SECOND ADDENDUM TO TIMBER SUPPLY ANALYSIS FOR TREE FARM LICENSE 8

Pope & Talbot Ltd.
Boundary Timber Division
Management Plan No. 10

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1.   INTRODUCTION

The following addendum to the *TFL 8 Timber Supply Analysis Report* (AR) has been prepared to document the results of additional sensitivity analyses undertaken prior to, and in support of, the AAC determination on TFL8.

The AR presented three alternative harvest flows. A maximum even flow harvest level (186,600 cubic metres per year) was determined by applying full old seral requirements in low BEO areas for the entire planning horizon. A second maximum even flow harvest level (205,600 cubic metres per year) was determined by applying one-third (1/3) old seral requirements in low BEO areas for the entire planning horizon. Finally, the base case harvest flow was developed using the reduced seral requirements throughout the planning horizon. The base case consisted of the proposed AAC of 163,535 cubic metres per year (m^3/yr) for six (6) decades followed by an increase to 208,100 m^3/yr for the remainder of the planning horizon. The proposed AAC level was chosen based on consideration of several downward pressures whose impact was estimated relative to the more conservative maximum even flow estimate of 186,600 m^3/yr.

1.1   Mature seral retention

The base case and all associated sensitivity analyses documented in *Timber Supply Analysis for Tree Farm License 8* (AR) incorporated minimum retention levels for mature-plus-old seral habitat as required by the Kootenay-Boundary Higher Level Plan Order (KBHLPO). The Deputy Chief Forester has requested a further sensitivity analysis exploring the impact of removing the mature-plus-old seral retention requirements on the maximum even flow harvest level *determined at the reduced old seral target levels.*

The results of this analysis run are shown in Figure 1.1. The dashed lines show the maximum even flow (205,600 m^3/yr) and associated available inventory characteristics as previously established in the timber supply analysis. The upper solid line shows the available inventory volume determined at the 205,600 m^3/yr harvest level after removing the mature-plus-old seral retention requirement. Finally, the adjusted maximum even flow harvest level of 222,800 m^3/yr is shown (the lower solid line in the figure). Thus, the removal of mature-plus-old seral retention requirements allows an 8% increase in the maximum even flow harvest level as determined at reduced old seral retention targets.
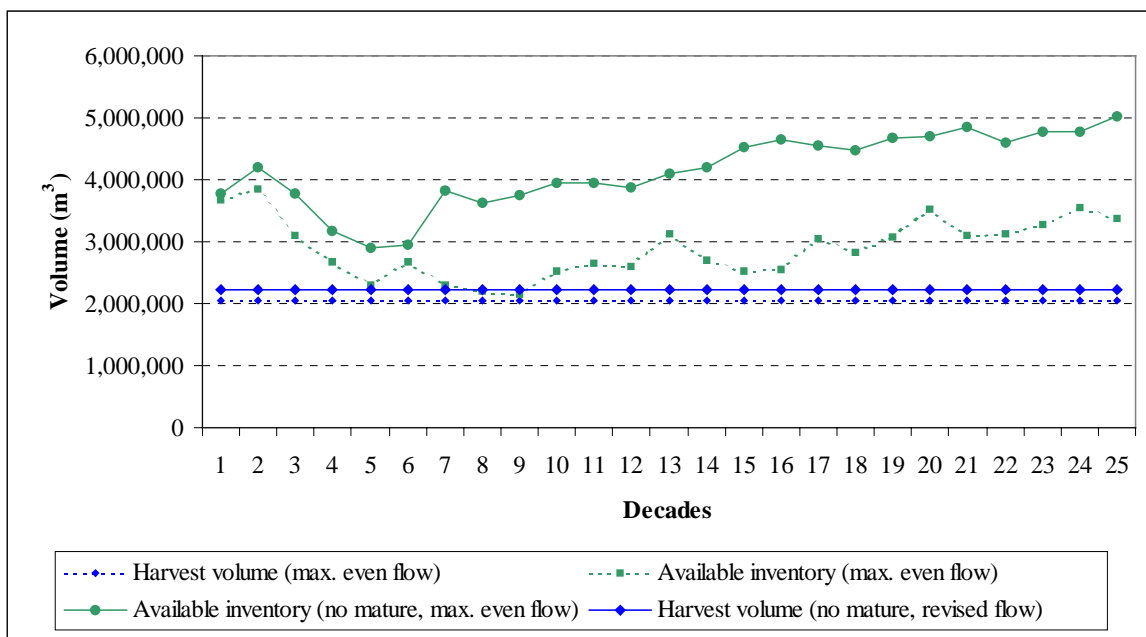
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Figure 1.1 Sensitivity to removal of mature-plus-old seral retention requirement

1.2 Old seral retention

TFL 8 contains portions of three landscape units that also extend into the neighbouring Boundary timber supply area (TSA). For all analyses presented in the AR, old seral retention requirements were modelled assuming a purely proportional contribution from the TFL to the retention targets for the complete landscape unit. Four sensitivity analyses were prepared to explore the potential impact of two alternate models of apportioning old seral retention requirements between the TFL and the neighbouring TSA.

1.2.1 TFL contributes 100% of TSA&TFL combined requirements

The first two sensitivity analyses considered the case in which old seral retention requirements for the TSA plus TFL combined are fulfilled entirely from the TFL.

The derivation of adjusted retention targets is summarized in Table 1.1. The first five columns in the table are repeated from Table 10.9 in the *Timber Supply Analysis Information Package for Tree Farm License 8*. Column 6 represents an estimate of the crown forested landbase (CFLB) area within each seral zone in the Boundary TSA. These figures were derived from Table A-3 in the TSR2 analysis report for the Boundary TSA (MoF 2000), and are estimates only since the BEC classification for the TSA come from the provincial BEC inventory, while the BEC classifications within the TFL come from the TEM completed on the TFL. Column 7 is an estimate of the total CFLB area within each seral zone on the combined TSA and TFL landbase. Column 8 is the KBHLPO old seral retention target, incorporating the 2/3 draw-down of retention requirements within low biodiversity emphasis option (BEO) seral zones. Column 9 shows the number of old seral hectares required in each seral zone of the combined TSA and TFL landbase. Column 10 presents the percentage of each seral zone within the TFL needed to satisfy the entire old seral requirement completely from the TFL landbase. Columns 11, 12 and 13 are analogous to columns 8, 9 and 10 except that they impose the full KBHLPO old seral requirements within low BEO zones.

Table 1.1 Adjusted target percentages where TFL contributes all old seral

1	2	3	4	5	6	7	8	9	10	11	12	13
Seral Zone	Description	TFL CFLB ha	STS Area ha	Adjusted TFL ha	TSA CFLB ha	Total CFLB ha	Target % (1/3 Old)	Total Target ha (1/3 Old)	TFLTarget % (1/3 Old)	Target % (3/3 Old)	Total Target ha (3/3 Old)	TFL Target % (3/3 Old)
1	B1-ICHmk1-I	2.3	0.0	2.3	3,557.6	3,559.9	14	498.4	100	14	498.4	100
2	B1-IDFdm1-H	2,870.4	755.1	2,115.3	13,236.5	16,106.9	19	3,060.3	100	19	3060.3	100
3	B1-IDFdm1-I	1,629.6	126.0	1,503.6	0.0	1,629.6	13	211.8	14	13	211.8	14
4	B1-MSdm1-H	164.7	17.3	147.5	0.0	164.7	21	34.6	23	21	34.6	23
5	B1-MSdm1-I	1,754.0	0.0	1,754.0	9,270.0	11,024.0	14	1,543.4	88	14	1543.4	88
6	B7-ESSFdc1-L	6,723.5	0.0	6,723.5	189.4	6,912.9	4.7	324.9	5	14	967.8	14
7	B7-ICHmk1-L	5,450.2	110.1	5,340.1	1,875.4	7,325.6	4.7	344.3	6	14	1025.6	19
8	B7-ICHmw2-L	307.0	0.0	307.0	2.0	309.0	3	9.3	3	9	27.8	9
9	B7-IDFdm1-L	6,597.9	1,280.0	5,318.0	1,131.5	7,729.4	4.3	332.4	6	13	1004.8	19
10	B7-MSdm1-L	16,020.6	141.7	15,878.9	751.6	16,772.2	4.7	788.3	5	14	2348.1	15
11	B8-ESSFdc1-L	3,601.7	0.0	3,601.7	34.6	3,636.3	4.7	170.9	5	14	509.1	14
12	B8-IDFdm1-L	9,789.1	615.0	9,174.1	5,712.6	15,501.7	4.3	666.6	7	13	2015.2	22
13	B8-MSdm1-L	18,264.5	8.6	18,255.9	13,075.2	31,339.7	4.7	1,473.0	8	14	4387.6	24

Column 3 = Total crown forested landbase (CFLB) within TFL

Column 4 = Single tree selection area within TFL

Column 5 = Column 3 – Column 4

Column 6 = Total crown forested landbase (CFLB) within TSA, from Table A-3 in MoF, 2000.

Column 7 = Column 3 + Column 6

Column 8 = Old seral retention target percent, from KBHLPO and with 2/3 draw-down in low BEO zones

Column 9 = Column 7 * Column 8 / 100

Column 10 = 100 * Column 9 / Column 5, where Column 9 < Column 5; = 100, where Column 9 ≥ Column 5

Column 11 = Old seral retention target percent, from KBHLPO and with no draw-down in low BEO zones

Column 12 = Column 7 * Column 11 / 100

Column 13 = 100 * Column 12 / Column 5, where Column 12 < Column 5; = 100, where Column 12 ≥ Column 5

The targets from column 10 of Table 1.1 were applied in a sensitivity analysis with respect to the maximum even flow harvest level determined at the reduced old seral target levels. In all other respects, the assumptions and inputs to this analysis were identical to the base case reported in the AR. Figure 1.2 shows the results of this simulation run. The dashed lines in the figure show the maximum even flow harvest level of 205,600 m^3/yr as previously reported in the AR, along with the associated available inventory volume characteristic. The solid available inventory line in the figure shows the impact of applying the adjusted old seral targets while trying to maintain the original harvest levels. Finally, the revised harvest level of 199,510 m^3/yr is shown as the solid horizontal line.

The revised harvest level represents a 3 % reduction in the initial maximum even flow harvest level.
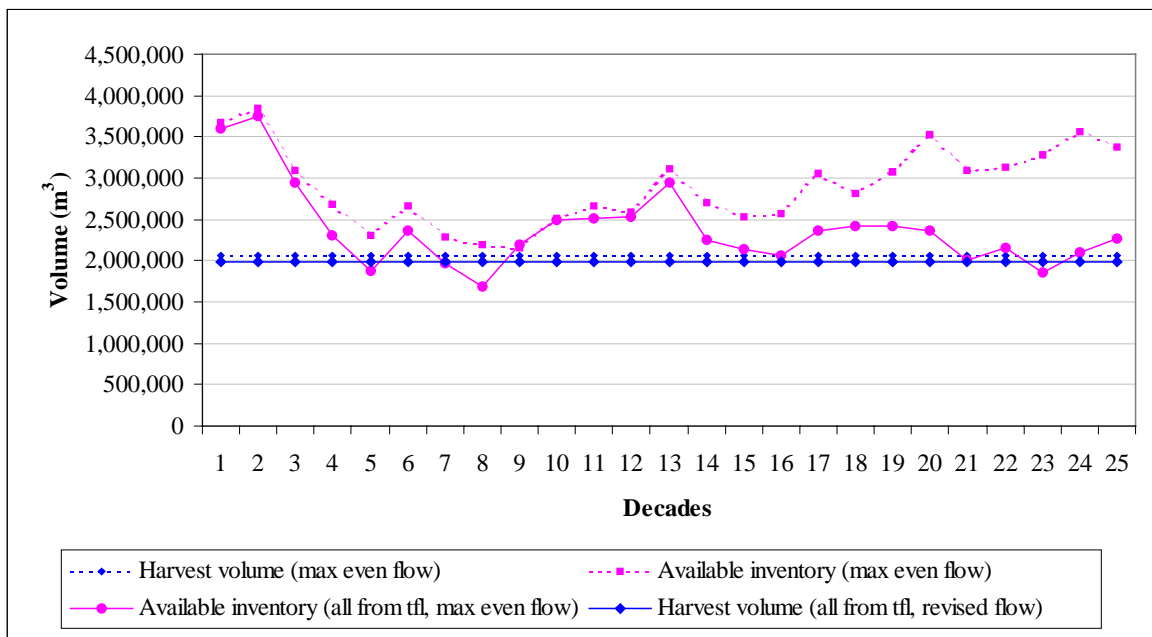

Figure 1.2 Sensitivity to TFL providing all old seral, 1/3 target levels

A second test was performed in which the targets from column 13 of Table 1.1 were applied with respect to the maximum even flow harvest level determined at the full old seral target levels. In all other respects, the assumptions and inputs to this analysis were identical to the base case reported in the AR. Figure 1.3 shows the results of this simulation. The dashed lines in the figure show the maximum even flow harvest level of 186,600 m^3/yr as previously reported in the AR, along with the associated available inventory volume characteristic. The solid available inventory line in the figure shows the impact of applying the adjusted old seral targets while trying to maintain the original harvest levels. Finally, the revised harvest forecast is shown as the solid horizontal line.

Following a 13% reduction to 162,730 m^3/yr in the short term, the revised harvest level was then raised in decade 8 to 104.6% of the original maximum even flow level.
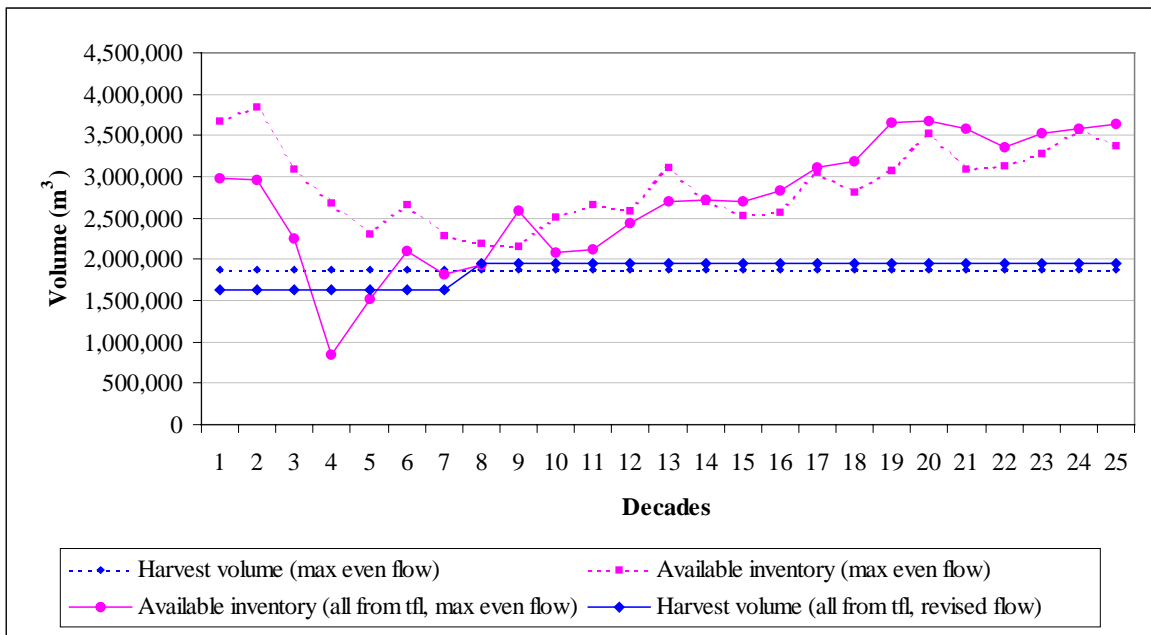
Figure 1.3 Sensitivity to TFL providing all old seral, 3/3 target levels

1.2.2   TFL contributes a variable proportion of TSA&TFL combined requirements

The second two sensitivity runs were developed assuming a variable contribution of the TFL toward the total old seral area requirements (columns 9 and 12 in Table 1.1). Specifically, column 3 in Table 1.2 is the proportion contributed by the TFL to the total seral zone area of the combined TSA and TFL landbase. It was then assumed that the TFL would contribute to the total old seral retention requirement in the same proportion as its' contribution to the overall seral zone area where that proportion was 50% or more; otherwise the TFL would contribute no more than 50% of the total old seral retention requirement.

The resulting adjusted retention targets for the TFL are shown in columns 7 and 8 of Table 1.2, for the 1/3 and full low BEO retention levels respectively.

Table 1.2 Adjusted target percentages where TFL contributes variable proportion of old seral

1	2	3	4	5	6	7	8
Seral Zone	Description	TFL % Total CFLB Area	Total Target ha (1/3 Old)	Total Target ha (3/3 Old)	Max. TFL contribution %	TFL Target % (1/3 Old)	TFL Target % (3/3 Old)
1	B1-ICHmk1-I	0.1	498.4	498.4	50	100.0	100.0
2	B1-IDFdm1-H	17.8	3,060.3	3060.3	50	72.3	72.3
3	B1-IDFdm1-I	100.0	211.8	211.8	100	14.1	14.1
4	B1-MSdm1-H	100.0	34.6	34.6	100	23.5	23.5
5	B1-MSdm1-I	15.9	1,543.4	1543.4	50	44.0	44.0
6	B7-ESSFdc1-L	97.3	324.9	967.8	97	4.7	14.0
7	B7-ICHmk1-L	74.4	344.3	1025.6	74	4.8	14.3
8	B7-ICHmw2-L	99.4	9.3	27.8	99	3.0	9.0
9	B7-IDFdm1-L	85.4	332.4	1004.8	85	5.3	16.1
10	B7-MSdm1-L	95.5	788.3	2348.1	96	4.7	14.1
11	B8-ESSFdc1-L	99.0	170.9	509.1	99	4.7	14.0
12	B8-IDFdm1-L	63.1	666.6	2015.2	63	4.6	13.9
13	B8-MSdm1-L	58.3	1,473.0	4387.6	58	4.7	14.0

Column 3 = 100 * (Table 1.1-Column 3/Table 1.1-Column 7)

Column 4 = Table 1.1-Column 9

Column 5= Table 1.1-Column 12

Column 6 = Column 3, where Column 3 ≥ 50; = 50, where Column 3 < 50

Column 7 = (Column 6 * Column 4)/Table 1.1-Column 5, where (Column 6 * Column 4)/100 < Table 1.1-Column 5;
        = 100, where (Column 6 * Column 4)/100 ≥ Table 1.1-Column 5

Column 8 = (Column 6 * Column 5)/Table 1.1-Column 5, where (Column 6 * Column 5)/100 < Table 1.1-Column 5;
        = 100, where (Column 6 * Column 5)/100 ≥ Table 1.1-Column 5

The targets from column 7 of Table 1.2 were applied to determine the sensitivity of the maximum even flow harvest level *determined at the reduced old seral target levels*. The results of this run are shown in Figure 1.4. The dashed lines in the figure show the initial harvest level of 205,600 m³/yr as previously reported in the AR, along with the associated available inventory volume characteristic. The solid available inventory line shows the impact of applying the adjusted old seral targets while trying to maintain the original harvest levels. Finally, the revised harvest level of 204,225 m³/yr is shown as the solid horizontal line. The revised harvest level represents a 0.7 % reduction in the original harvest level.
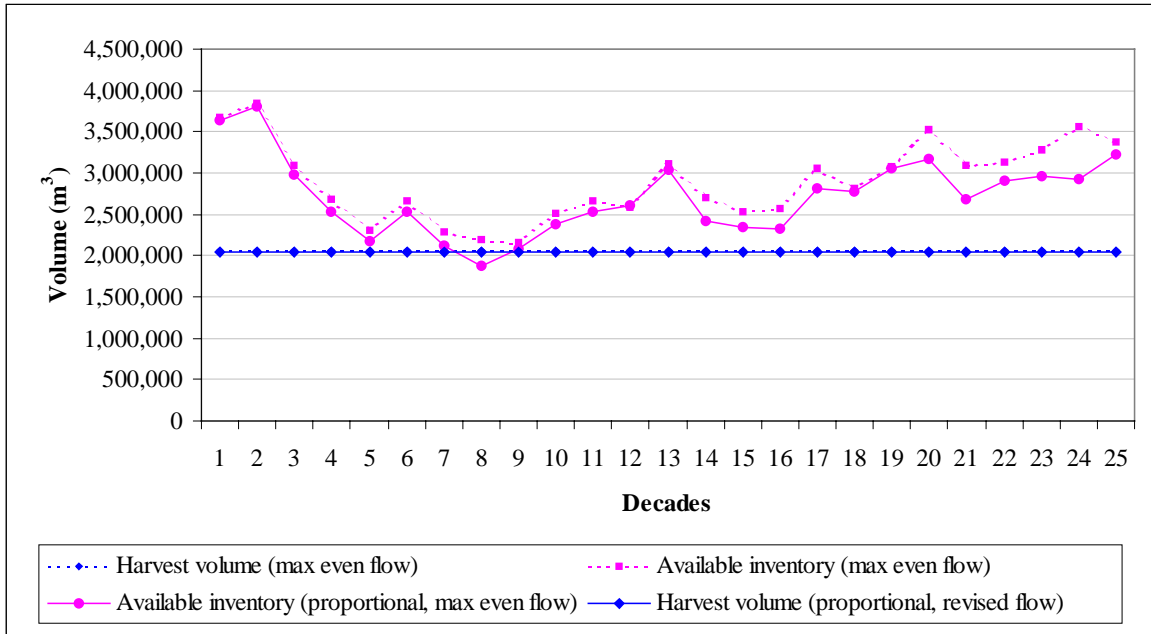

Figure 1.4 Sensitivity to TFL providing variable proportion of old seral, 1/3 target levels

The fourth test applied the targets from column 8 of Table 1.2 to determine the sensitivity with respect to the maximum even flow harvest level *determined at the full old seral target levels*. The results of this run are shown in Figure 1.5. The dashed lines in the figure show the initial harvest level of 186,600 m³/yr as previously reported in the AR, along with the associated available inventory volume characteristic. The solid available inventory line shows the impact of applying the adjusted old seral targets while trying to maintain the original harvest levels. Finally, the revised harvest level is shown as the solid horizontal line.

Following a 1.5 % reduction to 183,850 m³/yr in the short term, the revised harvest level was then raised in decade 8 to 114 % of the original maximum even flow level.
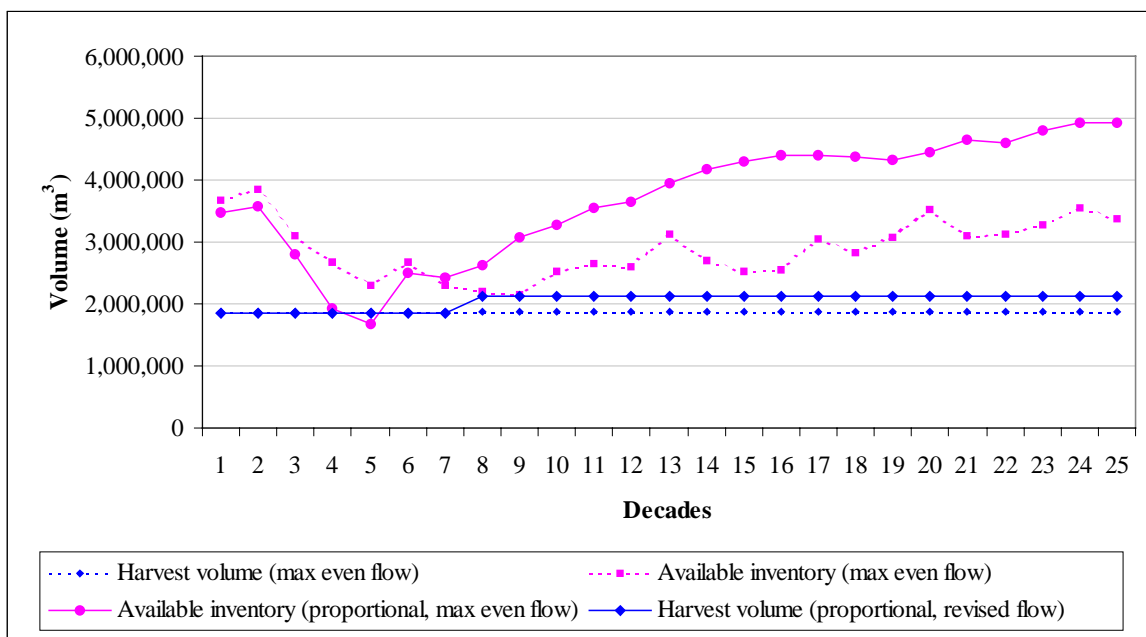
Figure 1.5 Sensitivity to TFL providing variable proportion of old seral, 3/3 target levels

1.3   Dense lodgepole pine stands

Section 8 of the AR discusses the downward pressures that were considered in arriving at the proposed AAC of 163,535 m³/yr.   Item 6 in that discussion relates to the marginal merchantability of many of the dense lodgepole pine (Pl) stands that were brought into the THLB as a result of the dense pine inventory project (JST, 1999). The Deputy Chief Forester has requested an analysis of the sensitivity of the maximum even flow harvest level (*at reduced old seral retention levels*) to the removal of these dense Pl stands from the THLB.

Based on the landbase classification (Table 6.1 in the Information Package for TFL8) and the definition of dense Pl stands (Table 8.1 in the Information Package for TFL8) there are 8,558 hectares of dense Pl stands included in the THLB for TFL8. Two separate sensitivity analyses were performed to explore this issue. In the first case, 50% of the area identified as dense Pl in the THLB was reclassified as part of the productive-but-excluded landbase. In the second case 100% of dense Pl stands lying in the THLB were reclassified as productive-but-excluded landbase. Although the 8,558 hectares of dense Pl stands contributed to the estimates of growth and yield for both natural and managed stands in the base case analysis, no adjustments were made to yield tables for these sensitivity analyses.

The results of the first sensitivity analysis are shown in Figure 1.6. The maximum even flow harvest level (at reduced old seral retention levels in low BEO areas) and the associated available inventory characteristics are shown (dashed lines). The solid available inventory volume line shows the impact of removing 4,279 hectares of dense Pl stands while attempting to maintain the 205,600 m³/yr harvest level throughout the planning horizon. Finally, the adjusted harvest flow forecast is shown (solid line). The adjusted harvest levels are also given in Table 1.3. The harvest level was reduced by 8 % to 188,850 m³/yr in the short term (decades 1 through 7). This represents the revised maximum even flow harvest level. The impact of removing 50% of the

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dense Pl was less in the long term, as it was possible to raise the harvest level to 199,100 m^3/yr in decade 8 and maintain this level throughout the remainder of the planning horizon.
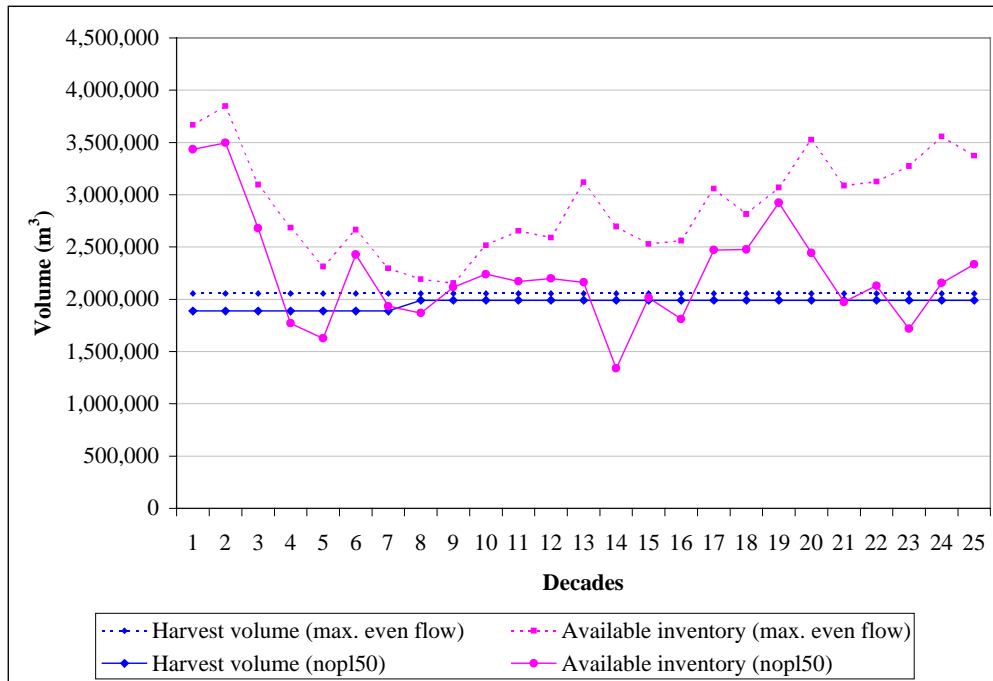

Figure 1.6 Sensitivity to removal of 50% of dense lodgepole pine area from THLB

Table 1.3 Revised Harvest Flow, 50% of dense Pl removed from THLB

Decade	Net Harvest m^3/yr
1-7	188,850
7-25	199,100

The results of the second sensitivity analysis are shown in Figure 1.7. The maximum even flow harvest level (at reduced old seral retention levels in low BEO areas) and the associated available inventory characteristics are shown (dashed lines). The solid available inventory volume line shows the impact of removing all 8,558 hectares of dense Pl stands while attempting to maintain the 205,600 m^3/yr harvest level throughout the planning horizon. The adjusted harvest flow forecast is also shown (solid line) in the figure, and summarized in Table 1.4. The harvest level was reduced by 18 % to 169,100 m^3/yr in the short term (decades 1 through 6). This represents the revised maximum even flow harvest level. The impact of removing all dense Pl was less in the long term, as it was possible to raise the harvest level to a long term level of 188,100 m^3/yr by decade 9 and maintain this level throughout the remainder of the planning horizon.
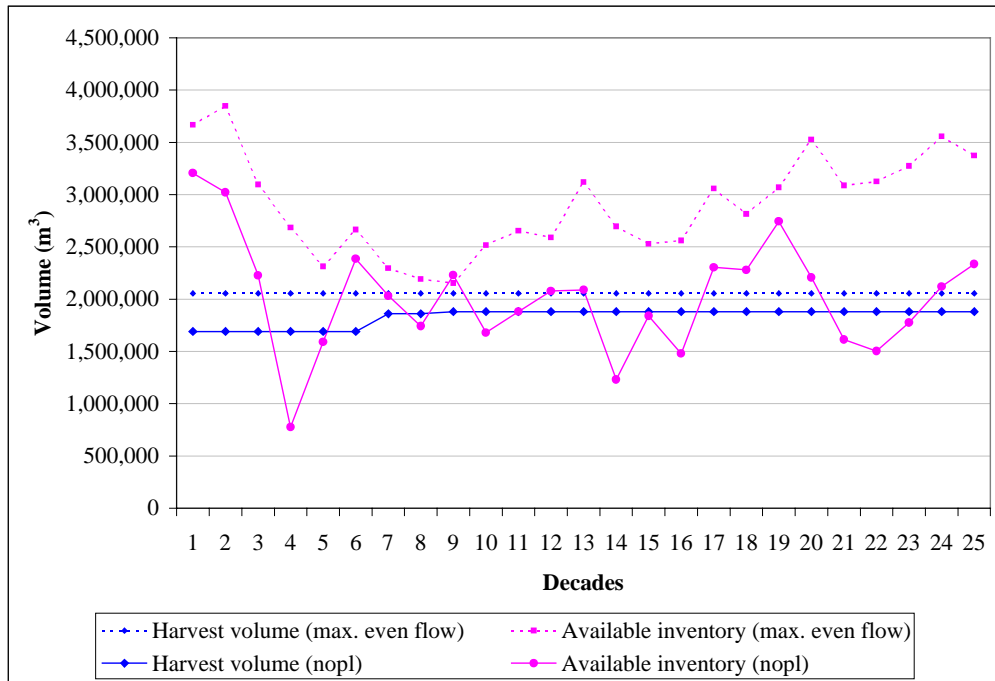
Figure 1.7 Sensitivity to removal of all dense lodgepole pine stands from THLB

Table 1.4 Revised Harvest Flow, All dense Pl removed from THLB

Decade	Net Harvest m³/yr
1-6	169,100
7-8	186,100
9-25	188,100

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REFERENCES

J.S. Thrower & Associates (JST), 1999. Statistical Adjustment of Dense Lodgepole Pine Polygons in the Boundary Forest District. Contract Rep. to Pope & Talbot. March 16, 1999. 12 pp.

Ministry of Forests, 2000. Boundary Timber Supply Area Analysis Report. 138 pp.