

File: 308-07/CRUI

July 6, 1998

To: Regional Managers

Re: *Provincial Cruising Manual*

Attached is Amendment No. 1 to the *Provincial Cruising Manual* which comes into effect on July 15, 1998.

Comments or questions concerning the technical content of this amendment should be referred to Don Rorison, Cruising Projects Specialist, Revenue Branch at 250-356-7674 or Maarten Prinsze, Cruising Policy Forester, Revenue Branch at 250-387-8357.

This is the only circulation of this amendment that the Ministry of Forests is providing for Crown Publications subscribers. All future general public requests for cruise manuals or amendments should be referred to Crown Publications, 521 Fort Street, Victoria, British Columbia, V8W 1E7 telephone at 250-386-4636 and Facsimile 250-386-0221. Also, please be advised that the *Provincial Cruising Manual* is scheduled for release on the Revenue Branch web site later this year.



Bill Howard
Director
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Attachment

pc All Manual Subscribers



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MANUAL TITLE

Cruising Manual

**AMENDMENT
NO.**

1

ISSUE DATE

July 15, 1998

MANUAL CO-ORDINATOR

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AUTHORIZATION (Name, Title)

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Please make the following changes to your copy of the above Ministry manual. Please insert the following specified pages and **file this notice** immediately after the Amendments Tab.

ACTION (Remove/Insert)	(VOL.) CHAPTER-SECTION-SUBJECT	PAGE(S)	COMMENTS
	TABLE OF CONTENTS		
REMOVE/INSERT	Table of Contents	vii - viii	
REMOVE/INSERT	Chapter 2 - Section 2.11	1 - 2	Notation added to clarify the interpretation of full measure plots throughout the Provincial Cruising Manual and the sampling error objective must be based on the full measure and count plots.
REMOVE/INSERT	Chapter 2 - Section 2.812	15 - 16	Half and border count plots must be converted to full measure half and border plots.
REMOVE/INSERT	Chapter 3 - Section 3.621 c.	27 - 28	Tree Heights
REMOVE/INSERT	Chapter 7 - Section 7.2 Position 14	7 - 8	Notation to address the Wet Belt/Dry Belt compilations when a cutting authority cruise occupies more than one Biogeoclimatic Zone, Subzone or Variant.
REMOVE/INSERT	Tables 17 & 18	T35 - T36	Age in 10's and tree class table required headers for clarification and risk group rating tables corrected for mature Cedar and older immature Douglas Fir.
REMOVE/INSERT	Appendices A.3	A7 - A8	Internet site corrected.
REMOVE/INSERT	Appendices A5.2	A11 - A12	Do not record pathological indicators above utilization top diameter.
REMOVE	Appendices A9.32	A71 - A76	Standing trees broken in the middle third will have only windthrow damage code E or F assigned. Call a dead/broken top in the middle third if the damage is greater than or equal to 5 years old. Examples of windthrow damage situations have been appended to clarify the windthrow damage coding. Note: Pages A75 to A78 have no revisions but page numbers have changed.
INSERT		A71 - A78	
INSERT	Transmittal and memo		After Amendment Tab

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Glossary

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2.1 Cruise Objective

The objective of the cruise is to obtain an estimate, to a specified degree of accuracy and with a specified level of confidence, of the volume of timber on the area cruised. The area cruised may be one or several cutting blocks that will be covered under one cutting permit and subject to one appraisal. In order to achieve the required accuracy, each cruise must be planned and approved by a forest officer prior to the field work being undertaken (see Section 3.64). Unless special circumstances indicate otherwise, a systematic design for plot layouts must be used.

The cruise plan and the accuracy requirements are affected by the timber appraisal.

1. For scale-based sales, the cruise provides the basis for determining the stumpage rate while the amount billed is based on the scale.

For cruise-based sales, both the estimate of the stumpage rate and billing are based on the cruise.

2. In special cases, such as salvage sales and right-of-way sales, cruising standards may be set by the Regional Manager in accordance with Chapter 4 of *Coast and Interior Appraisal Manuals*.

2.11 Scale-Based Stumpage Assessment-Timber Sales or Cutting Permits

For *scale based* sales, one of the following is required:

Sampling Objective - 15% sampling error at 2 standard errors based on the total stand (before reduction). Include all species listed under Section 6.32 of this manual and minimum tree sizes as specified in the *Timber Utilization Standards* issued by Resource Tenures and Engineering Branch. Where the 15% sampling error is achieved, the minimum number of trees per plot listed below is recommended but is not a check cruising concern.

1. Minimum Number of Plots - Where the sampling error is not expected to be achieved:
 - a. For cruises 10 hectares or less a minimum of 2 measure plots per hectare are required.

- b. For cruises larger than 10 hectares the minimum number of measure plots will be calculated as **Hectares + 10**.
2. Clearcutting - area clearcut is 90% or more of the total net cruise area.

All references to "plots", "cruise plots", and "measure plots" must be interpreted as Full Measure Plots unless specified otherwise. Sampling Error objective is based on full measure and count plots.

- a. Count plots may be used provided that there are at least 25 measure plots and a ratio of 3 counts to 1 full measure plots is not exceeded.
 - b. The required minimum average number of trees per plot is 4 excluding live and dead useless trees.
3. Partial Cutting - area clearcut is less than 90% of the total net cruise area.
- a. Count Plots cannot be used in the cruise compilation for appraisal purposes but may be useful for basal area and species selection criteria.
 - b. The required minimum average number of trees per plot is 6 excluding live and dead useless trees.
4. Silviculture systems that qualify for the clearcutting specifications are:
- a. Clearcut
 - b. Seed tree
 - c. Coppice (deciduous only)
 - d. Riparian Management Zones (RMZ) which will be partially cut and represent less than 10% of the cruise area
- All plots must originate from the harvest area.
5. Silviculture systems that qualify for the partial cutting specifications are:
- a. Shelterwood
 - b. Selection
 - c. Patch cut
 - d. Patchcut with reserves
 - e. Intermediate cuttings

2.8 Double-Sampling

As the name implies double-sampling consists of sampling certain characteristics within a sample instead of measuring those characteristics throughout the sample. Double-sampling improves the volume estimate by species.

2.81 Type of Plots

Double-sampling requires the use of two types of prism plots, the measured plot and the count plot. The measure and count plots together represent the main sample. Fixed-radius plots may not be used in this form of double-sampling.

2.811 Measured Plots

The measured plots are conventional samples in which all variables for each tree are measured, identified, recorded and represent the subsample in the double sampling cruise.

2.812 Count Plots

Count plots are samples in which only trees by species are tallied. All live and dead potential trees which are to be included in the compilation are noted. Do not include any tree below the lower dbh to be compiled for that species or tree class 4 (dead useless) or tree class 6 (live useless) trees. Half plots and border plots are not permitted in count plots. These plots must be converted to measure half and border plots.

It is not possible to compile a double sampled cruise with a species recorded in a count-plot by a species which has not been sampled in a measured plot. A cruiser who finds in a count-plot, a tree species which has not been sampled in a measured-plot, and which may not be sampled in the remaining measured-plots, should change the count-plot to a measured-plot to ensure that a measured tree of that species is tallied.

If, at the compilation stage, an unmeasured species is found to have been recorded in a count plot, refer the matter to the Regional Manager or their designate to resolve the problem.

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c. Heights:

- Any significant bias to tree height measurements will result in rejection.
- Use a clinometer and measuring tape or an electronic measuring device to check all tree heights. The accuracy of electronic measuring devices must be demonstrated prior to the commencement of check cruising if they will be used for the true height.
- A minimum of 20 tree heights must be checked. If the total cruise does not have 20, then check a minimum of 50% of the heights.

All Tree Heights

- Average absolute variation must not exceed 5%.

Original	Check	Difference
40.0	42.0	-2.0
42.0	41.0	1.0
43.0	44.0	-1.0
46.0	44.0	2.0
Sum =	171.0	6.0

$$\text{Absolute Variation} = \frac{6.0}{171.0} = 3.51\%$$

d. Pathological Indicators:**i. Plots**

- i. ± 1 external indicator on an individual plot. The wrongly called indicator must move the tree from one Risk Group to another as described in "Metric Diameter Class Decay, Waste and Breakage Factors".

ii. Block or Cutting Permit

- ii. No more than 5% of all trees checked can have a risk group change.

ANY ONE OF THE FOREGOING ITEMS WHICH ARE OUTSIDE THE PERMISSIBLE MEASUREMENT STANDARD, SHOULD BE GROUNDS FOR REDOING THE WORK.

e. Ages:

Refer to Section 3.591 for exceptions.

- 95% of all trees must be placed in the correct maturity class for loss factor deductions.

f. Breast Height: When this limit is exceeded, the true position is used for i and ii below.		- The height of the diameter-line marked at breast-height must not exceed $\pm 5\%$ (± 6.5 cm) from the true breast-height of 1.3 metres above high-side.
Diameter at Breast-Height (dbh): - as measured with a steel or equally accurate dbh tape. - DU trees can be estimated to the nearest 5 cm class.		i. $\geq 90\%$ of individual stems checked must be within 2% of true dbh. ii. Average absolute variation of all dbh's checked must be within $\pm 2\%$.
g. Strip lines or tie lines to prism or fixed-area plots.	$\pm 3\%$ of horizontal distance	$\pm 3\%$
Bearing-strip to strip or plot to plot and plot center reference.	$\pm 2^\circ$	$\pm 2^\circ$
Plot center reference	$\pm 1\%$ of horizontal distance	
Radius - fixed area plots	$\pm 1\%$ of horizontal distance	
Radius - prism plots	$\pm 1\%$ of horizontal distance	
Length and width: fixed rectangular plots	$\pm 1\%$ of horizontal distance	
Boundary Traverse	Cruise-Based	Scale-Based
- closure error	$\pm 0.7\%$	$\pm 1\%$
- area error	$\pm 1\%$	$\pm 1.5\%$
- inter-station distance	$\pm 1\%$	$\pm 2\%$

3.622 Quality - as they affect grade (Coast) or quality class (Interior fir)

<p>a. Pathological indicators:</p>	<p>- $\geq 90\%$ of these individual indicators which occur in the middle or lower 1/3 of the stem must be coded in the correct third on an individual plot.</p>
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7.2 Card Type B

Position 1

This card defines the standard of compilation and the output required for the sale.

Positions 2-10 Common to Card Type A.

Position 11 Damage Reporting

- Blank - NO damage reporting
- I - INSECT damage reporting
- F - FIRE damage reporting
- B - BLOWDOWN damage reporting

All damage codes are to be collected in a timber cruise, but only one damage agent will be compiled for net volume for appraisal purposes.

If multiple damage agents are reported, each one will have to be compiled separately and the most severe damage selected.

Position 12 Partial cutting indicator

- blank - compile all trees
- C - compile only "C" indicated (cut trees) and blank indicated trees.
- L - compile only "L" indicated (leave trees) trees.

Position 13 Double Sampling Indicator

- Enter 0 = all plots to be used
- 1 = count-plots not to be used

Position 14 Special Compilation**WET AND DRY BELT DOUGLAS FIR ZONES**

	Biogeoclimatic Zone	Biogeoclimatic Subzone and Variant
Wet Belt Code = 1	ICH (Interior Cedar Hemlock)	dw, dk, mw, mm, mk, mc, wk, vk, vc
	SBS (Sub-Boreal Spruce)	dh, dw, dk, mh, mw, mm, mk, mc, wk, vk
	IDF (Interior Douglas Fir)	mw, ww
	ESSF (Englemann Spruce - Subalpine Fir)	dc, dk, dv, mw, mv, mm, mk, mc, wv, wm, wk, wc, vc, vv
	SBPS (Sub-Boreal Pine - Spruce)	mk, dc, mc
Dry Belt Code = 2	ICH (Interior Cedar Hemlock)	xw
	IDF (Interior Douglas Fir)	undifferentiated, dk1, dk2, dm2, xh, xw, xm, dm
	ESSF (Englemann Spruce - Subalpine Fir)	xc
	MS (Montane Spruce)	xk, dc, dk, dm, xv
	SBPS (Sub-Boreal Pine - Spruce)	xc
	PP (Ponderosa Pine)	xh, dh

Note: If subzones are missing from the above listing, the general rule to apply is: very dry and dry subzones are Dry Belt; and moist, wet and very wet are Wet Belt.

Enter (blank) if Coast compilation
0 if Interior compilation is required by the three quality classes.
THIS OPTION HAS BEEN DISABLED.
1 if interior fir is present and sale is in the Wet Belt.
2 if interior fir is present and sale is in the Dry Belt.

If the cutting permit occupies both Wet and Dry Belt BEC zones, subzones or variants, compile using the zone with the highest Douglas fir total net volume based on the cruise data.

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	OI	3	YI	M	YI
4	OI	M	OI	4	YI	M	YI
5	M	M	OI	5	OI	M	OI
6	M	M	OI	6	OI	M	OI
7	M	M	OI	7	OI	M	OI
8	M	M	OI	8	OI	M	OI
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

Table 18 Risk Group Ratings by Pathological Indicators

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	
	Exceptions	Mature	121+	HEIGHT > or = 40.5 m.	HEIGHT < 40.5 m.	Bowron, Longworth, Monkman, Purden, Robson PSYU's and TFL30
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 INDICATORS	

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+	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+	1 of mistletoe or large rotten branch or frost crack	Two or more of mistletoe, large rotten branch or frost crack or 1 of any other indicator.	
	FIZ E,F,G	Mature	121+	1 of large rotten branch or mistletoe.	Two or more of large rotten branch or mistletoe or 1 of any other indicator.	
	FIZ I	Mature	121+	1 of dead/broken top, mistletoe, large rotten branch, or frost crack	Two or more of dead/broken top, or frost crack or 1 of any other indicator other than conk or blind conk.	Conk or blind conk

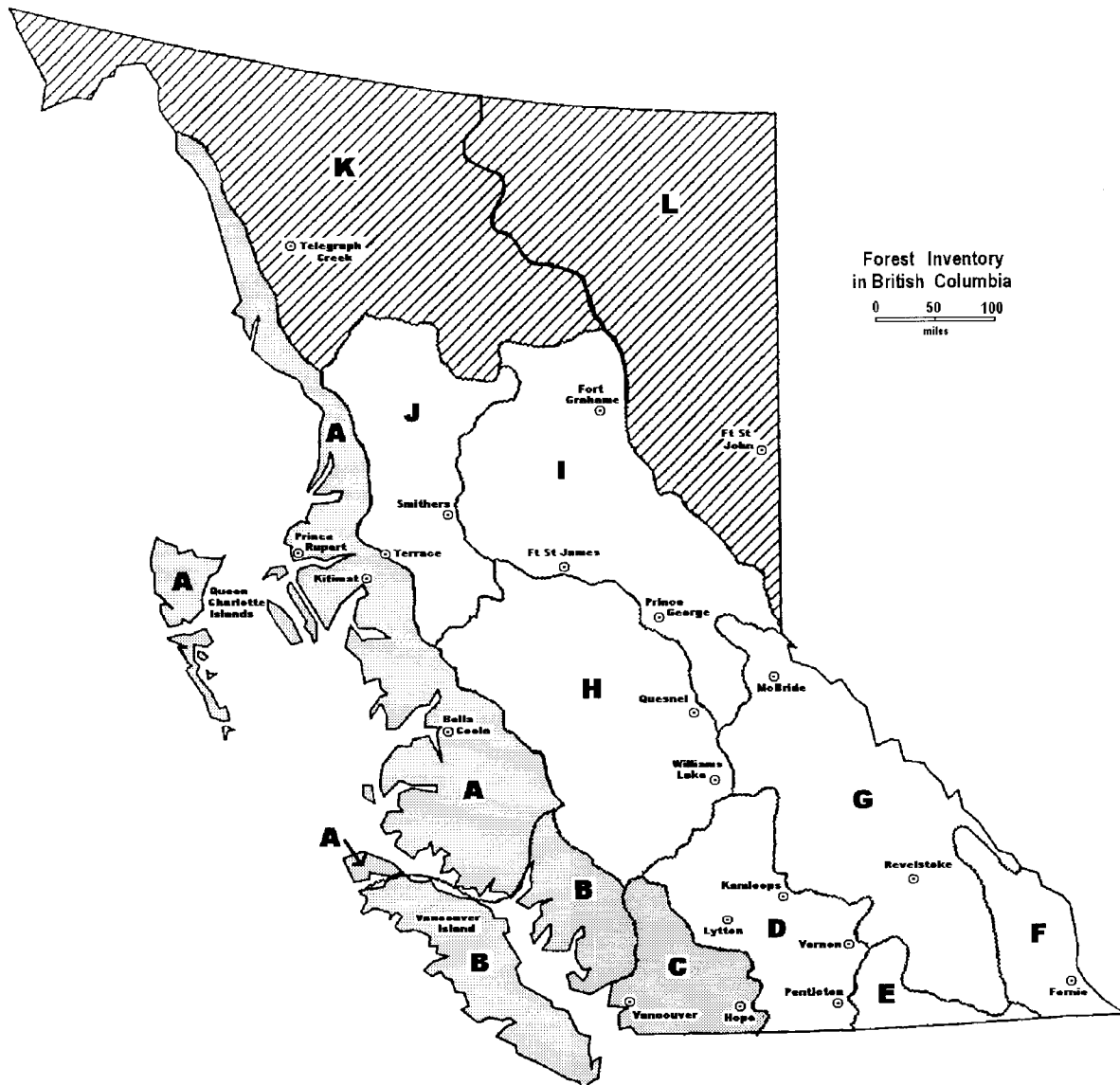
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Region	Location	Latitude	Longitude	Declination July 1, 1998	Annual Change
		in degrees, minutes			
Prince George	Valemount	52,50	119,15	20 58 E	8.0 W
Prince George	McBride	53,18	120,10	21 27 E	8.3 W
Prince George	Hixon	53,52	122,35	22 18 E	8.6 W
Prince George	Prince George	53,55	122,45	22 22 E	8.6 W
Prince George	Bear Lake (Hart Hwy)	54,30	122,40	22 42 E	9.0 W
Prince George	Vanderhoof	54,01	124,01	22 39 E	8.6 W
Prince George	Kenny Dam	53,36	124,58	22 34 E	8.4 W
Prince George	Ft. St. James	54,26	124,15	22 57 E	8.9 W
Prince George	Takla Landing	55,29	125,58	23 55 E	9.4 W
Prince George	Manson Creek	55,40	124,29	23 49 E	9.6 W
Prince George	Aiken Lake	56,26	125,45	24 34 E	10.0 W
Prince George	Bear Lake (Driftwood)	56,12	126,51	24 31 E	9.8 W
Prince George	Mackenzie	55,18	123,10	23 19 E	9.4 W
Prince George	Fort Ware	57,26	125,38	25 19 E	10.7 W
Prince George	Ingenika Point	56,47	124,52	24 42 E	10.3 W
Prince George	Ingenika Mine	56,42	125,11	24 41 E	10.2 W
Prince George	Dawson Creek	55,46	120,14	22 55 E	9.8 W
Prince George	Chetwynd	55,42	121,38	23 15 E	9.7 W
Prince George	Tumbler Ridge	55,07	120,55	22 42 E	9.4 W
Prince George	Fort St. John	56,15	120,51	23 24 E	10.1 W
Prince George	Beaton River (settl.)	57,23	121,25	24 23 E	10.9 W
Prince George	Pink Mountain	57,02	122,31	24 25 E	10.6 W
Prince George	Fort Nelson	58,48	122,43	25 56 E	12.0 W
Prince George	Muncho Lake	58,59	125,47	26 37 E	11.8 W
Prince George	Nelson Forks	59,30	124,01	26 49 E	12.4 W
Nelson	Beaverdell	49,26	119,05	19 10 E	6.3 W
Nelson	Castlegar	49,19	117,39	18 43 E	6.2 W
Nelson	Cranbrook	49,30	115,46	18 11 E	6.3 W
Nelson	Creston	49,06	116,31	18 162 E	6.1 W
Nelson	Flathead	49,22	114,37	17 40 E	6.2 W
Nelson	Golden	51,18	116,58	19 28 E	7.2 W
Nelson	Grand Forks	49,02	118,27	18 49 E	6.1 W
Nelson	Invermere	50,31	116,02	18 44 E	6.8 W
Nelson	Kaloo	49,55	116,54	18 46 E	6.5 W
Nelson	Mica Creek	52,05	118,34	20 23 E	7.6 W
Nelson	Nakusp	50,14	117,48	19 12 E	6.7 W
Nelson	Nelson	49,29	117,17	18 41 E	6.3 W
Nelson	Revelstoke	50,59	118,12	19 42 E	7.1 W
Nelson	Sparwood	49,43	114,53	17 55 E	6.4 W
Cariboo	Quesnel townsite	52,57	122,30	21 46 E	8.1 W
Cariboo	Farwell Canyon	51,49	122,34	21 09 E	7.5 W
Cariboo	mid - Horsefly Lake	52,24	121,02	21 09 E	7.8 W
Cariboo	100 Mile House Townsite	51,39	121,17	20 486 E	7.4 W
Cariboo	Chilanko Forks Settlement	52,07	124,04	21 36 E	7.6 W

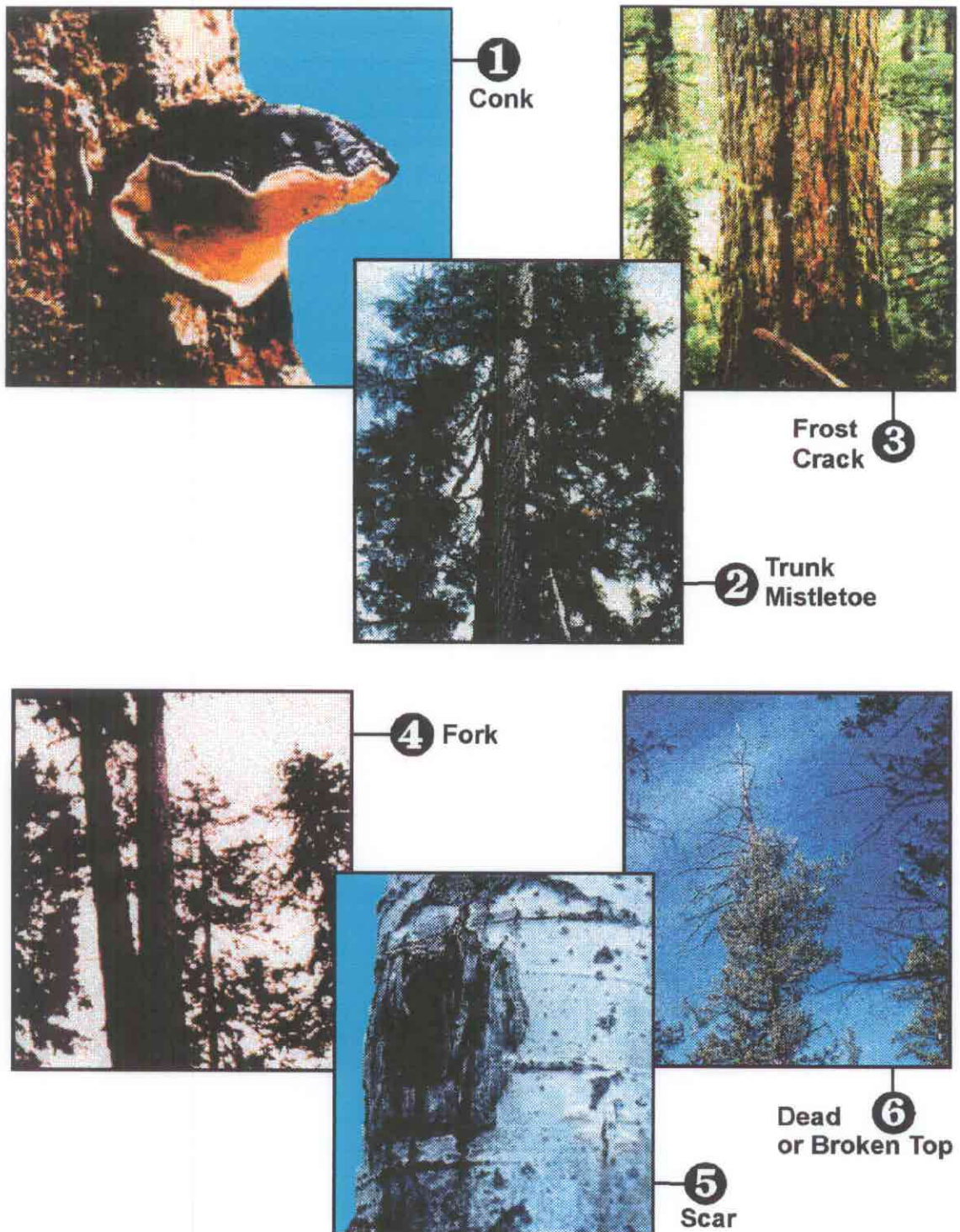
Internet Site:

http://www.geolab.nrcan.gc.ca/geomag/e_cgrf.html

A.4 Forest Inventory Zones



Refer to large scale maps from Resources Inventory Branch to confirm Forest Inventory Zone Zonal and Local geographic locations.



A.5.2 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 Section A.5.11. These indicators are to be called on all live and dead potential (except d.p. in the Interior) trees from the base of the tree to the **utilization top** including secondary leaders which contain a merchantable log (3 metres long to a 15 cm top - except 10 cm top for the interior and for coastal immature). Do not record pathological indicators above utilization top diameter. Not shown are large rotten branches and blind conks.

A.5.21 Conks

Conks are the fruiting bodies (sporophores) of decay fungi and are definite and reliable indicators of decay. They 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. For current cruising purposes, only specific root, butt and heart rot conks are suspect indicators. Slash conks are not suspect indicators. See Figure A.8 for a list of host species for selected decay fungi.

It is important to be able to differentiate between the fruiting of slash fungi that occur on dead branches and wounds of living trees and those that occur on the roots, live branches and trunks of living trees. It is necessary to be able to recognize the conks of the major heart rotting fungi found on living conifers and hardwoods. On conifers, the main conks to recognize are, *Echinodontium tinctorium*, *Phellinus (Fomes) pini*, *Phaeolus (Polyporous) schweinitzii* and *Fomitopsis (Fomes) pinicolii*. On hardwoods, the main conks are *Phellinus igniarius* and *Phellinus tremulae*. See the following host list for major and some minor heartwood decay species.

Definitions:

Merchantable section is the section of the stem between 30 cm stump and the 10 cm top diameter.

Charring is the actual destruction of wood by fire. There must be identifiable damage to a surface area greater than 100 cm².

Deep charring is where charring 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 tree classification.
 2. Trees are coded as they appear at the time of the cruise and not at the anticipated time of harvesting.

A.9.3 Uprooted Stands (Windthrow, Flood Damaged)

A.9.31 Pre-Assessment of Fall-down

Falldown should be assessed and reported in the cruise plan. The report is to include the approximate proportion of the stand affected and the species, diameter range, orientation and pattern of the downed trees.

A.9.32 Sampling Fall-down

The following applies to situations where trees have been blown down or uprooted. Standard cruise methods as outlined in the *Provincial Cruising Manual* are to be followed in conjunction with the following criteria.

- fixed or variable plots can be used for both standing and falldown
- trees will be coded as of the time of cruising
- for uprooted trees, assign the tree class and record the pathological indicators as normal
- standing trees that are broken in the bottom third will have a windthrow damage code assigned. Do not record a dead or broken top in 1
- standing trees that are broken in the middle third will only have wind throw damage codes E or F assigned. Do not record a dead or broken top in 2 unless the damage is ≥ 5 years since occurrence
- do not record uprooted tree class 4 and 6 trees
- the allowable tree classes for all codes are 1, 2, 3, 5, 7, 8, and 9
- all trees with red or green needles are classified as living trees
- The following Damage Codes will be entered in column 63 of the Tally Sheet (FS 205).

Length of Time		Condition of Uprooted Trees
Code	Time Since Damage	Description
E	0 - 12 months	The tree may have one clean break in the merchantable portion of the stem. The compilation program will assign the risk group by tree class and pathological indicators.
F	+ 12 months	The tree may have one clean break in the merchantable portion of the stem. The compilation program will assign the risk group by tree class and pathological indicators.
G	0 - 12 months	The tree must have two or more clean breaks or one or more shattered breaks within the merchantable portion of the stem. The compilation program will down grade these trees to the highest risk group.
H	+ 12 months	The tree must have two or more clean breaks or one or more shattered breaks within the merchantable portion of the stem. The compilation program will down grade these trees to the highest risk group.

Definitions:

Clean break is a break in the merchantable portion of the stem which can be bucked out in a length equivalent to the diameter of the stem at the break.

Shattered break is a break more severe than a clean break.

Examples

- If < 5 years since the damage and the tree is broken in the top third **do not** code blowdown or dead/broken top (d or b top).
- If ≥ 5 years since the damage and the tree is broken in the top third below utilization diameter, code d or b top **only**. If broken above utilization diameter do not tally blowdown or d or b top.
- If < 5 years since the damage and the tree is broken in the middle third, code E or F **only** and do not record d or b top.
- If ≥ 5 years since the damage and the tree is broken in the middle third, code F only and tally d or b top in 2nd third.

- All breaks in the first third of the tree code E/F/G or H and do not tally a d or b top.
- All uprooted trees, assign the appropriate blowdown code.
- If tree is partially uprooted and supported by another standing tree assign the appropriate blowdown code.
- If tree is partially uprooted and self-supporting do not assign a blowdown code.

A.9.4 Extremely Damaged Stands (Windthrow, Flood Damaged, Fire, Insects or Disease)

Where damage conditions are such that a stand cruise procedure becomes too costly in terms of recoverable values from the salvageable material, the Regional Manager has the following options of estimating the volume and quality of both the damaged and undamaged wood left on the area:

1. Applying an estimated damage factor (derived either by aerial or ground reconnaissance) to an earlier cruise of the area when the stand was undamaged.
2. Applying an estimated damage factor to volumes derived from the inventory map and average lines for the area.

Appendix 10 Logging Productivity Index Check Form

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Appendix 11 Interior Log Grade Algorithm

Interior Log Grade Algorithm								
for the ministry compilation program. Industry compilers may also include it.								
Assumption: Pathological and quality indicators on the tree can predict grade.								
Procedures: 1. The compilation program utilizes the table below for allocation of path in thirds to the logs.								
2. Conk, blind conk, frost crack, rotten branch, D&B top and spiral grain, are collected as per the manual.								
3. Saprot/checks are recorded (by 3rds) in the rootrot column. Record these defects as listed in the scaling manual. The overall rule is that at least 50% of the log must be suitable for lumber. Sound cores must be at least 10cm top diameter. Heart checks on logs 15cm or less can have only one check 4cm deep or more.								
The compilation program applies the following flow chart:								
<pre> graph TD Start([start here]) --> Q1{conk or b.conk in tree} Q1 -- yes --> Chipper[chipper TC 1,2,5,8 is Grade 4] Q1 -- no --> Q2{spiral > 2 in tree} Q2 -- yes --> Chipper Q2 -- no --> Q3{rotten branch in log} Q3 -- yes --> RedAttack[red attack is Grade 5] Q3 -- no --> Q4{Saprot/check in log} Q4 -- yes --> RedAttack Q4 -- no --> Q5{frost crack in 4,6,7} Q5 -- yes --> RedAttack Q5 -- no --> Q6{dead top in 1 then all logs} Q6 -- yes --> RedAttack Q6 -- no --> Q7{dead top in 2 then top 2/3} Q7 -- yes --> RedAttack Q7 -- no --> Q8{Dead top in 3 then top 1/3} Q8 -- yes --> RedAttack Q8 -- no --> Sawlog[sawlog TC 1,2,5,8 is Grade 1] Q8 -- no --> RedAttack </pre>								
This table converts the third of a tree into log number.								
The body of the table contains the log number that is affected.								
Path code by third	1	2	3	4	5	6	7	8
1	1	1	1	1	1	1,2	1,2	1,2,3
2	1	1	2	2,3	2,3,4	3,4	3,4,5	4,5
3	1	2	3	4	5	5,6	6,7	6,7,8
4	1	1	1,2	1,2	1,2,3,4	1,2,3,4	1,2,3,4	1 to 5
5	1	2	2,3	3,4	2,3,4,5	3,4,5,6	3,4,5,6	4 to 8
6	1	1,2	1,3	1,4	1,5	1,2,5,6	1,2,6,7	1,2,6,7
7	1	1,2	1,2,3	1,2,3,4	1 to 5	1 to 6	1 to 7	1 to 8
e.g. A code of 3 (top third) in a 6 log tree affects logs 5 & 6.								

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