Volume Summaries 12

12.1 Volume Summary - Overview

The volume summary reports summarize volume, grade and statistical data at the Type, Cutting Permit, Treatment Unit within Block and Block levels.

CSV All Treatment Unit Summaries (Pre and post–harvest) – The Cutting Permit Summary and each Block 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

12.1.1 List of Reports

(009A) - Timber Type Summary

(009B) - Block Summary

(009C) - Cutting Permit Summary

(009D) - Treatment Unit within Block Summary

For the (009A), (009B), and (009C) reports there are three additional damage reports for the damage types Blowdown, Fire, and Insect. For the (009B) report, there is also an optional Root Rot damage summary based on the letters J, K, and L in column 60 of card type 2. If three species in a type have insect damage, then there would be three additional insect damage reports for that type. The damage reports are by damage type and species and are depicted in chapter 4.

12.2 Header Information - All Reports

Include the following header information on Type, Block, Cutting Permit and Treatment Unit reports, including the damage reports. For damage reports, add the species and damage type, as shown in Chapter 4.

1. Compilers name and version number.
2. Title.
    a. Timber Type Summary,
    b. Block Summary,
    c. Cutting Permit Summary,
    d. Treatment Unit Summary.
3. Table Number.
    a. 009A,
    b. 009B,
    c. 009C,
    d. 009D.
4. Page Number.
5. Message indicating if compilation is for appraisal purposes or not.
6. Message if:
    a. Double sampling cruise,
    b. The statement PERCENT REDUCTION APPLIED will be reported in upper case letters and double spaced at the top of all pages when applicable,
    c. Stump cruise,
    d. Useless Excluded or Useless Included,
    e. Selective Cut – Leave,
    f. Selective Cut – Cut,
    g. Damage-Type of Damage.

7. Licence number.
8. Unit identity number.
9. Unit identity Block.
10. Cutting Permit number.
11. Forest Inventory Zone (F.I.Z).
12. Number of blocks.
13. Total merchantable Area of:
    a. Cutting Permit,
    b. Type,
    c. Block,
    d. Treatment Unit.
14. R/W Area removed under other licence:
    a. Block.
15. Timber Type, Treatment Unit or Block Summaries:
    a. Block or Type number,
    b. Number of measure plots in Type or Block,
    c. Number of count plots in Type or Block,
    d. Treatment Unit name.
16. Type of calculation:
    a. Average Line,
    b. Block.
17. Compiled date and time.
18. Compilation type used for the standards of the species.
19. Species letter codes.
20. Conifer.

21. Total.

22. DBH lower limit of the species.

23. Stump height of the species.

24. Minimum top diameter of the species.

25. Log length of the species.

12.3 Detail Information

All of the detail information is shown at the Timber Type, Block and Cutting Permit levels for the Gross Volume parameter only. For all other parameters only Timber Type calculations using the Average Line method will be shown. The methodology used in the Gross Volume section can be extrapolated for use in the remaining sections.

Lumber recovery and chip yield parameters are only reported for interior compilations.

Average slope, Minimum slope %, Maximum slope %, Coefficient of Variation, Standard Error of the Mean and the Sampling Error at the 95% level of probability slope calculations are required for coastal compilations in the Block summaries. Although not required at this time, slope calculations may also be provided for interior compilations.

Calculate each parameter for a particular species, s, and then calculate the parameter grouping all coniferous species and all species combined. For example, if there were five species in a compilation, then there would be seven calculations of each parameter at each of the four reporting levels. Cottonwood, Alder, Maple, Birch and Aspen are deciduous species and would not be included in the coniferous total.

When the Block method is being used, then apply the Block double sampling ratio for the Block and Treatment Unit within Block levels.

12.3.1 Summary Report Variables

The variables used throughout the chapter are defined below:

$\%D_l$	=	Decay percent for log l
$\%DG_i$	=	Decay percent – gross in Type i
$\%G_{i,g}$	=	Percent of grade g for Type i
$\%IM_j$	=	Percent immature for Block j
$\%IM_{j,u}$	=	Percent immature for Treatment Unit u in Block j
$\%S_{s,i}$	=	Percent of total volume from Species s in Type i
$\%ST_i$	=	Percent stud log for Type i
$\%TC_i$	=	Total cull percent – net for Type i
$\%W_i$	=	Waste percent – net for Type i
$\%WG_i$	=	Waste percent – gross for Type i
339	=	Chip recovery constant for large logs

A_{cp}	=	Area of Cutting Permit
A_i	=	Area of Type i
$A_{i,j}$	=	Area of Type i within Block j
$A_{i,j,u}$	=	Area of Treatment Unit u within Type i within Block j
$A_{i,u}$	=	Area of Treatment Unit u within Type i
A_j	=	Area of Block j
BAF_t	=	Basal area factor used to tally tree t (prism plots only)
BA_i	=	Basal area per hectare in Type i
BA_p	=	Basal area per hectare estimate for plot p
B_t	=	Biological volume for tree t (see Appendix 13)
BT_i	=	Total breakage volume in Type i
BV_i	=	Biological volume in Type i
BV_p	=	Biological volume in Plot p
CVi	=	Coefficient of Variation for Type i (measured plots only)
$CV_{i,j}$	=	Coefficient of Variation for Type i within Block j (measured plots only)
CV_j	=	Coefficient of Variation for Block j.
CV_i	=	Coefficient of Variation for Type i (measured plots only).
CYF_s	=	Chip yield factor for species s
CY_i	=	Chip yield for Type i
$CY_{s,i}$	=	Chip yield for Species s in Type i
DBH_t	=	DBH from card type 2
DMP_c	=	Midpoint of Top Diameter Class c
$D_{p,i}$	=	Total decay volume in Type i from Plot p
$\overline{D}_i$	=	Average DBH of Type i

DSR_t	=	Double sampling ratio applied to tree t (prism plots only)
DT_i	=	Total decay volume in Type i
$FBM_{G,i}$	=	Foot Board Measure of Lodgepole Pine in category G within Type i
FBM_i	=	Foot Board Measure in Type i
FBM_l	=	Foot Board Measure for log l
HBV_i	=	Biological volume times total height in Type i
HBV_p	=	Biological volume times total height in Plot p
H_t	=	Total height of tree t from card type 2
I	=	Number of Types in Cutting Permit
I_j	=	Number of Types in Block j
LPT_i	=	Number of logs per tree for Type i
LRF_i	=	Lumber recovery factor for Type i
$LRF_{PI,G,i}$	=	Lumber recovery factor for Lodgepole Pine in Category G within Type i
$LRF_{s,c}$	=	Lumber recovery factor for Species s and Top Diameter Class c
$\overline{LRF}_{PI,i}$	=	Average LRF for Lodgepole Pine within Type i
m_i	=	Number of measure plots in Type i
$m_{i,j}$	=	Number of measure plots in Type i within Block j
$m_{i,j,u}$	=	Number of measure plots in Treatment Unit u within Type i within Block j
NL_i	=	Number of logs in Type i
NL_p	=	Number of logs per hectare estimate from Plot p
NL_t	=	Number of logs in tree t including short log if >= 2.5 m
NVL_i	=	Net merchantable volume per log for type i
n_p	=	Number of trees in Plot p

pi	=	≅ (3.14159265)
$p_{i,j}$	=	proportional volume of Type i within Block j.
plotsize	=	Area of fixed area plots in hectares, to the nearest hundredth
$r_{i,j}$	=	Proportional area of Type i within Block j
R_t	=	Reduction for tree t
SEM_i	=	Standard error of the mean for Type i
$SEM_{i,j}$	=	Standard error of the mean for Type i within Block j
S_i	=	Stems per hectare for Type i
S_p	=	The stems per hectare estimate for Plot p
sp_i	=	Number of Species in type i
S_t	=	The stems per hectare estimate for tree t
t-value	=	Average line – total number of measured plots in all of the types occurring in the block minus the number of types in the block.
t-value	=	Block method – total number of measured plots in the block minus the number of types in block.
U_i	=	Number of Treatment Units in Type i
U_j	=	Number of Treatment Units in Block j
$VG_{i,j,u}$	=	Gross volume/ha of Treatment Unit u within Type i within Block j
$VG_{i,u}$	=	Gross volume per hectare for Treatment Unit u within Type i
$VG_{p,i}$	=	Gross volume per hectare estimate for Type i from plot p
$VG_{p,i,j}$	=	Gross volume/ha of Plot p within Type i within Block j
$VG_{p,i,j,u}$	=	Gross volume/ha of Plot p within Treatment Unit u within Type i within Block j
$VG_{t,i}$	=	Gross volume per tree in Type i
VGT_{cp}	=	Total gross volume in Cutting Permit
VGT_i	=	Total gross volume in Type i

$VGT_{i,j}$	=	Total gross volume in Type i within Block j
VGT_j	=	Total gross volume in Block j
$VGT_{j,u}$	=	Total gross volume in Treatment Unit u within Block j
$VGT_{G,i}$	=	Net merchantable volume of Lodgepole Pine in Category G within Type i
V_i	=	Net merchantable volume per hectare in Type i
V_j	=	Volume per hectare of Block j
V_l	=	Net merchantable volume of log l
$V_{m,i}$	=	Volume per hectare of Type i from measure plots only, not corrected for double sampling.
VST_i	=	Total stud log volume for Type i
VT_i	=	Total net merchantable volume of Type i
$VT_{i,g}$	=	Total grade g volume for Type i
VTI_j	=	Total immature net volume for Block j
$VTI_{j,u}$	=	Total immature net volume for Treatment Unit u in Block j
VT_j	=	Total net volume for Block j
$VT_{j,u}$	=	Total net volume for Treatment Unit u in Block j
$VT_{s,i}$	=	Total net volume for Species s in Type i
$VT_{s,la,i}$	=	Total net volume of large logs for Species s in Type i
$VT_{s,sm,i}$	=	Total net volume of small logs for Species s in Type i
$VT_{t,i}$	=	Net merchantable volume per tree in Type i
WH_i	=	Average weighted total height for Type i
$W_{p,i}$	=	Total waste volume in Type i from Plot p
WT_i	=	Total waste volume in Type i

12.3.2 Gross Merchantable Volume

The gross merchantable volume is obtained by multiplying the gross merchantable volume per hectare by the number of hectares in the report level. The gross merchantable volume per hectare is calculated as in section 3.5 with the double sampling ratio applied and using post-reduction volumes, if applicable. When compiling a reduction, pre and post reduction reports are required.

Timber Type

Multiply the average gross volume per hectare from the plots within the Type by the area of the Type. Type parameters are always calculated using the Average Line method.

$$VGT_{i,} = \frac{\sum_{p=1}^{m_i} VG_{p,i}}{m_i} * A_i$$

Report to nearest whole number.

Example 12.1

Type 1 is 5 Ha.

Type 2 is 7.5 Ha.

Block 1 is 5 Ha, 2.5 Ha of Type 1 and 2.5 Ha of Type 2.

Block 2 is 7.5 Ha, 2.5 Ha of Type 1 and 5 Ha of Type 2.

Treatment Unit 1 is 10 Ha, 5 Ha in Type 1 and 5 Ha in Type 2.

Treatment Unit 2 is 2.5 Ha in Type 2.

Plot	Type	Block	Volume/ha estimate	Treatment Unit
1	1	1	148.12	1
2	1	1	131.83	1
3	1	2	107.37	1
4	2	1	108.73	1
5	2	2	122.17	2
6	2	2	152.16	1

$$VGT_1 = \frac{148.12 + 131.83 + 107.37}{3} * 5 = 646\ m^3$$

Treatment Unit within Type

Treatment Unit within Type volumes are needed when performing reductions. See Section 5.3.1 for examples. The Average Line method is used only. Multiply the Gross volume of the Type by the proportional area of the Treatment Unit within the Type.

Example 12.2

Treatment Unit 2 within Type 2

$$VGT_{i,u} = VGT_2 * (A_{i,u} \div A_i) = 958 * (2.5 \div 7.5) = 319\ m^3$$

Report to nearest whole number.

Cutting Permit

Sum the Type volumes within the Cutting Permit.

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

Report to nearest whole number.

Block

Average line method:

Sum the portion of the Type volumes from the Types within the Block.

$$VGT_j = \sum_{i=1}^{I_j} VGT_{i,j} * (A_{i,j} \div A_i)$$

Report to nearest whole number.

Example 12.3

Block 1

$VGT_j = 646*(2.5/5.0) + 958*(2.5/7.5) = 642\ m^3$

Block Method:

Sum the volume per hectare of plots in the Types within the Block. Divide by the number of measure plots in the Type within the Block. Multiply by the area of the Type within the Block.

$$VGT_j = \sum_{i=1}^{I_j} \frac{VG_{p,i,j}}{m_{i,j}} * A_{i,j}$$

Report to nearest whole number.

Example 12.4

Block 1

$VGT_j = ((148.12+131.83) / 2 * 2.5) + (108.73 / 1 * 2.5) = 622\ m^3$

Treatment Unit within Block

Average line method:

Sum the Type gross volumes within the Block and multiply by the area of the Treatment Unit within the Types within the Block divided by the area of the Type within the Block.

$$VGT_{j,u} = \sum_{i=1}^{I_j} VGT_{i,j} * \left(\frac{A_{i,j,u}}{A_{i,j}} \right)$$

Example 12.5

Treatment Unit 2, Block 2

$VGT_{j,u} = (646 * (0/5)) + (958 * (2.5/7.5)) = 319\ m^3$

Block method:

Sum the volume/ha estimates of plots from Types containing the Treatment Unit within the Block. Divide by the number of Treatment Unit plots within Type within the Block. Multiply by the area of the Treatment Unit within the Type within the Block. Sum the individual Type parameters. See Section 5.3.2 for an example.

$$VGT_{j,u} = \sum_{i=1}^{I_j} \frac{VG_{p,i,j,u}}{m_{i,j,u}} * A_{i,j,u}$$

Example 12.6

Treatment Unit 2, Block 2

The only Type that contains Treatment Unit 2 is Type 2, therefore only those plots that are in Type 2 within Block 2 are used in the calculation.

$VGT_{j,u}$ = (122.17+152.16) /2* 2.5 = 343 m^3

12.3.3 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 step 4). 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 summary reports.

Report to nearest whole number.

12.3.4 Net Merchantable Volume per Hectare

Divide the total merchantable volume by the applicable area. Report the net merchantable volume per hectare for all reporting levels. Only the Type calculation is shown.

Timber Type

Divide the total net merchantable volume in the Type by the area of the Type.

$$V_I = \frac{VT_i}{A_i}$$

Report to nearest whole number.

12.3.5 Percent Distribution per Hectare

The percent distribution is the percentage of the net volume that a Species contributes to the total net volume.

Timber Type

$$V_i = \frac{VT_i}{A_i}$$

Use the same method for all reporting levels.

Report to nearest whole number.

12.3.6 Percent Decay – Gross

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

Timber Type

$$\%DG_I = \frac{DT_i}{VGT_i} * 100$$

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

Report to nearest whole number.

12.3.7 Percent Waste - Gross

This report is obsolete.

12.3.8 Percent Waste (Billing) - Net

This report is obsolete.

12.3.9 Percent Total Cull - Gross

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

Timber Type

$$\%TC_i = \frac{DT_i + WT_i + BT_i}{VGT_i} * 100$$

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

Report to nearest whole number.

12.3.10 Stems per Hectare

The stems per hectare parameter uses tree classes 1, 2, 3, 5, 7, 8 and 9. Apply the double sampling ratio and reduction, if applicable. (Refer to section 3.5.1.1).

Timber Type

Each tree contributes:

$$S_t = \frac{BAF_t * 12732.39545}{DBH^2} * DSR_t * R_t$$

To the number of stems per hectare in each plot. Therefore:

$$S_p = \sum_{t=1}^{n_p} S_t$$

And

$$S_I = \frac{\sum_{p=1}^{m_i} s_p}{m_i}$$

Report to 1 decimal place.

12.3.11 Snags per Hectare

The snags per hectare estimate is based on tree classes 4 and 6. Calculate the snags per hectare using the same method as the stems per hectare.

Report to 1 decimal place.

12.3.12 Average DBH - Stems

Include tree classes 1, 2, 3, 5, 7, 8 and 9 for this calculation.

The average DBH is calculated using the average Basal Area per Hectare estimates from the plots. See Section 3.4.1.2 for the method of calculating Basal Area per Hectare.

The calculated average DBH is expressed in meters. Report in centimeters by multiplying by 100.

Timber Type

The Basal Area per Hectare is:

$$BA_p = \sum_{t=1}^{n_p} BAF_t * DSR_t * R_t$$

$$BA_i = \frac{\sum_{p=1}^{m_i} BA_p}{m_i}$$

The Average DBH for Type i is:

$$\overline{D}_I = 100 * 2 * \sqrt{\frac{BA_i}{pi * S_i}}$$

12.3.13 Average DBH – Snags

The average DBH – snags estimate is based on tree classes 4 and 6. Calculate the average DBH – snags using the same method as the average DBH – stems.

Report to 1 decimal place.

12.3.14 Merchantable Volume per Tree - Gross

The gross merchantable volume is the volume between the compiled stump height (30cm) and the compiled mimmum top diameter inside bark. Divide the total gross merchantable volume by the total number of stems.

Timber Type

$$VG_{t,i} = \frac{VGT_i}{S_i * A_i}$$

Report to 2 decimal places.

12.3.15 Merchantable Volume per Tree - Net

Divide the total net merchantable volume by the total number of stems. Report the net merchantable volume per tree for all reporting levels.

Timber Type

$$VT_{t,i} = \frac{VT_i}{S_i * A_i}$$

Report to 2 decimal places.

12.3.16 Average Weighted Total Height

The total height from card type 2 is weighted by the biological volume. See Appendix 13 for the calculation of biological volume.

Prism Plots:

$$HBV_p = \sum_{t=1}^{n_p} \frac{BAF_t * 12732.39545}{DBH_t^2} * H_t * B_t$$

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

$$HBV_i = \frac{\sum_{p=1}^{m_i} HBV_p}{m_i}$$

$$BV_i = \frac{\sum_{p=1}^{m_i} BV_p}{m_i}$$

$$WH_i = \frac{HBV_i}{BV_i}$$

Report to 1 decimal place.

Fixed Area Plots:

$$HBV_p = \sum_{t=1}^{n_p} \frac{B_t * H_t}{plotsize}$$

$$BV_p = \sum_{t=1}^{n_p} \frac{B_t}{plotsize}$$

$$HBV_i = \frac{\sum_{p=1}^{m_i} HBV_p}{m_i}$$

$$BV_i = \frac{\sum_{p=1}^{m_i} BV_p}{m_i}$$

$$WH_i = \frac{HBV_i}{BV_i}$$

Report to 1 decimal place.

Example 12.7

Calculate the average weighted total height for Lodgepole Pine in Type 1. The Type is double sampled, with 3 measure plots.

DSR_t = 0.875 for all Lodgepole Pine in Type 1.

BAF_t = 10.000 for all trees in the Type 1 measure plots.

The Lodgepole Pine samples are as follows:

Plot	Plot Type	DBH	Biological Volume	Total Height
1	Border	45.5	2.481693	36.6
2	Full measure	41.0	1.802682	32.2
3	Full measure	38.8	1.326466	26.5

1. $HBV_1 = \frac{2*10.0*12732.39545}{45.5^2} * 36.6 * 2.481693 * 0.875$

$= 9775.8497$

$HBV_2 = 3847.0289$

$HBV_3 = 2601.3376$

$HBV_i = (9775.8497 + 3847.0289 + 2601.3376) = 16224.22$

2. $BV_1 = \frac{2*10.0*12732.39545}{45.5^2} * 2.481693 * 0.875$

$= 267.0997$

$BV_2 = 119.4729$

$BV_3 = 98.1637$

$BV_i = (267.0097 + 119.4729 + 98.1637) = 484.65$

The average total weighted height for Type 1 is:

$WH_1 = 16224.22 / 484.65 = 33.5$ m

12.3.17 Average Weighted Merchantable Height

The merchantable height and volume are from stump height to merchantable top diameter.

Use the same method as for the average weighted total height.

Report to 1 decimal place.

12.3.18 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 short log at the end, 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. The short last log would then be included as part of the second last log.

Prism plots

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

Fixed area plots

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

Timber Type

The number of logs estimate for the Timber Type must be calculated.

$$NL_{i,} = \frac{\sum_{p=1}^{mi} NL_p}{m_i}$$

Net merchantable volume per log for the type is:

$$NVL_{i,} = \frac{VGT_i - WT_i - DT_i}{NL_i}$$

Report to 2 decimal places.

Example 12.8

Calculate the net merchantable volume per log for Lodgepole Pine in Type i. The Type is double sampled, with 3 measure plots. No reduction is applied.

The Type gross merchantable volume is 781 m^3.

The Type is 5.0 hectares in area.

DSR_t = 0.875 for all Lodgepole Pine in Type 1

BAF_t = 10.000 or all trees in the Type 1 measure plots

The Lodgepole Pine samples are as follows:

Plot	Plot type	DBH	Gross merch.	Decay volume	Waste volume	No. of logs
1	B	45.5	2.408381	1.387227	0.341989	6
2	F	41.0	1.740533	0.231490	0.088767	6
3	F	38.8	1.269496	0.134566	0.001269	4

$$NL_1 = \frac{2*10.0*12732.39545}{45.5^2}*6*0.875 = 645.768$$

NL_2 = 397.651

NL_3 = 296.016

The Timber Type per hectare number of logs is the average of the plots.

NL_I = (645.768 + 397.651 + 296.016) / 3 = 446.478

$$VGT_1 = \frac{2*10.0*12732.39545}{45.5^2}*2.408381*0.875 = 259.209$$

VGT_2 = 115.354

VGT_3 = 93.948

The Timber Type per hectare gross volume is:

VGT_I = (259.209 + 115.354 + 93.948) / 3 = 156.17

$$DT_1 = \frac{2*10.0*12732.39545}{45.5^2}*1.387227*0.875 = 149.305$$

DT_2 = 15.342

DT_3 = 9.958

The Timber Type per hectare decay is:

$DT_I = (149.305 + 15.342 + 9.958) / 3 = 58.202$

$$WT_1 = \frac{2 * 10.0 * 12732.39545}{45.5^2} * 0.341989 * 0.875 = 36.808$$

$WT_2 = 5.883$

$WT_3 = 0.0939$

The Timber Type per hectare waste is:

$WT_1 = (36.808 + 5.883 + 0.0939) / 3 = 14.26$

Net merchantable volume per log for the type is:

$$\frac{156.17 - 14.26 - 58.202}{446.478} = 0.19$$

12.3.19 Average Number of Logs per Tree

Divide the number of logs by the number of trees. If position 15 of card type B is coded 1 then include snags. In this case reports will be marked "Not for appraisal purposes".

Timber Type

$$LPT_I = \frac{NL_i}{S_i * A_i}$$

Report to 2 decimal places.

12.3.20 Percent Immature - Coast Only

This parameter is reported for the Treatment Unit within Block and Block levels in the Coniferous and Total columns only.

Determine the maturity by the tree species, plot age in 10s, and tree class. Divide the immature net volume by the total net volume to give a percent immature. Calculate the immature net volume the same way the total volume is calculated using the following rules:

Coniferous species

Immature:	Tree class 8 and 9 are always immature
	Tree classes 1, 2 and 3 are immature if the plot age in 10s < 13

Deciduous species

Immature: Tree class 8 and 9 are always immature

Tree classes 1, 2 and 3 are immature if the plot age in 10s < 5 except for Aspen and Cottonwood in FIZ K and L which are immature if the age in 10s <9

Refer to the Tree Class Modification of Loss Factor Tables in table 17 of the *Cruising Manual*.

Tree class 4 and 6 are only included if the tree class combination from card type B is 1. In this case, summaries are "Not For Appraisal Purposes ".

Example 12.9

The specified maturity level would be assigned in the following cases:

Species	Plot age in 10s	Tree class	Maturity
Fir	11	1	Immature
Cedar	13	8	Immature
Hemlock	13	1	Mature
Maple	11	9	Immature
Alder	11	2	Mature

Block

Average line method:

Begin by calculating the % immature for the Types within the Block by dividing the % immature merchantable net volume of the Type by the total net volume of the Type. Then multiply the net merchantable volume the Type adds to the Block (see Section 12.2.1) by the % immature of that Type. Next sum for all Types in the Block. Divide by the total net merchantable volume of the Block and multiply by 100.

$$\%IM_j = \frac{VTI_j}{VT_j} * 100$$

Treatment Unit within Block

Average line method:

Calculate the Type % immature as above. Then multiply the net merchantable volume the Treatment Unit within Type adds to the Block by the % immature of that Type. Multiply by the area of the Treatment Unit within the Type within the Block divided by the area of the Block. Sum for all Treatment units within Types within Blocks. Divide by the total net merchantable volume of the Treatment Unit within Block. Multiply by 100.

$$\%IM_{j,u} = \frac{VTI_{j,u}}{VT_{j,u}} * 100$$

Report to nearest whole number.

Example 12.10

Type 1 net vol.	=	430 m^3 Area	=	5 hectares
Type 2 net vol.	=	831 m^3 Area	=	7.5 hectares
Block 1 net vol.	=	492 m^3 Area	=	5 hectares: 2.5 hectares from Type 1, 2.5 hectares from Type 2
Block 2 net vol.	=	769 m^3 Area	=	7.5 hectares: 2.5 hectares from Type 1, 5 hectares from Type 2
Treatment Unit 2	=	Area	=	2.5 hectares: 0 hectares within Type 1 within Blk. 2, 2.5 hectares within Type 2 within Blk. 2

Plot	*Type*	*Block*	Vol / Ha	Treatment Unit	Maturity
1	1	1	49.13	1	M
2	1	1	120.23	1	I
3	1	2	89.81	1	M
4	2	1	88.69	1	M

5	2	2	110.57	2	I
6	2	2	131.92	1	I

Block 1: % immature

Type 1 % immature = 120.23 / (49.13+120.23+89.81) = .46
Type 2 % immature = (110.57+131.92) / (88.69+110.57+313.92) = .73
Volume of Type 1 in Block 1 = 430 * (2.5/5) = 215
Volume of Type 2 in Block 1 = 831 * (2.5/7.5) = 277
Volume of immature in Type 1 in Block 1 = 215 * .46 = 99.74
Volume of immature in Type 2 in Block 1 = 277 * .73 = 202.82
Volume of immature in Block 1 = 99.74 + 202.82 = 302.56
% immature in Block 1 = 302.56 / 492 = .61 * 100 = 61

Treatment Unit 2 within Block 2:

Type 1 % immature = .46
Type 2 % immature = .73
Volume of Treatment Unit 2 within Type 1 in Block 2 = 430 * (0/5) = 0
Volume of Treatment Unit 2 within Type 2 in Block 2 = 831 * (2.5/7.5) = 277
Volume of immature in Treatment Unit 2 within Type 1 in Block 2 = 0 * .46 = 0
Volume of immature in Treatment Unit 2 within Type 2 in Block 2 = 277 * .73 = 202.82
% immature in Treatment Unit 2 within Block 2 = 202.82 / 277 = .73 * 100 = 73

12.3.21 Grade Percent - Coast Only

Grade each log by using the coast log grade algorithms (see Appendix 9). Divide the total net volume for each grade by the total net volume 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 to make the total 100%. If there is a tie for the largest grade percent, then adjust the grade letter that is first alphabetically from B to Y.

Timber Type

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

Report to nearest whole number.

Example 12.11

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

12.3.22 Block Slope – Coast Only

Using the Block Method (as per section 13.2.17) report the following statistics: Minimum slope %, Maximum slope %, Coefficient of Variation, Standard Error of the Mean and the Sampling Error at the 95% level of probability for coast compilations, by block, in the Block Summaries. Use both measure and count plot slopes in the calculations.

No slope statistics need to be generated for a block if there are less than 2 cruise plots in the block.

Minimum slope %, Maximum slope %:

Example 12.12

Block X has 4 plots.

Slope%:

Plot 1 = 10%

Plot 2 = 20%

Plot 3 = 30%

Plot 4 = 40%

Minimum slope % = 10%

Maximum slope % = 40%

Coefficient of Variation:

$$SD_{sp} = \sqrt{\frac{\sum_{p=1}^{m+c} SP_{p,j}^2 - \left(\sum_{p=1}^{m+c} SP_{p,j}\right)^2 \Big/ m+c}{m+c-1}}$$

$$CV_{sp} = \frac{SD_{SP}}{\overline{SP}} * 100\%$$

Where:

SD_{sp} = Standard Deviation for slope from measure and count plots.

CV_{sp} = Coefficient of Variation of slope for all plots.

Standard Error of the Mean for Slope:

$$SEM_{sp} = \frac{SD_{sp}}{\sqrt{n}}$$

Where:

SEM_{sp} = Standard Error of the Mean for Slope.

n = Number of plots sampled.

Sampling Error at the 95% level of probability for Slope:

$$95\%\ CIsp = \overline{SP} \pm SEM_{sp}\% * t_{m+c-1}$$

Where:

$$SEM_{sp}\% = \frac{SEM_{sp}}{\overline{SP}} * 100$$

95% CIsp = Error at the 95% level of probability for Slope.

t_{m+c-1} = Value from Appendix 11 with m + c – 1 degrees of freedom.

12.4 Lumber Information – Interior Only

The lumber information is also contained in chapter 11 – Volume and Lumber Recovery Reports.

12.4.1 Percent Net Merch - Stud Logs

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

Timber Type

$$\%ST_I = \frac{VST_i}{VT_i} * 100$$

Report to nearest whole number.

12.4.2 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.

12.4.3 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.

12.4.4 Average LRF - All Logs (bd ft/m^3)

See Chapter 11 for more information on LRF and FBM.

Timber Type

$$FBM_I = \sum_{1=1}^{NL_i} FBM_1$$

$$LRF_I = \frac{FBM_i}{VT_i}$$

Lodgepole Pine (Pl):

Pl is divided into several categories; green stems, green beetle attack, red beetle attack, grey beetle attack and dead potential stems. Green stems are described as living stems with no Mountain Pine Beetle (MPB) damage codes associated with them. Green attack stems are those that are marked with insect code 1, red attack stems are those marked with insect code 2 and grey attack stems are those marked with insect code 3. Dead potential stems are dead potential trees with no MPB insect damage codes.

Cruise LRFs will be calculated separately for each category. Pl reduction factors will be then applied to Cruise LRFs calculated for the green beetle attack, red beetle attack, grey beetle attack and dead potential categories. See section 11.5.1.

Lodgepole Pine average LRF will be reported as the weighted average, by net volume, of these categories.

Calculate the average Lodgeploe Pine LRF by weighting the individual category LRFs by net volume.

$$\overline{LRF_{Pl,i}} = \sum_{G=1}^{G_{Pl,i}} \frac{LRF_{Pl,G,i} * V_{G,i}}{V_{G,i}}$$

Example 12.12

There are 3 categories of Pl in a CP: green, red attack and grey attack.

Category	Net Volume	Foot Board Measure	LRF	MPB Reduction	MPB LRF
Green	361	70469	195	0	195
Red Attack	377	71716	190	33	157
Grey Attack	362	70677	195	83	112

Weight the LRFs in each category by net volume to get Pl species LRF.

$$\overline{LRF_{Pl,i}} = \frac{361 \times 195 + 377 \times 157 + 362 \times 112}{361 + 377 + 362}$$

$$= 155$$

Report to nearest whole number.

12.5 Statistical Summary

The statistical summary is reported at the Type, Block and Cutting Permit levels.

For the Type and Block levels, only the all-Species statistics need to be reported. For the Cutting Permit summary, the individual Species as well as the all-Species statistics are reported.

The Type and Cutting Permit calculations are shown in Section 8.4 except for the Cutting Permit number of plots per hectare (See 12.4.4) and Cutting Permit number of trees per plot (See 12.4.5). The rest of this section deals only with Block level reporting.

12.5.1 Number of Measured Plots Used

Average line method:

$$\text{\# measure plots} = \sum_{i=1}^{I_j} m_i$$

Block method:

$$\text{\# measure plots} = \sum_{i=1}^{I_j} m_{i,j}$$

12.5.2 Type of Plots

Report either 'Fixed' or 'Prism'. If both fixed area and prism plots are used in the Block, report 'Mixed'.

12.5.3 Number of Measured Potential Trees

A tree tallied in a border plot will count as two trees. Do not apply a reduction or a double sampling ratio.

Average Line Method:

Report the total number of potential trees (exclude tree class 4 and 6) tallied in the Types that occur in the Block.

Block method:

Report the total number of potential trees (exclude tree class 4 and 6) tallied in the Block.

Report to nearest whole number.

12.5.4 Number of Plots per Hectare - Cutting Permit Only

Divide the total number of plots, including count plots, by the area of the Cutting Permit.

Report to 1 decimal place.

12.5.5 Number of Trees per Plot - Cutting Permit and Timber Type Only

Divide the total number of trees tallied (all commercial Species combined), excluding tree class 4 and 6 by the number of plots in the Cutting Permit. Include count plots in the average.

When a cruised tree meets the minimum DBH utilization level but does not produce a 3 m log according to the taper equation then that tree will be used in the trees per plot equation. These trees will be converted to Tree Class 6 for other purposes.

Report to 1 decimal place.

Example 12.13

There were 84 trees tallied in 12 count and measure plots. One of the trees in a measure plot was a tree class 4. Six of the tallied trees were in a border plot. Six of the tallied trees were in a half plot. Therefore the number of trees per plot is:

(84 + (6 + 6) – 1) / 12 = 7.9

12.5.6 % Confidence Interval for Volume

The Block 95 Percent Confidence interval expresses the Standard Error of the Mean (SEM) as a percentage of the volume per hectare. Calculate the Block SEM by weighting the Type SEMs based on the proportional area of the Type within the Block. Refer to Section 8.4.2 for an explanation of the Type SEM.

$$r_{i,j} = \frac{A_i}{\sum_{i=1}^{I_j} A_i}$$

Average Line method:

Weight the Type SEMs based on plots from the Type.

$$95\%\ CI = \pm\ 100 * \frac{\sqrt{\sum_{i=1}^{I_j} r_{i,j}^2 SEM_i^2}}{V_j} * \text{t-value (refer to Appendix 11)}$$

Block Method:

Weight the Type SEMs based on plots from the Type within the Block.

$$95\%\ CI = \pm 100 * \frac{\sqrt{\sum_{i=1}^{I_j} r_{i,j}^2 SEM_{i,j}^2}}{V_j} * \text{t-value (refer to Appendix 11)}$$

Degrees of Freedom for t-value:

The number of degrees of freedom associated with the t-value is calculated as:

Average Line method:

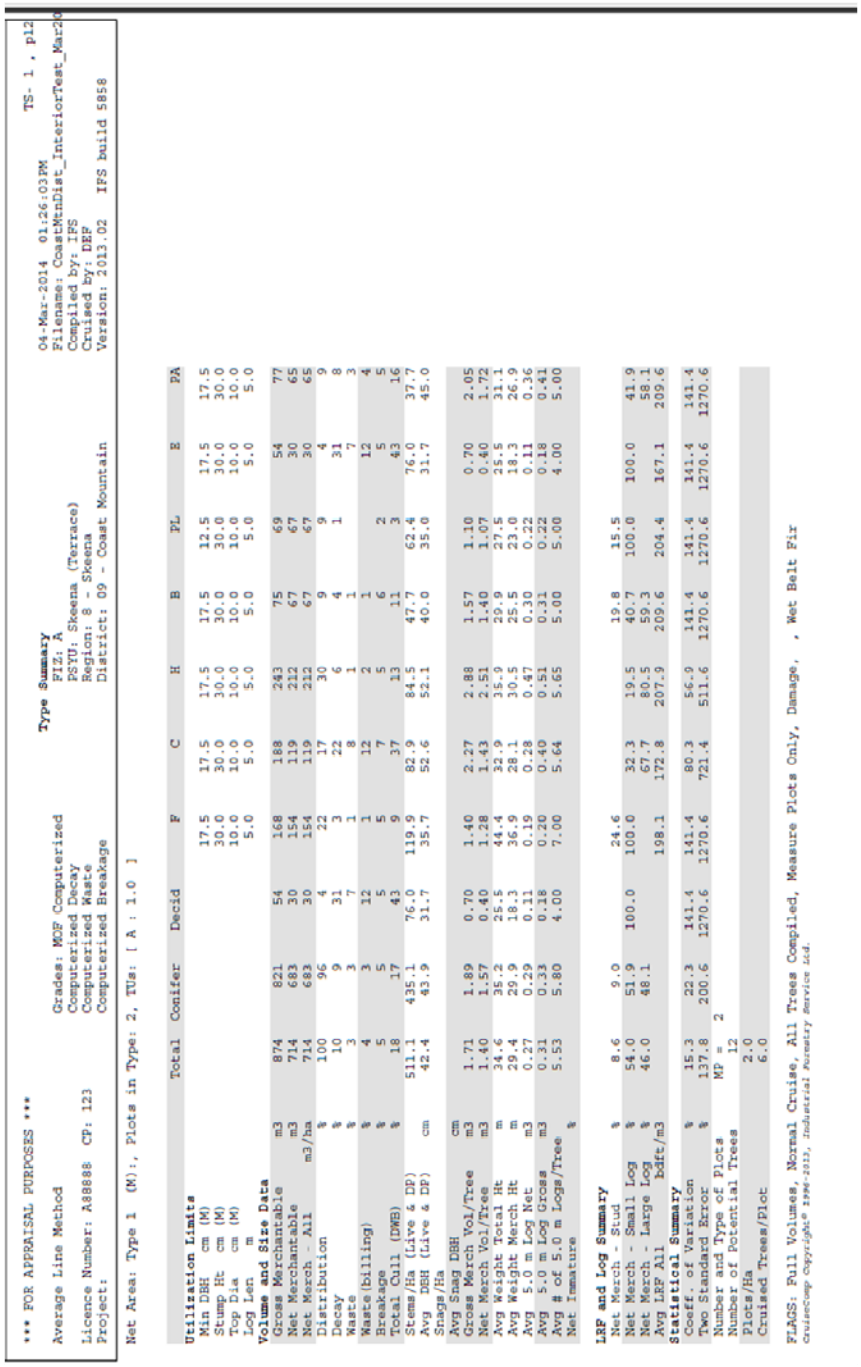
Total number of measured plots in all of the types occurring in the block minus the number of types in the block.

Block method:

Total number of measured plots in the block minus the number of types in block.

12.6 Volume Summary - Sample Listings

Report 009A - Timber Type summary - required.



*** FOR APPRAISAL PURPOSES ***

Average Line Method — Grades: MOF Computerized; Compu terized Decay; Computerized Waste; Computerized Breakage

Licence Number: A88888 CP: 123

Project:

Type Summary — FIZ: A; PSYU: Skeena (Terrace); Region: 8 - Skeena; District: 09 - Coast Mountain

04-Mar-2014 01:26:03PM — Filename: CoastMtnDist_InteriorTest_Mar20 — Compiled by: IFS — Cruised by: DEP — Version: 2013.02 IFS build 5858

TS- 1 , p12

Net Area: Type 1 (M):, Plots in Type: 2, TUs: [A : 1.0]

		Total	Conifer	Decid	F	C	H	B	PL	E	PA
Utilization Limits											
Min DBH cm (M)					17.5	17.5	17.5	17.5	12.5	17.5	17.5
Stump Ht cm (M)					30.0	30.0	30.0	30.0	30.0	30.0	30.0
Top Dia cm (M)					10.0	10.0	10.0	10.0	10.0	10.0	10.0
Log Len m					5.0	5.0	5.0	5.0	5.0	5.0	5.0
Volume and Site Data											
Gross Merchantable	m3	874	821	54	168	188	243	75	69	54	77
Net Merchantable	m3	714	683	30	154	119	212	67	67	30	65
Net Merch - All	m3/ha	714	683	30	154	119	212	67	67	30	65
Distribution	%	100	96	4	22	17	30	9	9	4	9
Decay	%	10	9	31	3	22	6	4	1	31	8
Waste	%	3	3	7	1	8	1	1		7	3
Waste(billing)	%	4	3	12	1	12	2	1		12	4
Breakage	%	5	5	5	5	7	5	6	2	5	5
Total Cull (DWB)	%	18	17	43	9	37	13	11	3	43	16
Stems/Ha (Live & DP)		511.1	435.1	76.0	119.9	82.9	84.5	47.7	62.4	76.0	37.7
Avg DBH (Live & DP)	cm	42.4	43.9	31.7	35.7	52.6	52.1	40.0	35.0	31.7	45.0
Snags/Ha											
Avg Snag DBH	cm										
Gross Merch Vol/Tree	m3	1.71	1.89	0.70	1.40	2.27	2.88	1.57	1.10	0.70	2.05
Net Merch Vol/Tree	m3	1.40	1.57	0.40	1.28	1.43	2.51	1.40	1.07	0.40	1.72
Avg Weight Total Ht	m	34.6	35.2	25.5	44.4	32.9	35.9	29.9	27.5	25.5	31.1
Avg Weight Merch Ht	m	29.4	29.9	18.3	36.9	28.1	30.5	25.5	23.0	18.3	26.9
Avg 5.0 m Log Net	m3	0.27	0.29	0.11	0.19	0.28	0.47	0.30	0.22	0.11	0.36
Avg 5.0 m Log Gross	m3	0.31	0.33	0.18	0.20	0.40	0.51	0.31	0.22	0.18	0.41
Avg # of 5.0 m Logs/Tree		5.53	5.80	4.00	7.00	5.64	5.65	5.00	5.00	4.00	5.00
Net Immature	%										
LRF and Log Summary											
Net Merch - Stud	%	8.6	9.0		24.6			19.8	15.5		
Net Merch - Small Log	%	54.0	51.9	100.0	100.0	32.3	19.5	40.7	100.0	100.0	41.9
Net Merch - Large Log	%	46.0	48.1			67.7	80.5	59.3			58.1
Avg LRF All	bdft/m3				198.1	172.8	207.9	209.6	204.4	167.1	209.6
Statistical Summary											
Coeff. of Variation	%	15.3	22.3	141.4	141.4	80.3	56.9	141.4	141.4	141.4	141.4
Two Standard Error	%	137.8	200.6	1270.6	1270.6	721.4	511.6	1270.6	1270.6	1270.6	1270.6
Number and Type of Plots		MP = 2									
Number of Potential Trees		12									
Plots/Ha		2.0									
Cruised Trees/Plot		6.0									

FLAGS: Full Volumes, Normal Cruise, All Trees Compiled, Measure Plots Only, Damage, , Wet Belt Fir

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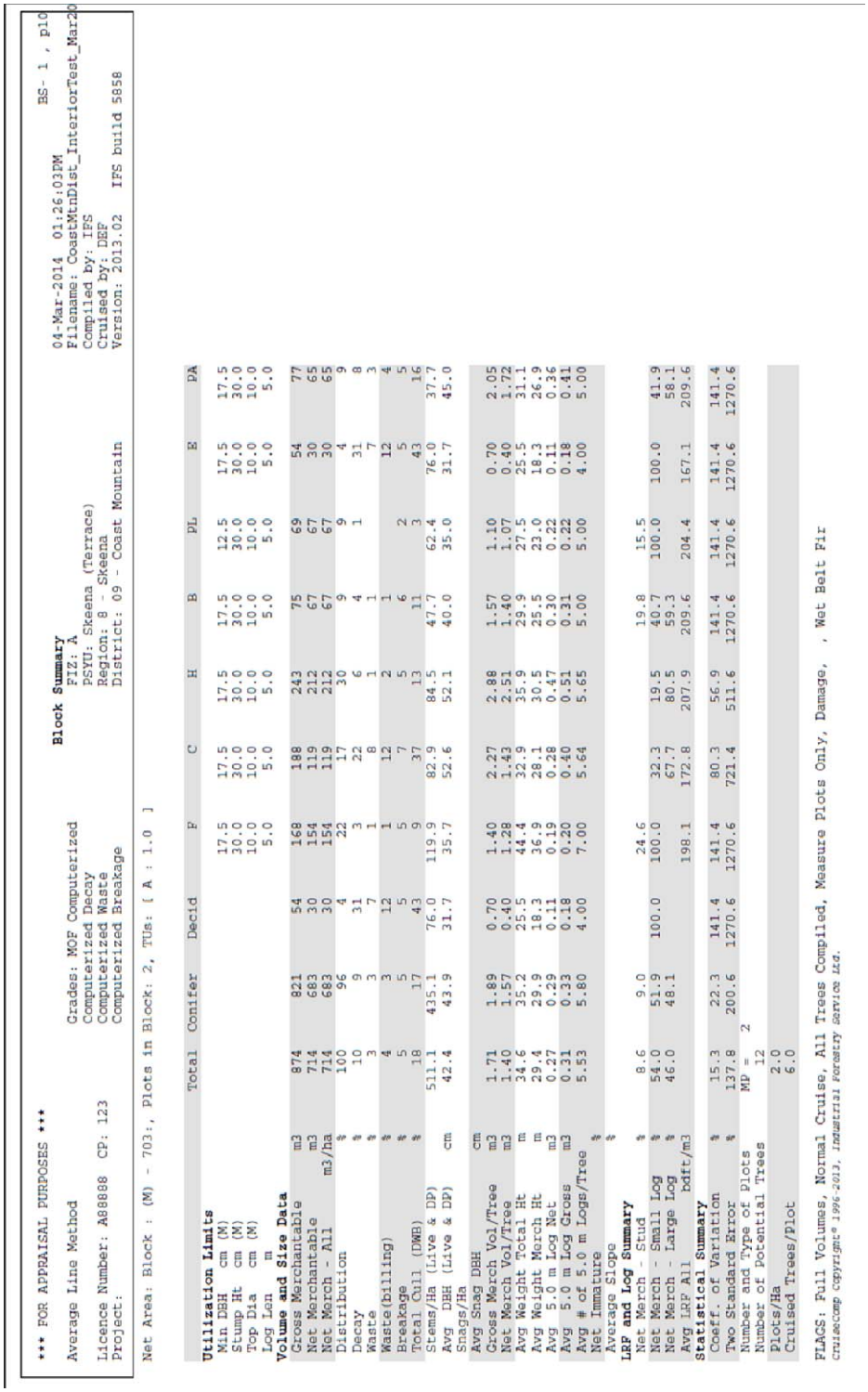
Figure 12.1 Type Volume Summary - Sample Listing (Partial).

Report 009B - Block summary - required.



*** FOR APPRAISAL PURPOSES ***

Average Line Method — Grades: MOF Computerized; Computerized Decay; Computerized Waste; Computerized Breakage

Licence Number: A88888 CP: 123
Project:

Block Summary
FIZ: A
PSYU: Skeena (Terrace)
Region: 8 - Skeena
District: 09 - Coast Mountain

04-Mar-2014 01:26:03PM BS- 1 , p10
Filename: CoastMtnDist_InteriorTest_Mar20
Compiled by: IFS
Cruised by: DEF
Version: 2013.02 IFS build 5858

Net Area: Block : (M) - 703:, Plots in Block: 2, TUs: [A : 1.0]

		Total	Conifer	Decid	F	C	H	B	PL	E	PA
Utilization Limits											
Min DBH cm (M)					17.5	17.5	17.5	17.5	12.5	17.5	17.5
Stump Ht cm (M)					30.0	30.0	30.0	30.0	30.0	30.0	30.0
Top Dia cm (M)					10.0	10.0	10.0	10.0	10.0	10.0	10.0
Log Len m					5.0	5.0	5.0	5.0	5.0	5.0	5.0
Volume and Size Data											
Gross Merchantable	m3	974	821	54	168	188	243	75	69	54	77
Net Merchantable	m3	714	683	30	154	119	212	67	67	30	65
Net Merch - All	m3/ha	714	683	30	154	119	212	67	67	30	65
Distribution	%	100	96	4	22	17	30	9	9	4	9
Decay	%	10	9	31	3	22	6	4	1	31	8
Waste	%	3	3	7	1	8	1	1		7	3
Waste(billing)	%	4	3	12	1	12	2	1		12	4
Breakage	%	5	5	5	5	7	5	6	2	5	5
Total Cull (DWB)	%	18	17	43	9	37	13	11	3	43	16
Stems/Ha (Live & DP)		511.1	435.1	76.0	119.9	82.9	84.5	47.7	62.4	76.0	37.7
Avg DBH (Live & DP)	cm	42.4	43.9	31.7	35.7	52.6	52.1	40.0	35.0	31.7	45.0
Snags/Ha											
Avg Snag DBH	cm										
Gross Merch Vol/Tree	m3	1.71	1.89	0.70	1.40	2.27	2.88	1.57	1.10	0.70	2.05
Net Merch Vol/Tree	m3	1.40	1.57	0.40	1.28	1.43	2.51	1.40	1.07	0.40	1.72
Avg Weight Total Ht	m	34.6	35.2	25.5	44.4	32.9	35.9	29.9	27.5	25.5	31.1
Avg Weight Merch Ht	m	29.4	29.9	18.3	36.9	28.1	30.5	25.5	23.0	18.3	26.9
Avg 5.0 m Log Net	m3	0.27	0.29	0.11	0.19	0.28	0.47	0.30	0.22	0.11	0.36
Avg 5.0 m Log Gross	m3	0.31	0.33	0.18	0.20	0.40	0.51	0.31	0.22	0.18	0.41
Avg # of 5.0 m Logs/Tree		5.53	5.80	4.00	7.00	5.64	5.65	5.00	5.00	4.00	5.00
Net Immature	%										
Average Slope	%										
L&P and Log Summary											
Net Merch - Stud	%	8.6	9.0		24.6			19.8	15.5		
Net Merch - Small Log	%	54.0	51.9	100.0	100.0	32.3	19.5	40.7	100.0	100.0	41.9
Net Merch - Large Log	%	46.0	48.1			67.7	80.5	59.3			58.1
Avg LRF All	bdft/m3				198.1	172.8	207.9	209.6	204.4	167.1	209.6
Statistical Summary											
Coeff. of Variation	%	15.3	22.3	141.4	141.4	80.3	56.9	141.4	141.4	141.4	141.4
Two Standard Error	%	137.8	200.6	1270.6	1270.6	721.4	511.6	1270.6	1270.6	1270.6	1270.6
Number and Type of Plots		MP = 2									
Number of Potential Trees		12									
Plots/Ha		2.0									
Cruised Trees/Plot		6.0									

FLAGS: Full Volumes, Normal Cruise, All Trees Compiled, Measure Plots Only, Damage, , Wet Belt Fir

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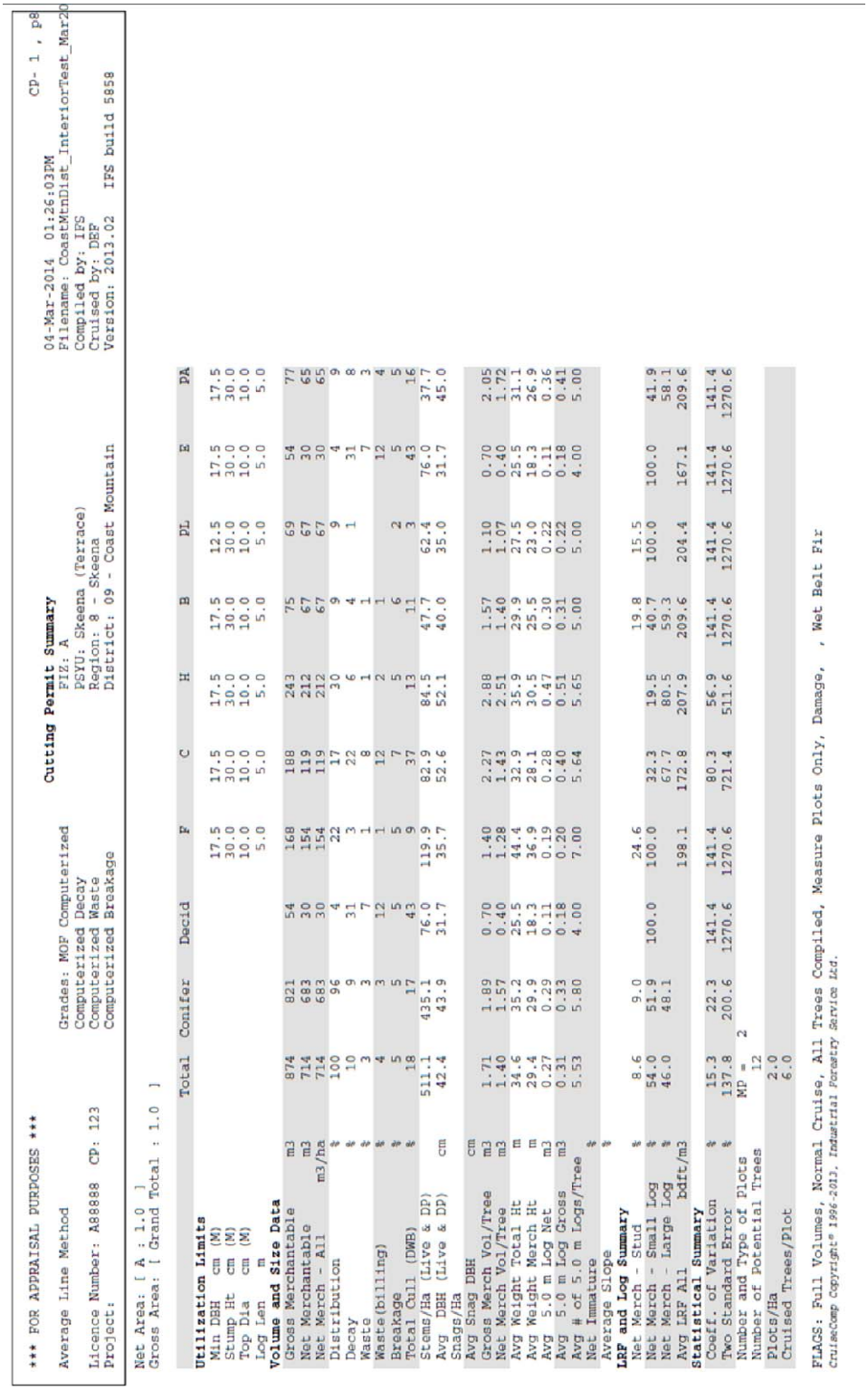
Figure 12.2 Block Volume Summary - Sample Listing (Partial).

Report 009C - Cutting Permit summary - required.



*** FOR APPRAISAL PURPOSES ***

Cutting Permit Summary

04-Mar-2014 01:26:03PM CP- 1 , p8
Filename: CoastMtnDist_InteriorTest_Mar20

Average Line Method
Grades: MOF Computerized
Computerized Decay
Computerized Waste
Computerized Breakage

FIZ: A
PSYU: Skeena (Terrace)
Region: 8 - Skeena
District: 09 - Coast Mountain

Compiled by: IFS
Cruised by: DEF
Version: 2013.02 IFS build 5858

Licence Number: A88888 CP: 123
Project:

Net Area: [A : 1.0]
Gross Area: [Grand Total : 1.0]

		Total	Conifer	Decid	F	C	H	B	PL	E	PA
Utilization Limits											
Min DBH cm (M)					17.5	17.5	17.5	17.5	12.5	17.5	17.5
Stump Ht cm (M)					30.0	30.0	30.0	30.0	30.0	30.0	30.0
Top Dia cm (M)					10.0	10.0	10.0	10.0	10.0	10.0	10.0
Log Len m					5.0	5.0	5.0	5.0	5.0	5.0	5.0
Volume and Size Data											
Gross Merchantable	m3	874	821	54	168	188	243	75	69	54	77
Net Merchantable	m3	714	683	30	154	119	212	67	67	30	65
Net Merch - All	m3/ha	714	683	30	154	119	212	67	67	30	65
Distribution	%	100	96	4	22	17	30	9	9	4	9
Decay	%	10	9	31	3	22	6	4	1	31	8
Waste	%	3	3	7	1	8	1	1		7	3
Waste(billing)	%	4	3	12	1	12	2	1		12	4
Breakage	%	5	5	5	5	7	5	6	2	5	5
Total Cull (DWB)	%	18	17	43	9	37	13	11	3	43	16
Stems/Ha (Live & DP)		511.1	435.1	76.0	119.9	82.9	84.5	47.7	62.4	76.0	37.7
Avg DBH (Live & DP)	cm	42.4	43.9	31.7	35.7	52.6	52.1	40.0	35.0	31.7	45.0
Snags/Ha											
Avg Snag DBH	cm										
Gross Merch Vol/Tree	m3	1.71	1.89	0.70	1.40	2.27	2.88	1.57	1.10	0.70	2.05
Net Merch Vol/Tree	m3	1.40	1.57	0.40	1.28	1.43	2.51	1.40	1.07	0.40	1.72
Avg Weight Total Ht	m	34.6	35.2	25.5	44.4	32.9	35.9	29.9	27.5	25.5	31.1
Avg Weight Merch Ht	m	29.4	29.9	18.3	36.9	28.1	30.5	25.5	23.0	18.3	26.9
Avg 5.0 m Log Net	m3	0.27	0.29	0.11	0.19	0.28	0.47	0.30	0.22	0.11	0.36
Avg 5.0 m Log Gross	m3	0.31	0.33	0.18	0.20	0.40	0.51	0.31	0.22	0.18	0.41
Avg # of 5.0 m Logs/Tree		5.53	5.80	4.00	7.00	5.64	5.65	5.00	5.00	4.00	5.00
Net Immature	%										
Average Slope	%										
LRF and Log Summary											
Net Merch - Stud	%	8.6	9.0		24.6			19.8	15.5		
Net Merch - Small Log	%	54.0	51.9	100.0	100.0	32.3	19.5	40.7	100.0	100.0	41.9
Net Merch - Large Log	%	46.0	48.1			67.7	80.5	59.3			58.1
Avg LRF All	bdft/m3				198.1	172.8	207.9	209.6	204.4	167.1	209.6
Statistical Summary											
Coeff. of Variation	%	15.3	22.3	141.4	141.4	80.3	56.9	141.4	141.4	141.4	141.4
Two Standard Error	%	137.8	200.6	1270.6	1270.6	721.4	511.6	1270.6	1270.6	1270.6	1270.6
Number and Type of Plots		MP = 2									
Number of Potential Trees		12									
Plots/Ha		2.0									
Cruised Trees/Plot		6.0									

FLAGS: Full Volumes, Normal Cruise, All Trees Compiled, Measure Plots Only, Damage, , Wet Belt Fir

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Figure 12.3 Cutting Permit Volume Summary - Sample Listing (Partial).