6

Page 2

Figure A.55 Pw – Western White Pine – Provincial

Table of Site Index by Breast Height Age and Height
Species: Py – Ponderosa Pine - Provincial

Age @ bh	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
	Site Index (m)																						
10	22	27	32	37	42	47																	
15	14	18	21	25	28	31	34	38	41	44	47	50											
20	11	13	16	18	21	23	26	28	31	33	35	38	40	42	45	47	49						
25	9	11	13	15	17	19	21	23	25	26	28	30	32	34	36	38	40	41	43	45	47	49	
30	8	9	11	13	14	16	17	19	21	22	24	25	27	29	30	32	33	35	36	38	40	41	43
35	7	8	9	11	12	14	15	16	18	19	21	22	23	25	26	27	29	30	32	33	34	36	37
40	6	7	8	10	11	12	13	15	16	17	18	19	21	22	23	24	26	27	28	29	30	32	33
45	5	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25	26	27	28	30
50	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
55	5	6	6	7	8	9	10	11	12	13	14	15	16	17	18	18	19	20	21	22	23	24	25
60		5	6	7	8	9	9	10	11	12	13	14	15	15	16	17	18	19	20	21	22	22	23
65		5	6	7	7	8	9	10	10	11	12	13	14	15	15	16	17	18	19	19	20	21	22
70		5	5	6	7	8	8	9	10	11	11	12	13	14	14	15	16	17	18	18	19	20	21
75			5	6	7	7	8	9	9	10	11	12	12	13	14	14	15	16	17	17	18	19	20
80			5	6	6	7	8	8	9	10	10	11	12	12	13	14	14	15	16	17	17	18	19
85			5	5	6	7	7	8	9	9	10	11	11	12	13	13	14	15	15	16	17	17	18
90			5	5	6	6	7	8	8	9	10	10	11	11	12	13	13	14	15	15	16	17	17
95				5	6	6	7	7	8	9	9	10	10	11	12	12	13	13	14	15	15	16	17
100				5	5	6	7	7	8	8	9	9	10	11	11	12	12	13	14	14	15	15	16
105				5	5	6	6	7	7	8	9	9	10	10	11	11	12	13	13	14	14	15	16
110				5	5	6	6	7	7	8	8	9	9	10	11	11	12	12	13	13	14	15	15
115					5	5	6	7	7	8	8	9	9	10	10	11	11	12	13	13	14	14	15
120					5	5	6	6	7	7	8	8	9	10	10	11	11	12	12	13	13	14	14
125					5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	14	14
130					5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14
135					5	5	6	6	6	7	7	8	8	9	9	10	10	11	11	12	13	13	14
140						5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13
145						5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13
150						5	5	6	6	7	7	8	8	8	9	9	10	10	11	11	12	12	13
155						5	5	6	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13
160						5	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13
165						5	5	5	6	6	7	7	8	8	9	9	9	10	10	11	11	12	12
170						5	5	5	6	6	7	7	8	8	8	9	9	10	10	11	11	12	12
175							5	5	6	6	7	7	7	8	8	9	9	10	10	11	11	12	12
180							5	5	6	6	6	7	7	8	8	9	9	10	10	11	11	12	12
185							5	5	6	6	6	7	7	8	8	9	9	10	10	10	11	11	12
190							5	5	6	6	6	7	7	8	8	9	9	9	10	10	11	11	12
195							5	5	5	6	6	7	7	8	8	8	9	9	10	10	11	11	12
200							5	5	5	6	6	7	7	8	8	8	9	9	10	10	11	11	12

Years to Boring Height

Site Index	5	6	7	8	9-10	11-14	15-22	23-47	48+
Correct yrs	14	13	12	11	10	9	8	7	6

SiteTools Version 3.2m – Research Branch, British Columbia Ministry of Forests
Date: March 11, 2002
Site Index Equation: Hann and Scrivani (1986)

Page 1

Table of Site Index by Breast Height Age and Height
Species: Py – Ponderosa Pine - Provincial

28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	Age @ bh
Site Index (m)																							
																							10
																							15
																							20
																							25
44	46	47	49	50																			30
38	40	41	42	44	45	46	48	49	50														35
34	35	36	38	39	40	41	42	44	45	46	47	48	50										40
31	32	33	34	35	36	37	38	39	40	42	43	44	45	46	47	48	49	50					45
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	50
26	27	28	29	30	31	31	32	33	34	35	36	37	38	39	40	41	42	43	44	44	45	46	55
24	25	26	27	28	28	29	30	31	32	33	34	35	35	36	37	38	39	40	41	42	42	43	60
23	23	24	25	26	27	28	28	29	30	31	32	33	33	34	35	36	37	37	38	39	40	41	65
21	22	23	24	25	25	26	27	28	28	29	30	31	32	32	33	34	35	36	36	37	38	39	70
20	21	22	23	23	24	25	26	26	27	28	29	29	30	31	32	32	33	34	35	35	36	37	75
19	20	21	22	22	23	24	24	25	26	27	27	28	29	29	30	31	32	32	33	34	35	35	80
19	19	20	21	21	22	23	23	24	25	25	26	27	28	28	29	30	30	31	32	33	33	34	85
18	19	19	20	21	21	22	23	23	24	25	25	26	27	27	28	29	29	30	31	31	32	33	90
17	18	19	19	20	20	21	22	22	23	24	24	25	26	26	27	28	28	29	30	30	31	32	95
17	17	18	19	19	20	20	21	22	22	23	24	24	25	26	26	27	28	28	29	29	30	31	100
16	17	17	18	19	19	20	20	21	22	22	23	24	24	25	25	26	27	27	28	29	29	30	105
16	16	17	18	18	19	19	20	21	21	22	22	23	24	24	25	25	26	27	27	28	29	29	110
15	16	17	17	18	18	19	19	20	21	21	22	22	23	24	24	25	25	26	27	27	28	29	115
15	16	16	17	17	18	18	19	20	20	21	21	22	23	23	24	24	25	26	26	27	27	28	120
15	15	16	16	17	17	18	19	19	20	20	21	22	22	23	23	24	24	25	26	26	27	27	125
14	15	15	16	17	17	18	18	19	19	20	21	21	22	22	23	23	24	25	25	26	26	27	130
14	15	15	16	16	17	17	18	19	19	20	20	21	21	22	22	23	24	24	25	25	26	27	135
14	14	15	15	16	17	17	18	18	19	19	20	20	21	22	22	23	23	24	24	25	26	26	140
14	14	15	15	16	16	17	17	18	18	19	20	20	21	21	22	22	23	24	24	25	25	26	145
13	14	14	15	16	16	17	17	18	18	19	19	20	20	21	22	22	23	23	24	24	25	25	150
13	14	14	15	15	16	16	17	17	18	19	19	20	20	21	21	22	22	23	23	24	25	25	155
13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	22	22	23	23	24	24	25	160
13	13	14	14	15	15	16	17	17	18	18	19	19	20	20	21	21	22	22	23	24	24	25	165
13	13	14	14	15	15	16	16	17	17	18	18	19	20	20	21	21	22	22	23	23	24	24	170
13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	23	23	24	24	175
13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	24	24	180
12	13	13	14	14	15	15	16	16	17	17	18	18	19	20	20	21	21	22	22	23	23	24	185
12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	22	22	23	23	24	190
12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	23	23	24	195
12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	200

Years to Boring Height

Site Index	5	6	7	8	9-10	11-14	15-22	23-47	48+
Correct yrs	14	13	12	11	10	9	8	7	6

Page 2

Figure A.56 Py – Ponderosa Pine – Provincial

Table of Site Index by Breast Height Age and Height
Species: Sb – Black Spruce – Provincial

Age @ bh	Top Height (m) 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
	Site Index (m)																						
10	17	20	23	25	27	29	32	34	35	37	39	41	43	44	46	47	49						
15	13	15	17	19	21	23	25	27	28	30	31	33	34	36	37	39	40	41	43	44	45	47	48
20	10	12	14	16	18	19	21	22	24	25	27	28	29	31	32	33	35	36	37	38	39	41	42
25	9	10	12	14	15	17	18	19	21	22	23	25	26	27	28	30	31	32	33	34	35	37	38
30	8	9	10	12	13	15	16	17	18	20	21	22	23	24	26	27	28	29	30	31	32	33	35
35	7	8	9	11	12	13	14	15	17	18	19	20	21	22	23	25	26	27	28	29	30	31	32
40	6	7	8	10	11	12	13	14	15	16	17	19	20	21	22	23	24	25	26	27	28	29	30
45	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
50	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
55	5	6	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
60		5	6	7	8	9	10	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
65		5	6	6	7	8	9	10	11	12	12	13	14	15	16	17	18	19	20	21	22	23	24
70		5	5	6	7	8	8	9	10	11	12	13	14	14	15	16	17	18	19	20	21	22	23
75			5	6	7	7	8	9	10	10	11	12	13	14	15	16	16	17	18	19	20	21	22
80			5	5	6	7	8	8	9	10	11	12	12	13	14	15	16	17	18	19	19	20	21
85			5	5	6	7	7	8	9	9	10	11	12	13	13	14	15	16	17	18	19	20	21
90				5	6	6	7	8	8	9	10	11	11	12	13	14	15	15	16	17	18	19	20
95				5	5	6	7	7	8	9	9	10	11	12	12	13	14	15	16	17	18	19	19
100				5	5	6	6	7	8	8	9	10	10	11	12	13	14	14	15	16	17	18	19
105					5	6	6	7	7	8	9	9	10	11	12	12	13	14	15	16	17	18	18
110					5	5	6	6	7	8	8	9	10	10	11	12	13	14	14	15	16	17	18
115					5	5	6	6	7	7	8	9	9	10	11	12	12	13	14	15	16	17	18
120						5	5	6	7	7	8	8	9	10	10	11	12	13	14	14	15	16	17
125						5	5	6	6	7	8	8	9	9	10	11	12	12	13	14	15	16	17
130						5	5	6	6	7	7	8	8	9	10	11	11	12	13	14	15	15	16
135						5	5	5	6	6	7	8	8	9	10	10	11	12	13	13	14	15	16
140							5	5	6	6	7	7	8	9	9	10	11	11	12	13	14	15	16
145							5	5	6	6	7	7	8	8	9	10	10	11	12	13	14	14	15
150							5	5	5	6	6	7	8	8	9	9	10	11	12	12	13	14	15
155								5	5	6	6	7	7	8	9	9	10	11	11	12	13	14	15
160								5	5	6	6	7	7	8	8	9	10	10	11	12	13	14	14
165								5	5	5	6	6	7	8	8	9	9	10	11	12	12	13	14
170								5	5	5	6	6	7	7	8	9	9	10	11	11	12	13	14
175									5	5	6	6	7	7	8	8	9	10	10	11	12	13	14
180									5	5	6	6	6	7	8	8	9	9	10	11	12	13	13
185									5	5	5	6	6	7	7	8	9	9	10	11	11	12	13
190										5	5	6	6	7	7	8	8	9	10	10	11	12	13
195										5	5	6	6	7	7	8	8	9	10	10	11	12	13
200										5	5	5	6	6	7	7	8	9	9	10	11	12	12

Years to Boring Height

Site Index	5	6	7	8	9	10-11	12-13	14-17	18-24	25-41	42
Correct yrs	23	21	20	19	18	17	16	15	14	13	12

SiteTools Version 3.2m -- Research Branch, British Columbia Ministry of Forests
Date: March 11, 2002
Site Index Equation: Alberta Forest Service (1985)

Table of Site Index by Breast Height Age and Height
Species: Sb – Black Spruce - Provincial

Top Height (m) 28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	Age @ bh
Site Index (m)																							
																							10
49	50																						15
43	44	45	46	48	49	50																	20
39	40	41	42	43	44	45	46	48	49	50													25
36	37	38	39	40	41	42	43	44	45	46	47	48	49	50									30
33	34	35	36	37	38	39	40	41	43	44	45	46	47	48	49	50							35
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50				40
29	30	31	32	34	34	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50			45
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	50
27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	55
26	27	28	29	30	31	32	33	34	35	36	37	38	38	39	40	41	42	43	44	45	46	47	60
25	26	27	28	29	30	31	32	33	33	34	35	36	37	38	39	40	41	42	43	44	45	46	65
24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	70
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	75
22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	80
22	23	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	85
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	90
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	95
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	100
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	105
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	110
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	115
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	120
18	19	19	20	21	22	23	24	25	26	27	28	29	30	31	32	34	35	36	37	38	39	40	125
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	130
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	135
17	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	35	36	37	38	39	140
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	39	145
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	150
16	17	17	18	19	20	21	22	23	24	25	27	28	29	30	31	32	33	34	35	36	37	38	155
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	33	34	35	36	37	38	160
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	37	38	165
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	170
15	15	16	17	18	19	20	21	22	23	24	26	27	28	29	30	31	32	33	34	35	36	37	175
14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30	31	32	33	34	35	36	37	180
14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	33	34	35	36	37	185
14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	35	36	37	190
14	15	15	16	17	18	19	20	22	23	24	25	26	27	28	29	30	31	32	33	34	35	37	195
13	14	15	16	17	18	19	20	21	22	23	25	26	27	28	29	30	31	32	33	34	35	36	200

Years to Boring Height

Site Index	5	6	7	8	9	10-11	12-13	14-17	18-24	25-41	42
Correct yrs	23	21	20	19	18	17	16	15	14	13	12

Figure A.57 Sb – Black Spruce – Provincial

BACK

Table of Site Index by Breast Height Age and Height
Species: Ss- Sitka Spruce - Provincial

Age @ bh	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	Top Height (m) / Site Index (m)																
10	24	29	33	37	40	44	47	50	53	56	59	62	65	68			
15	16	20	23	25	28	31	33	36	38	40	43	45	47	49	51	53	55
20	12	15	17	19	22	24	26	28	30	32	34	35	37	39	41	42	44
25	10	12	14	16	18	19	21	23	24	26	28	29	31	32	34	35	37
30	8	10	12	13	15	16	18	19	21	22	24	25	27	28	29	31	32
35	7	8	10	11	13	14	15	17	18	19	21	22	23	24	26	27	28
40	6	7	9	10	11	12	14	15	16	17	18	20	21	22	23	24	25
45	6	7	8	9	10	11	12	13	14	15	17	18	19	20	21	22	23
50	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
55	5	5	6	7	8	9	10	11	12	13	14	15	16	17	18	18	19
60		5	6	7	8	8	9	10	11	12	13	14	14	15	16	17	18
65		5	5	6	7	8	9	9	10	11	12	13	13	14	15	16	17
70			5	6	7	7	8	9	9	10	11	12	13	13	14	15	16
75			5	5	6	7	7	8	9	10	10	11	12	13	13	14	15
80			5	5	6	6	7	8	8	9	10	10	11	12	13	13	14
85				5	5	6	7	7	8	9	9	10	10	11	12	13	13
90				5	5	6	6	7	7	8	9	9	10	11	11	12	13
95					5	5	6	7	7	8	8	9	9	10	11	11	12
100					5	5	6	6	7	7	8	8	9	10	10	11	12
105						5	5	6	6	7	8	8	9	9	10	10	11
110						5	5	6	6	7	7	8	8	9	9	10	11
115						5	5	5	6	6	7	7	8	8	9	10	10
120							5	5	6	6	7	7	8	8	9	9	10
125							5	5	5	6	6	7	7	8	8	9	9
130								5	5	6	6	7	7	8	8	9	9
135								5	5	6	6	6	7	7	8	8	9
140								5	5	5	6	6	7	7	8	8	9
145									5	5	6	6	6	7	7	8	8
150									5	5	5	6	6	7	7	8	8
155									5	5	5	6	6	6	7	7	8
160										5	5	5	6	6	7	7	8
165										5	5	5	6	6	6	7	7
170											5	5	6	6	6	7	7
175											5	5	5	6	6	7	7
180											5	5	5	6	6	6	7
185												5	5	5	6	6	7
190												5	5	5	6	6	6
195												5	5	5	6	6	6
200													5	5	5	6	6

Years to Boring Height

Site Index	10–11	12-17	18-22	23-28	29-33	34-38	39-44	45-49	50+
Correct yrs	10	9	8	7	6	5	4	3	2

SiteTools Version 3.2m – Research Branch, British Columbia Ministry of Forests
Date: February 27, 2002
Site Index Equation: Nigh (1997)

Page 1

Table of Site Index by Breast Height Age and Height
Species: Ss- Sitka Spruce - Provincial

22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	Age @ bh
Top Height (m) / Site Index (m)																
																10
57	59	61														15
46	47	49	51	52	54	55	57									20
38	40	41	43	44	46	47	48	50	51	52	54	55				25
33	35	36	37	39	40	41	42	44	45	46	47	49	50	51	52	30
29	31	32	33	34	35	37	38	39	40	41	42	44	45	46	47	35
26	28	29	30	31	32	33	34	35	36	38	39	40	41	42	43	40
24	25	26	27	28	29	30	31	32	33	35	36	37	38	39	40	45
22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	50
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	55
19	20	21	22	23	23	24	25	26	27	28	29	30	31	32	33	60
18	19	19	20	21	22	23	24	25	26	26	27	28	29	30	31	65
17	17	18	19	20	21	22	23	23	24	25	26	27	28	29	30	70
16	16	17	18	19	20	21	21	22	23	24	25	26	26	27	28	75
15	16	16	17	18	19	20	20	21	22	23	24	24	25	26	27	80
14	15	16	16	17	18	19	19	20	21	22	23	23	24	25	26	85
13	14	15	16	16	17	18	19	19	20	21	22	23	23	24	25	90
13	13	14	15	16	16	17	18	19	19	20	21	22	22	23	24	95
12	13	14	14	15	16	16	17	18	19	19	20	21	22	22	23	100
12	12	13	14	14	15	16	16	17	18	19	19	20	21	22	23	105
11	12	12	13	14	14	15	16	17	17	18	19	20	20	21	22	110
11	11	12	13	13	14	15	15	16	17	17	18	19	20	20	21	115
10	11	12	12	13	13	14	15	16	16	17	18	18	19	20	21	120
10	11	11	12	12	13	14	14	15	16	16	17	18	19	19	20	125
10	10	11	11	12	13	13	14	15	15	16	17	17	18	19	20	130
9	10	10	11	12	12	13	14	14	15	16	16	17	18	18	19	135
9	10	10	11	11	12	13	13	14	14	15	16	16	17	18	19	140
9	9	10	10	11	12	12	13	13	14	15	15	16	17	17	18	145
9	9	10	10	11	11	12	12	13	14	14	15	16	16	17	18	150
8	9	9	10	10	11	12	12	13	13	14	15	15	16	17	17	155
8	9	9	10	10	11	11	12	12	13	14	14	15	16	16	17	160
8	8	9	9	10	10	11	12	12	13	13	14	15	15	16	17	165
8	8	9	9	10	10	11	11	12	12	13	14	14	15	16	16	170
7	8	8	9	9	10	10	11	12	12	13	13	14	15	15	16	175
7	8	8	9	9	10	10	11	11	12	12	13	14	14	15	16	180
7	7	8	8	9	9	10	10	11	12	12	13	13	14	15	15	185
7	7	8	8	9	9	10	10	11	11	12	13	13	14	15	15	190
7	7	8	8	9	9	10	10	11	11	12	12	13	14	14	15	195
7	7	7	8	8	9	9	10	10	11	12	12	13	13	14	15	200

Years to Boring Height

Site Index	10–11	12-17	18-22	23-28	29-33	34-38	39-44	45-49	50+
Correct yrs	10	9	8	7	6	5	4	3	2

Page 2

BACK

BACK

Table of Site Index by Breast Height Age and Height
Species: Ss- Sitka Spruce - Provincial

Age @ bh	Top Height (m) 38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
	Site Index (m)																
10																	
15																	
20																	
25																	
30	53	55															
35	48	49	50	52	53	54											
40	44	45	46	47	48	49	51	52	53								
45	41	42	43	44	45	46	47	48	49	50	51	52					
50	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52		
55	36	37	38	39	40	41	42	42	43	44	45	46	47	48	49	50	51
60	34	35	36	37	37	38	39	40	41	42	43	44	45	46	47	48	49
65	32	33	34	35	36	37	38	38	39	40	41	42	43	44	45	46	47
70	30	31	32	33	34	35	36	37	38	39	40	40	41	42	43	44	45
75	29	30	31	32	33	34	34	35	36	37	38	39	40	41	42	43	44
80	28	29	30	30	31	32	33	34	35	36	37	38	39	39	40	41	42
85	27	28	29	29	30	31	32	33	34	35	36	36	37	38	39	40	41
90	26	27	27	28	29	30	31	32	33	34	34	35	36	37	38	39	40
95	25	26	27	27	28	29	30	31	32	33	33	34	35	36	37	38	39
100	24	25	26	27	27	28	29	30	31	32	33	33	34	35	36	37	38
105	23	24	25	26	27	27	28	29	30	31	32	33	33	34	35	36	37
110	23	23	24	25	26	27	28	28	29	30	31	32	33	34	34	35	36
115	22	23	24	24	25	26	27	28	29	29	30	31	32	33	34	35	35
120	21	22	23	24	25	25	26	27	28	29	30	30	31	32	33	34	35
125	21	22	22	23	24	25	26	26	27	28	29	30	31	31	32	33	34
130	20	21	22	23	23	24	25	26	27	28	28	29	30	31	32	33	34
135	20	21	21	22	23	24	25	25	26	27	28	29	30	30	31	32	33
140	19	20	21	22	22	23	24	25	26	26	27	28	29	30	31	32	32
145	19	20	20	21	22	23	24	24	25	26	27	28	29	29	30	31	32
150	19	19	20	21	22	22	23	24	25	26	26	27	28	29	30	31	31
155	18	19	20	20	21	22	23	24	24	25	26	27	28	28	29	30	31
160	18	18	19	20	21	22	22	23	24	25	26	26	27	28	29	30	31
165	17	18	19	20	20	21	22	23	24	24	25	26	27	28	29	29	30
170	17	18	19	19	20	21	22	22	23	24	25	26	26	27	28	29	30
175	17	17	18	19	20	20	21	22	23	24	24	25	26	27	28	29	30
180	16	17	18	19	19	20	21	22	23	23	24	25	26	27	28	28	29
185	16	17	18	18	19	20	21	21	22	23	24	25	26	26	27	28	29
190	16	17	17	18	19	20	20	21	22	23	24	24	25	26	27	28	29
195	16	16	17	18	19	19	20	21	22	22	23	24	25	26	27	27	28
200	15	16	17	18	18	19	20	21	21	22	23	24	25	25	26	27	28

Years to Boring Height

Site Index	10–11	12-17	18-22	23-28	29-33	34-38	39-44	45-49	50+
Correct yrs	10	9	8	7	6	5	4	3	2

Page 3

Table of Site Index by Breast Height Age and Height
Species: Ss- Sitka Spruce - Provincial

Top Height (m) 55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	Age @ bh
Site Index (m)																
																10
																15
																20
																25
																30
																35
																40
																45
																50
																55
50	51															60
48	49	50	51													65
46	47	48	49	50	51											70
45	45	46	47	48	49	50										75
43	44	45	46	47	48	49	50	51								80
42	43	44	45	45	46	47	48	49	50							85
41	42	43	43	44	45	46	47	48	49	50						90
40	41	41	42	43	44	45	46	47	48	49	50					95
39	40	41	41	42	43	44	45	46	47	48	49	50				100
38	39	40	41	41	42	43	44	45	46	47	48	49	50			105
37	38	39	40	41	42	42	43	44	45	46	47	48	49	50		110
36	37	38	39	40	41	42	43	44	44	45	46	47	48	49	50	115
36	36	37	38	39	40	41	42	43	44	45	46	46	47	48	49	120
35	36	37	38	39	39	40	41	42	43	44	45	46	47	48	49	125
34	35	36	37	38	39	40	41	42	42	43	44	45	46	47	48	130
34	35	36	36	37	38	39	40	41	42	43	44	45	46	46	47	135
33	34	35	36	37	38	39	40	40	41	42	43	44	45	46	47	140
33	34	35	35	36	37	38	39	40	41	42	43	44	45	45	46	145
32	33	34	35	36	37	38	39	39	40	41	42	43	44	45	46	150
32	33	34	35	35	36	37	38	39	40	41	42	43	44	45	45	155
32	32	33	34	35	36	37	38	39	40	40	41	42	43	44	45	160
31	32	33	34	35	36	36	37	38	39	40	41	42	43	44	45	165
31	32	33	33	34	35	36	37	38	39	40	41	42	42	43	44	170
30	31	32	33	34	35	36	37	38	38	39	40	41	42	43	44	175
30	31	32	33	34	35	35	36	37	38	39	40	41	42	43	44	180
30	31	32	32	33	34	35	36	37	38	39	40	41	41	42	43	185
29	30	31	32	33	34	35	36	37	38	38	39	40	41	42	43	190
29	30	31	32	33	34	35	35	36	37	38	39	40	41	42	43	195
29	30	31	32	32	33	34	35	36	37	38	39	40	41	42	43	200

Years to Boring Height

Site Index	10-11	12-17	18-22	23-28	29-33	34-38	39-44	45-49	50+
Correct yrs	10	9	8	7	6	5	4	3	2

Page 4

Figure A.58 Ss – Sitka Spruce - Provincial

Table of Site Index by Breast Height Age and Height
Species: Sw – White Spruce and Englemann Spruce – Provincial

Age @ bh	Top Height (m) 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
	Site Index (m)																						
10	23	27	31	34	36	39	42	44	47	49													
15	16	19	22	24	27	29	31	33	35	37	39	40	42	44	45	47	49	50					
20	13	15	17	19	21	23	25	26	28	30	31	33	34	36	37	39	40	42	43	44	46	47	48
25	10	12	14	16	17	19	21	22	24	25	27	28	29	31	32	33	35	36	37	38	40	41	42
30	8	10	12	13	15	16	18	19	20	22	23	24	26	27	28	29	30	32	33	34	35	36	37
35	7	9	10	11	13	14	15	17	18	19	20	22	23	24	25	26	27	28	30	31	32	33	34
40	6	8	9	10	11	12	14	15	16	17	18	19	20	22	23	24	25	26	27	28	29	30	31
45	6	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25	26	27	28	29
50	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
55	5	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20	21	22	23	24	25
60		5	6	7	7	8	9	10	11	12	13	14	15	15	16	17	18	19	20	21	22	23	24
65		5	5	6	7	8	8	9	10	11	12	13	13	14	15	16	17	18	19	20	21	22	23
70			5	6	6	7	8	9	9	10	11	12	13	13	14	15	16	17	18	19	20	21	22
75			5	5	6	7	7	8	9	9	10	11	12	13	13	14	15	16	17	18	19	20	21
80				5	6	6	7	7	8	9	10	10	11	12	13	13	14	15	16	17	18	19	20
85				5	5	6	6	7	8	8	9	10	10	11	12	13	14	14	15	16	17	18	19
90					5	5	6	7	7	8	9	9	10	11	11	12	13	14	15	15	16	17	18
95					5	5	6	6	7	7	8	9	9	10	11	12	12	13	14	15	16	16	17
100						5	5	6	6	7	8	8	9	10	10	11	12	12	13	14	15	16	17
105						5	5	6	6	7	7	8	8	9	10	10	11	12	13	13	14	15	16
110							5	5	6	6	7	7	8	9	9	10	11	11	12	13	14	15	15
115							5	5	6	6	7	7	8	8	9	10	10	11	12	12	13	14	15
120								5	5	6	6	7	7	8	9	9	10	10	11	12	13	14	14
125								5	5	6	6	7	7	8	8	9	9	10	11	12	12	13	14
130								5	5	5	6	6	7	7	8	8	9	10	10	11	12	13	13
135									5	5	6	6	6	7	8	8	9	9	10	11	11	12	13
140									5	5	5	6	6	7	7	8	8	9	10	10	11	12	13
145										5	5	6	6	6	7	7	8	9	9	10	11	11	12
150										5	5	5	6	6	7	7	8	8	9	10	10	11	12
155											5	5	6	6	6	7	7	8	9	9	10	11	12
160											5	5	5	6	6	7	7	8	8	9	10	10	11
165												5	5	6	6	6	7	8	8	9	9	10	11
170												5	5	5	6	6	7	7	8	8	9	10	11
175												5	5	5	6	6	7	7	8	8	9	10	10
180													5	5	5	6	6	7	7	8	9	9	10
185													5	5	5	6	6	7	7	8	8	9	10
190														5	5	6	6	6	7	7	8	9	9
195														5	5	5	6	6	7	7	8	8	9
200														5	5	5	6	6	7	7	8	8	9

Years to Boring Height

Site Index	5	6	7	8	9	10	11	12-13	14-15	16-17	18-20	21-25	26-33	34-47	48+
Correct yrs	30	27	24	22	20	19	18	17	16	15	14	13	12	11	10

SiteTools Version 3.2m – Research Branch, British Columbia Ministry of Forests
Date: March 11, 2002
Site Index Equation: Goudie (1984) (natural)

Page 1

Table of Site Index by Breast Height Age and Height
Species: Sw – White Spruce and Englemann Spruce – Provincial

Top Height (m) 28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	Age @ bh
Site Index (m)																							
																							10
																							15
49																							20
43	44	45	47	48	49	50																	25
39	40	41	42	43	44	45	46	47	48	50													30
35	36	37	38	39	40	41	43	44	45	46	47	48	49	50									35
32	33	34	35	36	37	38	40	41	42	43	44	45	46	47	48	49	50						40
30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50			45
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	50
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	55
25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	60
24	25	26	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	65
22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	70
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	75
21	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	80
20	21	22	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	85
19	20	21	22	23	24	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	90
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	95
18	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	100
17	18	19	20	21	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	39	105
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	110
16	17	18	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	38	115
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	120
15	16	17	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	34	35	36	37	125
14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	130
14	15	16	17	17	18	19	20	21	22	23	24	25	26	28	29	30	31	32	33	34	35	36	135
13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	35	36	140
13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	145
13	14	14	15	16	17	18	19	20	21	22	23	24	25	26	28	29	30	31	32	33	34	35	150
12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	33	34	35	155
12	13	14	15	16	17	17	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	160
12	12	13	14	15	16	17	18	19	20	21	22	23	24	26	27	28	29	30	31	32	33	34	165
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	29	30	31	32	33	34	170
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	32	33	34	175
11	12	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27	28	29	30	31	32	34	180
10	11	12	13	14	15	16	17	18	19	20	21	22	23	25	26	27	28	29	30	31	32	33	185
10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	27	28	29	30	31	32	33	190
10	11	12	12	13	14	15	16	18	19	20	21	22	23	24	25	26	27	29	30	31	32	33	195
10	10	11	12	13	14	15	16	17	18	19	21	22	23	24	25	26	27	28	29	31	32	33	200

Years to Boring Height

Site Index	5	6	7	8	9	10	11	12-13	14-15	16-17	18-20	21-25	26-33	34-47	48+
Correct yrs	30	27	24	22	20	19	18	17	16	15	14	13	12	11	10

Page 2

Figure A.59 Sw – White and Englemann Spruce - Provincial

BACK

Stump and Breast Height Diameter Tables for the British Columbia Merchantable Tree Species (Tables 4 to 8)[8]

The following tables (Tables 4 to 8) are designed to be used in the estimation of diameters breast height outside bark (DBH) from stump diameter inside bark (DSIB) measured at a fixed height above ground level (SH). Each table was derived from a regression equation that was fitted on butt diameter measurements of the same trees that were used in the Ministry of Forests and Range metric volume equations.

The regression equations are of the following form:

$$DBH=DSIB+b_0*DSIB*(2.3–SH)+b_1*DSIB*1n\left[(SH+1.0)/2.3\right]$$

where DBH and DSIB are in centimetres. SH is measured in metres and can range from 0.15 to 1.05 m. For a given stump cruise, all DSIB measurements should be at a given stump height to facilitate computer compilation.

The constant b_0 and b_1 for the various species and zones are listed in Table 4.

A spreadsheet to calculate breast height using the above equation can be found at the following website:

Cruising Calculations

[8] A. Kozak, Faculty of Forestry, University of British Columbia and S. A. Omule, Research Branch, Ministry of Forests, February 1989.

Constants for Species and Zones (Table 4)

Species	Age*	Zone[b]	No. of Observations	B_0	B_1	SEE[c]
Douglas-fir	MAT.	ABC	2027	0.192451	0.656977	5.24
Douglas-fir	IMM.	ABC	1180	0.155107	0.564107	1.77
Douglas-fir	ALL	D-L	9978	0.189385	0.712098	3.62
Red Cedar	MAT.	ABC	1988	0.032043	0.585026	5.70
Red Cedar	IMM.	ABC	1297	0.055116	0.706639	2.98
Red Cedar	ALL	D-L	4669	0.059052	0.655006	4.16
Red Cedar	ALL	A-QCI	200	0.0297088	.404490	5.96
Hemlock	MAT.	ABC	4058	0.064571	0.534355	4.68
Hemlock	IMM.	ABC	2167	0.077996	0.438284	1.73
Hemlock	ALL	D-L	5466	0.100771	0.504787	2.94
Hemlock	ALL	A-QCI	323	0.0508525	0.360565	6.50
Spruce	MAT.	ABC	1197	0.021123	0.530663	8.23
Spruce	IMM.	ABC	980	0.046301	0.580005	4.23
Spruce	ALL	D-J	13755	0.065728	0.575037	3.11
Spruce	ALL	KL	11494	0.062808	0.442810	1.46
Spruce	ALL	A-QCI	184	0.0299746	0.413498	6.48
Balsam	ALL	ABC	2548	0.057484	0.573054	4.84
Balsam	ALL	D-J	11760	0.073625	0.477491	2.02
Balsam	ALL	KL	2307	0.073358	0.431277	1.24
Yellow-Cedar	ALL	A-L	905	0.037211	0.460492	2.03
Yellow Cedar	ALL	A-QCI	106	0.0217802	0.289677	3.61
White Pine	ALL	ABC	275	0.057377	0.561538	3.32
White Pine	ALL	D-L	774	0.056953	0.449184	1.76
Lodgepole pine	ALL	A-J	8318	0.056984	0.374589	1.23
Lodgepole pine	ALL	KL	5259	0.051075	0.337046	0.91
Yellow pine	ALL	A-L	2023	0.154163	0.638001	3.18
Larch	ALL	A-J	2520	0.190001	0.682016	4.06
Larch	ALL	KL	811	0.078977	0.532930	0.91
Cottonwood	ALL	A-J	996	0.117130	0.565108	3.91
Cottonwood	ALL	KL	2137	0.136074	0.498340	1.80
Alder	ALL	A-L	1556	0.055705	0.374983	1.34
Maple	ALL	A-L	416	0.064992	0.421552	0.72
Birch	ALL	A-J	923	0.070797	0.455765	1.60
Birch	ALL	KL	750	0.070901	0.407800	0.84
Aspen	ALL	A-J	2204	0.103886	0.492890	1.55
Aspen	ALL	KL	4100	0.097907	0.469721	1.50
Whitebark pine	ALL	A-L	148	0.036171	0.482541	1.66

*Age: IMM. = immature, up to 120 years old, MAT. = mature, more than 120 years old, ALL = all ages.

[b]Zone: A = North and central coast region, B = Southern coast region, C = South Coast transition belt, D = South western interior dry belt, E = West Kootenay region, F = East Kootenay region, G = central Columbia region, interior wet belt, H = Nechako, Fraser plateau region, I = Central interior, J = North west plateau region, Stikine, Skeena, K = North Central Region, Cassiar, Omineca, L = North eastern plains region.

[c]SEE: = Standard error of estimated DBH, for all diameter classes (cm).

Note - QCI = Queen Charlottes PSYU

Butt Taper - Mature - FIZ A, B and C – Coast (Table 5)

dbh (ob)	F*		C*		H*		B		S*		Y	
(cm) @ 1.3 m	dib	dob	dib	dob	dib	dob	dib	dob	dib	dob	dib	dob
06	6	7	8	9	7	8	8	8	8	8	7	8
08	8	9	11	11	10	10	10	10	11	11	10	10
10	10	12	14	14	12	13	13	13	14	14	12	13
12	12	14	17	17	15	15	15	16	16	17	15	15
14	14	17	19	20	17	18	18	18	19	19	17	18
16	16	19	22	22	19	20	20	21	22	22	20	20
18	18	21	25	25	22	23	23	23	24	25	22	23
20	20	24	27	28	24	25	25	26	27	27	25	25
22	22	26	30	31	27	28	28	29	30	30	27	28
24	24	28	33	34	29	30	31	31	33	33	30	31
26	26	31	36	37	32	33	33	34	35	36	32	33
28	28	33	38	39	34	35	36	36	38	38	35	36
30	30	35	41	42	36	38	38	39	41	41	37	38
32	32	38	44	45	39	40	41	41	43	44	39	41
34	34	40	47	48	41	43	43	44	46	47	42	43
36	36	43	49	51	44	45	46	47	49	49	44	46
38	38	45	52	54	46	48	48	49	51	52	47	48
40	40	47	55	56	49	50	51	52	54	55	49	51
42	42	50	58	59	51	53	53	54	57	58	52	53
44	44	52	60	62	53	55	56	57	60	60	54	56
46	46	54	63	65	56	58	58	60	62	63	57	59
48	48	57	66	68	58	60	61	62	65	66	59	61
50	50	59	69	70	61	63	64	65	68	69	62	64
55	55	65	75	77	67	69	70	71	74	75	68	70
60	59	71	82	84	73	76	76	78	81	82	74	76
65	64	77	89	92	79	82	83	84	88	89	80	83
70	69	83	96	99	85	88	89	91	95	94	86	89
75	74	89	103	106	91	94	95	97	101	103	92	95
80	79	94	110	113	101	102	104	108	108	110	99	102
85	84	100	116	120	103	107	108	110	115	116	105	108
90	89	106	123	127	109	113	114	117	122	123	111	114
95	94	112	130	134	115	120	121	123	129	130	117	121
100	99	118	137	141	121	126	127	130	135	137	123	127
105	104	124	144	148	127	132	133	136	142	144	129	133
110	109	130	151	155	134	138	140	142	149	151	136	140
115	114	136	158	162	140	145	146	149	156	158	142	146
120	119	142	164	169	146	151	152	155	162	164	148	153

* Mature - Forest Inventory Zones - A, B, C, - Coast (table shows diameter at stump height of 0.3 m).

dbh (ob)	Pw		Pl		Ac		Alder		Maple		Birch	
(cm) @ 1.3 m	dib	dob	dib	dob	dib	dob	dib	dob	dib	dob	dib	dob
06	8	8	7	7	7	7	7	7	7	7	7	7
08	10	10	9	10	9	10	9	9	9	10	9	10
10	13	13	11	12	11	12	11	12	11	12	11	12
12	15	16	13	14	13	14	13	14	14	14	14	15
14	18	18	16	17	15	17	16	17	16	17	16	17
16	20	21	18	19	18	19	18	19	18	19	18	19
18	23	23	20	21	20	21	20	21	20	22	20	22
20	25	26	22	24	22	24	22	24	23	24	23	24
22	28	28	24	26	24	26	25	26	25	26	25	27
24	30	31	27	28	26	28	27	28	27	29	27	29
26	33	34	29	31	29	31	29	31	29	31	30	31
28	35	36	31	33	31	33	31	33	32	34	32	34
30	38	39	33	36	33	36	33	35	34	36	34	36
32	40	41	36	38	35	38	36	38	36	38	36	39
34	43	44	38	40	37	40	38	40	38	41	39	41
36	45	46	40	43	40	43	40	42	41	43	41	43
38	48	49	42	45	42	45	42	45	43	45	43	46
40	50	52	44	47	44	47	45	47	45	48	45	48
42	53	54	47	50	46	50	47	49	47	50	48	51
44	55	57	49	52	48	52	49	52	50	53	50	53
46	58	59	51	54	51	55	51	54	52	55	52	55
48	60	62	53	57	53	57	54	56	54	57	55	58
50	63	65	56	59	55	59	56	59	56	60	57	60
55	69	71	61	65	60	65	61	65	62	66	62	66
60	76	77	67	71	66	71	67	71	68	72	68	72
65	82	84	72	77	71	77	72	76	73	78	74	78
70	88	90	78	83	77	83	78	82	79	84	79	84
75	94	97	83	89	82	89	84	88	84	90	85	90
80	101	103	89	95	88	95	89	94	90	96	91	96
85	107	110	94	100	93	101	95	100	96	102	96	102
90	113	116	100	106	99	107	100	106	101	108	102	108
95	102	123	106	112	104	113	106	112	107	114	108	115
100	126	129	111	118	110	118	111	118	112	120	113	121
105	132	135	117	124	115	124	117	123	118	126	119	126
110	139	142	122	130	121	130	123	129	124	131	125	133
115	145	148	128	136	126	136	128	135	129	137	131	139
120	151	155	133	142	132	142	134	141	135	143	136	145

* Mature - Forest Inventory Zones - A, B, C, - Coast (table shows diameter at stump height of 0.3 m).

Butt Taper - All Ages - FIZ D to J – Interior (Table 6)

dbh (ob)	F		C		H		B		S		Pw	
(cm) @ 1.3 m	dib	dob	dib	dob	dib	dob	dib	dob	dib	dob	dib	dob
06	6	7	8	8	7	7	7	7	8	8	7	7
08	8	10	11	11	9	9	9	10	10	11	9	10
10	10	12	14	14	11	12	11	12	13	13	12	12
12	12	15	16	17	13	14	14	15	15	16	14	15
14	14	17	19	19	15	17	16	17	17	18	16	17
16	17	20	22	22	18	19	18	19	20	21	19	20
18	19	22	24	25	20	21	21	22	22	24	21	22
20	21	25	27	28	22	23	23	24	25	26	23	25
22	23	27	30	31	24	26	25	27	27	29	26	27
24	25	30	32	33	26	28	27	29	30	32	28	30
26	27	32	35	36	29	31	30	31	32	34	30	32
28	29	35	38	39	31	33	32	34	35	37	33	35
30	31	37	40	42	33	35	34	36	37	39	35	37
32	33	40	43	44	35	38	37	39	40	42	37	39
34	35	42	46	47	37	40	39	41	42	45	40	42
36	37	45	48	50	39	42	41	44	45	47	42	44
38	39	47	51	53	42	45	43	46	47	50	44	47
40	41	49	54	55	44	47	46	48	50	53	47	49
42	43	52	56	58	46	50	48	51	52	55	49	52
44	45	54	59	61	48	52	50	53	55	58	51	54
46	47	57	62	64	50	54	53	56	57	60	54	57
48	49	59	65	67	53	56	55	58	60	63	56	59
50	51	62	67	69	55	59	57	60	62	66	58	62
55	57	68	74	76	60	65	63	66	69	72	64	68
60	62	74	81	83	66	71	69	73	75	79	70	74
65	67	80	87	90	71	77	74	79	81	85	76	80
70	72	87	94	97	77	82	80	85	87	92	82	86
75	77	93	101	104	82	88	86	91	93	98	88	92
80	82	99	108	111	88	94	92	97	100	105	93	99
85	87	105	114	118	93	100	97	103	106	112	99	105
90	93	111	121	125	99	106	103	109	112	118	105	111
95	98	117	128	132	104	112	109	115	118	125	110	117
100	103	124	134	139	110	118	114	121	125	131	117	123
105	108	130	141	145	115	124	120	127	131	138	122	129
110	113	136	148	152	121	130	126	133	137	144	128	136
115	118	142	155	159	126	135	132	139	143	151	134	142
120	123	148	161	166	131	141	137	145	149	157	140	148

All Ages - Forest Inventory Zones - D to J - Interior (table shows diameter at stump height of 0.3 m).

dbh (ob)	Pl		Py		Larch		Ac		Birch		Aspen	
(cm) @ 1.3 m	dib	dob	dib	dob	dib	dob	dib	dob	dib	dob	dib	dob
06	7	7	6	7	6	8	7	7	7	7	7	7
08	9	10	9	10	8	11	9	10	9	10	9	10
10	11	12	11	12	10	14	11	12	11	12	11	12
12	13	14	13	15	12	16	13	14	14	15	13	14
14	16	17	15	17	14	19	15	17	16	17	15	17
16	18	19	17	20	16	22	18	19	18	19	17	19
18	20	21	19	22	18	24	20	21	20	22	19	21
20	22	24	21	25	20	27	22	24	23	24	22	24
22	24	26	23	27	22	30	24	26	25	27	24	26
24	27	28	25	30	24	33	26	28	27	29	26	29
26	29	31	28	32	26	35	29	31	30	31	28	31
28	31	33	30	35	28	38	31	33	32	34	30	33
30	33	36	32	37	30	41	33	35	34	36	32	36
32	36	38	34	40	32	43	35	38	36	39	35	38
34	38	40	36	42	34	46	37	40	39	41	37	40
36	40	43	38	45	36	49	40	43	41	43	39	43
38	42	45	40	47	38	52	42	45	43	46	41	45
40	44	47	42	50	40	54	44	47	45	48	43	48
42	47	50	45	52	42	57	46	50	48	51	45	50
44	49	52	47	55	44	60	48	52	50	53	48	52
46	51	54	49	57	46	62	51	54	52	55	50	55
48	53	57	51	59	48	65	53	57	55	58	52	57
50	56	59	53	62	50	68	55	59	57	60	54	60
55	62	65	58	68	56	75	60	65	62	66	59	66
60	67	71	64	74	61	81	66	71	68	72	65	72
65	72	77	69	81	66	88	71	77	74	78	70	77
70	78	83	74	87	71	95	77	83	79	84	76	83
75	83	89	80	93	76	102	82	89	85	90	81	89
80	89	95	85	99	81	109	88	95	91	96	86	95
85	94	100	90	105	86	115	93	101	96	102	92	101
90	100	106	95	111	91	122	99	107	102	108	97	107
95	106	112	101	118	96	129	104	113	108	115	103	113
100	111	118	106	124	101	136	110	118	113	121	108	120
105	117	124	111	130	106	143	115	124	119	127	113	125
110	122	130	117	136	111	149	121	130	125	133	119	131
115	128	136	122	142	116	156	126	136	131	139	124	137
120	133	142	127	149	121	163	132	142	136	145	130	143

All Ages - Forest Inventory Zones - D to J - Interior (table shows diameter at stump height of 0.3 m).

Butt Taper - All Ages - FIZ K and L – Interior (Table 7)

(Table shows diameter at stump height of 0.3 m)

dbh (ob)	H		B		S		Pl	
(cm) @ 1.3 m	dib	dob	dib	dob	dib	dob	dib	dob
06	7	7	7	7	7	7	7	7
08	9	9	9	9	9	10	9	9
10	11	12	11	12	12	12	11	12
12	13	14	13	14	14	15	13	14
14	15	17	16	17	16	17	15	16
16	18	19	18	19	18	19	18	18
18	20	21	20	21	21	22	20	21
20	22	23	22	24	23	24	22	23
22	24	26	24	26	25	27	24	25
24	26	28	27	28	28	29	26	28
26	29	31	29	31	30	31	29	30
28	31	33	31	33	32	34	31	32
30	33	35	33	35	34	36	33	34
32	35	38	36	38	37	39	35	37
34	37	40	38	40	39	41	37	39
36	39	42	40	42	41	43	40	41
38	42	45	42	45	44	46	42	44
40	44	47	44	47	46	48	44	46
42	46	50	47	50	42	51	46	48
44	48	52	49	52	50	53	48	50
46	50	54	51	54	53	56	51	53
48	53	56	53	57	55	58	53	55
50	55	59	56	59	57	60	55	57
55	60	65	61	65	63	66	61	63
60	66	71	67	71	69	72	66	69
65	71	77	72	77	75	78	71	75
70	77	82	78	82	80	84	77	80
75	82	88	83	88	86	91	82	86
80	88	94	89	94	92	97	88	92
85	93	100	94	100	97	103	93	98
90	99	106	100	106	103	109	99	103
95	104	112	106	112	109	115	104	109
100	110	118	111	118	115	121	110	115
105	115	124	117	124	120	127	115	121
110	121	130	122	130	126	133	121	126
115	126	135	128	135	132	139	126	132
120	131	141	133	141	138	145	132	138

dbh (ob)	Larch		Ac		Birch		Aspen	
(cm) @ 1.3 m	dib	dob	dib	dob	dib	dob	dib	dob
06	7	8	6	7	7	7	7	7
08	9	10	8	9	9	9	9	10
10	12	13	10	11	11	12	11	12
12	14	15	12	14	13	14	13	14
14	16	18	14	16	15	16	15	17
16	19	20	16	18	18	19	17	19
18	21	23	18	20	20	21	19	22
20	23	25	20	23	22	23	22	24
22	26	28	22	25	24	26	24	26
24	28	30	24	27	26	28	26	29
26	31	33	26	29	29	30	28	31
28	33	35	28	32	31	33	30	34
30	35	38	30	34	33	35	32	36
32	38	40	32	36	35	38	35	38
34	40	43	34	39	37	40	37	41
36	43	45	36	41	40	42	39	43
38	45	48	39	43	42	45	41	45
40	47	50	41	45	44	47	43	48
42	49	53	43	48	46	49	45	50
44	52	55	45	50	48	52	47	53
46	54	58	47	52	51	54	50	55
48	56	60	49	54	53	56	52	57
50	59	63	51	57	55	59	54	60
55	64	69	56	62	61	64	59	66
60	70	75	61	68	66	70	65	72
65	76	81	66	74	72	76	70	78
70	82	88	71	79	77	82	75	84
75	88	94	76	85	83	88	81	90
80	94	100	81	91	88	94	86	96
85	100	106	86	96	94	100	92	102
90	105	113	91	102	99	105	97	108
95	111	119	96	108	105	111	102	114
100	117	125	101	113	110	117	108	120
105	123	132	106	119	116	123	113	126
110	129	138	111	125	121	129	119	132
115	135	144	116	130	127	135	124	138
120	140	150	121	136	132	141	129	144

Butt Taper - Immature - FIZ A, B and C – Coast (Table 8)

(Table shows diameter at stump height of 0.3 m)

dbh (ob)	F		C		H		S	
(cm) @ 1.3 m	dib	dob	dib	dob	dib	dob	dib	dob
06	6	7	9	9	7	7	8	8
08	8	10	11	12	9	10	11	11
10	10	12	14	15	11	12	13	13
12	12	14	17	18	13	14	16	16
14	14	17	20	20	16	17	18	19
16	16	19	23	23	18	19	21	21
18	18	21	26	26	20	21	24	24
20	20	24	28	29	22	24	26	27
22	22	26	31	32	24	26	29	29
24	24	29	34	35	27	28	32	32
26	26	31	37	38	29	31	34	34
28	28	33	40	41	31	33	37	37
30	30	36	42	44	33	36	39	40
32	32	38	45	47	35	38	42	42
34	34	40	48	50	38	40	45	45
36	36	43	51	53	40	43	47	48
38	38	45	54	55	42	45	50	50
40	41	48	57	58	44	47	53	53
42	43	50	59	61	46	50	55	56
44	45	52	62	64	49	52	58	58
46	47	55	65	67	51	54	60	61
48	49	57	68	70	53	57	63	64
50	51	59	71	73	55	59	66	66
55	56	65	78	80	61	65	72	73
60	61	71	85	87	66	71	79	79
65	66	77	92	95	72	77	85	86
70	71	83	99	102	77	83	92	93
75	76	89	106	109	83	89	99	99
80	81	95	112	117	88	95	105	106
85	86	101	120	124	94	101	112	113
90	91	107	127	131	99	106	118	119
95	96	113	134	138	105	112	125	126
100	101	119	142	146	110	118	131	132
105	106	125	149	153	116	124	138	139
110	111	131	156	160	121	130	144	146
115	116	137	163	168	127	136	151	152
120	121	142	170	175	133	142	158	159

Timber Type Label Information

Timber type labels have traditionally followed inventory naming conventions. The fields within the inventory labels are presented below:

Major Species: A species is major if it comprises 20 percent or more of the total gross volume.

Species #1: Leading species in terms of gross volume in the type.

Species #2: Second leading species in terms of gross volume in the type.

Species #3: Third leading species in terms of gross volume in the type.

Minor Species: A minor species comprises less than 20 percent of the gross volume for the type. Usually identified by brackets in the label.

Age Class

Code	Age Class Limits
1	1-20 years
2	21-40 years
3	41-60 years
4	61-80 years
5	81-100 years
6	101-120 years
7	121-140 years
8	141-250 years
9	250+ years

Height Class (metres)

Code	Height Class Limits (metres)
1	0-10.4
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 +

Site Class

Site is determined for all productive forest types by the application of sample tree age and height measurements in the Site Index Tables for British Columbia – All Species (Appendix 9).

	Code
G	good site
M	medium site
P	poor site
L	low site

Type Identity

The recognized classes of cover on forest land are Immature, Mature, Mature Residual, Not Satisfactorily Restocked (NSR), Non-commercial (NC), and Non-Productive Forest.

Code	Identity	Description
1	Immature (Imm.)	Coniferous trees younger than 121 years with the exception of deciduous which must be younger than 41 years to be classed as immature.
2	Mature (Mat.)	Coniferous trees older than 120 years with the exception of deciduous species where the age break is more than 40 years.
3	Mature Residual (Mat. R.)	Types disturbed 26 to 75 percent; supporting remnants of the original forest stand where the most significant element of the surviving stand is classed as mature.
4	NSR	Denuded areas that do not meet minimum stocking requirements of approximately 750 healthy, well-distributed seedlings or juvenile stems per hectare.
5	Non-Commercial (NC)	This cover class is used very sparingly being confined almost exclusively to deciduous brush growing on productive sites. On occasion it may be used to describe stands usually disturbed, of very low quality that cannot be, as a practical matter, classified as commercial, NSR or DSD.
6	Non-Productive Forest	Forest land of very low productivity presenting no commercial possibilities in the foreseeable future.

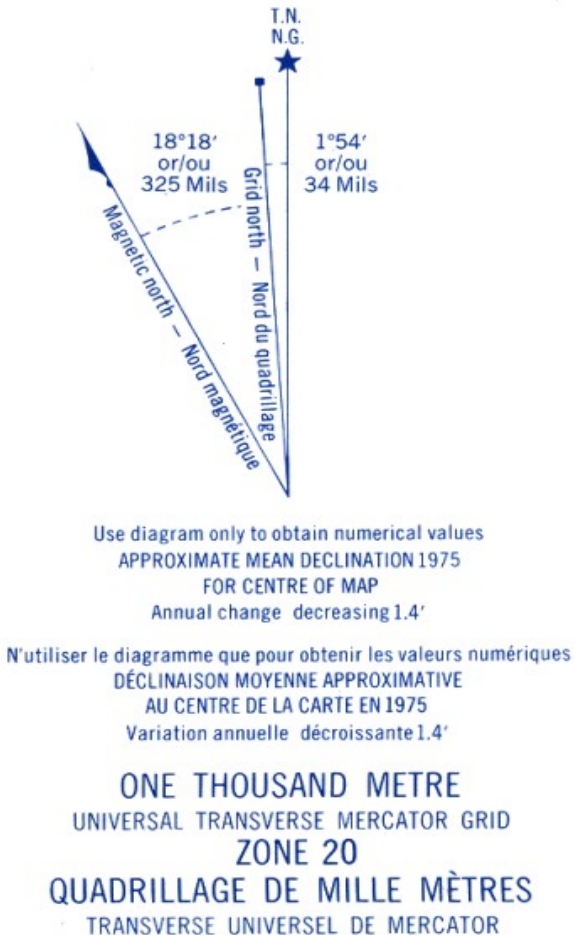
True North, Magnetic North and Grid North

The following is an explanation prepared by Ted Vint, RFT – West Fraser Mills Ltd

There are three different definitions of North, commonly seen in forestry mapping. Which one is relevant depends on whether one is looking at a compass or map (and what map projections are used to align the map, or are displayed as grids on the map). A cruise grid design is best done in alignment with true north.

- **True North** can be found on a map where there are meridians (north-south running lines) that run straight at the earth's actual North Pole. The best example of this would be the Geographic Coordinate System, in which the grid is made up of lines of latitude and longitude. The BC Albers projection also has meridians that lead to true north.
- **Magnetic North** is the direction to the magnetic north pole, which is constantly changing. A magnetic declination calculator is available at http://geomag.nrcan.gc.ca/apps/mdcal-eng.php, which will give the current declination for any location, as compared to true north. Declination values could also come from other sources, like federal government topographic maps, which give the declination in relation to grid north (see blue diagram to right).
- **Grid North:**
  a) **The Universal Transverse Mercator (UTM) projection** grid leads to 'grid north', which only matches true north at the centre of each UTM Zone. Grid north differs more and more from true north, as one moves east or west of the central meridian of the UTM Zone.

  b) **The BC Albers projection** grid also leads to its own 'grid north', which only matches true north at its central meridian (at 126° Longitude). Grid north differs more and more from true north, as one moves east or west of the central meridian.



The edges of a map could potentially align with either true north or grid north.

- The example below shows a cruise grid aligned with the lines of latitude and longitude (in green), and illustrates how North on the UTM grid (red) can be several degrees different from the True North of the geographic grid.

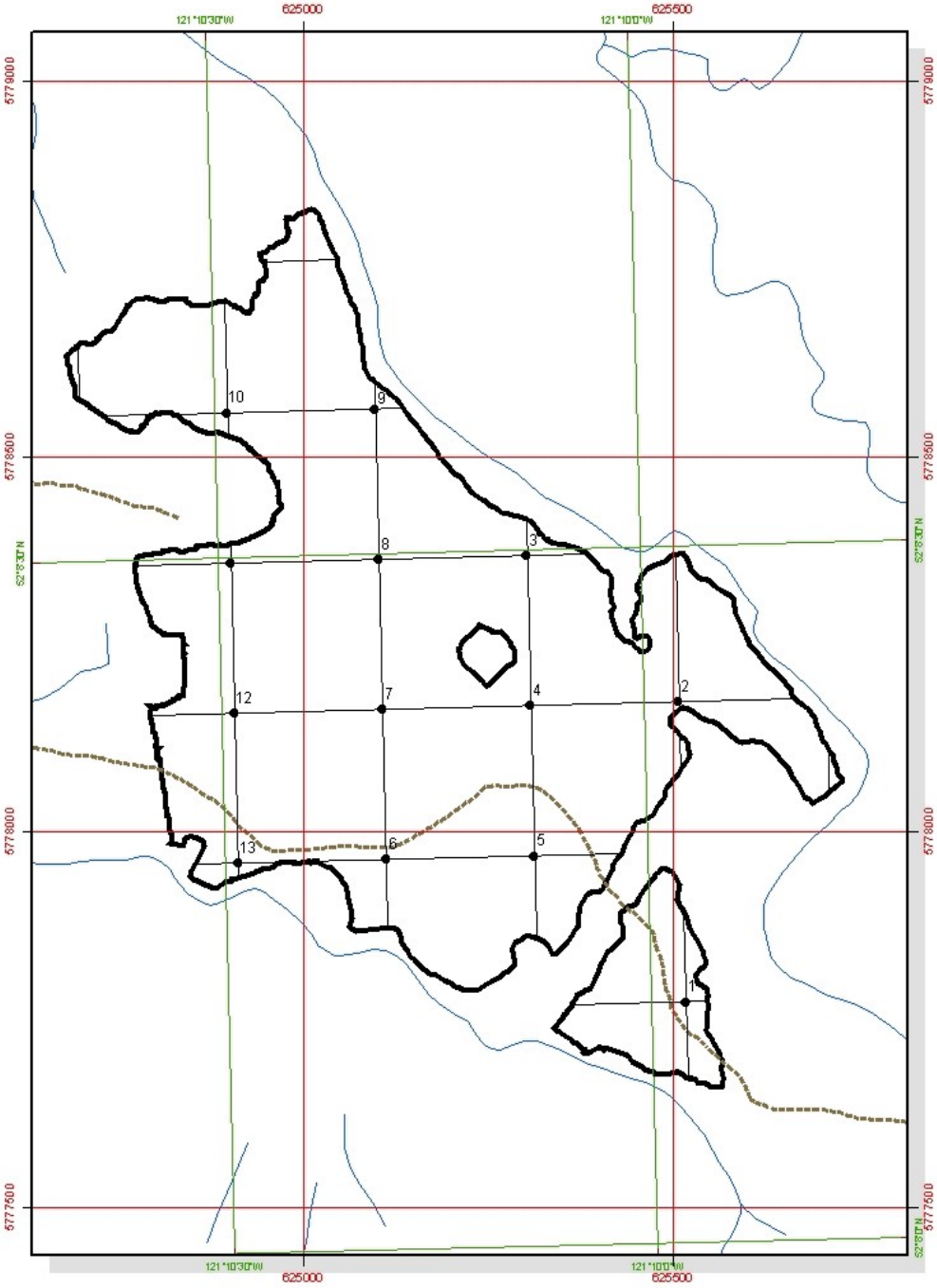


Figure A.60 Map showing difference between True North and Grid North