

Harvesting Method Summary -

Overview

13

The Harvest Method summary reports summarize volume and grade data at the Harvest Method and All Method levels.

Approved Harvest Methods:

CC	- Cable Clear Cut	
CS	- Cable Selective Cut	
HC	- Helicopter Clear Cut	
HS	- Helicopter Selective Cut	(Interior)
HL	- Helicopter Land Drop	(Clear Cut)
SL	- Helicopter Selection Land Drop	(Does not include Single Standing Stem Selection)
FL	- Helicopter Single Standing Stem Selection Land Drop	
HW	- Helicopter Water Drop	(Clear Cut)
SW	- Helicopter Selection Water Drop	(Does not include Single Standing Stem Selection)
FW	- Helicopter Single Standing Stem Selection Water Drop	
LC	- Skyline Clear Cut	
LS	- Skyline Selective Cut	

- HO - Horse
- SC - Ground System Clear Cut
- SS - Ground System Selective Cut
- SP - Specified Operation

The All Method Summary always uses the Average Line method of calculation similar to the Cutting Permit.

The parameters are reported by species, coniferous and all species total, except LRF values which need to be reported at the species level only. Cottonwood, Alder, Maple, Birch and Aspen are deciduous species and would not be included in the coniferous total.

There are no additional damage reports for the Harvest Method Summaries. Instead there are specific damage parameters included in the reports. Trees with multiple damage codes contribute to the net volume percent for all applicable damage parameters. See Sections 13.2.12 through 13.2.15. Net volume deducted from a tree because of damage, to be used in calculating species net volume, will be calculated using the most severe damage type, as outlined in Section 4.2.

CSV All Treatment Unit Summaries (Pre and post-harvest) – Each *Harvesting Method Summary* will be exported from the cruise compilation program in comma-separated value (CSV) formats. See the required format for the summaries and the file descriptions at the following web link:

<http://www.for.gov.bc.ca/hva/manuals/csvdocumentation.htm>

List of Reports

- (015A) - Harvesting Method and All Method

13.1 Header Information

Include the following header information on Harvesting Method reports.

1. License from card type A.
2. Cutting Permit from card type A.
3. Number of Harvesting Methods.
4. Harvesting Method name, for the Harvesting Method reports only.
5. Cruiser name or agency from card type A.
6. Forest Inventory Zone from card type A.
7. Unit number and block from card type A.
8. Total merchantable area from card type A.
9. Number of count and measure plots.
10. Message indicating whether compilation is for appraisals or not.
11. Method of calculation (Average Line or Block).
12. Merchantability requirements from card type B for each species on the report.
13. Special compilation messages for:
 - a. Reduction compilation.
 - b. Stump cruise compilation.
 - c. Tree class combination - useless volumes are included or excluded, from column 15 of card type B (0 or blank - snags excluded, 1 - snags included).
 - d. Selective cut indicator - which trees to compile depends on column 12 of card type B (blank - include all trees, 'C' - include cut-indicated and non-indicated trees, 'L' - include leave-indicated trees).
 - e. Double sampling, if count plots are used.
14. Compiler program name and version.
15. Compile date and time.
16. Page number.

13.2 Detail Information Variable Definitions

The variables used throughout the chapter are defined below.

$\%B_{am}$	=	Percent Blowdown damage for Cutting Permit
$\%B_h$	=	Percent Blowdown damage for Harvest Method h
$\%DG_h$	=	Decay percent – gross for Harvest Method h
$\%D_l$	=	Decay percent for log l
$\%F_h$	=	Percent Fire damage for Harvest Method h
$\%FH_h$	=	Percent Heavy Fire damage for Harvest Method h
$\%G_{am,g}$	=	Percent of grade g for Cutting Permit
$\%G_{h,g}$	=	Percent of grade g for Harvest Method h
$\%SG_{am}$	=	Percent second growth for the Cutting Permit
$\%SL_{am}$	=	Slope percent in Cutting Permit
$\%SL_h$	=	Slope percent in Harvest method h
$\%SL_i$	=	Slope percent in Type i
$\%SL_{i,h}$	=	Slope percent in Type i within Harvest Method h
$\%SL_{p,i}$	=	Slope percent in Plot p within Type i
$\%ST_{am}$	=	Percent stud log – net for Cutting Permit
$\%ST_h$	=	Percent stud log – net for Harvest Method h
$\%TC_h$	=	Total cull percent – gross in Harvest Method h
$\%U_h$	=	Percent useless trees in Harvest Method h
$\%W_h$	=	Waste percent – net for Harvest Method h
A_{am}	=	Area of Cutting Permit
A_h	=	Area of Harvesting Method h
A_i	=	Area of Type i
$A_{i,h}$	=	Area of Harvest Method h within Type i

B_h	=	Total net volume of blowdown damage in Harvest Method h
B_i	=	Total net volume of blowdown damage in Timber Type i
BAF_t	=	Basal area factor for tree t (prism plots only)
BT_h	=	Total breakage volume for Harvest Method h
DBH_t	=	Diameter 1.3 m above ground for tree t
DMP_c	=	Midpoint of Top Diameter Class c
DT_h	=	Total decay volume in Harvest Method h
$DT_{i,h}$	=	Total decay volume in Harvest Method h (Block Method)
FBM_{am}	=	Lumber recovery in Cutting Permit
FBM_l	=	Lumber recovery for log l, in Foot Board measures
$FBM_{s,h}$	=	Total lumber recovery for small logs in Harvest Method h
F_h	=	Total Fire net volume for Harvest Method h
FH_h	=	Total Heavy Fire net volume for Harvest Method h
I	=	Number of Types in Cutting Permit
I_h	=	Number of Types in Harvesting Method h
LRF_{am}	=	Lumber recovery factor for Cutting Permit
$LRF_{sp,c}$	=	Lumber recover factor for Species s and Top Diameter Class c
$LRF_{s,h}$	=	Lumber recovery factor for small logs in Harvest Method h
mc_i	=	Number of measure and count plots in Type i
m_i	=	Number of measure plots in Type i
$m_{i,h}$	=	Number of measure plots in Type i within Harvest Method h
NL_{am}	=	Number of logs in Cutting Permit
NL_h	=	Number of logs in Harvest Method h
$NL_{i,h}$	=	Number of logs in Harvest Method h within Type i
NL_p	=	Number of logs per hectare for Plot p

$NL_{s,h}$	=	Number of small logs in Harvest Method h
NL_t	=	Number of logs in tree t including small log if greater than 2.5 m
n_p	=	Number of trees in plot p
NVL_{am}	=	Net merchantable volume per log for the Cutting Permit
NVL_i	=	Net merchantable volume per log for Timber Type i
NVL_h	=	Net merchantable volume per log for Harvest Method h
plotsize	=	Area of a fixed area plot in hectares, to the nearest hundredth
SG_{am}	=	Total second growth net volume for the Cutting Permit
S_h	=	Stems per hectare for Harvest Method h
SN_h	=	Number of snags in Harvest Method h
$VB_{p,i,h}$	=	Net merch Blowdown volume per hectare from Plot p within Type i within Harvest Method h
$VB_{p,i}$	=	Net merch Blowdown volume per hectare from Plot p within Type i
$VG_{p,i}$	=	Gross volume per hectare estimate for Plot p in Type i
$VG_{p,i,h}$	=	Gross volume per hectare estimate for Plot p in Type i within Harvest Method h
VGT_{am}	=	Total gross volume in Cutting Permit
VGT_i	=	Total gross volume in Timber Type i
VGT_h	=	Total gross volume in Harvest Method h
V_h	=	Net merchantable volume per hectare in Harvest Method h
V_l	=	Net merchantable volume of log l
$V_{p,i}$	=	Net merchantable volume per hectare from Plot p within Type i
$V_{p,i,h}$	=	Net merchantable volume per hectare from Plot p within Type i within Harvest Method h
VST_{am}	=	Total stud log volume for Cutting Permit
VST_h	=	Total stud log volume for Harvest Method h

VT_{am}	=	Total net volume in the Cutting Permit
$VT_{am,g}$	=	Total grade g volume for Cutting Permit
VT_h	=	Total net volume in Harvest Method h
$VT_{h,g}$	=	Total grade g volume for Harvest Method h
$VT_{i,h}$	=	Total net volume in Type i within Harvest Method h
$VT_{t,h}$	=	Net merchantable volume per tree for Harvest Method h
WT_h	=	Total waste volume in Harvest Method h
$WT_{i,h}$	=	Total waste volume in Harvest Method h (Block Method)

13.2.1 Gross Merchantable Volume

The gross merchantable volume is calculated as the volume per hectare multiplied by the number of hectares for each reporting level.

Harvest Method

Average Line method:

Calculate the gross volume per hectare within the Types that contain the Harvest Method using all of the plots within these Types.

Sum the Plot per hectare estimates in a Type. Divide by the number of plots in the Type. Multiply by the area of the Type. Multiply by the ratio of the Type within the Harvest Method.

$$VGT_h = \frac{\sum_{p=1}^{m_i} VG_{p,i}}{m_i} * A_i * \left(\frac{A_{i,h}}{A_i} \right)$$

Report to nearest whole number.

Example 13.1

Type 1 is 5 Ha

Type 2 is 7.5 Ha

Harvest Method SC is 7.5 Ha, 2.5 Ha of Type 1 and 5 Ha of Type 2.

Plot	Type	Volume/ha estimate	Harvest Method
1	1	148.12	SS
2	1	131.83	SC
3	1	107.37	SC
4	2	108.73	SC
5	2	122.17	SS
6	2	152.16	SC

Harvest Method SC:

$$VGT_h = \left(\frac{148.12 + 131.83 + 107.37}{3} * 5 * \frac{2.5}{5} \right) + \left(\frac{108.73 + 122.17 + 152.16}{3} * 7.5 * \frac{5}{7.5} \right) = 961 \text{ m}^3$$

Block Method:

Calculate the gross volumes within a Type that contains the Harvest Method using only the plots within the Harvest Method. Use the Harvest Method double sampling ratio for the plot estimates, if needed.

Sum the Plot per hectare estimates from the Plots in the Type containing the Harvest Method. Divide by the number of plots in the Type within the Harvest Method. Multiple by the area of the Type. Multiply by the ratio of the Type within the Harvest Method.

$$VGT_h = \frac{\sum_{p=1}^{m_{i,h}} VG_{p,i,h}}{m_{i,h}} * A_i * \left(\frac{A_{i,h}}{A_i} \right)$$

Report to nearest whole number.

Example 13.2

Harvest Method SC:

Using the table from Example 13.1:

$$VGT_h = \left(\frac{131.83 + 107.37}{2} * 5 * \frac{2.5}{5} \right) + \left(\frac{108.73 + 152.16}{2} * 7.5 * \frac{5}{7.5} \right) = 951 \text{ m}^3$$

All Method

The All Method calculations always use the Average Line method.

Sum the Type gross volumes within the Cutting Permit. See Section 12.2.1.

$$VGT_{am} = \sum_{i=1}^I VGT_i$$

Report to nearest whole number.

Old Growth and Second Growth Reports

This report is obsolete.

13.2.2 Net Merchantable Volume

The total net merchantable volume is calculated the same way as the gross volume only the loss factors have been applied (see section 3.3.1 step # 3). See Table 17 of the [Cruising Manual](#) and the Metric Diameter Class Decay, Waste and Breakage Factors 1976 tables.

Each tree volume is reduced by the applicable loss factors, which convert the gross volume per hectare estimates into net volume per hectare estimates. Report the net merchantable volume for all reporting levels.

Report to nearest whole number.

13.2.3 Net Merchantable Volume per Hectare

Divide the net merchantable volume by the area of the reporting level. Only the Harvest Method is shown.

Harvest Method

$$V_h = \frac{VT_h}{A_h}$$

Report to 3 decimal places.

13.2.4 Net Merchantable Volume per Hectare - Live

Live trees include tree classes 1, 2, 5, and 8. Calculate the total net merchantable volume for live trees and divide by the area for each reporting level.

Report to 3 decimal places.

13.2.5 Net Merchantable Volume per Hectare - Dead Potential

Dead potential trees include tree classes 3, 7, and 9. Calculate the total net merchantable volume for dead potential trees and divide by the area for each reporting level.

Report to 3 decimal places.

13.2.6 Net Merchantable Volume per Tree

Divide the total net merchantable volume by the total number of stems. Refer to section 12.2.9 for an explanation of the number of stems per hectare calculation. Report the net merchantable volume per tree for all reporting levels. Only the Harvest Method calculation is shown.

Harvest Method

$$VT_{t,h} = \frac{VT_h}{S_h * A_h}$$

Report to 2 decimal places.

13.2.7 Net Merchantable Volume per Log

The 'net merchantable volume' for this parameter is the gross merchantable volume less decay and waste. Do not subtract the breakage percent.

The number of merchantable logs in a tree includes the small log at the **top of the tree** if it is 2.5 m or greater. If the last log is less than 2.5 m, then do not include it as an extra log, rather add it to the second last log.

Plot estimates are calculated for the number of logs per hectare. Multiplying the number of logs per hectare by the area of the reporting level will **report** the total number of logs **in the unit**.

Refer to example 12.8 for sample calculations for the net merchantable volume per log.

Number of trees per plot:

Prism plots:

$$NL_p = \sum_{t=1}^{n_p} \frac{BAF_t * 12732.39545}{DBH_t^2} * NL_t$$

Fixed area plots:

$$NL_p = \sum_{t=1}^{n_p} \frac{NL_t}{plotsize}$$

Harvest Method

Average Line method:

Calculate the number of logs per hectare estimate for the Timber Types that have plots within the Harvest Method using all of the plots in the Type. Divide by the number of full measure plots in the Type. Multiply by the area of the Type. Multiple by the ratio of the Harvest Method area within the Type to get the number of logs in the Type within the Harvest Method.

$$NL_{i,h} = \frac{\sum_{p=1}^{m_i} NL_p}{m_i} * A_i * \left(\frac{A_{i,h}}{A_i} \right)$$

Sum the number of logs in the Types within the Harvest Method:

$$NL_h = \sum_{i=1}^{I_h} NL_{i,h}$$

The net merchantable volume per log for the Harvest Method is:

$$NVL_h = \frac{VGT_h - WT_h - DT_h}{NL_h}$$

See Chapter 12 for a discussion on calculating waste and decay volumes.

Report to 2 decimal places.

Block method:

Calculate the number of logs per hectare estimate for the Types that have plots within the Harvest Method using only the plots in the Type that are within the Harvest Method. Divide by the number of plots in the Type within the Harvest Method. Multiply by the area of the Type. Multiple by the ratio of the Harvest Method area within the Type to get the number of logs in the Type within the Harvest Method.

$$NL_{i,h} = \frac{\sum_{p=1}^{m_{i,h}} NL_p}{m_{i,h}} * A_i * \left(\frac{A_{i,h}}{A_i} \right)$$

Sum the number of logs in the Types within the Harvest Method:

$$NL_h = \sum_{i=1}^{I_h} NL_{i,h}$$

The net merchantable volume per log for the Harvest Method is:

$$NVL_h = \frac{VGT_{i,h} - WT_{i,h} - DT_{i,h}}{NL_h}$$

See Chapter 12 for a discussion on calculating waste and decay volumes.

Report to 2 decimal places.

All Method

Multiply the Harvest Method net merchantable volume per log, calculated by the Average Line method, by the ratio of the Harvest Method area to the Cutting Permit area. Sum these values for all of the Harvest Methods within the Cutting Permit.

$$NVL_{am} = \sum_{i=1}^I \left(NVL_i * \left(\frac{A_i}{A_{am}} \right) \right)$$

Report to 2 decimal places.

Second Growth and old Growth

These reports are to be discontinued as of April 1, 2003 and so will not be illustrated here.

13.2.8 Percent Decay - Gross

Each tree is reduced by a decay percent as explained in section 3.3.1 Step #4. The decay amount would be the gross volume for the tree multiplied by the decay percent.

The percent decay – gross is calculated by dividing the total decay volume by the total gross merchantable volume for each reporting level.

Harvest Method

$$\%DG_h = \frac{DT_h}{VGT_h} * 100$$

The method for determining the total decay volume is the same as for total gross volume.

Report to nearest whole number.

13.2.9 Percent Waste (Billing) - Net

Each tree is reduced by a waste percent as explained in section 3.3.1 Step #4. The waste volume would be the gross volume for the tree multiplied by the waste percent.

The percent waste (billing) – net is calculated by dividing the total waste volume by the total net merchantable volume for each reporting level.

Harvest Method

$$\% W_h = \frac{WT_h}{VT_h} * 100$$

The method for determining the total waste volume is the same as for total gross volume.

Report to nearest whole number.

13.2.10 Percent Total Cull - Gross

The percent total cull – gross is the total of the 3 loss factors (decay, waste and breakage) divided by the total gross merchantable volume. Report the percent total cull – gross for all reporting levels

Harvest Method

$$\% TC_h = \frac{DT_h + WT_h + BT_h}{VGT_h} * 100$$

The method for determining the total breakage volume at all reporting levels is the same as for total gross merchantable volume.

Report to nearest whole number.

13.2.11 Percent Useless Trees

Useless trees include tree classes 4 and 6. Divide the number of snags by the total number of trees for each reporting level. Refer to sections 12.2.9 and 12.2.10 for an explanation of the calculation of stems and snags.

$$\% U_h = \frac{SN_h}{SN_h + S_h} * 100$$

Report to the nearest whole number.

13.2.12 Percent Blowdown Volume - Net

Trees with multiple damage codes contribute to the net volume percent for all applicable damage parameters. Net volume deducted from a tree because of damage, to be used in calculating species net volume, will be calculated using the most severe damage type, as outlined in Section 4.2.

Any tree with a blowdown code of E or G in column 63 of card type 2 will contribute to the percent net merchantable blowdown total. Report the percent blowdown – net for each reporting level. See Section 4.2

Harvest Method

Average Line method:

Calculate the net volume of damage by: summing the net volume per hectare of stems having damage from all plots within the Type within the Harvest Method. Divide by the total volume per hectare from all plots within the Type within the Harvest Method. Multiply by the volume of the Type within Harvest Method. Sum the damage volumes from all Types within the Harvest Method.

$$B_h = \sum_{i=1}^{I_h} \left(\frac{VB_{p,i}}{V_{p,i}} * VT_{i,h} \right)$$

Divide the net volume of stems coded as having damage within the Harvest Method by the total net volume of the Harvest Method. Multiply by 100.

$$\%B_h = \frac{B_h}{VT_h} * 100$$

Report to the nearest whole number.

Block Method:

Calculate the net volume of damage by: summing the net volume per hectare of stems having damage from only plots within the Type within the Harvest Method. Divide by the total volume per hectare from only plots within the Type within the Harvest Method. Multiply by the volume of the Type within Harvest Method. Sum the damage volumes from all Types within the Harvest Method.

$$B_h = \sum_{i=1}^{I_h} \left(\frac{VB_{p,i,h}}{V_{p,i,h}} * VT_{i,h} \right)$$

Divide the net volume of stems coded as having damage within the Harvest Method by the total net volume of the Harvest Method. Multiply by 100.

$$\%B_h = \frac{B_h}{VT_h} * 100$$

Example 13.3

Blowdown volumes include all stems in plots 1, 3 and 5.

Plot	Type	Volume/ha estimate	Harvest Method
1	1	38.81	SS
2	1	108.9	SC
3	1	88.69	SC
4	2	89.81	SC
5	2	16.98	SS
6	2	124.16	SC

Average Line: Harvest Method Summary

Total net volume in Type 1 within Harvest Method SC = 197 m³

Total net volume in Type 2 within Harvest Method SC = 385 m³

Total net volume in Harvest Method SC = 582 m³

Type 1:

Volume per hectare of stems with damage: 38.81 + 88.69 = 127.5

Total volume per hectare for all plots: 38.81 + 108.9 + 88.69 = 236.4

Ratio of damage net volume to total net volume: 127.5 / 236.4 = .53934

Multiply by the net volume of the Type within the Harvest Method:
 .53934 * 197 = 106.25

Type 2:

Volume per hectare of stems with damage: 16.98 = 16.98

Total volume per hectare for all plots: $89.91 + 16.98 + 124.16 = 231.05$

Ratio of damage net volume to total net volume: $16.98/230.95 = .07349$

Multiply by the net volume of the Type within the Harvest Method: $.07349 * 385 = 28.29$

Sum the damage volume from all Types within the Harvest Method. $B_h = 106.25 + 28.29 = 134.54$

Divide the net volume of stems coded as having damage within the Harvest Method by the total net volume of the Harvest Method. Multiply by 100.

$\%B_h = (134.54 / 582) * 100 = 23$

Block Method: Harvest Method Summary

Total net volume in Type 1 within Harvest Method SC = 247 m^3

Total net volume in Type 2 within Harvest Method SC = 535 m^3

Total net volume in Harvest Method SC = 782 m^3

Type 1:

Volume per hectare of stems with damage within the Harvest Method: 88.69 = 88.69

Total volume per hectare for plots within the Harvest Method: $108.9 + 88.69 = 197.59$

Ratio of damage net volume to total net volume: $88.69 / 197.59 = .45$

Multiply by the net volume of the Type within the Harvest Method: $.45 * 247 = 111.15$

Type 2:

Volume per hectare of stems with damage: 0	= 0
Total volume per hectare for all plots: 89.81 + 124.16	= 213.97
Ratio of damage net volume to total net volume: 0 / 213.97	= 0.00
Multiply by the net volume of the Type within the Harvest Method: 0.00 * 535	= 0.00
Sum the damage volume from all Types within the Harvest Method. $B_h = 111.15 + 0.00$	= 111.15
Divide the net volume of stems coded as having damage within the Harvest Method by the total net volume of the Harvest Method. Multiply by 100. $\%B_h = (111.15 / 782) * 100$	= 14

All Method

Sum the Blowdown net volume of all Types within the Cutting Permit and divide by the All Method net volume. Multiply by 100.

$$\%B_{am} = \frac{\sum_{i=1}^I B_i}{VT_{am}} * 100$$

Report to the nearest whole number.

13.2.13 Percent Fire Damage Volume - Net

Trees with multiple damage codes contribute to the net volume percent for all applicable damage parameters. Net volume deducted from a tree because of damage, to be used in calculating species net volume, will be calculated using the most severe damage type, as outlined in Section 4.2.

Any tree with a fire code of A, B or C in column 62 of card type 2 will contribute to the Percent Fire Damage Volume – net (All Burn %). Report the percent Fire damage for each reporting level.

Divide the net volume of stems coded as having Fire damage within the Harvest Method by the total net volume of the Harvest Method. Multiply by 100.

The net volume of stems coded as having Fire damage within the Harvest Method is calculated in the same way as the net volume of stems coded as having Blowdown damage. See Example 13.3.

Harvest Method

$$\%F_h = \frac{F_h}{VT_h} * 100$$

Report to the nearest whole number.

All Method

Calculate in the same manner as Blowdown damage.

Report to the nearest whole number.

13.2.14 Percent Heavy Fire Damage Volume – Net

Trees with multiple damage codes contribute to the net volume percent for all applicable damage parameters. Net volume deducted from a tree because of damage, to be used in calculating species net volume, will be calculated using the most severe damage type, as outlined in Section 4.2.

Any tree with a fire code of C in column 62 of card type 2 will contribute to the percent Heavy Fire total. Report the parameter for each reporting level.

Divide the net volume of stems coded as having Heavy Fire damage within the Harvest Method by the total net volume of the Harvest Method. Multiply by 100.

The net volume of stems coded as having Heavy Fire damage within the Harvest Method is calculated in the same way as the net volume of stems coded as having Blowdown damage. See Example 13.3.

Harvesting Method

$$\%FH_h = \frac{FH_h}{VT_h} * 100$$

Report to the nearest whole number.

All Method

Calculate in the same manner as Blowdown damage.

Report to the nearest whole number.

13.2.15 Percent Insect Damage Volume – Net

Trees with multiple damage codes contribute to the net volume percent for all applicable damage parameters. Net volume deducted from a tree because of damage, to be used in

calculating species net volume, will be calculated using the most severe damage type, as outlined in Section 4.2.

Any tree with an insect code of 1-8, X or Y in column 61 of card type 2 will contribute to the Percent Insect Damage Volume – net total. Report the parameter at all reporting levels.

Divide the net volume of stems coded as having Insect damage within the Harvest Method by the total net volume of the Harvest Method. Multiply by 100.

The net volume of stems coded as having Insect damage within the Harvest Method is calculated in the same way as the net volume of stems coded as having Blowdown damage. See Example 13.3.

Harvest Method

$$\%I_h = \frac{I_h}{VT_h} * 100$$

Report to the nearest whole number.

All Method

Calculate in the same manner as Blowdown damage.

Report to the nearest whole number.

13.2.16 Percent Second Growth Volume – Net

Report the percent second growth volume – net for the All Method report coniferous species only. Divide the second growth total net merchantable volume of the coniferous species by the total net merchantable volume of the coniferous species. Multiply by 100.

The net merchantable second growth volume is calculated in the same way as the net volume of stems coded as having Blowdown damage. See Example 13.3.

A tree will contribute to the second growth total net merchantable volume depending on the Age in 10s from card type 9 and the tree class:

If Age in 10s < 15, then tree classes 1, 2, 3, 4, 6, 8 and 9 are second growth.

If Age in 10s >= 15, then tree classes 8 and 9 are second growth.

Example 13.4

The Fir and Cedar are second growth based on their age in 10s and tree classes. The Hemlock is Tree Class 5, which is not second growth.

Species	Plot age in 10s	Tree class	Second growth
Fir	11	1	Yes
Cedar	15	8	Yes
Hemlock	13	5	No

All Method

$$\%SG_{am} = \frac{SG_{am}}{VT_{am}} * 100$$

Report to the nearest whole number.

13.2.17 Average Slope Percent

Report the average slope percent once only at each reporting level; i.e., there is no segregation of species for this parameter.

The average slope must be calculated using the Block method unless there are no plots in the Harvest Method, in which case the Average Line method must be used.

Include both count and measure plot slopes.

A blank slope field on Card type 9 is compiled as 0 percent.

Harvest Method

Calculate the Harvest Method percent slope by weighting the Type within Harvest Method value based on the area of the Type within the Harvest Method using only the plots in the Type within the Harvest Method.

When there are no plots in a Type within a Harvest Method assign the average slope for the Type to that Harvest Method.

$$\%SL_h = \frac{\sum_{i=1}^{I_h} \%SL_{i,h} * A_{i,h}}{A_h}$$

Report to the nearest whole number.

Example 13.5

Harvest Method SC is 7.5 Ha, 2.5 Ha of Type 1 and 5 Ha of Type 2.

Type	Slope	Harvest Method
1	50	SS
1	90	SC
1	80	SC
2	50	SC
2	70	SS
2	60	SC

Harvest Method SC slope:

Type 1:

$$\%SL_{i,h} = (90 + 80) / 2 = 85$$

Type 2:

$$\%SL_{i,h} = (50 + 60) / 2 = 55$$

Harvest Method SC:

$$\%SL_h = ((85 * 2.5) + (55 * 5)) / 7.5 = 65$$

Example 13.6

Harvest Method SS is 3.3 Ha, 0.3 Ha of Type 1 and 3.0 Ha of Type 2. Type 1 has no plots in the Harvest Method, Type 2 has 3 plots.

Type	Slope	Harvest Method
1	29	SC
1	27	SC
1	34	SC
1	21	SC
2	31	SS
2	63	SS
2	55	SS

Type 1 consists of 4 plots, none of which fall in the SS method. Area for this type in SS method is 0.3 ha, thus Average Line for this segment is to be used:

Average Slope for type 1 is $(29 + 27 + 34 + 21) / 4 = 27.75$ (Average Line Method)

Average Slope for type 2 is $(31 + 63 + 55) / 3 = 49.67$ (Block Method)

Harvest Method slope:

$(27.75 \times 0.3 \text{ ha}) + (49.67 \times 3 \text{ ha}) / 3.3\text{ha}$

$8.32 + 149.01 = 157.33 / 33 = 47.67$

Report 48

Example 13.7

Assume there will be 0.5 ha HO method, in type 2. Type 2 consists of 3 plots, none of which fall in the HO method. Average Line for this method is to be used.

Type	Slope	Harvest Method
2	31	SS
2	63	SS
2	55	SS

Average Slope for type 2 is $(31 + 63 + 55) / 3 = 49.67$ (Average Line Method)

Report 50% for the 0.5 ha HO method.

All Method

Calculate the Type average slope.

$$\%SL_I = \frac{\sum_{p=1}^{mc_i} \%SL_{p,i}}{mc_i}$$

Calculate the average slope percent for the All Method Summary by weighting the Type values based on area of the Type within the Cutting permit.

$$\%SL_{am} = \frac{\sum_{i=1}^I \%SL_i * A_i}{A_{am}}$$

Report to the nearest whole number.

13.2.18 Algorithm Grade Percent - Coast

Grade each log **using** the coast log grade algorithm (see Appendix 9). Divide the total net volume for each grade by species by the total net volume by species to give a percent for that grade.

If the sum of the reported grade percents is not exactly 100% (due to rounding), then add or subtract from the grade with the highest percent so that the total is 100%. Do this for the species as well as for the Total and Coniferous columns. If there is a tie for the largest grade percent, then adjust the grade letter that is first alphabetically from B to Y.

Example 13.8

If D=33%, E=33% and F=33% - Adjust grade D to 34%

Harvest Method

$$\%G_{h,g} = \frac{VT_{h,g}}{VT_h} * 100$$

Report to nearest whole number.

All Method

$$\%G_{am,g} = \frac{VT_{am,g}}{VT_{am}} * 100$$

Report to nearest whole number.

13.3 Lumber Information - Interior Only

13.3.1 Percent Stud Log Volume - Net

A stud log has a top diameter less than 20.0 cm. Calculate the total merchantable stud log volume for the reporting levels the same way as for the total merchantable volume. Divide the Stud log volume by the total net volume of the reporting level. Calculate the percent stud log for Fir, Balsam, Spruce, Lodgepole Pine and Larch species only.

Harvest Method

$$\%ST_h = \frac{VST_h}{VT_h} * 100$$

Report to nearest whole number.

All Method

Sum the stud log net volumes from the Types within the Cutting Permit. Divide by the total net volume of the Cutting Permit. Multiply by 100.

$$\%ST_{am} = \frac{VST_{am}}{VT_{am}} * 100$$

Report to nearest whole number.

13.3.2 Percent Net Merch – Small Logs

A small log has a top diameter less than 30.0 cm. Calculate the percent net merchantable small logs using the same method as for the stud logs but include all species.

Report to nearest whole number.

13.3.3 Percent Net Merch – Large Logs

A large log has a top diameter greater than 29.9 cm. Calculate the percent net merchantable large logs using the same method as for the stud logs, but include all species.

Report to nearest whole number.

13.3.4 Average LRF – All Logs

See Chapter 11 for more information on LRF and FBM.

Report to nearest whole number.