Appendix VIII

Okanagan IFPA Analysis Summary

Prepared by

Okanagan Innovative Forestry Society

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SUMMARY

The objective of this '*Binder*' is to provide a starting document for the Ministry of Forest's (MOF) review process of the innovative analysis, from which the MOF can make revisions to and ultimately provide the necessary level of information for its AAC determination meeting with the statutory decision maker.

The following sections have been written to provide a link between the OIFS technical programs, and the MOF's TSR2 review process. Each section includes a summary of the OIFS program, the current analysis, key changes made in the innovative analysis, followed by a discussion of risk, and finally a statement of the OIFS recommendations and future plans. Changes in the timber supply modeling assumptions and methodologies from TSR2 are outlined, and if a specific item is not included, it can be assumed TSR2 assumptions were used. Appropriate cross references are made to supporting documentation of the AAC Application.

The OIFS has attempted to provide a balanced synopsis of the technical issues in support of the current AAC application, associated risk and uncertainty, and public, first nations and agency comments. However, there may still be additional information that the MOF requests as part of its review process, and the OIFS would be happy to assist wherever possible. An electronic copy of this document will also be provided to the MOF.

For further details on the Okanagan Innovative Analysis, the OIFS AAC application, included in the Forestry Plan amendment dated January 31, 2003 should be referenced. The specific documents contained in the AAC application include:

1. Okanagan Innovative Forestry Society. 2003. Application for an Allowable Annual Cut Increase for the Okanagan IFPAs: Forestry Plan Amendment. With technical support from J.S. Thrower and Associates Ltd., and Timberline Forest Inventory Consultants Ltd. Final Report.
2. Timberline Forest Inventory Consultants Ltd. 2002. Information Package – Okanagan Innovative Forestry Practices Agreement Allowable Annual Cut Uplift Analysis. Prepared for the Okanagan Innovative Forestry Society. Final Report.
3. Timberline Forest Inventory Consultants Ltd. 2002. Analysis Report – Okanagan Innovative Forestry Practices Agreement Allowable Annual Cut Uplift Analysis. Prepared for the Okanagan Innovative Forestry Society. Final Report.
4. OIFS IFPA Forestry Plan Amendment cover letter requesting an AAC increase, dated May 22, 2003, which includes a summary of the socio-economic, first nations, and public review issues.

1. TIMBER SUPPLY SCENARIOS

1.1 BACKGROUND

The OIFS completed a Type 2 Silviculture Strategy in 2001/2002. The TSR data set generated from this analysis became the source from which the Innovative Analysis was based. For the AAC application, three separate analyses were defined:

- The TSR2 + LRMP analysis to benchmark against the revised TSR2 analysis
- The uplift base case analysis, from which to compare all innovative practices
- The uplift composite analysis, to support the AAC uplift request

1.2 LRMP REVISED TSR2 SCENARIO

In order to provide a basis for comparison to the AAC determination process, an initial run re-creates as closely as possible the factors contributing to the determination of the current AAC. The TSR2 base case, plus items modelled in the subsequent Okanagan-Shuswap LRMP analysis (unpublished), and items addressed in the Chief Forester's AAC Rationale document are included.

The LRMP revised TSR2 scenario deviates from the TSR2 Analysis Report Base Case as follows:

- Goal 1 and goal 2 protected areas - additional area classified as unavailable for harvest;
- Enhanced riparian reserves - additional area classified as unavailable for harvest;
- Wildlife tree patch reductions increased;
- IRM green-up height changed from 3m to 2m;
- Several additional or enhances wildlife protection measures including the replacement of ungulate winter range requirements;
- Increased forest area in scenic areas; and
- Changes in application of scenic area rules: higher maximum areas and lower minimum heights.
- Old Growth Management Areas modelled using % of THLB in BEC/variant zones which have been temporarily identified prior to spatial locations being identified.

1.3 UPLIFT BASE CASE

This spatially explicit scenario is based on the LRMP revised TSR2 scenario, but introduces new elements that improve the modeling of the OSLRMP issues, including:

- Includes all LRMP revised TSR2 assumptions
- Incorporates spatially modeled adjacency requirements.
- Locally generated estimates of wild life tree patch reductions;
- Wetbelt/drybelt differences captured in analysis unit definition; and
- Current estimates of genetic gain are applied to all managed stands.

1.4 UPLIFT COMPOSITE

The uplift composite scenario is based on the Uplift Base Case but introduces the effects of the following OIFS funded innovative forestry practices:

- Inventory Adjustment from the Vegetation Resource Inventory (VRI) Phase II program. The inventory adjustment method included in the composite is based on a prior review of four different VRI adjustment timber supply scenarios.

- New site index estimates for managed stands in the wet-belt and dry-belt regions. The site index information included in the composite is based on a prior review of three different combinations of site index timber supply scenarios.
- In addition, sensitivity analyses on new operational adjustment factors, and roads, trails and landing (RTL) netdowns were completed to provide supporting information of upward pressures in timber supply.

2. UPLIFT BASE CASE

In preparation for the Okanagan TSR2 AAC Rationale, the Chief Forester requested a revised analysis to reflect the Okanagan Shuswap Land and Resource Management Plan (OSLRMP). Although analysis report was published, the revised analysis was described in the AAC rationale and the MOF provided further information and support. These revisions are reflected in the innovative uplift base case plus all subsequent innovative analyses.

2.1 OSLRMP REVISIONS

The following table summarizes the OSLRMP issues and their applicability to the uplift base case analysis.

Issue	Applicability to the Uplift Base Case Analysis
Derenzy Sheep Resource Management Zone	This is a subset of the Bighorn Sheep Habitat RMZ. Zone 2 of the Derenzy area has specific forest cover constraints to apply.
Protected Areas Strategy (PAS) Goal 1 and 2 areas and PAS corridor.	As both are now accepted, PAS Goal 1 and Goal 2 areas will be classified as non-contributing to harvest.
Visual Resource Management Zones Zone 1 – declared known scenic with visual quality objectives (VQOs) under the Forest Practices Code (FPC) Zone 2 – not scenic areas with no established VQOs and no timber supply analysis impact Zone 3 – foreground management and no timber supply analysis impact	The zone 1 visuals replace previously mapped visual quality classes. New visually effective green-up (VEG) requirements to be applied to the zone 1 area have been supplied by the MoF.
Lake Management Zones Classified as part of the FPC and enshrined in the LRMP.	Forest cover objectives to be used to meet objectives. New requirements to be applied have been supplied by the MoF.
Community Watersheds RMZ	Forest cover constraints applied to the forested land base at the watershed level.
Enhanced Riparian Reserves The TSA OSLRMP revised base case incorporates the additional enhanced riparian reserves recommended in the OSLRMP, which represent a total area of approximately 10,000 (whole LRMP area) hectares timber harvesting land base.	This is modelled by determining the ratio of riparian reserve to the entire THLB and reducing each THLB polygon appropriately and transferring that area to the non-contributing land base.
Mule Deer Winter Range RMZ Replaces ungulate winter range assumptions from TSR. OSLRMP revised base case applied constraints at the landscape unit/biogeoclimatic zone level in lieu of planning cell definitions.	Planning cells have not yet been defined and analysis will follow the lead of the OSLRMP revised TSR base case and apply requirements at the LU/BEC level.
Grizzly Bear Habitat RMZ	Forest cover constraint: 10 percent of stands must exceed 19.5 metres in height. Applied at the LU/BEC in absence of management units.
Mountain Caribou Habitat RMZ	No timber supply implications beyond OGMA and biodiversity requirement otherwise in place.
Marten Habitat RMZ	Forest cover requirements for marten in the Fly Hills RMZ,

Issue	Applicability to the Uplift Base Case Analysis
	which specify that at least one-third of all stands be greater than 19 metres in height, apply to 29,271 hectares of productive forest land.
Moose Habitat RMZ	Forest cover requirements for moose, which require that at least one-third of all stands be greater than 16 metres in height, apply to 161,081 hectares of productive forest land.
Elk Habitat RMZ	Forest cover requirements for bighorn elk, which require that at least one-third of all stands be greater than 16 metres in height, apply to 4,449 hectares of productive forest land.
Bighorn Sheep Habitat RMZ	Forest cover requirements for bighorn sheep, which require that at least one-third of all stands be greater than 16 metres in height, apply to 112,025 hectares of productive forest land.
Goat Habitat RMZ	Forest cover requirements for mountain goat, which specify that at least 10 percent of productive forest land be covered in stands of at least 150 years of age, apply to 16 081 hectares of productive forest land.
Tourism, Fish, Recreation RMZ	No timber supply implications.
Community Crown Interface	No timber supply implications.
Stand Level Biodiversity (wildlife tree patch reductions)	Reduce yields by 1.7% of harvestable volume as describe in sections 7.17 and 11.3.1
OGMAs The TSA OSLRMP-revised base case assumed the immediate placement of OGMAs of which 58 000 hectares would fall within the timber harvesting land base.	This is implemented by requiring a percentage of the THLB to be greater than the minimum age for OLD on a LU BEC variant level.
NDT4	No timber supply implications.
Mission Creek	No timber supply implications.
Joe Rich Total Resource Plan	Guiding document only at this time. No timber supply implications.

2.2 ANALYSIS UNITS / YIELD TABLES

2.2.1 Uplift Base Case Assumptions

- Analysis units are represented by combination of stands divided by the following attributes: inventory type group, age class, BGC unit, and forest cover inventory site index. For the uplft base case, analysis units were restructured to separate out the wet-belt from the dry-belt regions. Average attributes for each analysis unit were used as inputs into yield tables.
- Yield tables for existing natural stands > 20 years are derived using VDYP ver 6.6d. VDYP yield tables were revised to incorporate specific VRI volume adjustments.
- Yield tables for existing managed stands (<= 20 years) and all future stands are derived using TIPSY ver 3.0a. TIPSY yield tables were revised to incorporate new estimates of potential site index.

2.2.2 Risk / Uncertainty

- Managed stands are defined as all existing stands 20 years of age or less, and all stands regenerated in the future, as per TSR2. The risk within the definition is an underestimation of the potential of some stands > 20 years old, which are likely performing like managed stands and should be modeled as such. If site index estimates for managed stands were applied to the

current age class 2 stands (21-40yrs) the potential increase in MAI would be approximately 49,000 m^3/yr. However, this impact would not be fully realized since not all age class 2 stands are currently performing as managed stands. As well, this impact would only apply to the first rotation since the age class 2 stands will be modeled as managed stands after harvesting.

2.3 CURRENT TREE IMPROVEMENT

2.3.1 Uplift Base Case Assumptions

- The tree improvement program for the interior of BC was initiated for spruce in the late 1960s and the orchards are now close to full production. The program for lodgepole pine was initiated in the 1970s and the orchards currently supply approximately one third of the seedlings required. The majority of the licensees in the Okanagan TSA currently use class A seed for approximately 20% of lodgepole pine, 100% of spruce, and 50% of larch planted. The OIFS believes that the tree improvement program is an important component of forest management.
- In TSR2, no allowance was made for tree improvement estimates. However, the Chief Forester acknowledged that "*the use of class A Pl and Sx seed represents in aggregate a 5.5% increase in the productivity of regenerating stands on the TSA. This results in an increase in the long term-timber supply, and to a lesser extent an increase in the mid-term timber supply.*"
- For the uplift base case, estimates of current genetic gain estimates were derived using individual crop plans and seed zone mapping supplied by the MOF, Research Branch and through consultation with Research Branch staff.

Species	Wet/Dry belt	Elevation	Genetic gain	Short-term availability	Current genetic gains
Fd	All	All	0%	0%	None
Pl	Dry	All	10%	20%	2.5% gain to pine in AU 123
	Wet	All	7%	13%	6.9% gain to pine in AU 324
Sw	All	All	4%	100%	4.0% gain to all spruce

2.3.2 Risk / Uncertainty

- An assumptions was made that there is seed zone coverage where each species is planted for the full TSA.

3. UPLIFT COMPOSITE

The objective of the uplift composite analysis is to show the incremental AAC impact of each innovative practice; test a number of scenarios, including different VRI adjustment and potential site index options; and develop a composite to justify the AAC uplift request.

Results of the composite analysis are summarized first. Evaluation of the different scenarios modeled around inventory adjustment, site productivity, OAFs, RTLs, and future tree improvement, are dealt with under subsequent sections (ie., sections 4 – 9).

3.1 INNOVATIVE ANALYSIS

3.1.1 Innovative Practice

The composite analysis incorporates the following components:

- Spatial uplift base case analysis
- VRI inventory adjustment (7% constant adjustment scenario) - Reference Section 4.
- Wet-belt site index estimates (site index scenario #3) – Reference Section 5.
- Dry-belt site index estimates (site index scenario #2) – Reference Section 6.

3.1.2 Risk / Uncertainty

- There is a significant timber supply pinch point in decade 7 that currently limits additional volume increases. There are a number of key assumptions (see upward pressures) that provide the future opportunity to address this pinch point including:
  a) Reduced minimum harvest ages
  b) Future tree improvement gains
  c) Potential incremental silviculture opportunities for the mid-term that were identified in the Type 2 Silviculture Strategy
  d) Potential gains in growth & yield of existing natural stands that may be quantified upon completion of a Timber Emphasis VRI (Phase I)

3.1.3 Results

Innovative Practice	Incremental Volume from Uplift Base case (m^3/yr)		
	Short Term (0 – 50 yrs)	Mid Term (60 – 100 yrs)	Long Term (110 – 250 yrs)
Composite	345,000	440,000	820,000

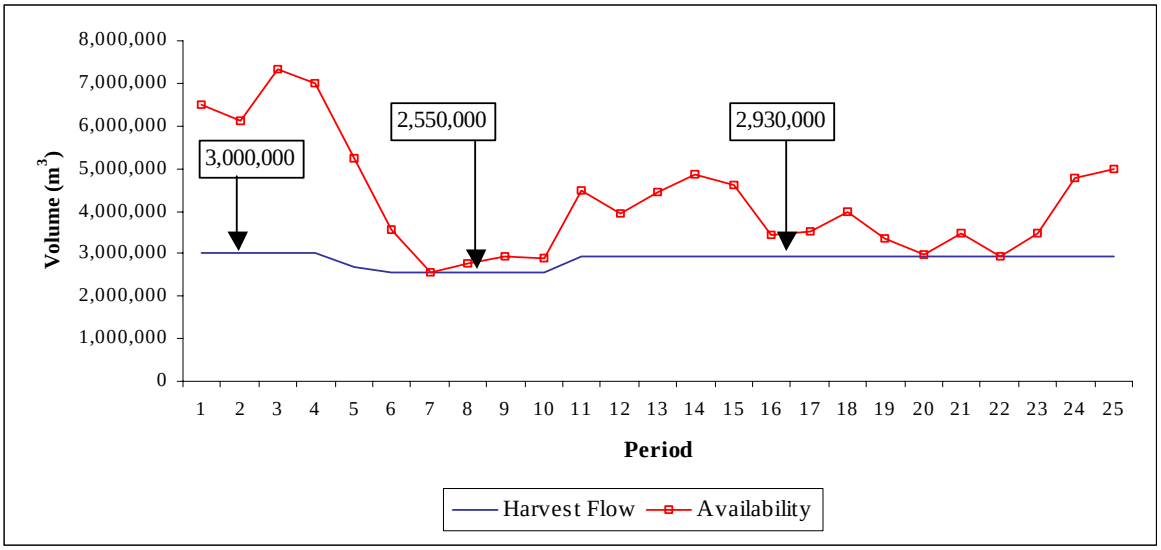

Figure 1. Harvest flow and availability lines for the uplift composite.

The following figures show the three step process used to create the uplift composite scenario. This involves first doing the inventory adjustment, then applying site index adjustment to the wet belt and finally applying the site index adjustment to the dry belt.

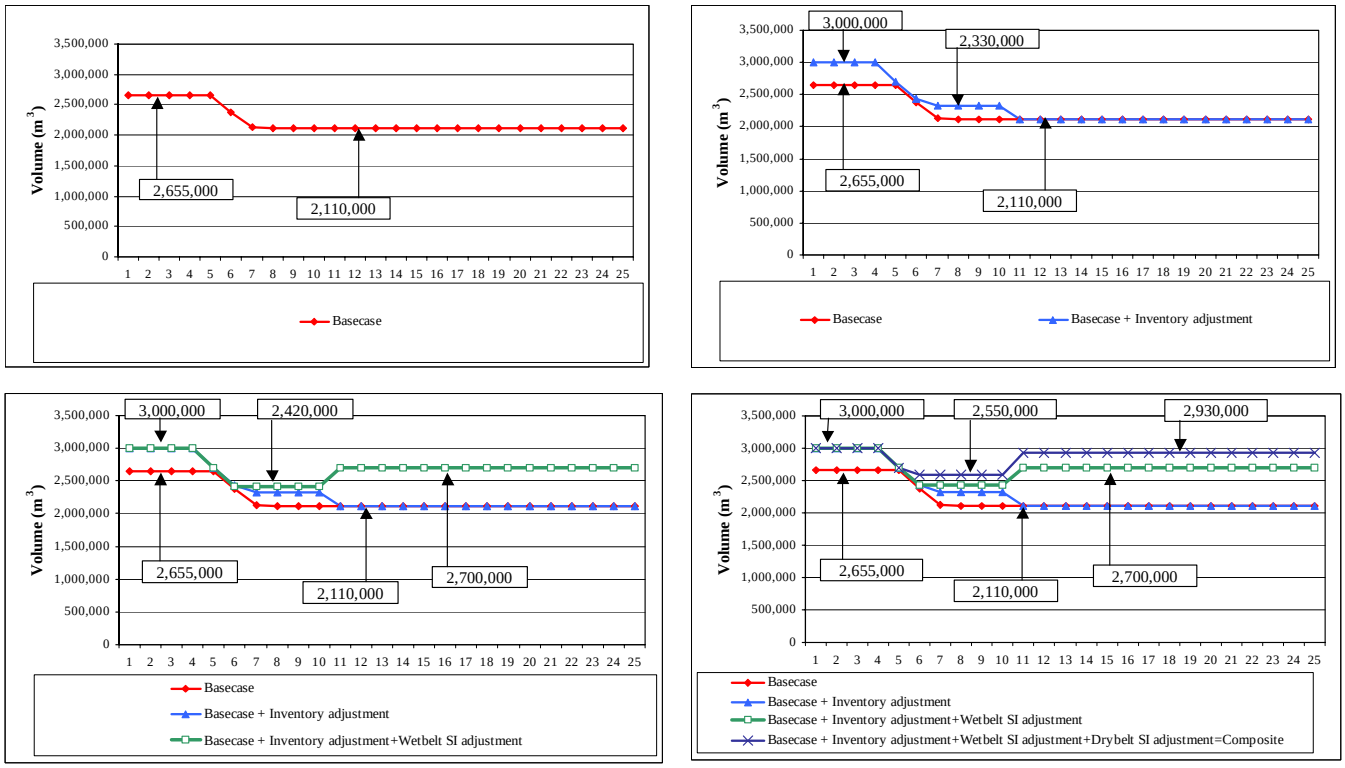

Figure 2. Incremental gains from uplift base case to uplift composite.

3.1.4 References

- Okanagan Innovative Forestry Society. 2003. Application for an Allowable Annual Cut Increase for the Okanagan IFPAs: Forestry Plan Amendment. Technical support from J.S. Thrower and Associates Ltd., and Timberline Forest Inventory Consultants Ltd. Final Report.
- Timberline Forest Inventory Consultants Ltd. 2002. Information Package – Okanagan Innovative Forestry Practices Agreement Allowable Annual Cut Uplift Analysis. Prepared for the Okanagan Innovative Forestry Society. Final Report.
- Timberline Forest Inventory Consultants Ltd. 2002. Analysis Report – Okanagan Innovative Forestry Practices Agreement Allowable Annual Cut Uplift Analysis. Prepared for the Okanagan Innovative Forestry Society. Final Report.

3.2 OIFS RECOMMENDATIONS

- The uplift composite scenario forms the basis for the OIFS Uplift Application. The composite provides a technically sound, risk averse, scenario upon which the statutory decision maker can have a high level of confidence.

3.3 COMMENTS

3.3.1 MOF / MSRM

- Concerns were expressed that not all habitat areas were considered. The OIFS response is that the innovative analysis is consistent with the wildlife habitat requirements of the OSLRMP. Under the OSLRMP, critical habitat areas have been mapped for bighorn sheep, mule deer, mountain goat, elk, grizzly bear, marten, moose and mountain caribou. Detailed objectives have been developed as part of the LRMP process and adhered to by the OIFS. The IFPA timber supply analysis followed existing standards for biodiversity requirements. New information from IFPA deer and marten studies will be incorporated into future timber supply analyses when it becomes available.
- *M. Blacktock, stated that the Regional Manager needs to feel comfortable with the consultation efforts of the OIFS as documented by MoF staff.*
- The OIFS will need to develop an appendix to the First Nations Strategy to identify the summary of concerns and issues raised by the bands. The OIFS sent out referral letters to all First Nations in the Okanagan TSA in early February, inviting them to participate in the public review and comment for the uplift request. Further meetings were arranged with the LSIB and ONA. Band comments specific to the AAC uplift request are outlined in the "First Nations" section of this appendix.
- *J. Stone expressed concern that there is insufficient information to assess the timber supply implications of the proposed projects for marten, caribou and mule deer. Study results on habitat use over a 3-5 year period can seriously misrepresent habitat requirements.*
- The IFPA marten, caribou and mule deer habitat studies are ongoing, multi-year projects with results expected by 2007. Information from this work will be available for the next AAC uplift application, and appropriately factored in at that time. The risks to habitat from this uplift are negligible. The incremental 345,000 m^3 equates to about 8,000 additional hectares being harvested by the expiry of the IFPAs. This figure is roughly 0.5% of the forested landbase in the Okanagan TSA
- *M. Fenger expressed concern that Temperature sensitive streams (TSS) have not been identified as part of the IFPA background work. It is reasonable to expect a number of TSS will be identified in the Okanagan TSA. It cannot be assumed that current forest practices modelled will adequately sustain species in TSS. Measures to manage TSS are needed, such as riparian reserves on S4 streams*.
- TSS are not issues accounted for in the present OSLRMP. However, the IFPA uplift analysis incorporated the best available information for riparian protection measures as outlined in the OSLRMP. This included 10,000 ha of "enhanced reserves", which are expected to address TSS issues. The timber supply impacts of TSS are expected to be minor
- *M. Fenger expressed concern that the analysis modelling did not account for risks associated with fire and epidemic insect outbreaks.*
- At this time, timber supply analysis does not account for fire or epidemic insect losses directly. Instead, estimates of non-recoverable losses have been factored into the analysis.
- *M. Fenger expressed concern that the current condition of NDT4 ecosystems is considered sub-optimal for sustaining many non-timber values in these forests. Aggressive fire suppression has*

created forest encroachment and over stocking. Future management is expected to maintain lower tree densities in these areas.

- Only existing policy is included in the timber supply analysis. Since the future management direction in NDT4 has not been quantified, it cannot be included at this time. It is speculative to state that managing for lower densities in NDT4 will result in a downward pressure in timber supply.

- *M. Fenger stated there are a number of species at risk in the TSA apart from caribou. The extent to which these species can be sustained by current management is unclear. Management for these species will be a priority in crown land areas of the TSA versus the more expensive private land option. Managing for species at risk provides an unquantified downward pressure on AAC that may exceed the current timber impact budget identified for species at risk.*
- Species at risk are management through the Identified Wildlife Management Strategy. The provincial timber supply impact budget for the IWMS is 1%. The IFPA timber supply analysis utilized the best available information on species at risk from the OSLRMP and the IWMS.

- *M. Fenger stated that when modelling OSLRMP assumptions in TSR2, the MoF did not follow provincial policy direction for meeting the full compliment of old growth after three rotation in the Low BEO landscape units. Downward pressure is exerted when modelling is consistent with current practice assumptions*
- The IFPA timber supply analysis complied with the OSLRMP requirements for achieving old growth requirements on a landscape unit specific basis. The OSLRMP direction supersedes provincial policy in this matter. The Ministry of Environment, WLAP's legacy ministry, was a signatory of the OSLRMP.

- *M. Fenger, stated that the proposed incremental harvest of approximately 1,100 ha annually may place environmental values at higher risk in light of these concerns.*
- The OIFS' uplift proposal meets all current environmental objectives. Future timber supply reviews and/or future OIFS uplift requests will include any new information, and policy or management changes that are considered current practice at that time.

3.3.2 First Nations

- *M. Werstuik, ONA expressed concern that there are also netdowns to the THLB as a result of First Nations values, but without a fair process to work with the Okanagan Nation to determine this information, the magnitude of the netdown remains unknown at this time.*
- The Society applied the definitions resulting from TSR2 updated with the LRMP.

3.3.3 Public

- *M. Standhuis, NORD, expressed concern over ECA percentages in community watersheds and logging on sensitive terrain due to increased cut. Concerned with peak flows, siltation, sedimentation and freshet timing.*
- The AAC increase applies to the TSA as a whole and follows standards set out by the Okanagan-Shuswap LRMP. The AAC uplift application does not change current forest practices regulations or the development planning process. Any AAC uplift must meet Hydrologist recommendations for ECA and Geotechnical Engineer requirements for harvests on sensitive terrain. The AAC uplift would create one additional ± 110 ha cutting permit yearly per Licensee woodlands division, spread out over their operating areas.

- *D. Dobson, BMID, stated that riparian reserves are the most sensitive areas for the water resource. BMID welcomes any improvements to identification of these areas on forest cover maps and in the field. A 12.4 m wide reserve was applied to all TRIM streams as an estimate, but we are still concerned about the issue of "reserves" and we prefer the forest to be managed properly over the entire landbase. This includes those stands along streams where the health and function of the stand over time is important for the protection of water quality.*
- Riparian reserves are equally important to the OIFS and its members. The 12.4 m wide reserve for all TRIM file streams is an artefact of the TSR2 data package. This reflects the best available information based on a riparian assessment by the Wildstone consulting group.
- *D. Dobson, BMID, stated that very little detail provided in the uplift request on how the proposed increase might affect community watersheds. Please provide detail on how the intent of the OSLRMP is going to be followed. Table 3.1 on page 6 of the application indicates "no timber supply implications" to Mission creek from this analysis. Please explain how this was determined. Similarly for the Joe Rich Total Resource Plan.*
- Strategies to achieve the LRMP objectives for the Mission Creek RMZ include developing water quality objectives, implementing a monitoring program and make watershed restoration recommendations. None of these strategies are expected to have timber supply implications. Strategies to achieve the LRMP objectives for the Joe Rich RMZ involve applying ecosystem based forestry principles and evaluating the effectiveness of the alternative silviculture and harvesting systems. These strategies will involve changes in forest operations but are not expected to have timber supply implications.

4. FOREST INVENTORY VOLUME

4.1 TSR2

4.1.1 Analysis Report

- The Okanagan TSA forest inventory was based on an inventory conducted between 1963 and 1979 with an update in 1995 / 1996 to account for timber harvesting and inventory attribute projections.
- The age of the inventory created some uncertainty about the volumes and species composition described for existing stands by the inventory data.
- An inventory audit completed by the MOF in 1997 concluded there were no significant differences between the audit and inventory volumes for mature stands.

4.1.2 LRMP Revisons

- The forest inventory was updated to 1999 to account for timber harvesting and inventory attribute projections.

4.1.3 AAC Rationale

- The Chief Forester stated that "*The forest inventory for the Okanagan TSA is one of the oldest in the province and district staff are currently pursuing funding to complete a new inventory.*", and that "… *I am fully supportive of the districts assessment that a new forest inventory is a high priority for the Okanagan TSA*."

4.2 INNOVATIVE ANALYSIS

4.2.1 Uplift Base Case

- The LRMP-revised TSR2 data set was used.

4.2.2 Innovative Practice

Program	Description	Completion Date	MOF Approval Date	Forestry Plan Reference	AAC Application Reference
VRI Phase II	VRI Phase II timber emphasis field sampling and inventory adjustment for the TSA	November 2002	December 2002	Section 3.2.1 Appendix IX	Section 4.3
VRI NVAF	Estimates of decay and waste from VRI Phase II samples	September 2002	December 2002	Appendix IX	Section 4.3

4.2.3 Project Description

In 2002, the OIFS carried out a VRI Phase 2 project including:

- 110 VRI Phase II plots were installed across the TSA using MOF sampling criteria.
- 93 trees from 28 of the VRI Phase II plots were destructively sampled to determine NVAF.
- The VRI adjustment method followed the MSRM-approved Fraser Protocol.
- Results show that the average volume in the PFLB is 10% higher than the current inventory, and 7% higher in the THLB. The latter was estimated by re-running the VRI adjustment from a subset of VRI plots that fell inside the THLB (86 of the 110 plots).
- Height and age attributes were over-estimated by approximately 4% and 18%, respectively.

4.2.4 Application

The results of the Fraser Protocol VRI adjustment method raised some questions on yield projections. Therefore, the OIFS evaluated the following four VRI adjustment methods in separate timber supply scenarios to provide better understanding and quantify potential risks of each method:

1. Fraser Protocol – This adjustment method follows the MSRM approved protocol, where adjusted ages and heights are used to generate new VDYP curves.
2. Constant 10% increase over unadjusted VDYP curves – A 10% volume adjustment was applied to all VDYP curves across all age classes, based on the average inventory adjustment computed for the PFLB. No adjustment was made to age and height attributes.
3. Constant 7% increase over unadjusted VDYP curves – A 7% volume adjustment was applied to all VDYP curves across all age classes based on the average inventory adjustment computed for the THLB. No adjustment was made to age and height attributes.
4. Volume adjustment regression – A volume adjustment regression was fit from the VRI plot data, which modeled adjusted volume as a function of stand age, volume, and diameter attributes. Average volume differences were then summarized by age class, and used to adjust volumes at each age class for all VDYP curves. No adjustment was made to age and height attributes.

4.2.5 Risk / Uncertainty

- The uncertainties and risk to the statutory decision maker is the over / underestimation of the inventory and the significant impact it can have on timber supply.
- Testing different methods of adjusting the VRI in the innovative analysis enabled the range of uncertainty to be evaluated around adjusted natural stand volumes. After examining the timber supply results, and following discussions with MOF / MSRM, the OIFS believes the 7% constant volume increase over unadjusted VDYP curves results in a cautious and defensible approach for the statutory decision maker. The impact is that the future growth of the natural stands is cautiously underestimated over the short term. The rationale used to support this scenario as part of the composite analysis are:
    1. There are concerns with using the Fraser Protocol for the Okanagan analysis. These include error propagation when deriving site index from adjusted age and heights; weakened statistical confidence with reduced sample sizes through stratification by species groups and significant harvest flow impacts considering the adjusted inventory is not significantly different from the unadjusted inventory.
    2. MOF staff consider the VRI adjustment to be more appropriately based on the timber harvesting landbase, rather than the productive forest landbase.
    3. There was minimal impact on harvest flow when volume adjustment was accounted for by age class compared to a constant volume adjustment across all age classes
- While the volume adjustment regression may be a better approach to adjust the VRI data, the results from Timberline's analysis show that harvest flows are not significantly different between applying one proportional volume adjustment across all age classes, versus applying separate volume adjustments for each age class.

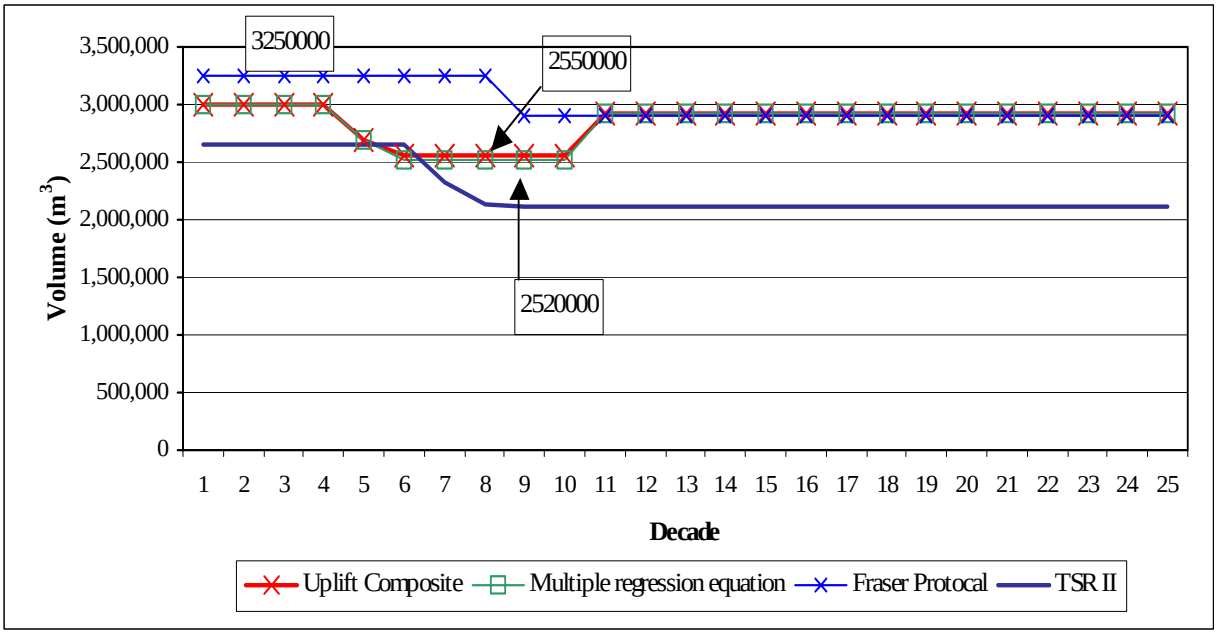

Figure 3. Harvest flow differences between the 7% constant inventory adjustment (included in the uplift composite), volume adjustment regression, and the Fraser Protocol, where all innovative scenarios include site productivity estimates.

- There may be opportunities for further ground sampling in the Interior Cedar Hemlock (ICH) and Montane Spruce (MS) biogeoclimatic (BGC) zones to confirm whether higher levels of volume underestimation occur in these zones. The potential result is an upward pressure on timber supply.
- Evaluation of leading species showed that the risk of the inventory file containing incorrect leading species is very low. The need for adjustments to both the age and height attributes emphasizes the value of a phase 1 re-inventory, which will ultimately increase the level of confidence of the standing inventory.

4.2.6 Results

Innovative Practice	Incremental Volume (m^3/yr)		
	Short Term (0 – 40 yrs)	Mid Term (70 – 100 yrs)	Long Term (110 – 250 yrs)
Constant 7% increase	345,000	220,000	0

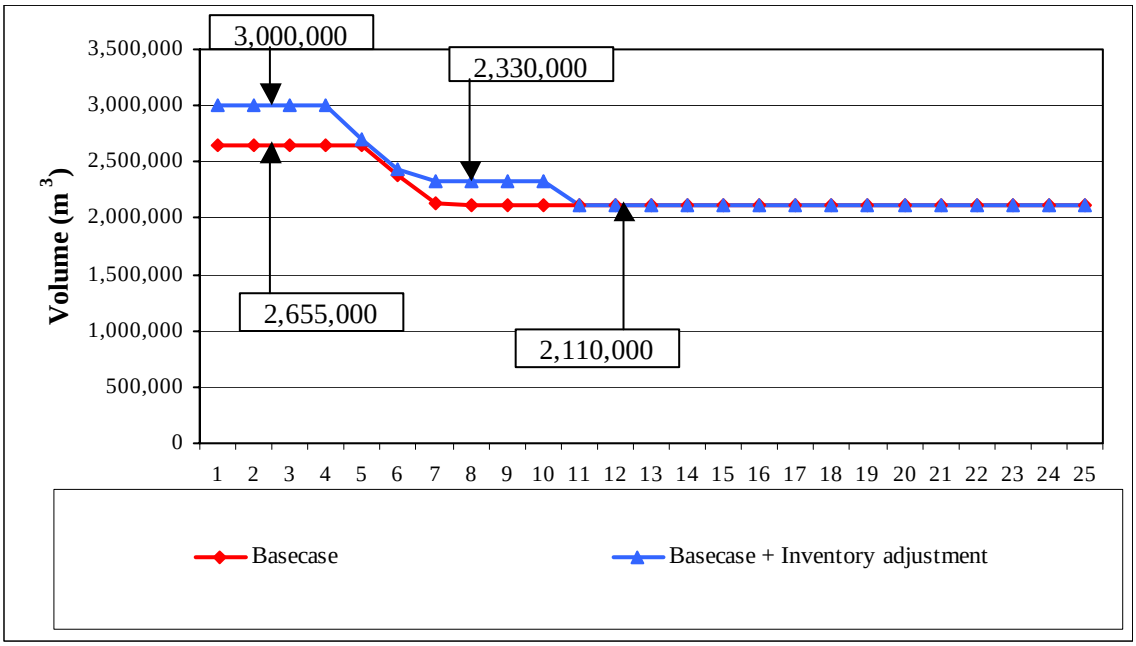

Figure 4. Incremental harvest flow resulting from the 7% constant inventory adjustment (included in the uplift composite), relative to the uplift base case.

4.2.7 References

- J.S. Thrower & Associates Ltd. November 2002. Okanagan TSA Vegetation Resources Inventory Ground Sampling and Statistical Adjustment: Final Report

4.3 FUTURE WORK

Future work the OIFS is considering pending resolution of policy and funding uncertainties:

- Explore the integration of VRI Phase I and PEM in the Okanagan TSA. The OIFS is currently working on a pilot project to complete VRI Phase I on two TSA mapsheets (82E084 and 82E085). In addition, funding has been secured to commence VRI Phase I linework on 764,000 ha for the southern portion of the TSA in fiscal year 2002/03.
- Use the updated VRI Phase I information to define “managed“ stands in future analyses.

4.4 OIFS RECOMMENDATIONS

- To include the constant 7% VRI adjustment scenario (7% constant volume increase over unadjusted VDYP curves) as part of the composite analysis, as it reflects a cautious approach for the statutory decision maker relative to the Fraser Protocol and the 10% constant volume increase.

4.5 COMMENTS

4.5.1 MOF / MSRM

- *J. Stone questioned why the harvest flow for the "base case + inventory adjustment" scenario did not follow the base case harvest flow for the first six decades, suggesting this would be possible if reducing the incremental cut in decades 1-4 to 230,000 m^3.*
- The OIFS ran a spatial model that otherwise follows TSR assumptions. The spatial model was used to find timber on the ground for a 30-year period. The spatial model indicates the 345,000 m^3 incremental timber is available on the ground during this period. The Society chose this harvest flow for a number of reasons:
    - Other IFPAs have set the precedent of increasing the harvest level for a 40-year period.
    - Higher volumes in the first decades will help licensees proactively address forest health issues.
    - The OIFS committed to generally mimic the TSR II harvest flow, with a smaller fall down.
    - The conversion to managed stands will occur sooner.
    - There will be opportunities to fill in the mid-term trough. For example, commercial thinning, drybelt stump height etc.
- *J. Stone questioned if the current inventory timber volume falls within the confidence intervals of the adjusted phase 2 timber volume (+7%) outlined in the FP amendment, how does the phase 2 inventory increase certainty in volume estimates?*
- Discussions between J.S. Thrower and Keith Tudor, MSRM, indicate that although the VRI phase 2 results are not statistically different from the current inventory, it has become standard practise through numerous Ministry precedents to use the local, statistically representative adjustments as best available information in base case timber supply analyses. The different VRI adjustment scenarios that were evaluated attempted to quantify the potential differences in timber supply forecasts. The option included in the AAC uplift (ie., 7% constant volume adjustment based on the THLB) reflects a conservative approach, relative to other methods such as the Fraser Protocol and the 10% constant volume adjustment based on the PFLB.
- *J. Stone asked if yield curve underestimates (Appendix V, part 8, page 25) in current inventory volume for younger stands would equal future underestimates in the field.*
- The regression equation computed showed that inventory volume is substantially underestimated at younger ages. However, the scenario used to model the regression equation (fixed volume adjustments that were specific to a given age class only), ensured that large underestimates of younger stands would only be applicable at a given age and not be carried forward, and that over time the volume adjustment would become gradually less (as shown in table 2 of appendix V part 8). This method of applying the volume X age regression reflected a conservative option.

4.5.2 First Nations

- *M. Wertuik, ONA, requested clarification on the source of the 7% constant adjustment ratio used in the composite, in reference to supporting documentation.*
- The OIFS provided clarification on this issue.
- *M. Wertuik, ONA, questioned why an average adjustment ratio was applied to BEC zones.*
- Based on the VRI analysis completed, there was not enough evidence to reject the null hypothesis that all BEC zones were the same. Without enough evidence to show that they were statistically different, all zones were combined into one adjustment ratio

4.5.3 Public

- *M. Standhuis, NORD, expressed concern that over-estimation of sustainable yields carries higher risk than under-estimation, so areas where conservatism was used in dealing with uncertainties should be clarified. The MoF should define a timetable when the application would be reassessed.*
- Standing timber inventory volumes were estimated from a sample of 110 random plots, at a sampling intensity 151% higher than was used in TSR II. The mean standing timber volume was found to be 10% higher (at 13% sample error) than previous estimates. The OIFS chose to propose an AAC uplift based on a 7% increase in standing timber volume to minimize risk. As a further safeguard, the Chief Forester will reassess the AAC application during the next legislated Timber Supply Review in 2006.
- *D. Dobson, BMID, asked how will the Phase 2 VRI and the new site index information affect our watersheds? Is there more mature timber and therefore additional harvesting opportunities in these watersheds? BMID supports sustainable forest management, but it is not clear how the uplift affects this.*
- The 7% Phase II VRI adjustment to mature timber volume largely forms the basis of the 345,000 m^3 uplift request. The incremental harvest will be allocated throughout the individual licensee operating areas. Any harvest in a CWS, whether existing or incremental volume, will be evaluated every 3-5 years in the IWAP process. Stakeholders, forest licensees and water purveyors provide input to a Professional Hydrologist who will conduct the IWAP and provide recommendations. Forest licensees must either plan to harvest in accordance with the IWAP or provide comprehensive and defensible rationale (i.e. catastrophic fire, blowdown, forest pest activity) to vary the IWAP recommendations. Incremental harvesting opportunities may or may not increase in CWS.
- Allen Soltis of Paxton Forest Industries Ltd. indicated in his letter of October 29th 2002, that the AAC uplift should not have any effect on Paxton's Non Replaceable Forest License as any potential uplift analysis does not target Stocking Class 4 Pine problem forest types. Further, the volume granted to Paxton for the remaining 8 years of their license should be achievable.
- Walter Exner of White Lake Logging Ltd. indicated in his letter received June 10, 2003 that the Lakeside's License A61107 has developed all but 5000m3 of its allowable cut volume allocated to its non replaceable forest license. Further, it is not expected that a potential uplift will have any adverse effect for White Lake Logging to bring under permit last 5000 m3 to complete its 5 year allowable cut volume prior to its license expiration in 2006, as the uplift analysis does not include the Hemlock leading >70% older than 120 years that makes up a large part of Lakeside's harvest profile.

5. SITE PRODUCTIVITY – WET BELT

5.1 TSR2

5.1.1 Analysis Report

- Forest cover inventory based site index estimates were used in the base case analysis. Sensitivity analyses applied OGSI data which suggested a 22% increase in long term harvest levels.

5.1.2 LRMP

- The TSR2 base case site index estimates were used in the LRMP-revised base case.

5.1.3 Rationale

- The Chief Forester concluded that "…*the timber supply in the OSLRMP-revised basecase has probably been underestimated by an unquantifiable amount*", as the "*timber supply analysis for the Okanagan TSA was based on overly conservative estimates of site productivity. This results in an unquantified upward pressure that will affect the mid- to long-term timber supply*."
- For TSR2, the Chief Forester recognized an upward pressure in the mid to long term timber supply.

5.2 INNOVATIVE ANALYSIS

5.2.1 Uplift Base Case

- The site index estimates applied in the TSR2 base case were also used in the uplift base case.

5.2.2 Innovative Practice

- The OIFS recognized the conclusions raised by the Chief Forester, and carried out studies to improve site index estimates for managed stands in the wet-belt.

Program	Description	Completion Date	MOF Approval Date	Forestry Plan Reference	AAC Application Reference
Site Index Adjustment in the Wet-belt area	Site index sampling and adjustment based on using a biophysical model	November 2002		Section 3.2.1 Appendix IX	Section 4.4

5.2.3 Project Description

- The Biophysical Model/Site Index Adjustment (SIA) project was completed in 2002 for the wet-belt portion of the TSA. This model predicts preliminary estimates of site index across the entire wet-belt as a function of BEC subzone, elevation, slope position, aspect, and bedrock geology. A randomly sampled SIA project was also completed and was used to adjust preliminary site index estimates from the biophysical model in both the ICH and Interior Douglas-fir (IDF) BGC zones.
- For the high elevation ESSF, the biophysical model was used to derive estimates of site index, however these estimates were not statistically adjusted.

5.2.4 Application

- New MSYTs were based on the updated site productivity information generated from the biophysical model / SIA project and the TSR2 silviculture assumptions.
- To help understand the risk and uncertainties associated with the new site index information, three separate scenarios were modeled in the current timber supply analysis:

SI Source Selection Priority	Scenario 1	Scenario 2	Scenario 3
Statistically adjust potential site index for lodgepole pine and Douglas-fir leading polygons in ICH and IDF	1st	1st	1st
Apply site index conversion equation to spruce in ICH and IDF from statistically adjusted lodgepole pine as reference species		2nd	2nd
Assign unadjusted potential site index for lodgepole pine, Douglas-fir, and spruce leading polygons in the ESSF			3rd
Assign forest cover inventory site index to remaining stands not covered in any of the above.	2nd	3rd	4th

5.2.5 Risk / Uncertainty

The risk to the statutory decision maker is that the current forest cover inventory site index estimates underestimate future growth of managed stands, thereby underestimating the AAC and economic opportunities it provides. The OIFS examined several options and selected scenario #3 in the composite, based on the following rationale:

a. Site index conversion equations are an accepted component of timber supply analysis, as they are used whenever species conversion is defined as part of the silviculture regimes, and are applied to TIPSY managed stand yield tables for all species other than the leading species.

b. A review of independent paired site index data showed that the MOF's 'pine to spruce' conversion equation reasonably described the relationship between pine and spruce site index.

c. The likelihood of unadjusted PSI's to overestimate site index in high elevation areas is expected to be low. This is supported by a limited number of random samples that were collected.

d. The use of unadjusted PSI's in high elevation areas has been acknowledged by the MOF who assigned partial credit to similar components in the recently completed Adams Lake innovative analysis.

- The biophysical model is a new approach and it has yet to be approved by the MOF. However, the random sampling associated with the SIA part of the project significantly improves the reliability of the data.
- The random sampling methods used in the SIA project for the low elevation areas (representing approximately 70% of the Productive Forest Land Base (PFLB)) provides a high level of comfort that bias has not been inadvertently introduced, and that the statistically adjusted average potential site index adequately represents the landbase. Potential site index estimates from this project are also consistent in magnitude and variability to other similar projects.
- The MOF expressed concern over the application of conversion equations for spruce-leading stands in the low elevation BGC zones. A review of the MOF conversion equation against paired

site index trees from other project sources indicate that its use is not expected to introduce additional bias.

- While the biophysical model was used to develop potential site index estimates in the high elevation ESSF, these estimates were not statistically adjusted as was done in the low elevation. However, from the set of random samples collected, actual site index was higher than that estimated from the biophysical model, suggesting that the potential for the biophysical model to overestimate potential site index in the ESSF is low.
- A sensitivity analysis was run on adjusting the site index estimates by +/-1.0m. This sensitivity analysis includes both the wet-belt (scenario #3) and dry-belt (scenario #2).

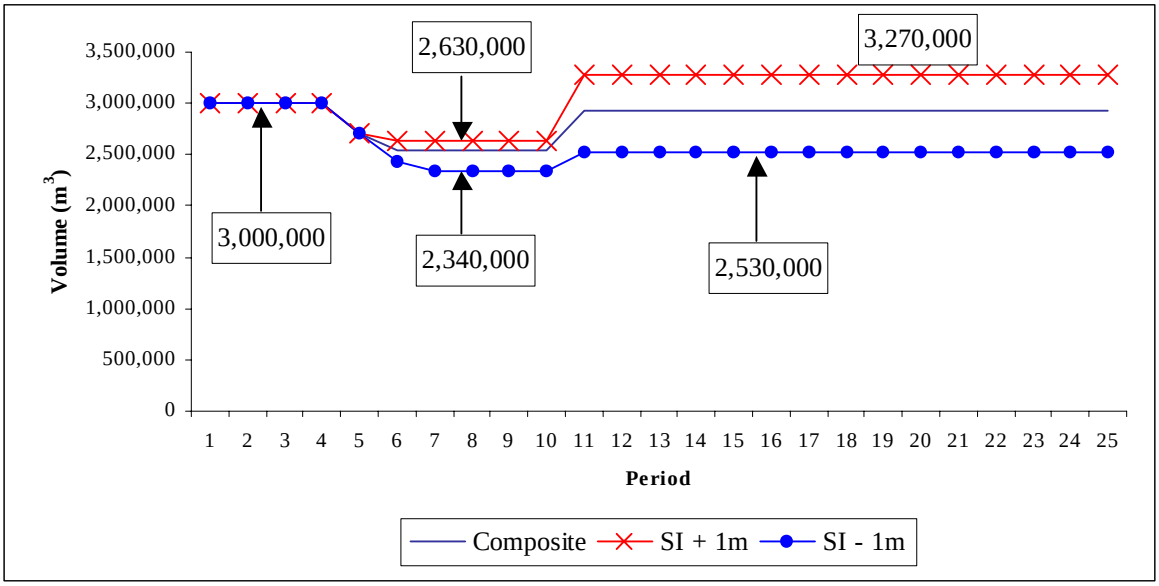

Figure 5. Harvest flow – site index +/- 1 m on the uplift composite

5.2.6 Results

Scenario #3 was selected for inclusion in the uplift composite scenario.

Innovative Practice	Incremental Volume (m^3/yr)		
	Short Term (0 – 50 yrs)	Mid Term (70 – 100 yrs)	Long Term (110 – 250 yrs)
Scenario 3	0	90,000	590,000

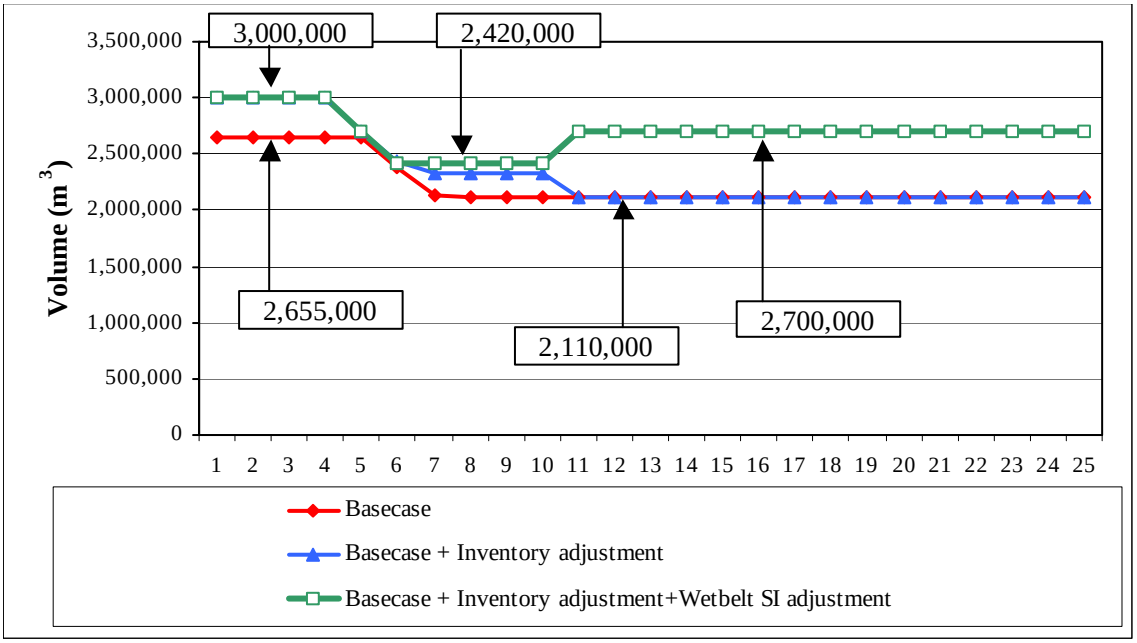

Figure 6. Incremental harvest flow differences associated with the biophysical model / SIA based on scenario #3 (ie., comparing light blue vs. green lines

5.2.7 References

- J.S. Thrower and Associates Ltd. November 2002. Site Index Adjustment for the wet-belt portion of the Okanagan TSA – Final Report.

5.3 FUTURE WORK

Future work the OIFS is considering pending resolution of policy and funding uncertainties:

- Completing PEM for the wet-belt portion of the TSA (scheduled for completion in March 2005).
- Implementing SIBEC sampling in the wet-belt portion of the TSA (scheduled for completion in March 2005).
- Review the business case for growth & yield monitoring in the Okanagan TSA.
- Review the potential opportunity to develop new MSYTs based on the licensee's ecologically defined silviculture regimes.

5.4 OIFS RECOMMENDATIONS

- To include scenario #3 as part of the uplift composite, as it represents the scenario with the best available site index information for the wet-belt with minimal risk to the statutory decision maker.

5.5 COMMENTS

5.5.1 MOF / MSRM

- *J. Stone asked why the timber supply analysis does not show any "AAC effects" related to new site productivity information. Asked if there was any flexibility in moving some of the mid-term harvest flow gains to the short term.*
- By choice, no site productivity improvements were applied in the IFPA timber supply analysis supporting the uplift request. It is expected that site productivity improvements will help fill in the mid-term trough as part of a future uplift request. The flexibility to move some of the mid-term gains to the short-term could be explored as part of the next uplift request.
- *J. Stone stated that The Okanagan IFPA biophysical model can be presented to the Regional Manager within the IFPA AAC increase application. The RM will judge how this information supports the proposed AAC increase. The RM will only provide approval to the AAC increase application and not the biophysical model itself. IFPA holders should seek out appropriate approvals of government standards (none for the Okanagan IFPA biophysical model) and /or peer reviews and make these known to the RM.*
- A description of the Okanagan IFPA biophysical model is provided in tab 1 of appendix 5 of the Forestry Plan Amendment.

5.5.2 First Nations

- None

5.5.3 Public

- *Concerns over the lack of consideration given to climate change were expressed by J. Cooperman, R. Volk, I. Pritchard, M. Whitaker, and L. Bradly.*
- The OIFS has discussed the issue of climate change with the Canadian Climate Impacts and Adaptation Research Network (C-CAIRN). According to C-CAIRN, it is not possible to precisely assess the impacts of climate change on tree growth. Rather, it is crucial that forest management remain flexible to deal with evolving issues relating to climate change. Climate change is not a measurable factor in timber supply analysis at this time. The OIFS will address this issue once the Chief Forester has defined an acceptable methodology to incorporate climate change into timber supply analysis.

6. SITE PRODUCTIVITY – DRY BELT

6.1 TSR2

6.1.1 Analysis Report

- Forest cover inventory based site index estimates were used in the base case analysis. Sensitivity analyses applied OGSI data which suggested a 22% increase in long term harvest levels.

6.1.2 LRMP

- The TSR2 base case site index estimates were used in the LRMP-revised base case.

6.1.3 Rationale

- The Chief Forester concluded that "…*the timber supply in the OSLRMP-revised basecase has probably been underestimated by an unquantifiable amount*", as the "*timber supply analysis for the Okanagan TSA was based on overly conservative estimates of site productivity. This results in an unquantified upward pressure that will affect the mid- to long-term timber supply*."
- For TSR2, the Chief Forester recognized an upward pressure in the mid to long term timber supply.

6.2 INNOVATIVE ANALYSIS

6.2.1 Uplift Base Case

- The site index estimates applied in the TSR2 base case were also used in the uplift base case.

6.2.2 Innovative Practice

- The OIFS recognized the conclusions raised by the Chief Forester, and carried out studies to improve site index estimates for managed stands in the dry-belt.

Program	Description	Completion Date	MOF Approval Date	Forestry Plan Reference	AAC Application Reference
PEM in Dry-belt	Development of a PEM map for the dry-belt area of the TSA	October 2002	November 2002	Section 3.2.1 Appendix IX	Section 4.4
SIBEC in the Dry-belt	SIBEC sampling completed for dry-belt	August 2002	October 2002	Section 3.2.1 Appendix IX	Section 4.4

6.2.3 Project Description

- The SIBEC/PEM project was completed for the dry-belt portion of the TSA in 2002.
- The SIBEC data comprised a combination of locally sampled data (40%) plus MOF SIBEC data (60%) for a total of 939 SIBEC plots.
- PEM map entities were groups of ecologically similar site series approved for TSR application by the Kamloops Regional Ecologist.
- Average site index, sampling error and sample size were computed for each BGC subzone / PEM map entity / species combination, which provided the basis for assigning SIBEC estimates in the dry-belt land base.

6.2.4 Application

- SIBEC estimates were applied to all age classes in the THLB, and were not restricted to the oldest and youngest age classes.
- MOF standards were not in place at the time of the analysis to define application of SIBEC data in timber supply analysis. To help assess different assumptions and data reliability, three separate site index scenarios were compared to help explore the impact of changing sampling error for a given species / site index estimate, as well as use of site index species conversion equations:

SI Source Selection Priority	Scenario 1	Scenario 2	Scenario 3
Average SI from SIBEC plots where n >= 4 and sampling error <=2.0m	1st	1st	
Average SI from SIBEC plots where n >= 4 and sampling error <=3.5m			1st
Computed SI from species conversion equation with lowest sampling error, based on average SI from SIBEC plots where n >= 4 and sampling error <= 2.0m		2nd	
Computed SI from species conversion equation with lowest sampling error, based on average SI from SIBEC plots where n >= 4 and sampling error <= 3.5m			2nd
SI from SIBEC 1997 1st approximation by 3m classes, whose reliability score = high	2nd	3rd	3rd
Forest cover site index of leading managed stand species	3rd	4th	4th
Computed SI from species conversion equation of leading managed stand species, based on existing species forest cover site index	4th	5th	5th

6.2.5 Risk / Uncertainty

- Scenario #2 was selected for inclusion in the uplift composite. The basis was that
  a) Site index conversion equations are an accepted component of timber supply analysis;
  b) A sampling error around a maximum sampling error of 2.0m within a given PEM map entity, is comparable to the sampling error achieved with estimates derived for the adjacent wet-belt region.
- In applying SIBEC estimates, uncertainty includes: subjective (biased) location of sample plots, no reliable estimates of accuracy or precision, no requirement for local data, and no mechanism to correct for bias and errors in the ecological map. The MOF has acknowledged these risks, but considers SIBEC estimates suitable for timber supply analysis.
- Over half of SIBEC plots used in the current timber supply analysis were taken in older stands (about 56% were in stands greater than 80 years and 32% greater than 100 years breast height age). With increased potential for suppression and repression in these older stands, SIBEC estimates in these stands tend to under-estimate growth potential of managed stands. This is reflected in the average site indices assigned to the PEM entities.

- The minimum criteria for SIBEC estimates to be included in the current timber supply analysis was defined as four SIBEC plots with a maximum sampling error of ±2.0 m in PEM entity. The MOF since indicated the minimum sample size will likely increase to seven plots per PEM map entity. We tested the impact of an increased sample size on the SIBEC estimates in the current timber supply analysis, which did not result in any significant change in the estimates.
- Standard practice by the MOF is to apply SIBEC estimates only to very young and very old stands, and to depend on inventory site index for the remaining land base. We compared SIBEC and inventory site indices across all age classes, which showed the inventory site indices under-estimate site productivity across all age classes (relative to SIBEC estimates). Therefore, for the current timber supply analysis, SIBEC estimates were used (where available) in favor of inventory site index across all age classes for the regenerated stands.
- For the scenario selected for the uplift composite (#2), suitability criteria were selected to provide the statutory decision maker with the best estimates with least corresponding risk. However, the criteria used for this analysis resulted in only 44% of the THLB being assigned second generation SIBEC site indices, 16% based on species conversion equations, 9% from first generation SIBEC estimates, and the remaining 31% assigned using forest cover inventory site index. We expect the overall site indices used from these different sources (especially inventory-based site index) will under-estimate the growth and productivity of regenerated stands.
- Only 40% of the SIBEC data used for the timber supply analysis was from local samples, with the remaining 60% provided by the MOF. The SIBEC data collected in the Okanagan IFPA area used randomly selected grid points; however, the randomness was compromised by subjectively selecting trees for sampling in the general area to meet the SIBEC standards. The majority of the SIBEC data (provided by the MOF) represents a variety of unknown sources, which may or may not have been established in the Okanagan TSA. The effect of using the pooled data (as opposed to local data only) on the resulting timber supply is unknown.
- The best way to know how well the SIBEC estimates represent the Okanagan TSA landbase is to randomly sample suitable areas and compare the results with the SIBEC estimates. This was not done in the Okanagan IFPA area; however, we compared the SIBEC estimates against data collected by J.S. Thrower & Associates Ltd. in site index adjustment (SIA) projects in nearby ecologically similar areas. For the same site series within a given BGC subzone / variant, the SIBEC estimates developed for the Okanagan IFPA consistently under-estimated SIA by about 1–3 m for lodgepole pine. The SIA data were taken from randomly located sample plots. We expect that the major risk for statutory decision makers in using the SIBEC data is that growth potential is under-estimated.

6.2.6 Results

Scenario #2 was selected for inclusion in the uplift composite scenario.

Innovative Practice	Incremental Volume (m^3/yr)		
	Short Term (0 – 50 yrs)	Mid Term (60 – 100 yrs)	Long Term (110 – 250 yrs)
Scenario #2	0	130,000	230,000

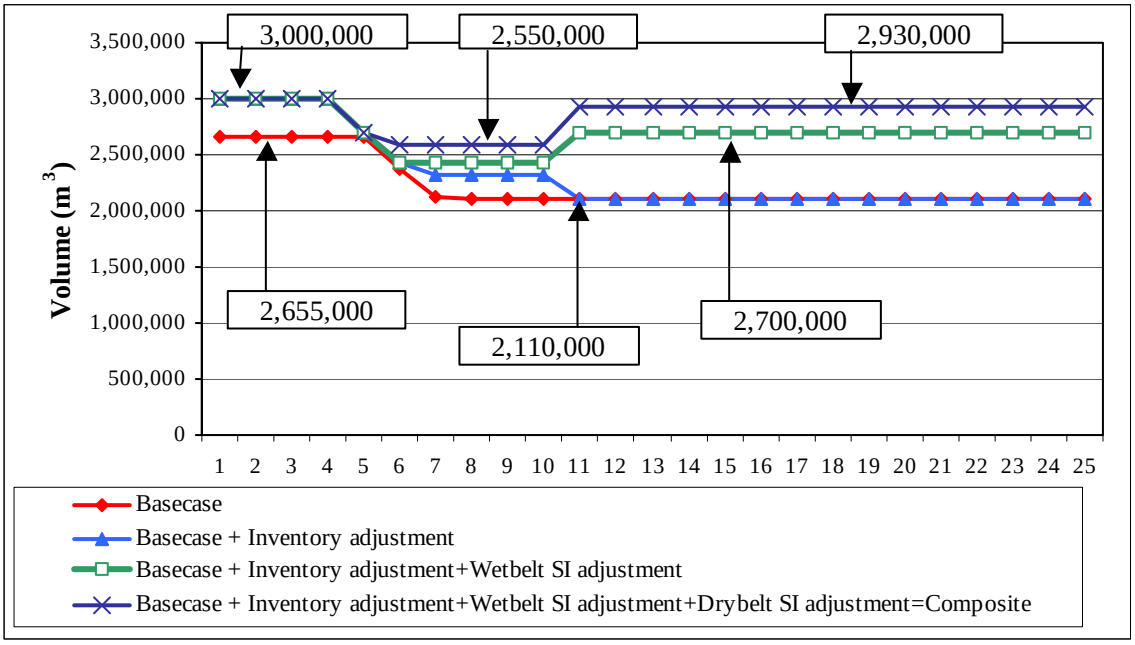

Figure 7. Incremental harvest flow differences associated with SIBEC / PEM estimates (comparing dark blue vs. green lines).

6.2.7 References

- JMJ Holdings Ltd. October 2002. Okanagan TSA Dry Belt PEM and Site Index Assignment Project – Final Report.

6.3 FUTURE WORK

Future work the OIFS is considering pending resolution of policy and funding uncertainties:

- Review the business case for growth & yield monitoring in the Okanagan TSA.
- Review the potential opportunity to develop new MSYTs based on the licensee's ecologically defined silviculture regimes.

6.4 OIFS RECOMMENDATIONS

- To include scenario #2 as part of the uplift composite, as it represents the scenario with the best available site index information for the dry-belt with minimal risk to the statutory decision maker.

6.5 COMMENTS

- Refer to section *'Site productivity – wetbelt'* for general comments on site productivity estimates.

7. OPERATIONAL ADJUSTMENT FACTORS

7.1 TSR2

7.1.1 Analysis Report

- The standard provincial reductions of 15% for OAF1 and 5% for OAF2 were applied to all lodgepole pine stands, and some dry-belt Douglas-fir and balsam stands.
- Balsam and spruce stands growing on good and medium sites received an OAF1 of 20% and OAF2 of 0%.
- For regenerating cedar- and hemlock-leading stands and wet-belt Douglas-fir stands in which root disease is endemic, the Kamloops Region derived OAF1 and OAF2 estimates to reflect potential future volume reductions.

7.1.2 LRMP

- The TSR2 base case OAF1 and OAF2 estimates were used in the LRMP-revised base case.

7.1.3 Rationale

- The Chief Forester accepted these revised OAF estimates since they were based on expert review of the productivity of regenerating stands subject to root disease.

7.2 INNOVATIVE ANALYSIS

7.2.1 Uplift Base Case

- The TSR2 base case OAF1 / 2 estimates were used in the uplift base case.

7.2.2 Innovative Practice

Program	Description	Completion Date	MOF Approval Date	Forestry Plan Reference	AAC Application Reference
OAF1	OAF1 sampling and adjustment for lodgepole pine leading stands in the TSA	September 2002	October 2002	Section 3.2.1 Appendix IX	Section 4.8

7.2.3 Project Description

- The OAF1 components that deal with espacement and non-productive gaps were the focus of this project.
- The project included random sampling of 50 lodgepole pine leading stands throughout the TSA, using a modification of the MOF OAF1 sampling procedures.
- The results were that revised OAF1 estimates for lodgepole pine stands in the Okanagan TSA should be 12.9% for the wet-belt stands and 10.8% for the dry-belt stands.

7.2.4 Application

- The revised OAF1 estimates for Pl leading analysis units were incorporated into the current timber supply analysis as a sensitivity analysis.

7.2.5 Risk / Uncertainty

- The risk of over-estimating OAF1 in Pl leading stands is minimal, since managed stands are likely to have lower OAFs in the future as silviculture practices improve.
- The results of the sensitivity analysis indicates an upward pressure of 60,000m^3/yr to long term harvest flows.

7.2.6 Results

Innovative Practice	Incremental Volume (m^3/yr)		
	Short Term (0 – 50 yrs)	Mid Term (60 – 100 yrs)	Long Term (110 – 250 yrs)
OAF1 – Pl	0	0	60,000

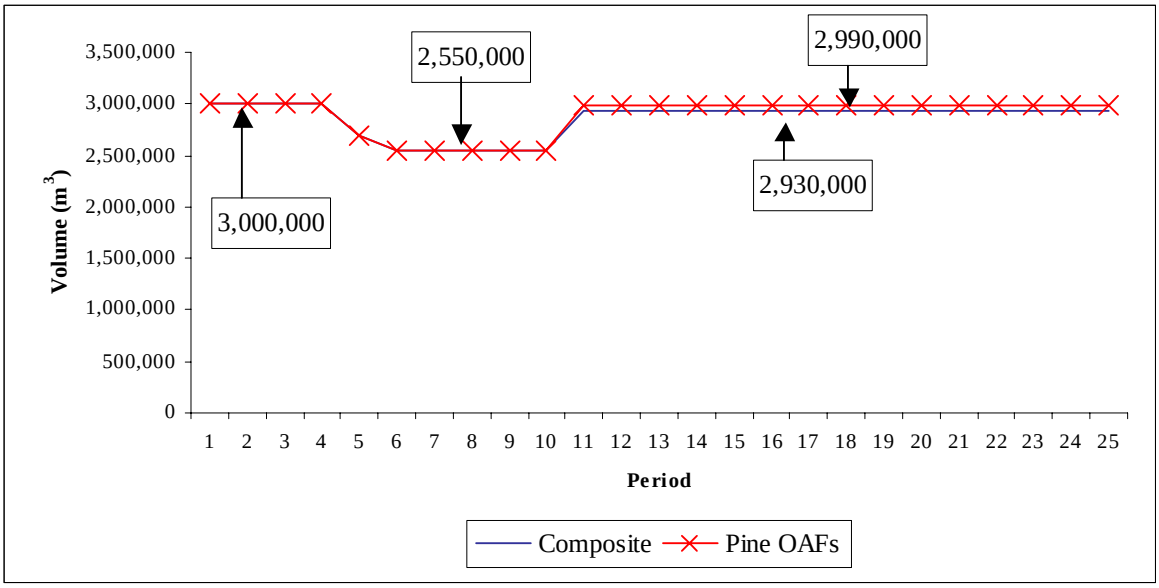

Figure 8. Harvest flow differences associated with revised OAF1 estimates for Pl leading stands.

7.2.7 References

- Forsite Consultants Ltd. October 2002. Operational Adjustment Factor 1 Evaluation in the Okanagan TSA – Final Report

7.3 FUTURE WORK

Future work the OIFS is considering pending resolution of policy and funding uncertainties:

- OAF1 in cedar and hemlock stands
- OAF1 in spruce and balsam stands
- OAF1 in Douglas-fir stands

7.4 OIFS RECOMMENDATIONS

- To exclude the revised OAF1 estimates from the uplift composite, and consider this factor to provide upward pressure in harvest flows for the statutory decision maker.

7.5 COMMENTS

7.5.1 MOF / MSRM

- *J. Stone questioned why OAFs should be increased for this IFPA or any timber supply reviews in the SIR to tone down managed stand yield expectations on root disease prone sites, and that root disease affects other inventory type groups besides those identified in TSR2.*
- The sample population to define the OAF1 values in the Okanagan TSA was restricted to refining the OAF1 estimates for pine leading stands only. These revised OAF1 estimates were applied to the pine analysis units in a separate sensitivity analysis. As part of the composite analysis, pine leading stands were assigned provincial averages. Estimates assigned to all other analysis units were based on TSR2 derived OAF1&2 estimates, which included volume reductions to account for root disease as determined by the regional pathologist.

7.5.2 First Nations

- None

7.5.3 Public

- None

8. ROADS, TRAILS, & LANDINGS

8.1 TSR2

8.1.1 Analysis Report

- Studies completed by the Kamloops Regional Pedologist formed the basis for RTL netdowns.
- For stands < 40 years, the current THLB was reduced by 5.4%.
- For all future stands, the future THLB was reduced by 4.9%.

8.1.2 LRMP

- The TSR2 base case RTL netdowns were used in the LRMP revised base case.

8.1.3 Rationale

- The Chief Forester stated he was satisfied that the assumptions regarding RTL's used for the analysis represented the best available information and were suitable for use in the determination.

8.2 INNOVATIVE ANALYSIS

8.2.1 Uplift Base Case

- The TSR2 base case RTL netdowns were used in the uplift base case.

8.2.2 Innovative Practice

Program	Description	Completion Date	MOF Approval Date	Forestry Plan Reference	AAC Application Reference
Roads, Trails, and Landings	Refine estimates of disturbance by roads, trails, and landings	September 2002	October 2002	Section 3.2.1 Appendix IX	Section 4.1

8.2.3 Project Description

- The 'trails' component of the RTLs (specifically site preparation and soil disturbance) were the focus of this study.
- The results indicate that future netdowns associated with trails could be reduced from 1.7% (TSR2) down to 0.9%. This translates to an overall future RTL netdown from 4.9% (TSR2) down to 4.1%.

	Existing RTL < 40 yrs		Future RTL	
	TSR2	Innovative Practice	TSR2	Innovative Practice
Roads / Landings	3.5	3.5	3.2	3.2
Trails	1.9	1.9	1.7	0.9
Total	*5.4*	*5.4*	*4.9*	*4.1*

8.2.4 Application

- An assessment was made of potential changes to the THLB using the revised RTL netdown criteria.
- By applying the revised RTL netdown criteria, the future THLB could increase by 6,736 ha, or 0.6%.

8.2.5 Risk / Uncertainty

- The results of this project were not specifically included in a separate sensitivity analysis. Rather, impacts can be approximated using sensitivity analysis around the size of the THLB. The THLB sensitivity analysis showed that a 5% change in THLB resulted in a comparable 5% change in long term harvest levels. This would suggest that the impact of the revised RTL netdowns would result in a 0.6% increase in long term harvest flow.

8.2.6 Results

- No sensitivity analysis was run on changes to RTL netdowns.

8.2.7 References

- Thompson Forest Management. August 2002. Evaluation of Netdowns for Roads, Trails, and Landings in the Okanagan TSA – Final Report.

8.3 FUTURE WORK

8.4 OIFS RECOMMENDATIONS

- To exclude the revised RTL netdown estimates from the uplift composite, and consider this factor to provide upward pressure in harvest flows for the statutory decision maker.

8.5 COMMENTS

8.5.1 MOF / MSRM

- None

8.5.2 First Nations

- None

8.5.3 Public

- None

9. FUTURE TREE IMPROVEMENT

9.1 TSR2

9.1.1 Analysis Report

- No allowances were made for tree improvement estimates

9.1.2 LRMP

- The TSR2 base case assumptions were used in the LRMP revised base case.

9.1.3 Rationale

- The Chief Forester acknowledged that "*the use of class A Pl and Sx seed represents in aggregate a 5.5% increase in the productivity of regenerating stands on the TSA. This results in an increase in the long term-timber supply, and to a lesser extent an increase in the mid-term timber supply.*"

9.2 INNOVATIVE ANALYSIS

9.2.1 Uplift Base Case

- Current genetic gain estimates were included in the uplift base case. Refer to 'uplift basecase' section for estimates used.

9.2.2 Innovative Practice

- Future estimates of genetic gain were evaluated in a sensitivity analysis.

9.2.3 Project Description

Species	Wet/Dry belt	Elevation	Genetic gain	Short-term availability	Future genetic gains
Fd	All	All	22%	25%	15% gain to AU 103
Pl	Dry	All	11%	35%	11% gain to pine in AU 324
	Wet	All	12%	100%	12% gain to pine Aus in wet
Sw	All	All	16%	100%	16.0% gain to all spruce

9.2.4 Risk / Uncertainty

- Future tree improvement estimates were evaluated in a sensitivity analysis. There is a risk that projected future tree improvement levels may not be maintained. However, the tree improvement program currently plans to provide this seed, and as a result the risk is expected to be low. The inclusion of future tree improvement estimates provide an upward pressure in mid-term and long-term harvest levels.

9.2.5 Results

- The impact of future tree improvement estimates were evaluated in a separate sensitivity analysis.

Innovative Practice	Incremental Volume (m^3/yr)		
	Short Term (0 – 50 yrs)	Mid Term (60 – 100 yrs)	Long Term (110 – 250 yrs)
Future Tree Improvement	0	40,000	80,000

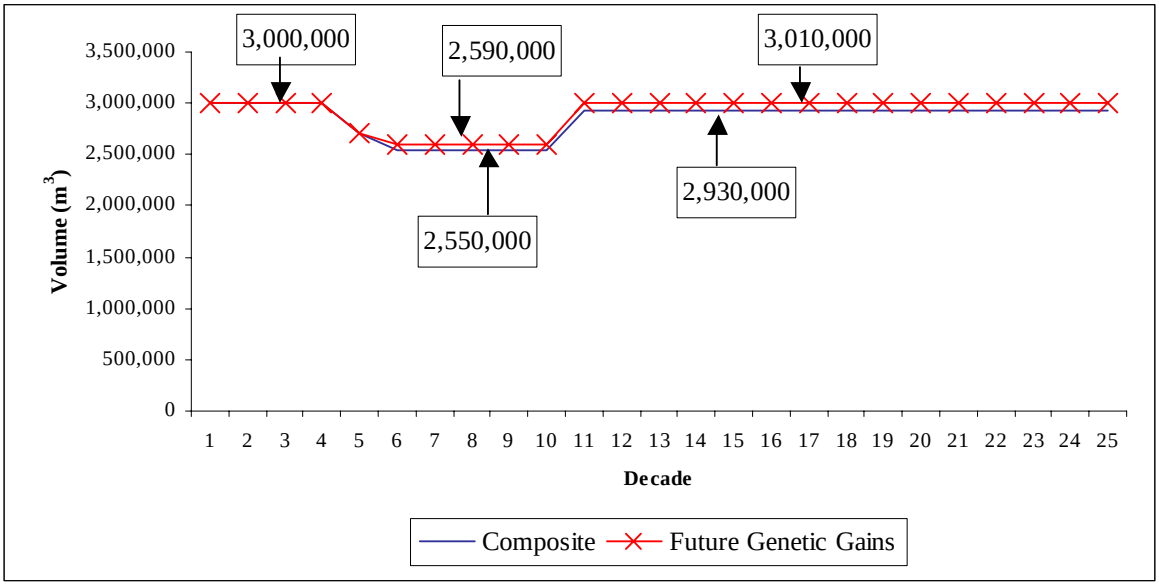

Figure 9. Sensitivity analysis of harvest flow differences associated with future estimates of tree improveme

9.2.6 References

9.3 FUTURE WORK

Future work the OIFS is considering pending resolution of policy and funding uncertainties:

- Completing a study to determine the potential increases in height and volume that can be obtained by using sub-maritime Douglas-fir seed.
- Working to ensure the licensees understand the potential impact of the tree improvement program to ensure full utilization of improved seed.

9.4 OIFS RECOMMENDATIONS

- To include current estimates of tree improvement as part of the uplift composite, as this best reflects current management practices. Future tree improvement estimates have been excluded from the composite, reflecting a conservative approach taken for the statutory decision maker.

9.5 COMMENTS

9.5.1 MOF / MSRM

- None

9.5.2 First Nations

- None

9.5.3 Public

- None