TFL 1 Supplemental MoFR Analysis

January 2008

Introduction

During the fall review of the "Factors for Consideration" for TFL 1's AAC determination the economic viability of old, poor site, predominantly hemlock stands was discussed. These stands occupy over one-third of the timber harvesting land base (THLB) and are only suitable to harvest for pulp. Given the current market conditions these stands may not be harvested and the entire AAC could come from the non-pulp stands. This would result in long periods when only pulp stands are available for harvest.

One option to help the non-pulp stands from being over harvested, in the short term, is to partition the AAC into pulp and non-pulp stands. Unfortunately the 2003 analysis did not take this into consideration. The objective of this supplementary analysis is provide the deputy chief forester enough information to partition the AAC into non-pulp and pulp stands.

Methodology

The data set used in the timber supply analysis is not available so one was created using the information from the 2003 Information Package. These data did not differentiate old hemlock leading pulp stands so the information package assumptions were applied to the forest inventory and the THLB was re-created. With direction from the District staff, attributes for pulp stands were identified and applied to flag pulp stands in the forest cover inventory. The amount of pulp stands in the forest cover inventory THLB was calculated and used to create new analysis units in the timber supply data base.

All aspects of 2003 analysis could not be re-created due to amount of time required to collect and collate the original inventories[1]. The major differences between the 2003 and 2008 datasets are:

- The 2008 database does not include many of management zones (e.g. wildlife areas and VQO's).
- Upon review in 2007 the yield curves presented in the 2003 information package may not have been the ones used in the 2003 analysis. For example, actual versus reported Minimum Harvestable Ages (MHA) did not match. Note: There was a last minute change to some yield assumptions and the final report may not have been updated to reflect those changes.
- The description of the old hemlock regeneration assumptions did not match the 2003 base case assumptions – the correct assumptions were used in the 2008 analysis. This factor is accredited to editorial error rather than analysis error.
- The 2003 and 2008 THLB are not an exactly match. There is 1,000 hectare difference but this magnitude should not impact the 2008 analysis.

Although the 2003 databases do not exactly replicate the 2008 databases, the differences are small enough that to mimic forecast trends and approximate partitions for non-pulp and pulp hemlock stands.

1. The Information Package was used to create the timber supply model database. The inventory database was used to develop more inventory information for the analysis units and to calculate the amount of old hemlock non-pulp and pulp content of the original analysis units.

Statistics

The following tables and charts depict various attributes of the THLB.

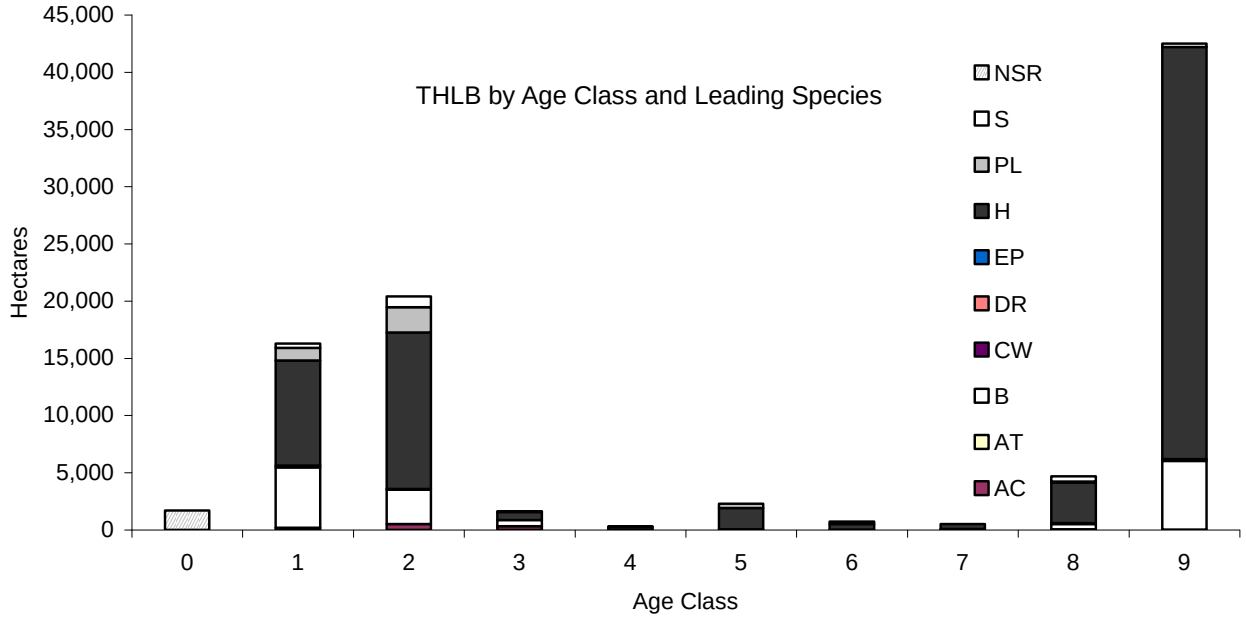
The first table shows the analysis units used in the 2003 analysis. The grey area represents hemlock analysis units that are greater than 250 years. The analysis units differ based on site productivity (SI < 15m and SI >= 15 m) and biogeoclimatic zones (e.g. CWH versus ICH).

The old (>250 years) hemlock stands (40,837 ha) are 45.6% of the THLB. The old poor site stands (36,037 ha) are 40.2% of the THLB. The latter forms the majority of the pulpwood stands.

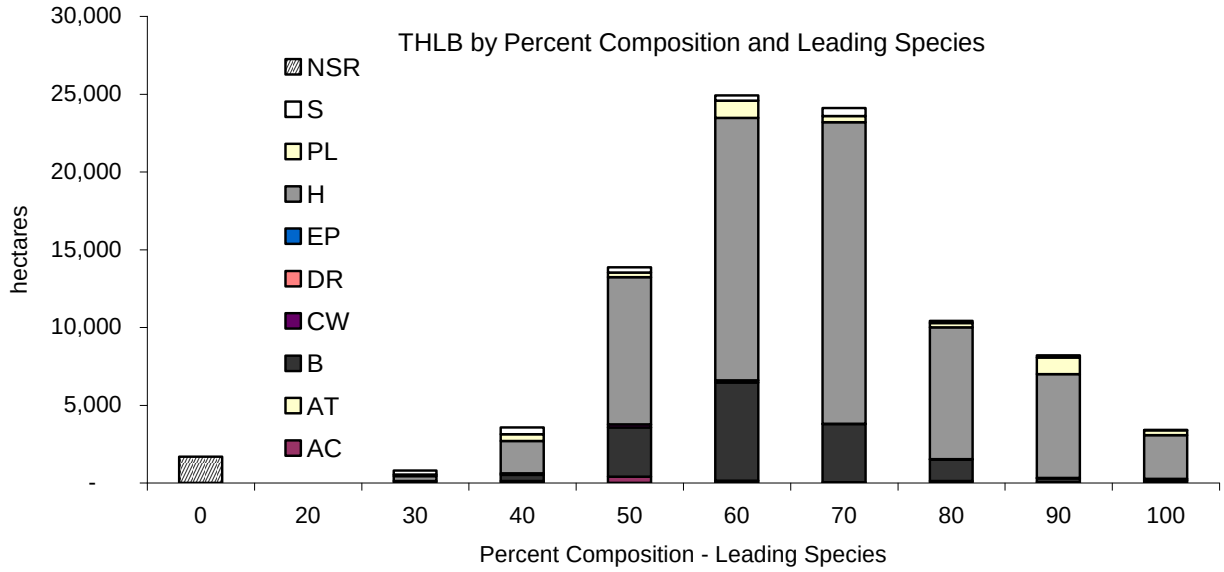
Table 1 Analysis Units

Analysis Unit	BEC zone	FIZ (for MH stands)	Leading species	Inventory Type Group	Site class	Age class	Current timber harvesting landbase (ha)
1	CWH	n/a	hemlock,	9 – 17	1, 2	All	3,331
2	CWH, MH	A	hemlock,	9 – 17	3	1 – 7	14,497
3	CWH, MH	A	hemlock,	9 – 17	4	1 – 7	2,796
4	CWH, MH	A	hemlock,	9 – 17	3	8, 9	4,046
5	CWH, MH	A	hemlock,	9 – 17	4	8, 9	29,667
6	CWH, MH	A	balsam	18 - 20	1, 2	All	1,602
7	CWH, MH	A	balsam	18 - 20	3	All	6,958
8	CWH, MH	A	balsam	18 - 20	4	All	3,644
9	CWH	n/a	spruce	21 - 26	1 – 4	All	1,246
10	CWH	n/a	pine	28 – 31	2 – 4	All	2,577
11	CWH	n/a	cottonwood	35 - 36	2 – 4	All	626
12	ICH, MH	J	hemlock, cedar	9 – 17	2, 3	1 – 7	4,511
13	ICH, MH	J	hemlock, cedar	9 – 17	4	1 – 7	775
14	ICH, MH	J	hemlock, cedar	9 – 17	3	8, 9	704
15	ICH, MH, ESSF	J	hemlock, cedar	9 – 17	4	8, 9	6420
16	ICH, MH	J	balsam	18 - 20	2, 3	All	1003
17	ICH, MH, ESSF	J	balsam	18 - 20	4	All	2,544
18	ICH, MH	J	spruce	21 – 26	1 – 4	All	375
19	ICH, MH	J	pine	28 – 31	2 – 4	All	1492
20	ICH, MH	J	cottonwood	35 - 36	1 – 4	All	283
Total							89,596

The graph below shows that most the most area is occupied by Hm in age class 8/9. The youngest minimum harvestable age (MHA) is 60 years. However, the majority of the analysis units have a MHA greater than 90 years old. The means that most of the merchantable area are old hemlock stands.



The graph below shows the percent composition of the leading species by age class. The graph shows that there is a significant amount of area that is 50 to 70% hemlock (leading species). One issue is: Where is the true viability cut-off for the amount of hemlock in a stands. District staff feel that most stands less than 250 (age class 0-8) produce viable sawlog material. The exceptions is age class 8 stands with greater than 80% hemlock.



Definition of Pulp Analysis Units – Restricted to hemlock leading stands that are age class 8/9.

In the information package dataset the percent composition for the leading species is not given. The data below was derived from the inventory database.

The first assumption is that all hemlock leading stands with a site index less than 15 are pulp stands (productivity definition). The following table shows this THLB by percent hemlock content and associated secondary species. The grey area are pulp stands.

Age class 8/9 hemlock leading stands with a site index < 15 metres

Leading Species		Percent Compostion of Hemlock (ha)							Total
	Secondary Species	40	50	60	70	80	90	100	(ha)
H	AC	12			3				15
	AT				11		3		15
	B		103	542	333	12	34		1,024
	BA	12	1,007	5,231	9,167	4,646	3,693	132	23,887
	BL		137	207	592	86	124		1,145
	CW	96	296	466	218	211	132		1,420
	PL		147	148	107	113	118		633
	S	2	190	120	146	313	303		1,074
	(blank)							1,520	1,520
Total		123	1,880	6,713	10,577	5,381	4,407	1,651	30,731

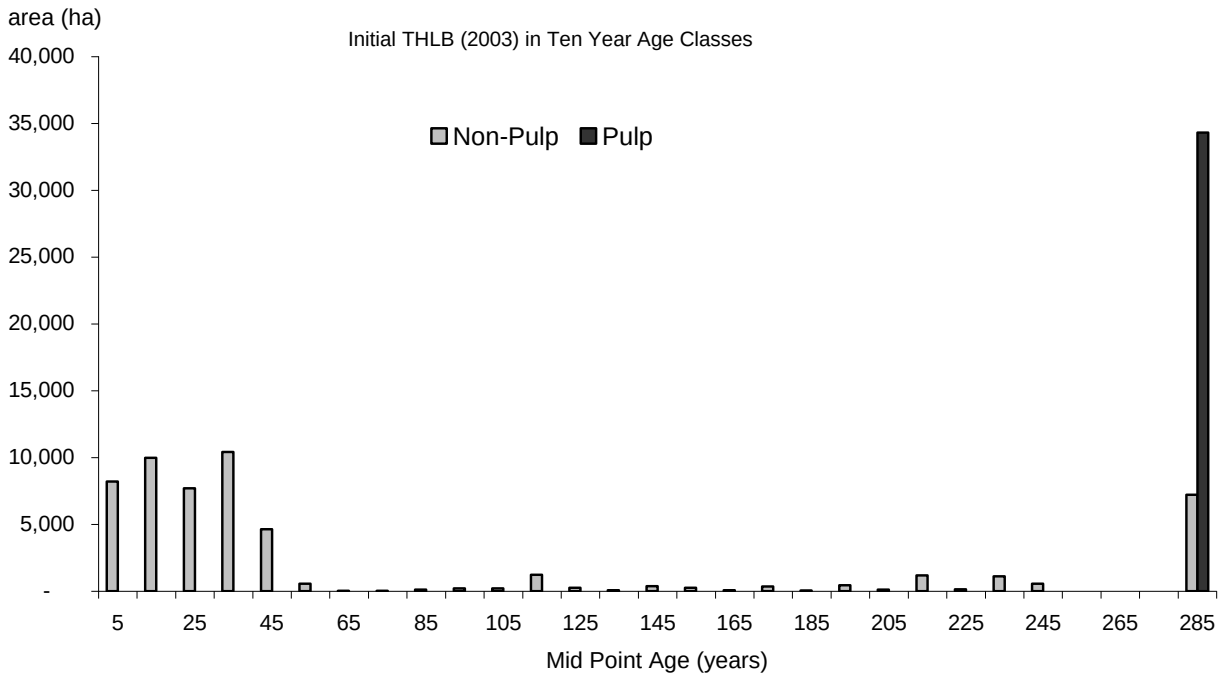
The second assumption is that stands with greater than 80% hemlock with a site index of greater than 15 would quality as less viable or pulp stands (species composition definition). The grey areas are pulp stands.

Age class 8/9 hemlock leading stands with a site index >= 15 metres.

Leading Species		Percent Compostion of Hemlock (ha)							Total
	Secondary Species	40	50	60	70	80	90	100	(ha)
H	B	7	10	345	31				393
	BA	176	1,645	2,135	2,309	413	478		7,157
	BL					2			2
	CW	66	190	255	151	96	19		776
	S		59	137	26	24	68		314
	(blank)							193	193
Total		250	1,904	2,872	2,516	535	565	193	8,835

The amount of pulp stands derived from the inventory dataset was calculated and prorated to the information package dataset to develop non-pulp and pulp analysis units.

The following graph depicts the age class distribution of the non-pulp and pulp stands.



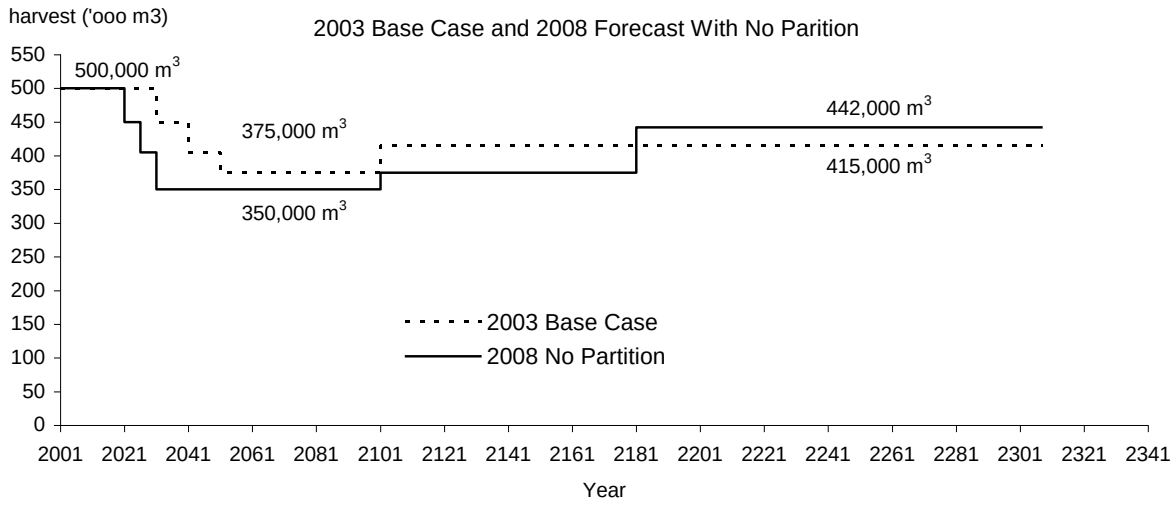
Comparison of 2003 and 2008 Forecast with No Partitions

The 2003 base case was developed using the following harvest rules:

- For the first 20 years follow the harvest profile of the last 20 years.
- If the profile could not be met, oldest first.

The 2008 Forecast with no partitions was developed using the following harvest rules:

- First 20 years harvest the non-pulp stands
- After 20 years – oldest first



As discussed at the 2003 meeting there are very little hemlock pulp stands in the historic harvest profile. This means that most of the available non-pulp stands would be harvested (see age class distribution on page 4) in the first 20 years. After that, forecast would be composed of mostly hemlock for a minimum of 20 years. Over-harvesting the non-pulp land is an issue to the district.

The district concern of over-harvesting the non-pulp land base is amplified by the fact that the licencee is not tied to pulp or saw mills. They are now 'market loggers'. Therefore, the harvest rules used in the 2003 analysis are no longer relevant.

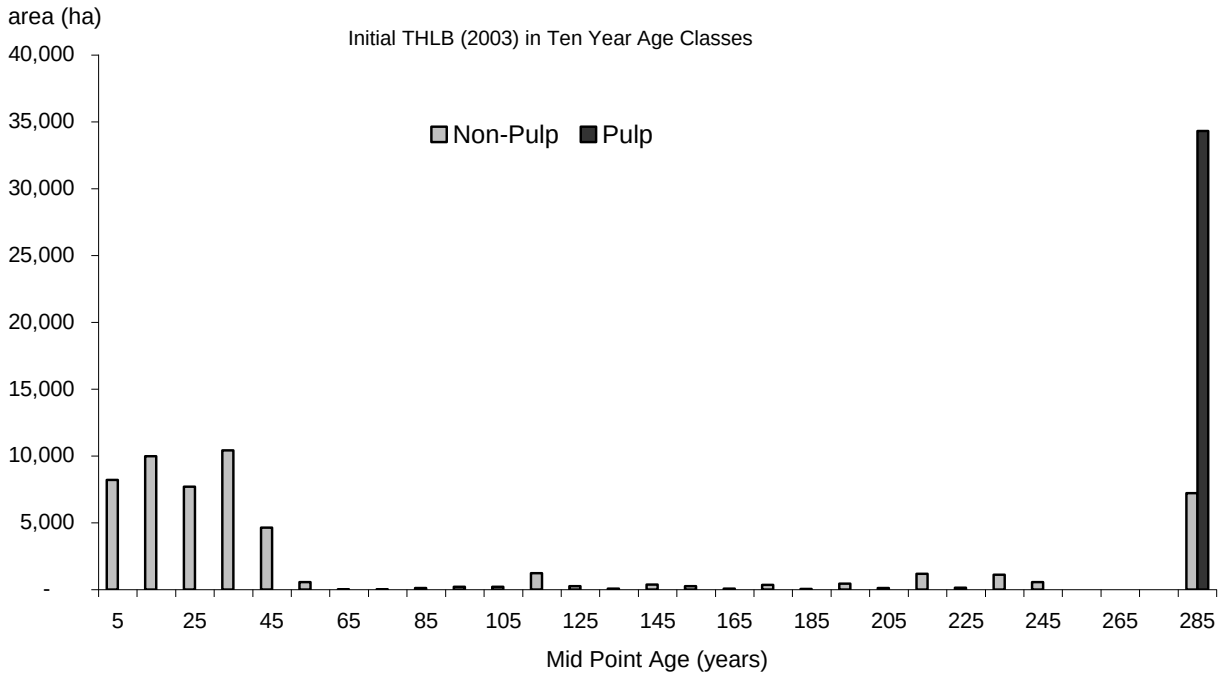
Partitioning the harvest into non-pulp and pulp flows can prevent the non-pulp THLB from over harvesting. To better understand the impacts of creating a partition we start with a review of the dynamics of the 2008 no partition harvest flowcast.

Dynamics of the 2008 Harvest Forecasts

Using the no partition data set – stands that are non-pulp were grouped and how much and when they were harvested was reported. This was also done for the pulp stands.

Site index adjustment work on the THLB showed that post harvest hemlock stands will grow much better than the existing natural stands. Therefore, it was assumed that the pulp stands will grow as non-pulp stands once they are harvested.

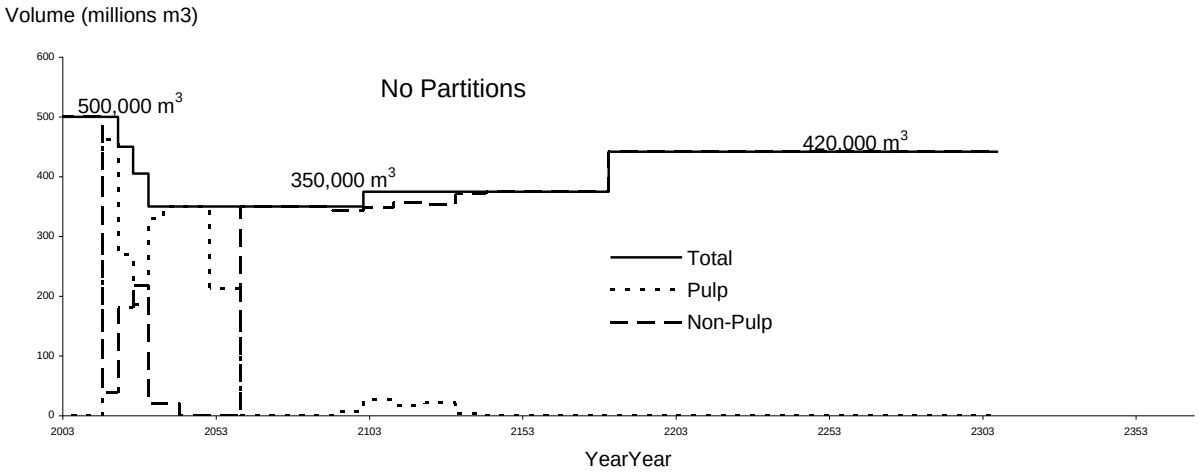
An important aspect of the age class distribution is that most of the non-pulp area is below minimum harvestable age (MHA). Therefore, there is a fixed amount of that volume that can be harvested into the mid-term.



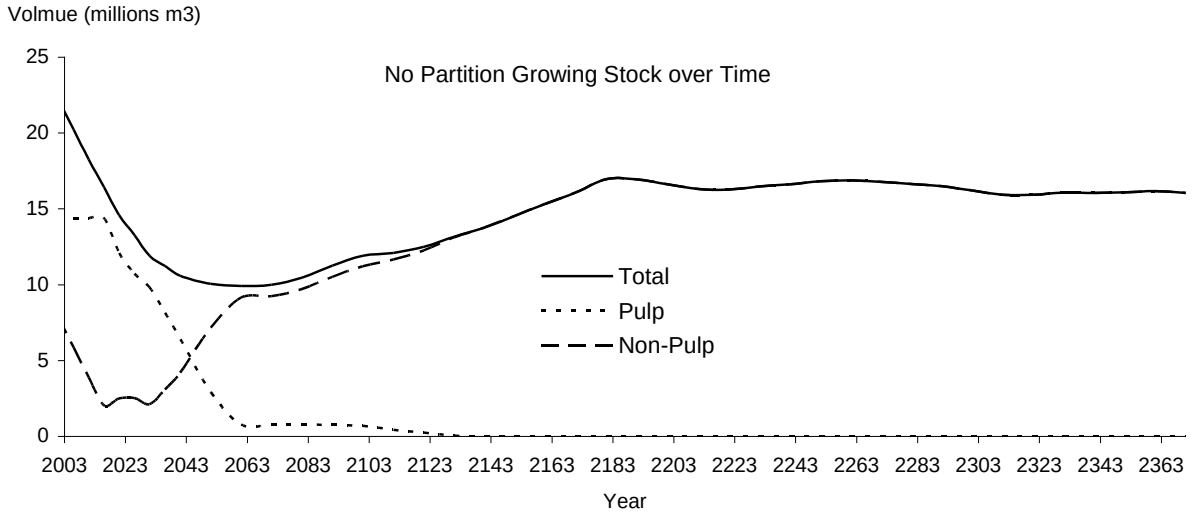
N.B. The lowest MHA is approximately 60 years and more than half the THLB has a MHA above 90 years.

No Partition Harvest Forecast

The following charts show the harvest flow and growing stock for the total, non-pulp and pulp THLB when there are no partitions.



The above chart shows that if the initial harvest is 500,000 m3 and only non-pulp stands are harvested - there will be periods of time when there are no non-pulp stands available for harvest. An extreme example (not-shown) is to force all the merchantable non-pulp stands to be harvested for the first 25 years. This would result in only pulp stands being available for the next 30 years.

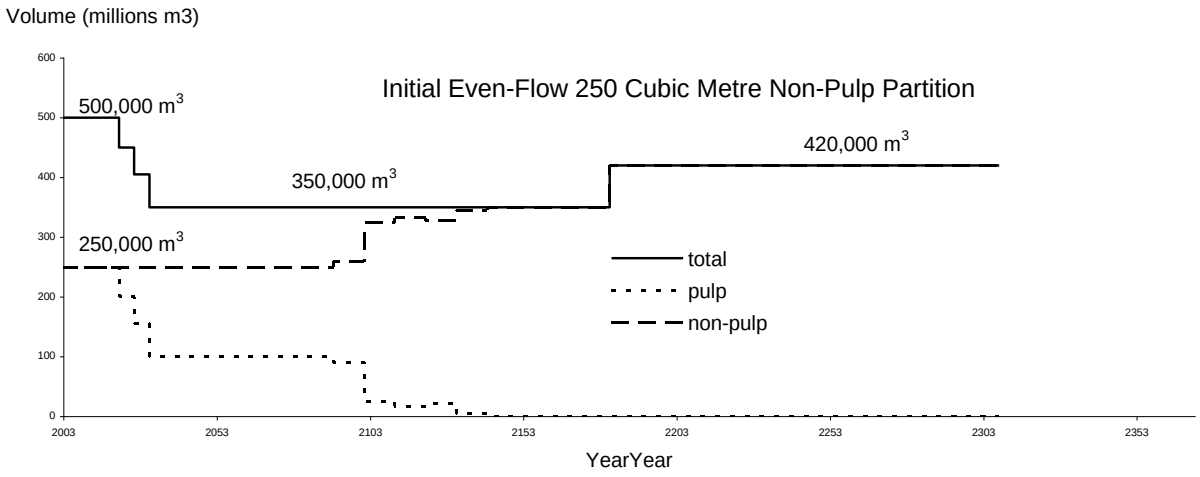


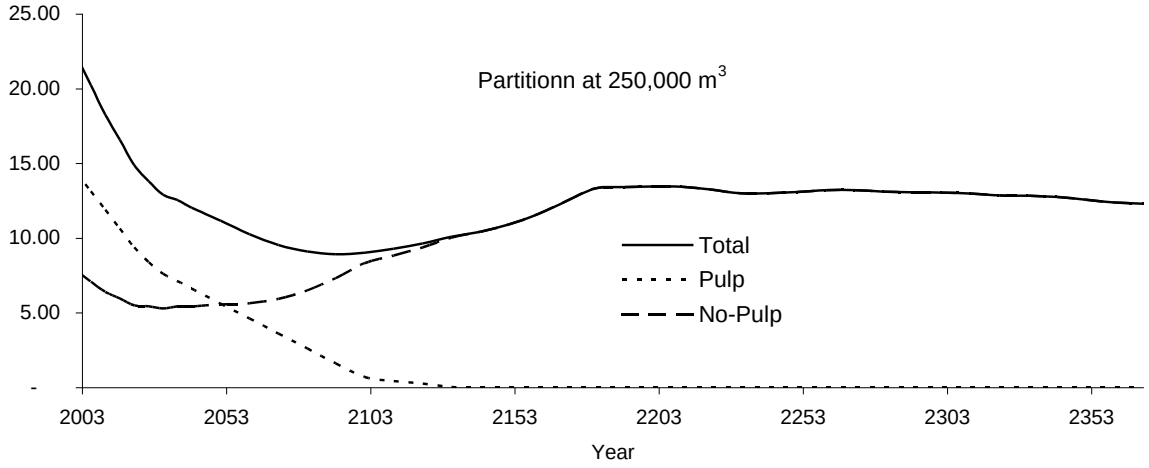
The above chart shows the growing stock over time. As noted previously, in the short term there is a fixed amount of non-pulp stands. Therefore, the decision to be made is how to metre them out over time. Two possible choices to do this are: 1) create an even-flow and 2) create a declining flow (how high can you start).

Transitioning to managed – merchantable (MHA) - non-pulp stands will have an impact on initial to mid-term timber supply.

Even Flow Harvest Flows.

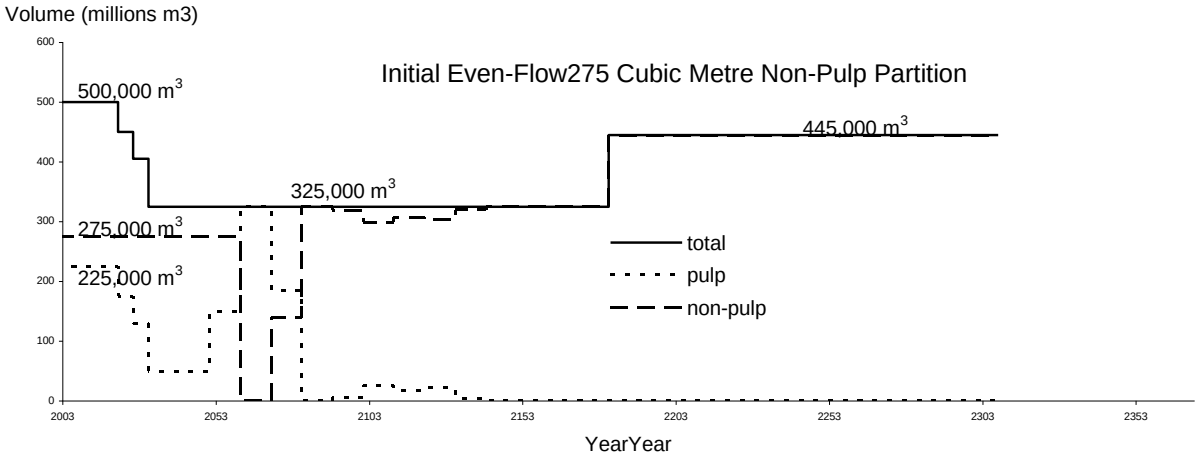
Various non-pulp even flow runs were performed and the most suitable was a partition of 250,000 m3 for non-pulp stands. The following charts show the harvest flows and growing stock for the total, non-pulp and pulp THLB.

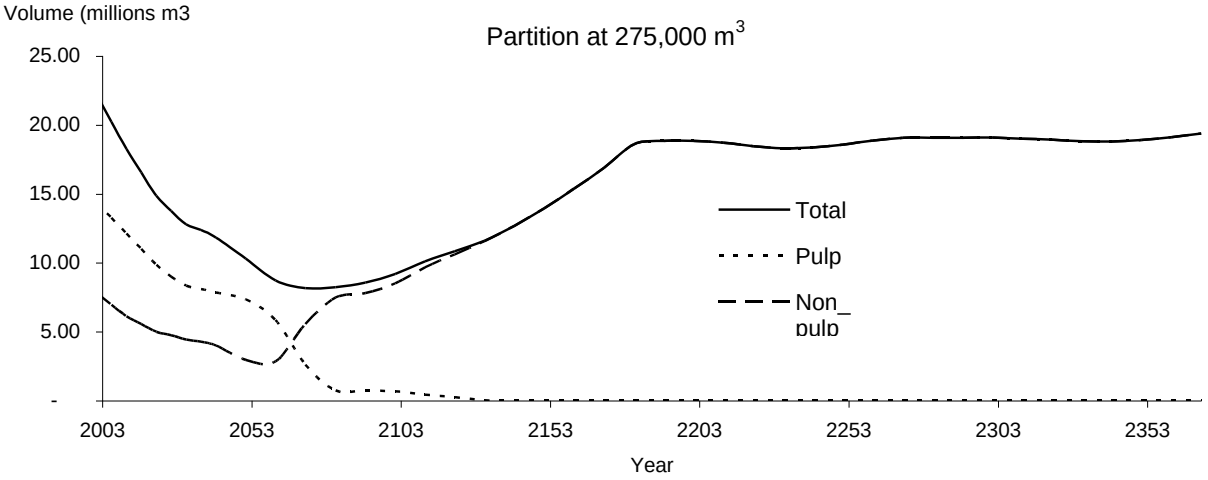




The above charts show a nice transition into the managed non-pulp stands. Further, the overall harvest forecast remains the same the same as the non-partition forecast.

The following charts show the results of requesting an initial even flow, non-pulp partition at 275,000 m3.

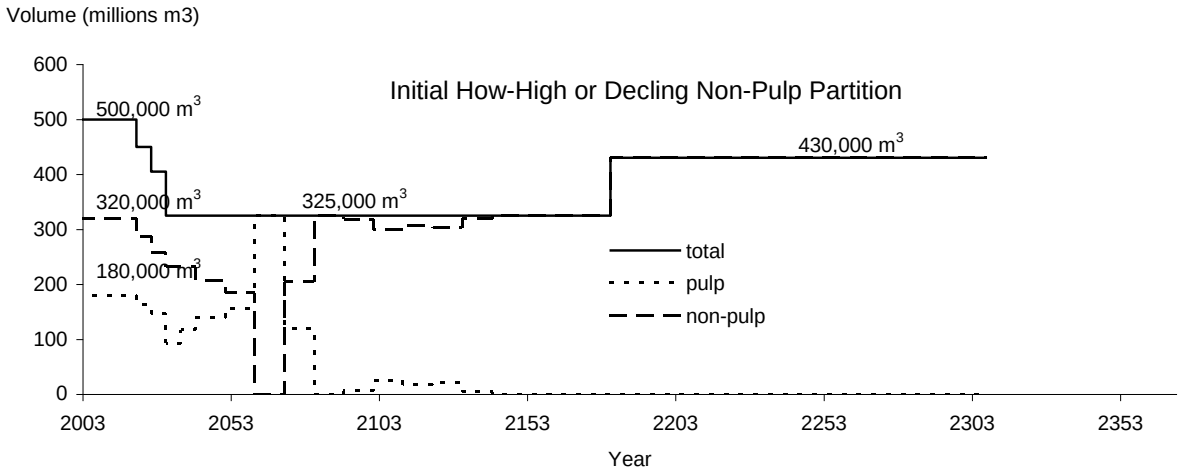


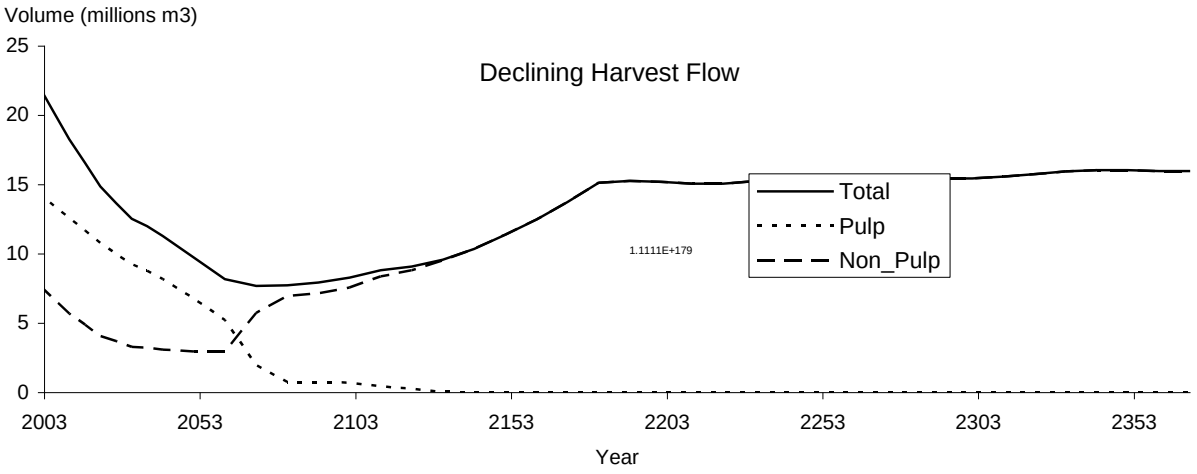


The objective of presenting the above is to point out that the transition to the managed non-pulp stands is very sensitive. First, the short- to mid-term non-pulp volume needs to be metred out or else there is still a large block of pulp stands to harvest. Second, the mid-term level is sensitive to the transition to managed stands; i.e. the mid-term harvest may have to come down (down 25,000 m3 or to 325,000 m3 in this case).

Declining mid-term non-pulp harvest flow

Another choice for a harvest flow is to see how high the initial harvest can be. If it is feasible such a partition would provide the licencee with the best opportunity to market non-pulp timber in the absence of a pulp market. Also, there be a non-pulp harvest in the mid-term (albeit at a lower level).





The above forecast shows the harvest for the first 20 years is 320,000 m3. This is the highest 'reasonable' initial harvest even through there is shortage of non-pulp timber for a ten year period. This deficit may be overcomed by maintaining the initial harvest level for 5 or 10 years, harvesting the more productive stands in the next 20 years so they mature earlier (use the relative oldest harvest rule) and/or intensive silviculture (planting versus natural regeneration, thinning, etc.).

Conclusion

While the 2008 analysis does not use the exact assumptions and data from 2003 analysis, the analysis does show trends and results that would be reasonability similar. Therefore, there is some flexibility to deviate from the exact harvest levels shown here.