



# Lakes TSA Type 4 Silviculture Strategy

***Issues and Preliminary Strategies***

**Initial Workshop**

September 11, 2012

Sean Curry, RPF

Jim Burbee, RPF

# Agenda for September 11

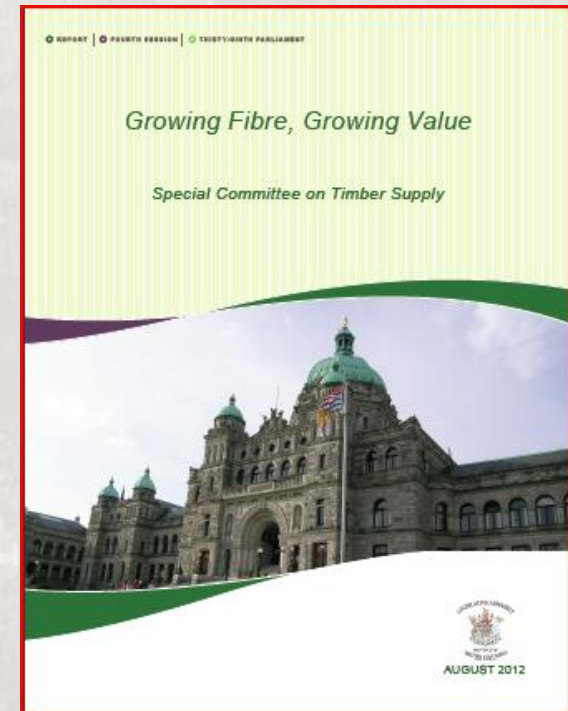
- Introductions
- Provincial overview
- Species targets and trends
- Silviculture Strategies Overview
- Type 4 Outcomes
- Review current situation in the Lakes TSA
- Identify working targets
- Review possible strategies to address issues, discuss and decide on strategies to be modeled



# Why do we need them?

A response to

- Special Committee on Timber Supply
- Auditor General Audit
- Forest Practices Board Reports
- Chief Forester Guidance



# Type IV Strategies – What are they?

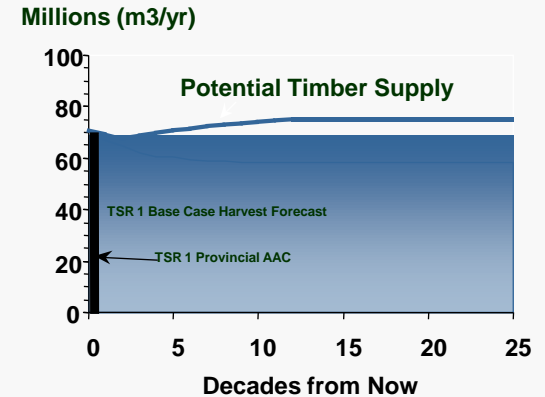
A comprehensive TSA level plan that

- identifies key objectives that pertain to an area,
- identifies key harvesting and silviculture strategies to achieve timber and non-timber objectives,
- provides direction regarding species selection, landscape level retention, harvesting priorities, climate change and other key local concerns.
- provides key priority treatments and a 5-year tactical plan for FFT activities.

# Strategic Considerations

- Timber Supply
  - How can silviculture investment decisions impact future timber supply?
- Timber Quality Outputs
  - How can silviculture investments impact future timber quality?
- Habitat / Non Timber Issues
  - How can silviculture investments impact habitat quality, hydrology, etc

Provincial Total (TSAs + TFLs)



# Type 4 Outcomes

- Strategic and tactical guidance for the expenditure of LBIS funds to address forest management issues within the unit.
- Clarity on whether harvesting is occurring where it is assumed to occur based on TSR or other direction.
- A clear description of landscape retention strategies, where they are located spatially, how they are being tracked when new areas are added and whether they are being monitored for the desired attributes they were retained for.



# Type 4 Outcomes

- To address growing concern over species deployment within the environment of climate change, species targets by BEC unit are to be created and monitored.
- To integrate existing direction to address risks from forest health, fire, and climate change, where this direction influences decisions for species selection, harvesting and incremental silviculture.
- To provide a foundation for building an operational strategic forest management planning process within Districts at some future date, in response to the Auditor General's report, numerous Forest Practices Board reports and FFESC climate change research reports.



An aerial photograph of a vast, dense forest covering rolling hills. The trees are mostly green, with some lighter green patches indicating different tree species or forest health. In the upper left, there is a small, irregularly shaped cleared area with exposed brown soil. The sky is a pale, hazy blue.

# ***Silviculture Strategy Type 4***

- Lakes TSA
- September 2012

**Silviculture Type 4 strategy**



# *Species targets/Trends by BEC subzone*

- Lakes TSA
- Preliminary discussions
- September 2012

**Silviculture Type 4 strategy**

# Species deployment on the landscape



*How much of each species where  
and when?*

## Direction

- Based on ecology
  - Feasible
  - Reliable
  - Productive
  - Resilient
  - Redundant
- Data that can be readily accessed
- Risks can be ascribed to the unit
- Trends can be discussed
- Targets or trends can be identified and measured against



FIRST...

## **It is not simple**

### **What is it that we desire or not?**

**Species selection working group created ecological ranges for Quesnel TSA by Subzone**

**BEC subzone and variant tree species descriptions developed by species selection working group**

**Pilot study in the ICHmc2 by LePage, Coates, Heemkerk, Banner and Hall Technical report 67**

**Looks at density and diversity**



FIRST...

# It is not simple

## What is it that we desire (or not)?

### Guidance from the Chief Forester



Ministry of Forests  
and Range

Forest Stewardship Division

MEMORANDUM

File: 280-30/TREESP

Ref. 119378

SEP 24 2009

To: Distribution List

From: Jim Snetsinger, R.P.F.  
Chief Forester

**Re: Guidance on Tree Species Composition at the Stand and Landscape Level**

British Columbia is an acknowledged world leader in reforestation with over six billion trees planted since reforestation programs began in the 1930s. Over this time we have developed a better understanding of stand establishment that has led to increased survival and growth of managed stands. We now also recognize that reforesting areas with a dominant single species can increase the risk of reduced yield due to forest health impacts. On a stand-by-stand basis this risk may not always seem significant, however, if single species or simplified stands are established over large geographic areas, it may reduce species diversity and resiliency of our managed stands which may have implications regarding the future options from our forests.

Recent forest health epidemics have focused attention on how vulnerable single species stands can be to pest infestations. The current mountain pine beetle infestation and the recent increase in mortality of lodgepole pine as a result of *Dothistroma* needle blight are examples of vulnerability accentuated by climate change and a dominant single species. While the evolving reforestation legislation has promoted and resulted in early and full stocking it did not specifically prescribe species composition within individual cutblocks or over larger geographic areas. Under the current legislation, Forest Planning and Practices Regulation section 26, Forest Stewardship Plan stocking standards must now address both immediate and long-term forest health issues when selecting desirable species that are ecologically suited to the site.

This memo is to provide guidance to professionals and tenure holders on how to address the potential risks to immediate and long-term forest health associated with species selection decisions.

**Immediate and Long-Term Forest Health**

My vision for British Columbia's future forests is to provide a diversity of well-adapted, healthy, resilient stands across the landscape that will fulfil the needs of future generations. To achieve this, it is important to learn from what we have experienced recently with respect to the vulnerability of single species stands to forest health epidemics and use this information

# To understand what we want we will want to know what we had:

## Reports that are available

The screenshot displays the 'Corporate Reporting System' interface. At the top, there is a navigation bar with 'Home' and 'Help' links, and the 'Ministry of Forests' logo. Below this, a 'Main Menu' path is shown: [Silviculture](#) : [RESULTS - Reporting Silviculture and Land Status](#) : Species Monitoring.

On the left side, there is a 'MY BOOKMARKS' section with four items, each with a 'delete' button:

- » [ISSAWM01-Free Growing Report](#) [delete](#)
- » [Planting by Species](#) [delete](#)
- » [RDD012-FDP&FSP Standards Report](#) [delete](#)
- » [Regenerated Forest Cover](#) [delete](#)

Below the bookmarks is a 'Search Reports:' section with a text input field and a 'Search' button.

The main content area is titled 'Reports' and contains a list of four items, each with a magnifying glass icon and a plus sign:

1. [Billed Volume Based on Reported Results Openings](#) +
2. [Planting by Species](#)
3. [Previous Leading Species for Results Openings](#) +
4. [Regenerated Forest Cover](#)

At the bottom of the page, there is a footer with links: [Top](#) [Copyright](#) [Disclaimer](#) [Privacy](#) and a [Feedback](#) button.

Billed Volume and Previous leading species

# Steps...

**1) Get Organized – What is desired?  
Or put another way, what is not  
desired?**

- Quesnel used regional ecologists, silviculturists, wildlife, and soils specialists, and district staff.
- Went from chaos to consensus.

# Steps...

## 2) Understand the management expectations, risks and ecological realities.

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- [Tree Planting Resources](#)

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### Stocking Standards

- [FREP Report #19, BC Ministry of Forests and Range. 2009. Forest Stewardship Plan Stocking Standard Evaluation.](#)
- [FRPA General Bulletin \(Number 22\) – An Overview of FSP Extensions](#) (248 k, pdf, posted March 29, 2010)
- [Memo from Phil Zacharatos, ADM Operations Division, regarding FRPA Administrative Bulletin \(Number 13\) – Silviculture Prescription Stocking Standard Amendments](#) (272 k, pdf, posted Dec 5, 2009)
- [Chief Forester's Guidance on Tree Species Composition at the Stand and Landscape Level](#) (389 k, pdf, posted October 22, 2009)
- [Silviculture Guidelines and Practices for Maintaining or Recruiting Key Habitat Objectives](#)
- [An Overview Reference for the Evaluation of Stocking Standards Under FRPA](#) (80 k, pdf, posted Nov. 8, 2008)
- [Letter re: Approval/Rejection of Multi-block Stocking Standards in Forest Stewardship Plans](#) (302K, PDF, posted Sept. 11, 2008)
- Power point presentation - [Summary for silviculture under FRPA](#) (link to file posted on MOF ftp server, Feb. 20, 2003)
  - Basic Business flow
  - What's new for silviculture under FRPA
  - What's not new
  - What are the business needs for information
  - Linkage to other business
- [Minimum inter-tree distance and other survey parameters](#) (link to MOF Research Branch)

The linked paper discusses the effect of the silviculture survey parameters (including reduction of MITD) on the free-growing decision probabilities and projected volume at rotation.

- [Chief Forester memo on the Incorporation of mixedwood and broadleaves into Forest Stewardship Plan stocking standards, SP amendments, and TSR regeneration assumptions](#) (pdf, 242 k, posted May 6, 2008)
- [Chief Forester letter on broadleaf management applies to Forest Development Plan stocking standards](#) (pdf, 21 k, posted Feb 4, 2003)
- [Chief Forester's Letter on broadleaf management](#) (pdf, 276 k, posted Dec. 17, 2002)
- [FPC Transition Flowchart](#) (ppt, 53 k, posted Dec. 17, 2002)

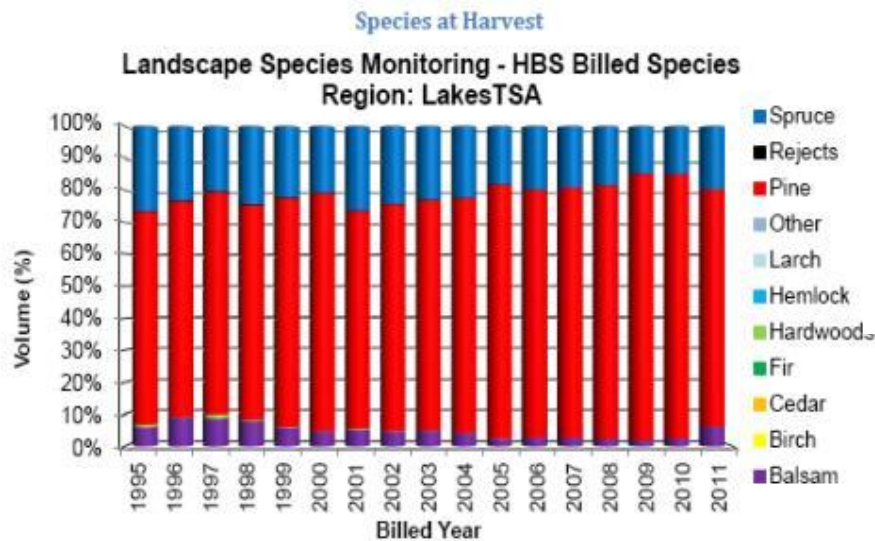
STOCKING STANDARDS

- [Reference Guide for FDP Stocking Standards](#), (616k, updated Nov. 26, 2010)

- Clear Provincial goals and direction.
- Regional and local goals and priorities.
- Local expertise.


**RESOURCE PRACTICES BRANCH**

## May 2012

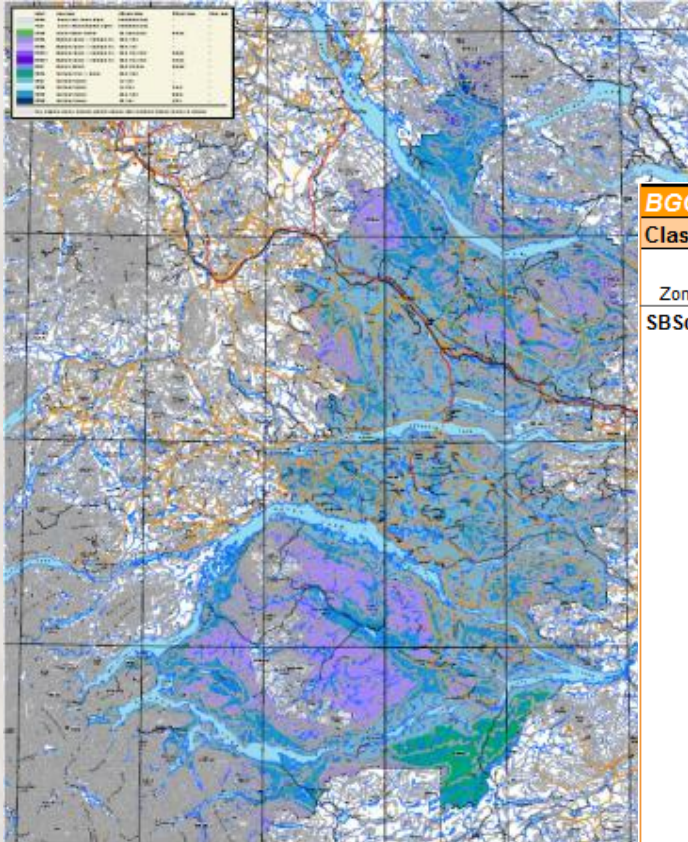


**Landscape Species Monitoring - Planted Species Region: Lakes TSA**

Disturbance Start Year	Spruce (%)	Pine (%)	Larch (%)	Hardwoods (%)	Fir (%)	Balsam (%)
1995	23	75	0	0	0	0
1996	30	68	0	0	0	0
1997	30	68	0	0	0	0
1998	30	68	0	0	0	0
1999	31	67	0	0	0	0
2000	31	65	0	0	0	0
2001	31	65	0	0	0	0
2002	42	56	0	0	0	0
2003	42	56	0	0	0	0
2004	40	58	0	0	0	0
2005	42	55	0	0	0	0
2006	40	57	0	0	0	0
2007	41	54	0	0	0	0
2008	33	59	0	0	0	0

# Steps...

3) Understand the context (BEC) and identify issues and opportunities – can begin with primary secondary tertiary



BGC			Regeneration Guide			
Classification			Species			
Zone/SZ	Series	Standards ID	Primary	Preferred (p)	Secondary	Broadleaf
SBSdk	01	81170	PI Sx	PI Sx Fd <sup>9,18</sup>	Fd <sup>9,18</sup>	At <sup>a</sup> Ep <sup>a</sup>
	02*	81171	PI	PI Sx <sup>28</sup>	Sx <sup>28</sup>	At <sup>b</sup> Ep <sup>b</sup>
	03*	81172	PI	PI Sx <sup>28</sup>	Sb <sup>28</sup> Sx <sup>28</sup>	At <sup>b</sup>
	04	81173	Fd PI	Fd PI Sx <sup>28</sup>	Sx <sup>28</sup>	At <sup>b</sup> Ep <sup>a</sup>
	05	81174	PI Sx <sup>28</sup>	PI Sx <sup>28</sup> Fd <sup>9,18</sup>	Fd <sup>9,18</sup>	At <sup>a</sup> Ep <sup>a</sup>
	06	81175	PI Sx	PI Sx Fd <sup>3,9,32</sup>	Fd <sup>3,9,32</sup>	Act <sup>a</sup> At <sup>a</sup> Ep <sup>a</sup>
	07	81176	Sx <sup>1,32</sup>	Sx <sup>1,32</sup> PI <sup>1</sup>	PI <sup>1</sup>	Act <sup>b</sup> At <sup>b</sup> Ep <sup>b</sup>
	08	81177	Sx <sup>1,32</sup>	Sx <sup>1,32</sup> PI <sup>1</sup>	PI <sup>1</sup>	Act <sup>a</sup> At <sup>a</sup> Ep <sup>a</sup>
	09*	81178	PI <sup>1</sup> Sb <sup>1</sup>	PI <sup>1</sup> Sb <sup>1</sup>		
	10*	81179	PI <sup>1</sup> Sb <sup>1</sup> Sx <sup>1,32</sup>	PI <sup>1</sup> Sb <sup>1</sup> Sx <sup>1,32</sup>		
	81	-	non-forested	non-forested		
	82	-	non-forested	non-forested		

# Steps...

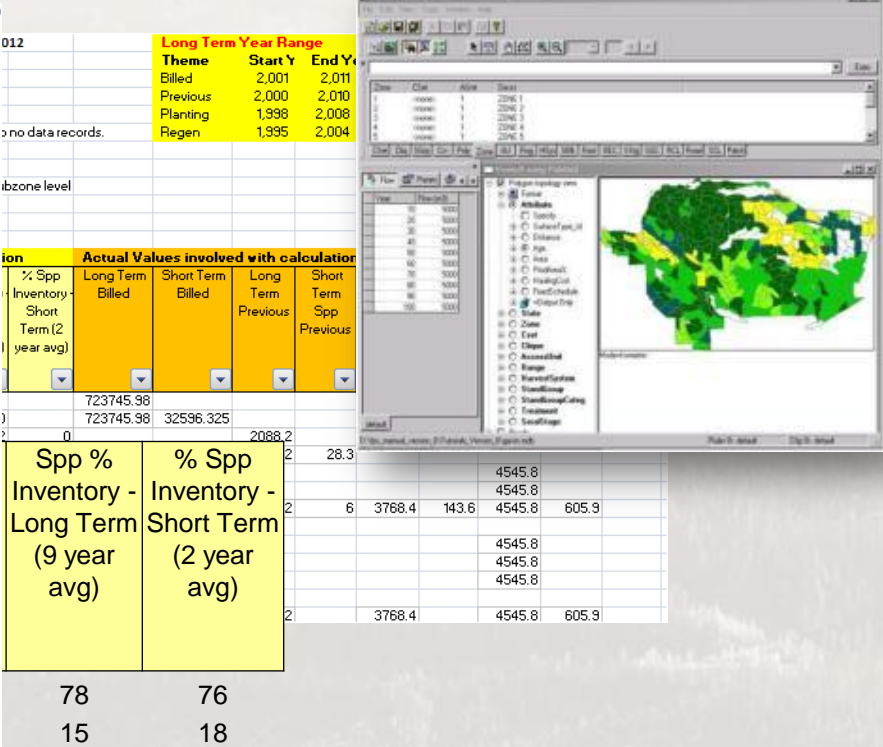
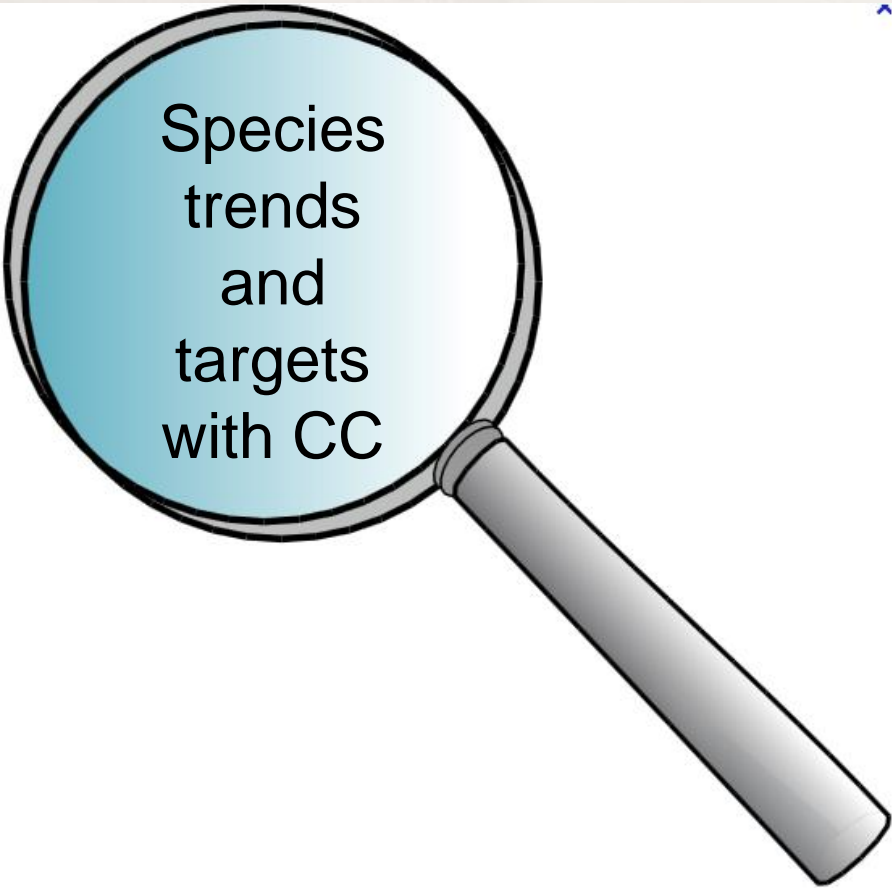
## 4) Create the Vision for the Future Forest Species mix

ZONE	SUBZONE	TREE_SPEC IES_CODE	Ranges	Spp % Billed - Long Term (11 year avg)	Spp % Billed - Short Term (2 year avg)	% Previous Leading Spp - Long Term (11 yr avg)	% Previous Leading Spp - Short Term (2 yr avg)	Spp % Planted - Long Term (11 yr avg)	Spp % Planted - Short Term (2 yr avg)	Spp % Inventory - Long Term (9 year avg)	% Spp Inventory - Short Term (2 year avg)
SBS	dk	Lw						1	2		
SBS	dk	Pl total		80	86	73	93	60	49	68	64
SBS	dk	S total		18	13	5	6	37	43	25	27
SBS	dk	SB								0	0
SBS	dk	Bl		2	1					2	1
SBS	dk	Fdi						2	6	0	

- Strategic objectives and a vision for the future species mix
  - Targets and or desired trends.
  - Are we on track?

# Steps...

## 4) Create the Vision for the Future Forest Species mix



Reassess with a Climate Change Lens

**Harvest tracking – is it being done locally?**

**If so how? – Are we on the track we think we are on?**



## **Landscape level Retention**

**Is it being modified by the Chief Forester's guidance?  
How is it being implemented? Tracked?**



# Silviculture Strategies Overview

Silviculture Strategies are meant to provide strategic direction for optional silviculture investments and can help to inform practitioners of the implications of choices for required silviculture.

- Required silviculture (planting, brushing, etc after harvesting)
- Optional silviculture (fire rehab, fertilization, pruning, etc)

Considered strategic because they take silviculture planning beyond stand level objectives to consider forest level objectives:

- timber supply,
- timber quality outputs,
- and habitat/non timber issues

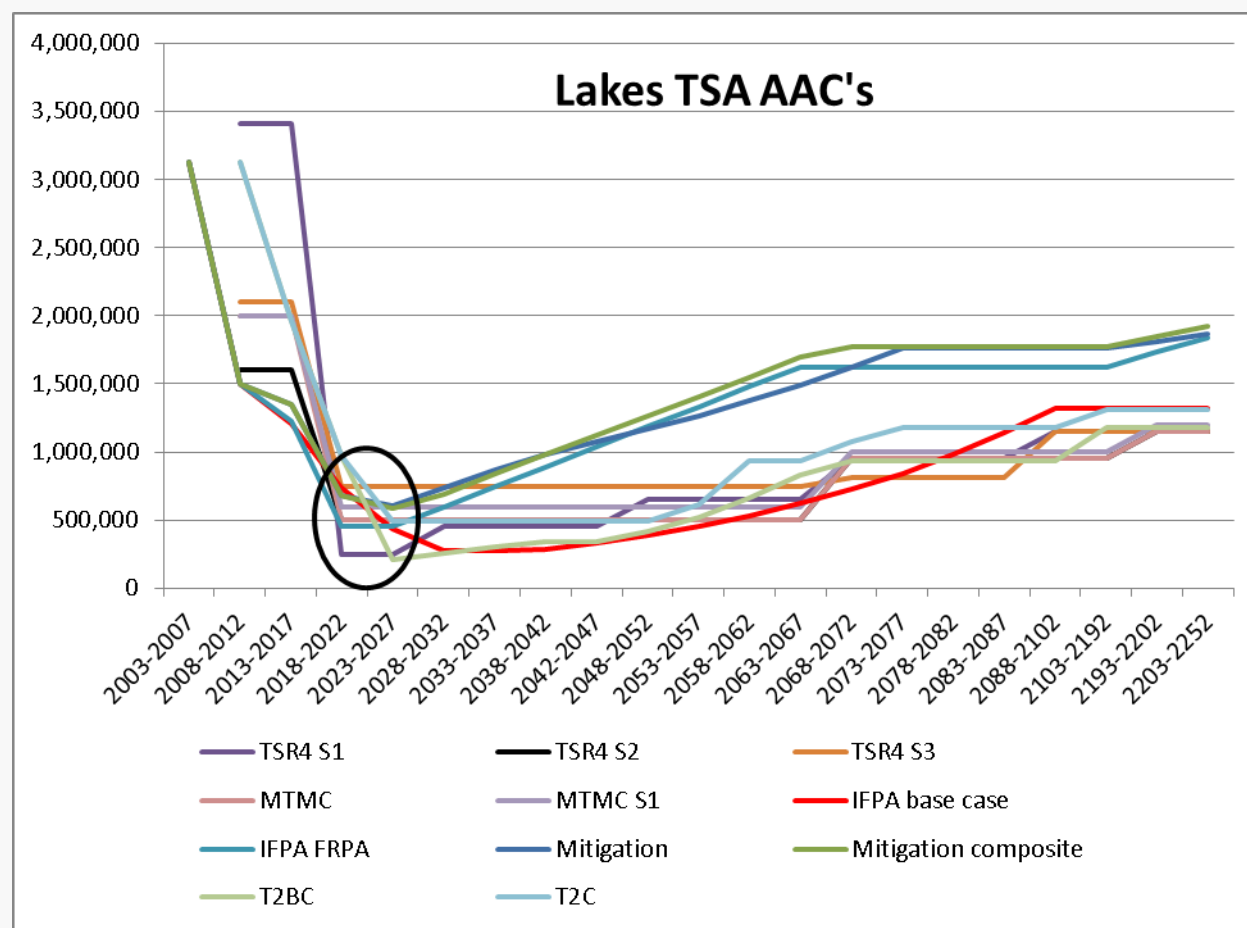
Important because management units need a comprehensive, locally driven, strategic investment plan for silviculture expenditures.



# Relevant Lakes TSA analyses

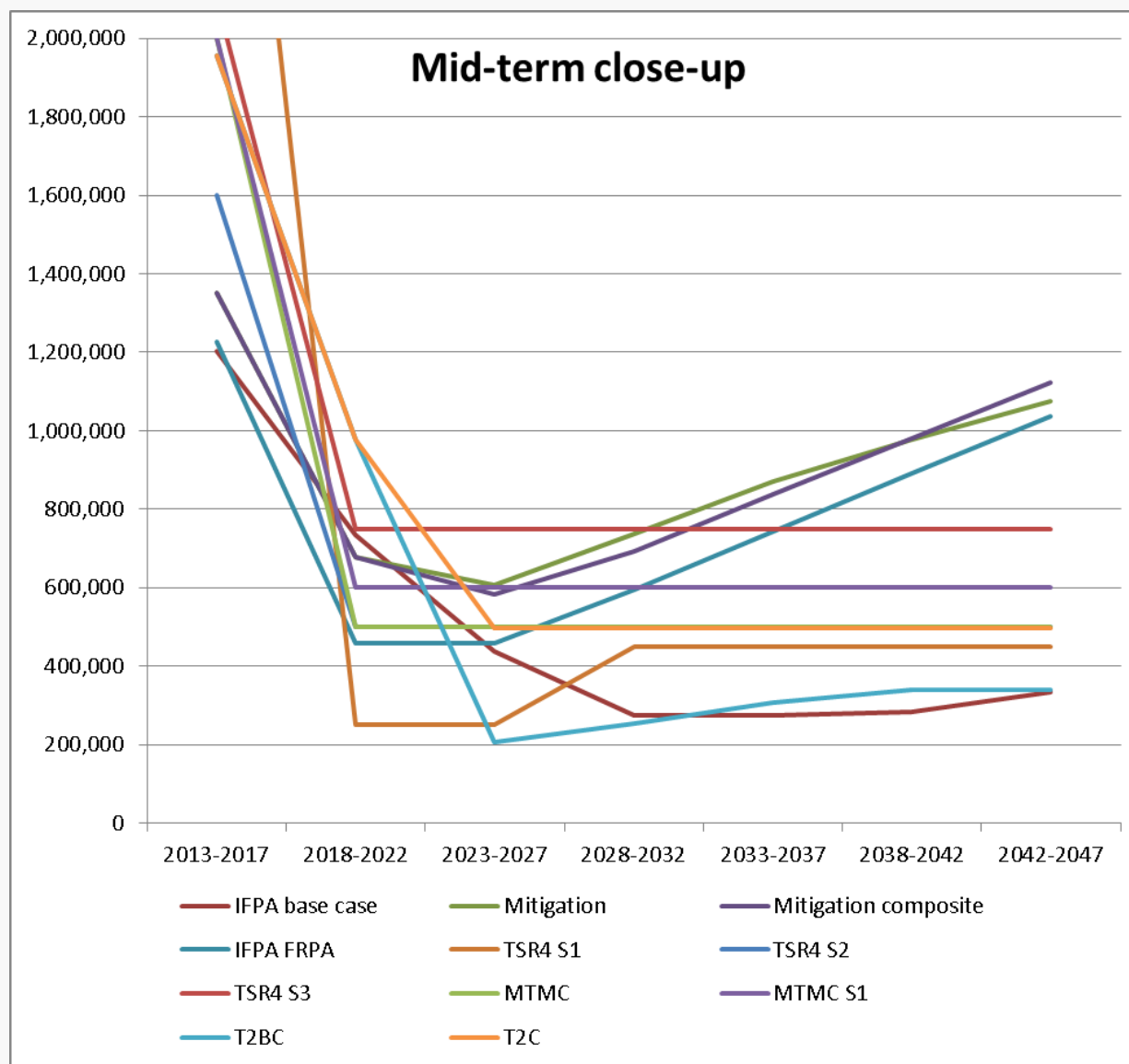
- **TSR4**
  - Focused on current practice and was used to assist in setting AAC
- **Morice & Lakes IFPA**
  - Based on TSR2 data, which was similar to expedited TSR3
  - Provided valuable insight into key timber supply levers such as operable landbase and policy assumptions, legislative requirements and silviculture strategies
- **Silviculture Type II Strategy**
  - Based on TSR4 data
  - Provided in-depth assessment of the impact of several silviculture strategies on timber supply
- **Mid-term Timber Supply Technical Report**
  - Provided valuable insight into timber supply levers such as operable landbase and policy assumptions, legislative requirements
  - A high-level overview of silviculture strategies was included

# Harvest Forecasts from previous analyses



# Harvest Forecasts from previous analyses

(m<sup>3</sup>)



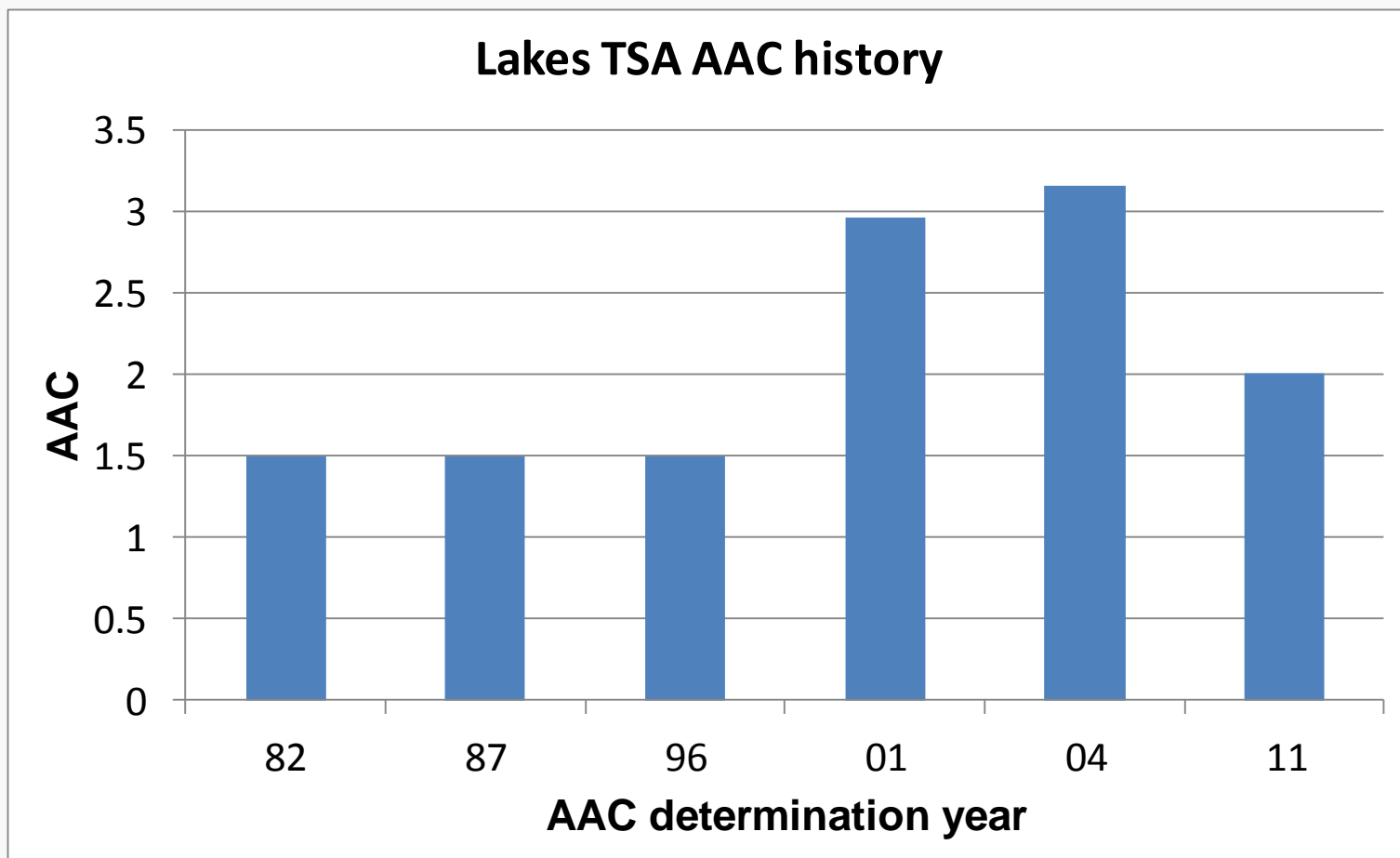
# Lakes TSA Overview



# AAC history

(million m<sup>3</sup>)

	'82	'87	'96	'01	'04	'11
AAC	1.5	1.5	1.5	2.96	3.16	2.0



# Land Base Classification

Table 1. Identification of the timber harvesting land base for the Lakes TSA

Classification	Productive forest area by classification (hectares)	Area (hectares)	Percent (%) of total TSA area	Percent (%) of Crown forest land
Total TSA area (excluding Tweedsmuir Park)		1 121 609	100	
Not managed by the B.C. Forest Service		157 020	14	
Non-forest		154 014	13.7	
<b>Total productive forest managed by the Forest Service<sup>a</sup> (Crown forest)</b>		<b>810 575</b>	<b>72.3</b>	<b>100</b>
<b>Reductions to Crown forest:</b>				
Existing roads, trails and landings		10 028	0.9	1.2
Riparian management areas		12 972	1.2	1.6
Protected areas	97 001	95 138	8.5	11.7
Wildlife areas	264	251	0	0
Old growth management areas	76 008	70 204	6.3	8.7
Sites with low productivity	32 537	26 885	2.4	3.3
Deciduous-leading stands	59 505	44 792	4	5.5
Balsam > 250 year old	3 993	1 640	0.1	0.2
Wildlife tree retention		24 759	2.2	3.1
<b>Total current reductions</b>		<b>286 668</b>	<b>25.6</b>	<b>35.4</b>
<b>Current timber harvesting land base</b>		<b>523 909</b>	<b>46.7</b>	<b>64.6</b>
<b>Future reductions</b>				
Future roads		11 342	1	1.4
<b>Long-term timber harvesting land base</b>		<b>512 567</b>	<b>45.7</b>	<b>63.2</b>

64% of Forested Area is THLB. Current THLB = 523,909 ha.

# Inventory site index

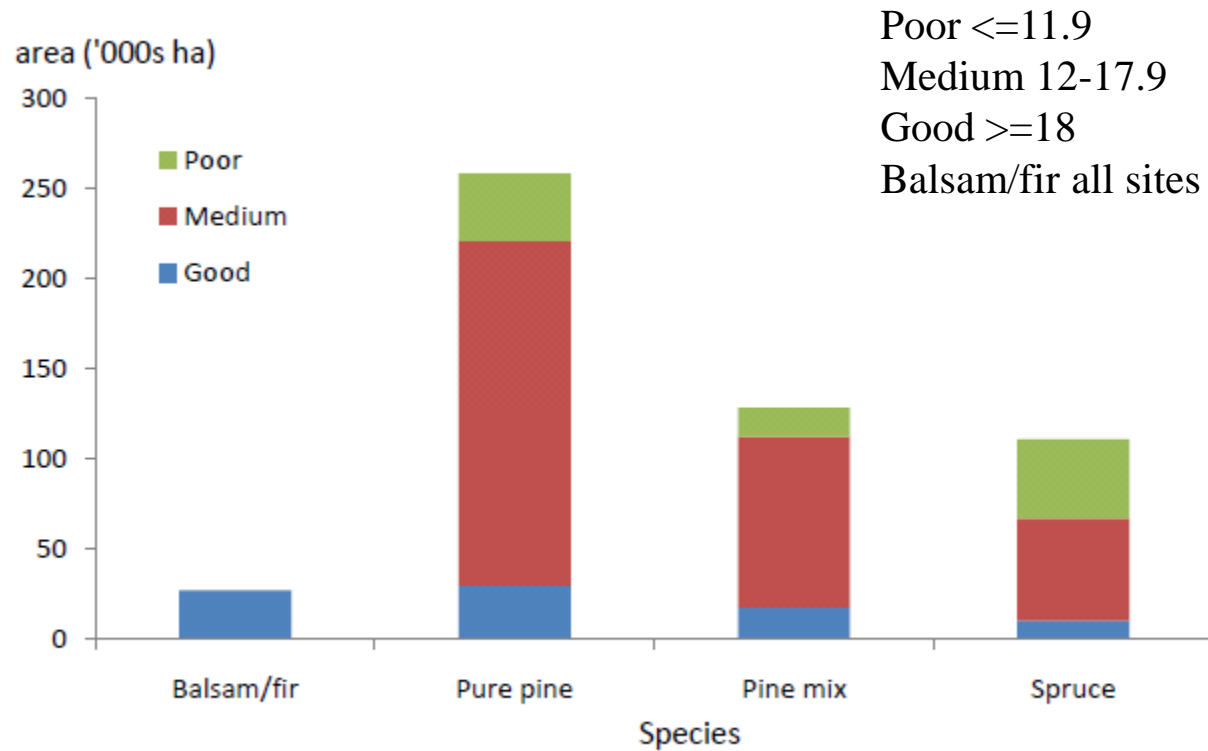


Figure 5. Distribution of site productivity for the timber harvesting land base.

# Age Class Profile

- Large area of the THLB is older than 80 yrs and large area less than 10. Of concern is the lack of THLB area between 40 and 60 years of age.

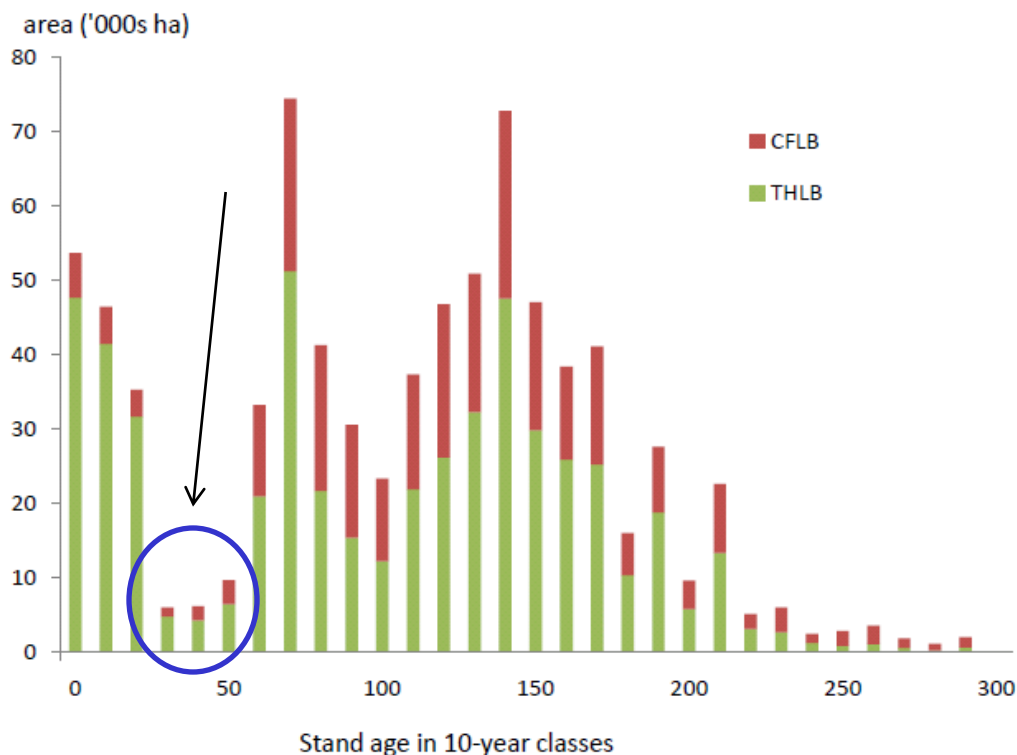


Figure 7. Age class distribution of the Crown forested land base and THLB.

# Existing regeneration and assumed plantation performance

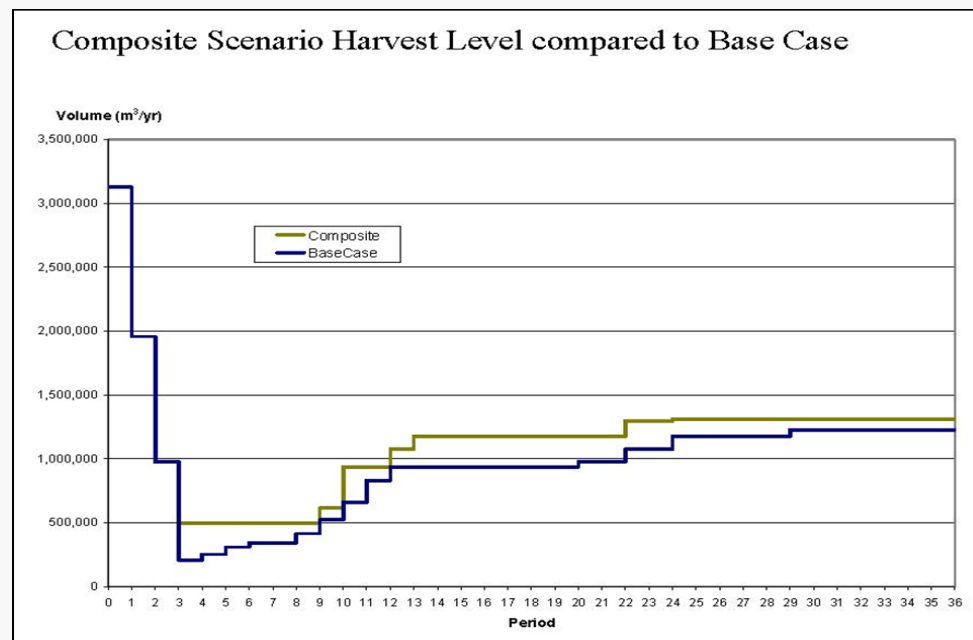
Table 17. Regeneration assumptions by analysis unit

Varied by species composition and existing/future status

Composition	Site index	Regen delay	OAFs		Method		Species code %	Density initial	
			1	2	Type	%			
Balsam leading		2 yrs	20	5	Plant	100	P6S4	80	1500
Balsam leading		2 yrs	15	5	Plant	100	S7P3	15	1500
Balsam leading		2 yrs	15	5	Plant	100	S4P4 B2	5	1500
Spruce leading		2 yrs	20	5	Plant	100	P6S4	80	1500
Spruce leading		2 yrs	15	5	Plant	100	S10	10	1500
Spruce leading		2 yrs	15	5	Plant	100	S7P3	10	1500
Pine leading		2 yrs	20	5	Plant	100	P6S4	95	1500
Pine leading		2 yrs	20	5	Plant	100	P10	5	1500

# Future regeneration and assumed plantation performance

- PI regeneration assumptions:
  - ?
- Sx, Ba regeneration assumptions:
  - ?
- Deciduous regeneration assumptions:
  - ?
- Key considerations include:
  - What is current practice?
  - What is the desired target at free-growing or later?
  - What levels of genetic gain do we use? An average gain of 17% was used, not sure of how this was modeled
  - Species mix?
  - Future/current pest incidence
- Type II provides direction
  - Genetic improvement
  - Species mix
  - Fertilization
  - Rehabilitation
  - Composite



# Future regeneration and assumed plantation performance(T2)

SPU Code	Seedling availability/Volume gain	
	2008	2018
PI BV low	54%/10%	100%/13%
Sx BV low	80%/16%	100%/23%
SX PG high/SX BVP high	100%/19%	100%/20%
SX PG low/SX BVP	87%/28%	100%/31%

- Plant greater proportions of Sx where feasible
  - SBSmc2, SBSdk
  - mesic/subhygric (01/06/07/08) sites
  - 60% Sx 40% PI
  - Included genetic gains from above chart
  - Genetically improved stock widely available
  - Mix stands = more resilience = reduced forest health issues

# 47 years of Silviculture History

Activity	Total
Planting	138,916
Brushing	22,486
Juvenile Spacing (basic & incremental)	17,612
Fertilization	4,961
Surveys	482,269
Pruning	513

- 1960 to 2007

# Species monitoring

Disturbance year		1995	2000	2003	2005	2011
HBS	%pl	65	76	75	80	74
HBS	%sw	27	20	22	18	20
HBS	%oth	8	4	3	2	6
Planted	%pl	78	67	55	55	No data
Planted	%sw	22	30	43	42	No data
Planted	%oth	0	3	2	3	No data
Regen $\geq 7$	%pl	75	65	62	No data	No data
Regen $\geq 7$	%sw	13	28	32	No data	No data
Regen $\geq 7$	%oth	12	6	6	No data	No data
% mixed at regen	Na	50	70	75	No data	No data
% mono at regen	Na	50	30	25	No data	No data
# species at regen	Na	5	5	4	5	No data



# Timber Supply

# Timber Supply Situation (TSR4)

- TSR4 scenario 1 is “reference forecast”
- Short-term harvest – 3.41 million m<sup>3</sup>/yr
- Mid-term – 250,000 m<sup>3</sup>/yr
- Long-term – 1.15 million m<sup>3</sup>/yr

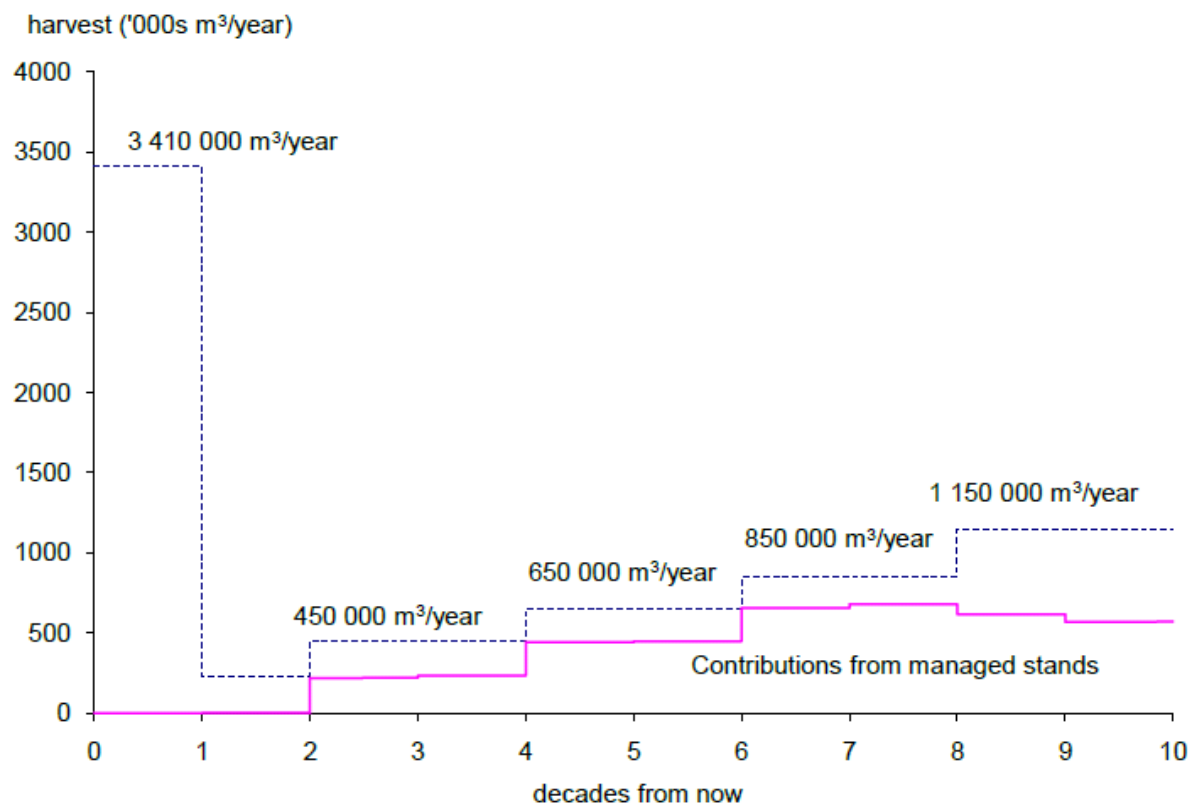


Figure 13. Scenario 1 harvest from managed stands.

# Timber Supply Situation (TSR4)

- Scenario 2 illustrates impact of reduced harvest, pine-leading only in short-term
- Fill in trough with non-pine species
- Short-term harvest – 1.6 million m<sup>3</sup>/yr
- Mid-term – 500,000 m<sup>3</sup>/yr
- Long-term – 1.15 million m<sup>3</sup>/yr

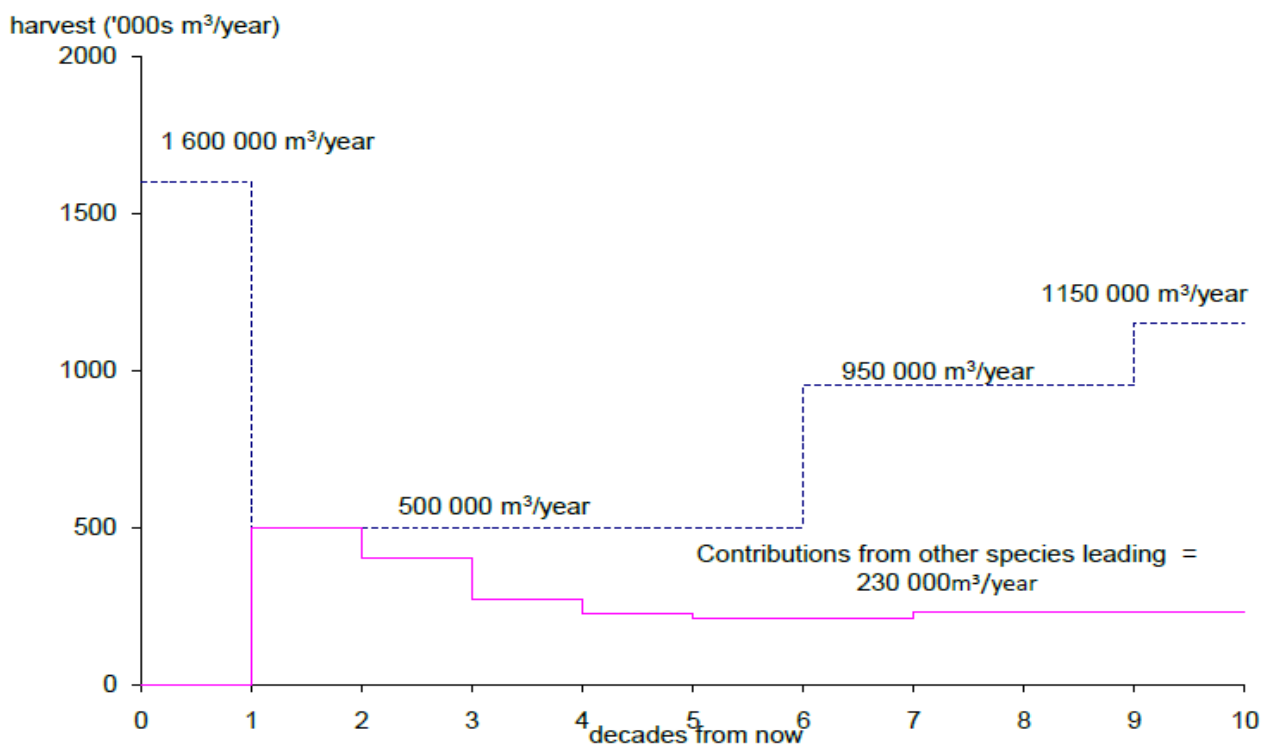


Figure 14. Scenario 2 — projected harvest if pine-leading stands continue to be salvaged at the past five average harvest level and non-pine leading stands are harvested at highest level in decades two.

# Timber Supply Situation (TSR4)

- Regenerated stands still a major factor in this scenario
- High level of harvest is supported by regenerated stands coming on stream

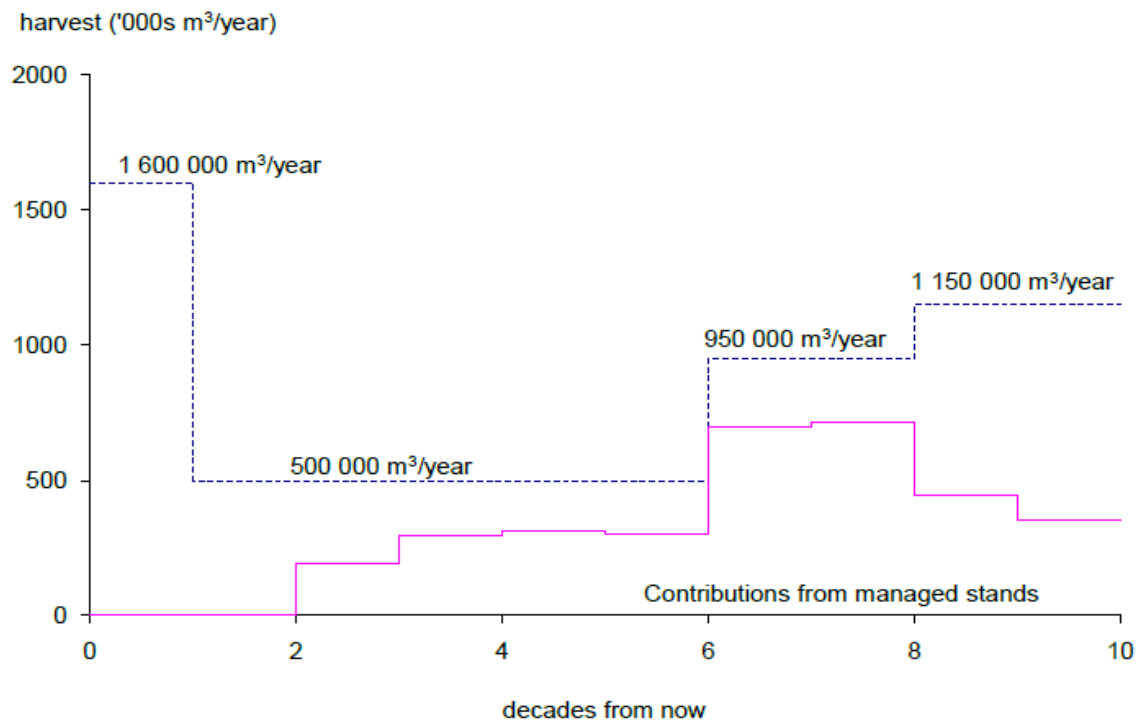


Figure 19. Scenario 2 harvest from managed stands.

# Timber Supply Situation (Mid-term report)

- Appears to be based on assumptions in TSR4 Scenario 2

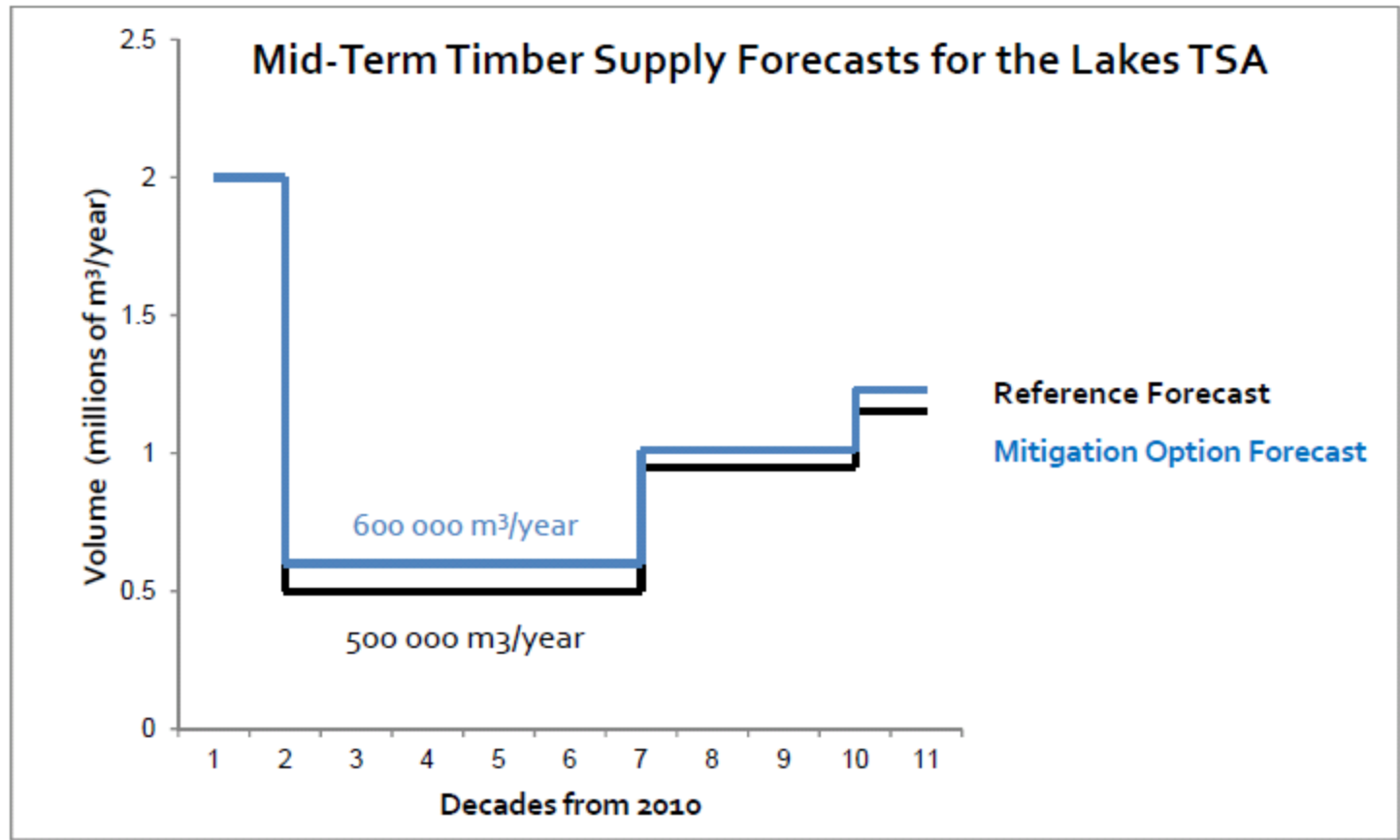


Figure 6 Timber Supply Forecast Based on Option 3 (in blue) Compared to the Reference Forecast (in Black)

# Harvest profile relative to AAC (Mid-term report)

- Surplus dead volume across TSA that can be used to extend time to drop
- Pine was an increasingly larger component of overall harvest

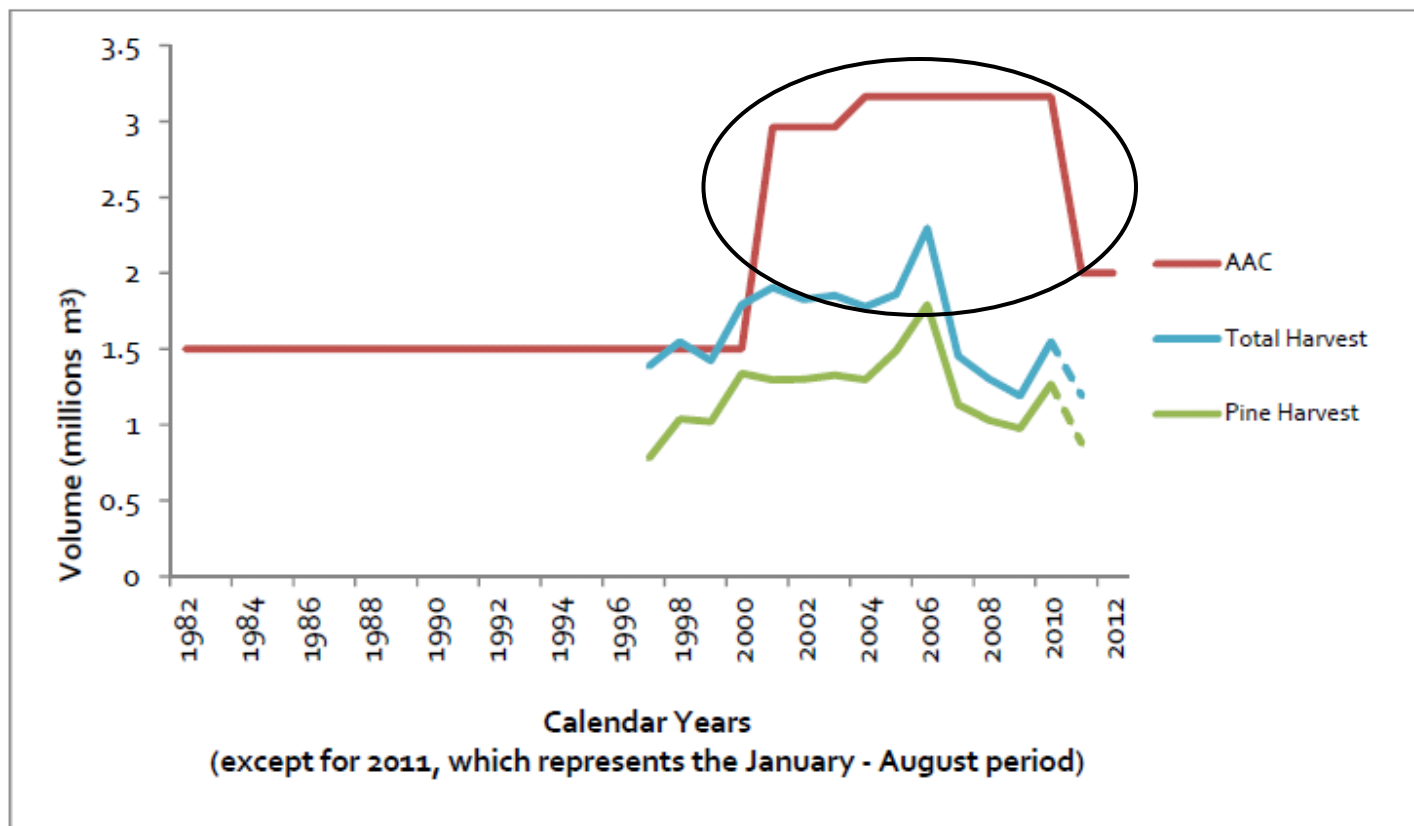


Figure 4. Lakes AAC and Volume Harvested over the Years

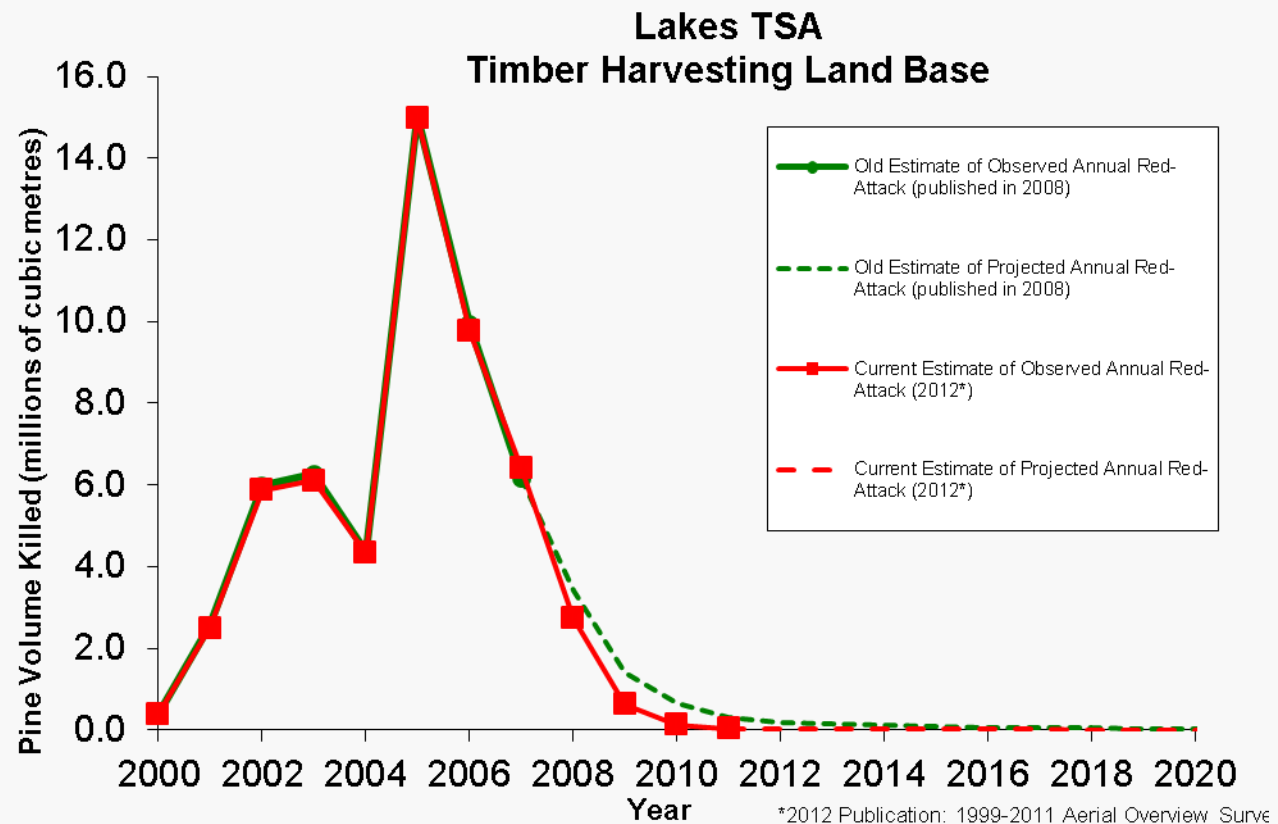
# Timber Supply Situation

- Key points:
  - Lower harvest levels help mid-term
  - Harvest priority helps mid-term
  - Non-pine harvest focus helps mid-term
  - Decade 2 appears to be a pinch point as regenerated stands come on stream
  - AAC has not been harvested = harvestable growing stock surplus
  - Focus on Pine % is high
- 
- What harvest priorities do we use as the base case for our work?



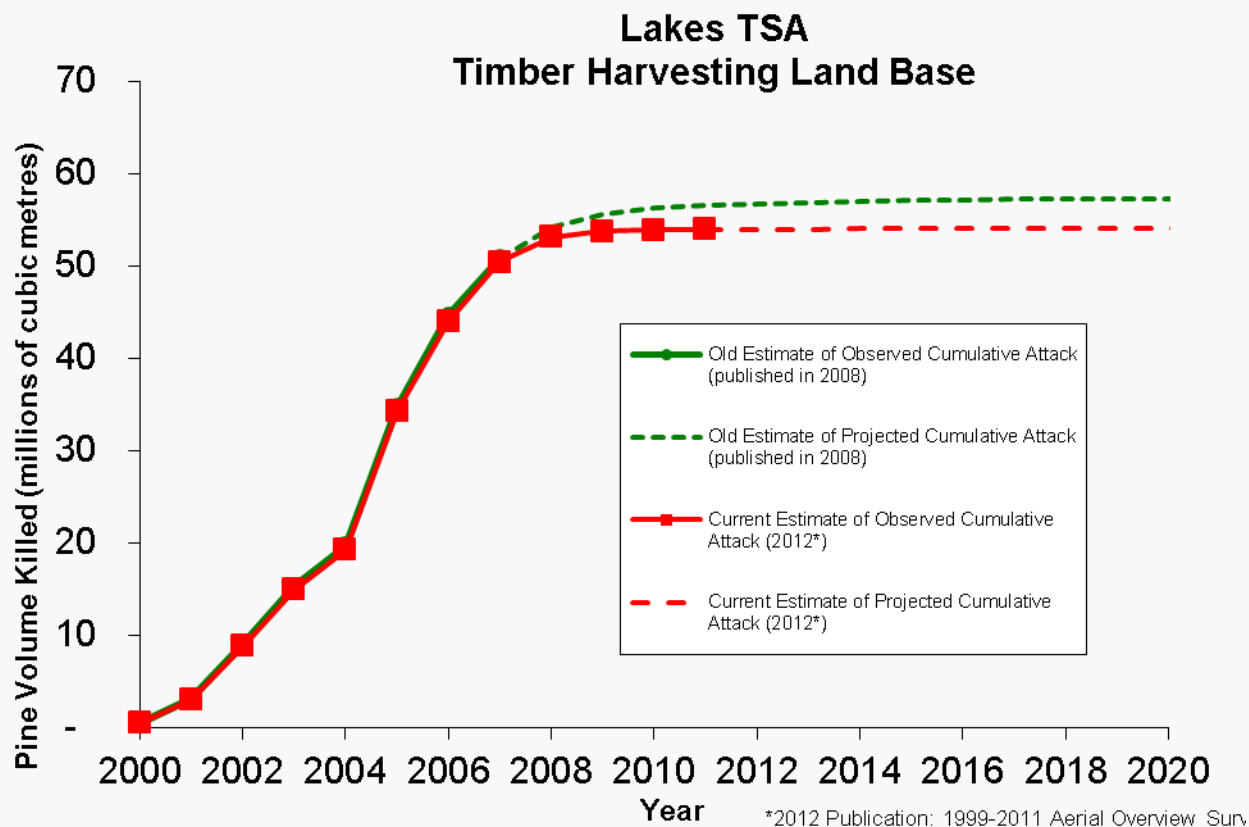
# Mountain Pine Beetle Implications

TSR4 used the MPB version 5 model, 2012 results shown for comparison




# Mountain Pine Beetle Implications

TSR4 used the MPB version 5 model, 2012 results shown for comparison



- TSR forecasted 3 million more dead than what latest overview flights indicate

# Timber Supply Questions

- 
- Mature Inventory
    - Reconciling Phase II, log grade changes and MPB mortality.
  - MPB impacts on young stands
    - Provincial reports
  - Secondary structure
    - What is it?
    - Where is it?
    - How much of it is there?
    - Can the data be used to infer natural regeneration success when no salvage occurs?
  - Minimum operability
    - Currently 140m<sup>3</sup>/ha
    - Several analyses looked at 100m<sup>3</sup>/ha
    - Mature stands versus second growth
  - Others??

# Mature Inventory

- The current inventory defines the initial growing stock.
- This volume must be metered out until managed stands come online. Changes to this volume can have significant impacts on short-midterm harvest levels.
- 2008 NVAF Inventory audit of VDYP7 volume indicated an underestimate of 10% overall, +/- 9.1%
- Not accounting for the inclusion of logs that were previously Grade 3 endemic and Grade 5 underestimates short-term timber supply by 7% (CF determination)
- FAIB currently in the field measuring phase II plots again, and these should be compiled before end of fiscal 12/13

# MPB in stands < 60 yrs

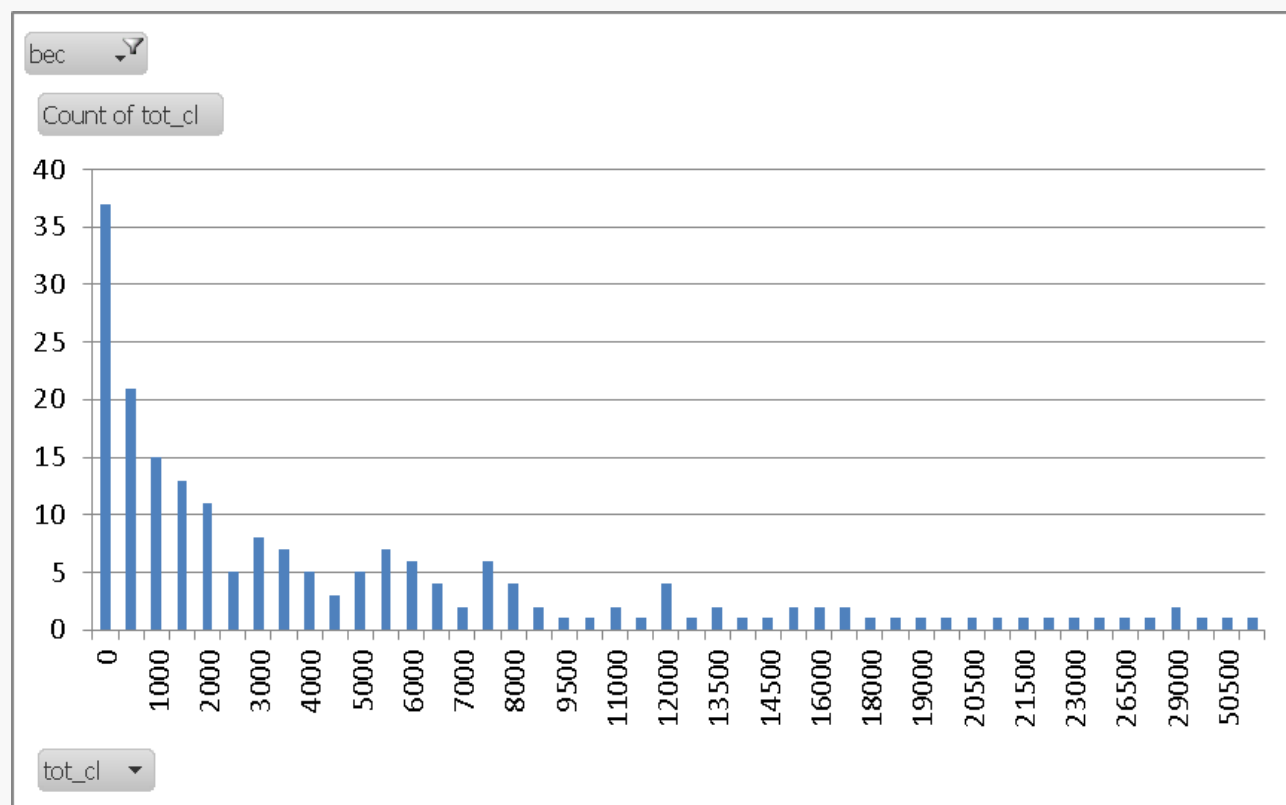
- TSR4 didn't include any mortality estimates for regenerated Pine

Age	% of stands sampled with MPB	Avg % MPB attack
20 - 25	12	3
25 - 30	33	6
31 - 40	40	19
41 - 50	33	30
51 - 60	97	34

- In 2005, 290 field plots in 29 polygons showed green attack 10%, red attack of 0.7%
- In 2007 37 stands were surveyed, 30% had MPB, and of those that were attacked attack levels were 3.3% green 4% red

# Secondary structure

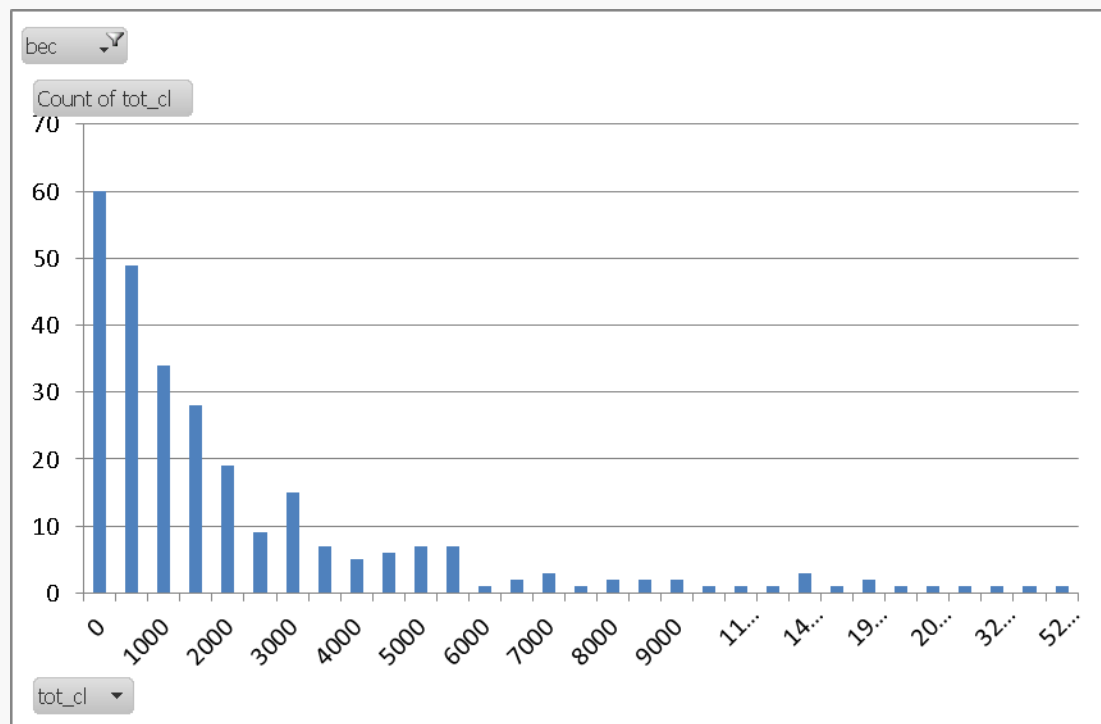
- SBSmk2
- 20% less than 500 sph, therefore no natural regen?





# Secondary structure

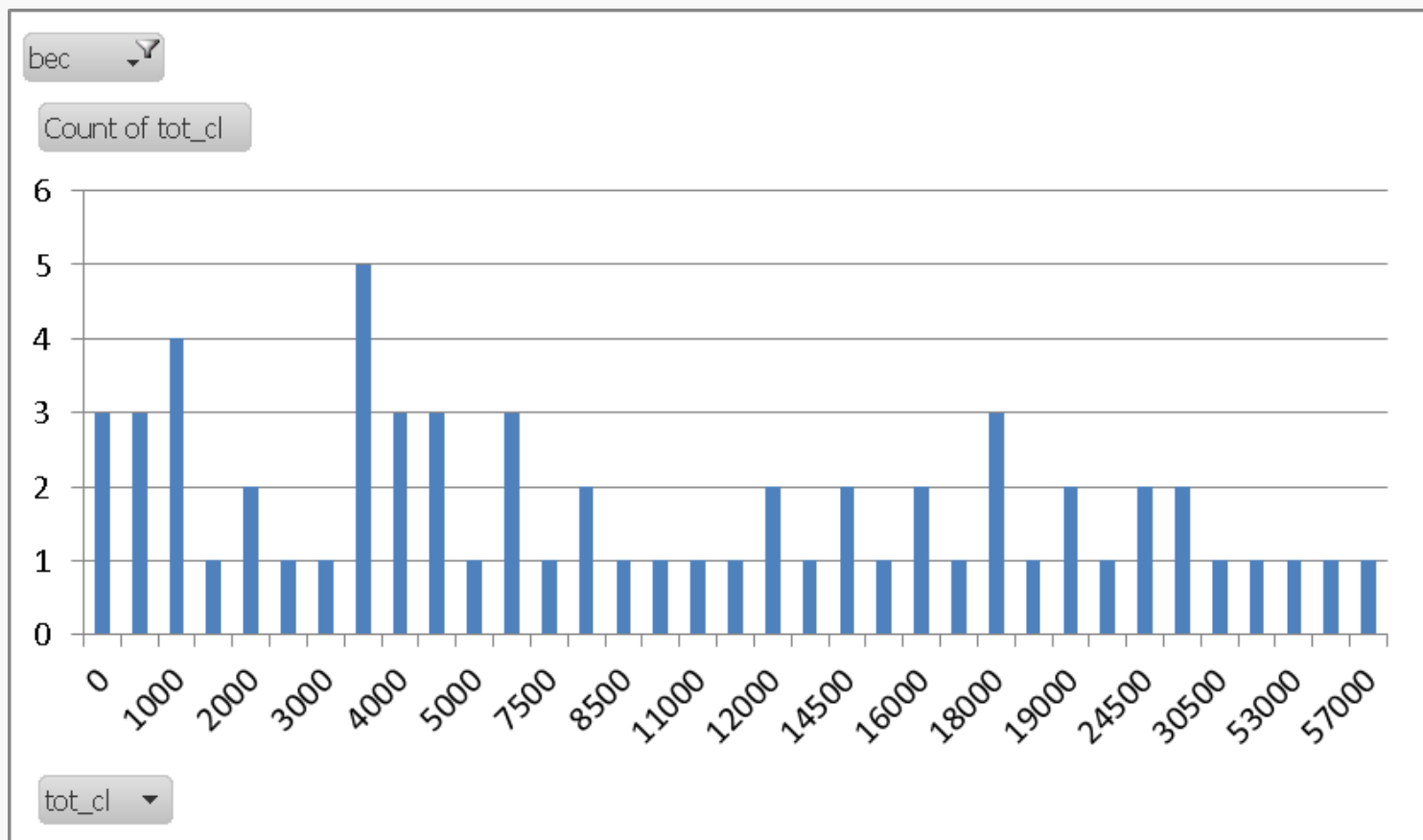
- SBSdk
- 22% less than 500 sph, therefore no natural regen?






# Secondary structure

- ESSFmc



# Minimum operability

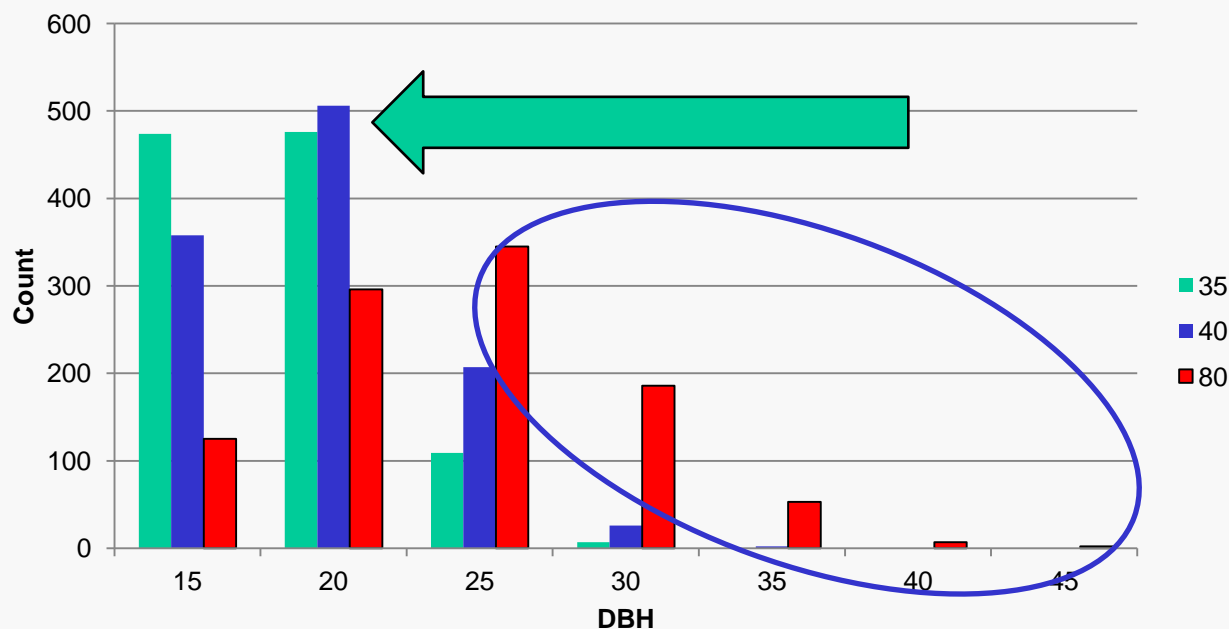
- 
- A vertical photograph on the left side of the slide showing a dense forest of evergreen trees. In the foreground, there is a small, calm body of water reflecting the surrounding greenery. The background shows rolling hills under a clear sky.
- How is operability determined today?
    - Years dead? Distance from mill? Pulp component?
    - Actual vs nominal sawlog volume per hectare?
  - How will operability be determined tomorrow?
    - Years dead? Distance from mill? Pulp component?
    - Actual vs nominal sawlog volume per hectare
    - Fibre-based opportunities?
  - How are our young stands actually growing, compared to what we predict?
    - More volume/less?
    - Species composition, size, quality?
    - Products?

# Regenerated Stand Merchantability

## Volume

	Age	mai	vol 12.5+	top ht	trees/ha	dbh
cmai	80	4.35	348	24	1,019	24.5
Minimum op 1	45	4.01	160.2	16	1,174	19.5
% of 80		92%	46%	67%	115%	80%
Minimum op 2	35	3.33	116.5	14.4	1,179	18
% of 80		77%	33%	60%	116%	73%

sph

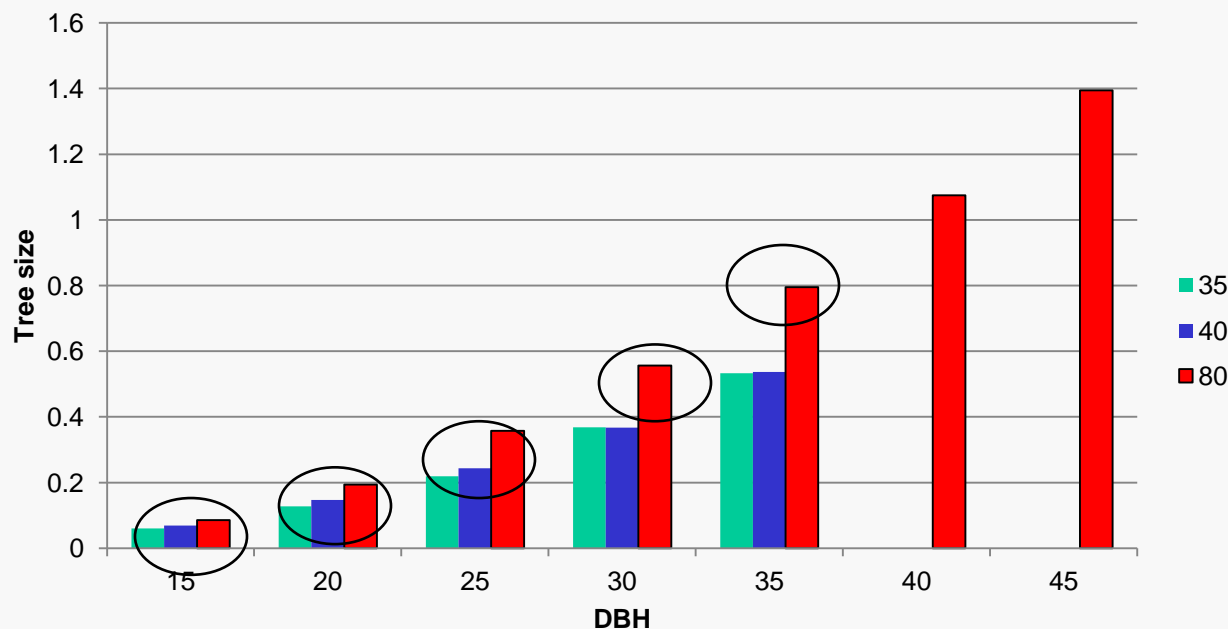


# Regenerated Stand Merchantability

## Quality

	Age	vol/tree 12.5+	mai	vol 12.5+	top ht	trees/ha	dbh
cmai	80	0.343	4.35	348	24	1,019	24.5
Minimum op 1	45	0.146	4.01	160.2	16	1,174	19.5
% of 80		43%	92%	46%	67%	115%	80%
Minimum op 2	35	0.109	3.33	116.5	14.4	1,179	18
% of 80		32%	77%	33%	60%	116%	73%

### 12.5+ tree size

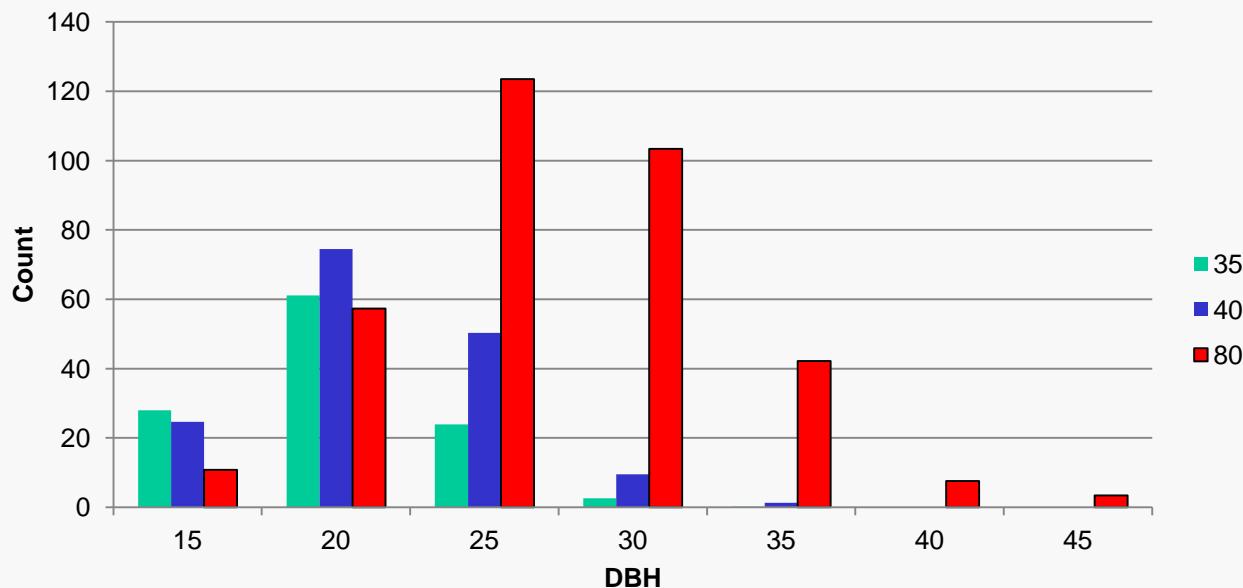


# Regenerated Stand Merchantability

## Quality

	Age	LRF	fbm/ha	chips	vol/tree 12.5+	mai	vol 12.5+	top ht	trees/ha	dbh
cmai	80	230	80,234	62	0.343	4.35	348	24	1,019	24.5
Minimum op 1	45	190	30,349	32	0.146	4.01	160.2	16	1,174	19.5
% of 80		83%	38%	52%	43%	92%	46%	67%	115%	80%
Minimum op 2	35	181	21,040	24	0.109	3.33	116.5	14.4	1,179	18
% of 80		79%	26%	39%	32%	77%	33%	60%	116%	73%

### 12.5+ vol



# Regenerated Stand Merchantability

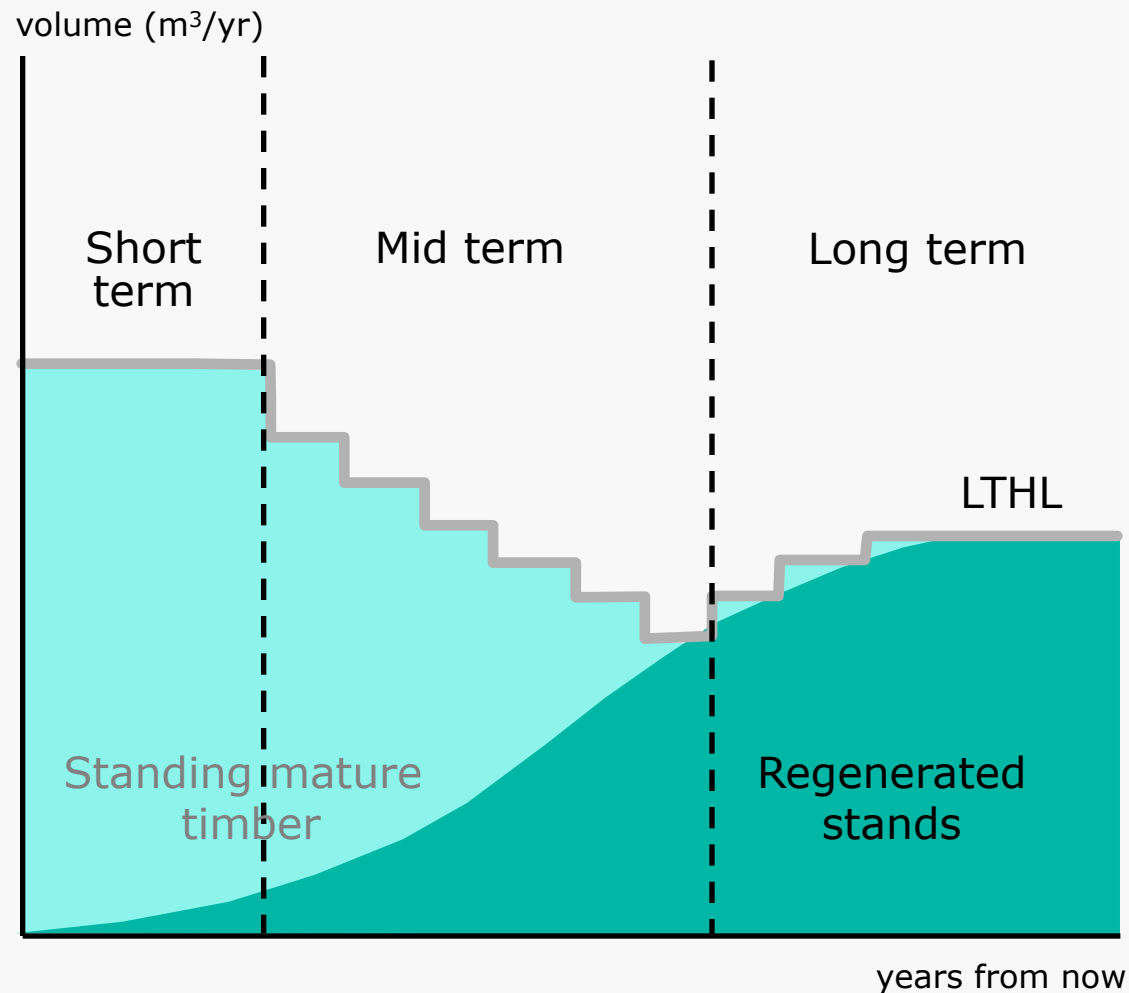
## Implications

		LRF	fbm/ha	vol 12.5+	\$/m3	\$/Mfbm	% selling price \$298/Mfbm
cmai	80	230	80,234	348	2.30	9.98	3%
Minimum op 1	45	190	30,349	160.2	5.01	26.39	9%
% of 80		83%	38%	46%	218%	46%	
Minimum op 2	35	181	21,040	116.5	6.91	38.07	13%
% of 80		79%	26%	33%	300%	33%	

- 2012 IAM MSxk silviculture costs \$801/ha
- March 30, Random Length composite \$298/Mfbm
- Factors not incorporated:
  - Changes in grade distribution due to increased wane (higher tapered logs)
  - Changes in grade distribution due to larger knots (low density stands)

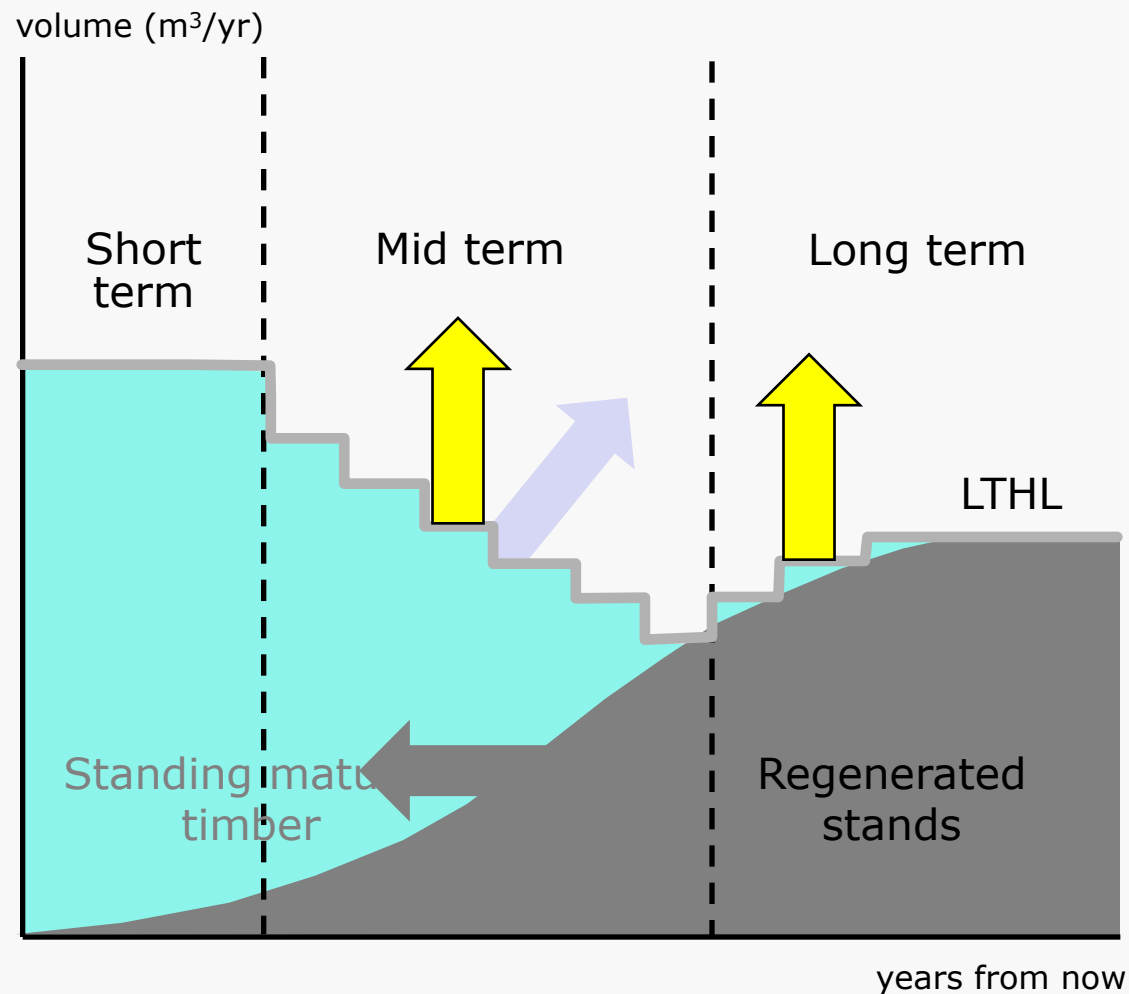
# Impact of minimum operability

- So what does this mean?



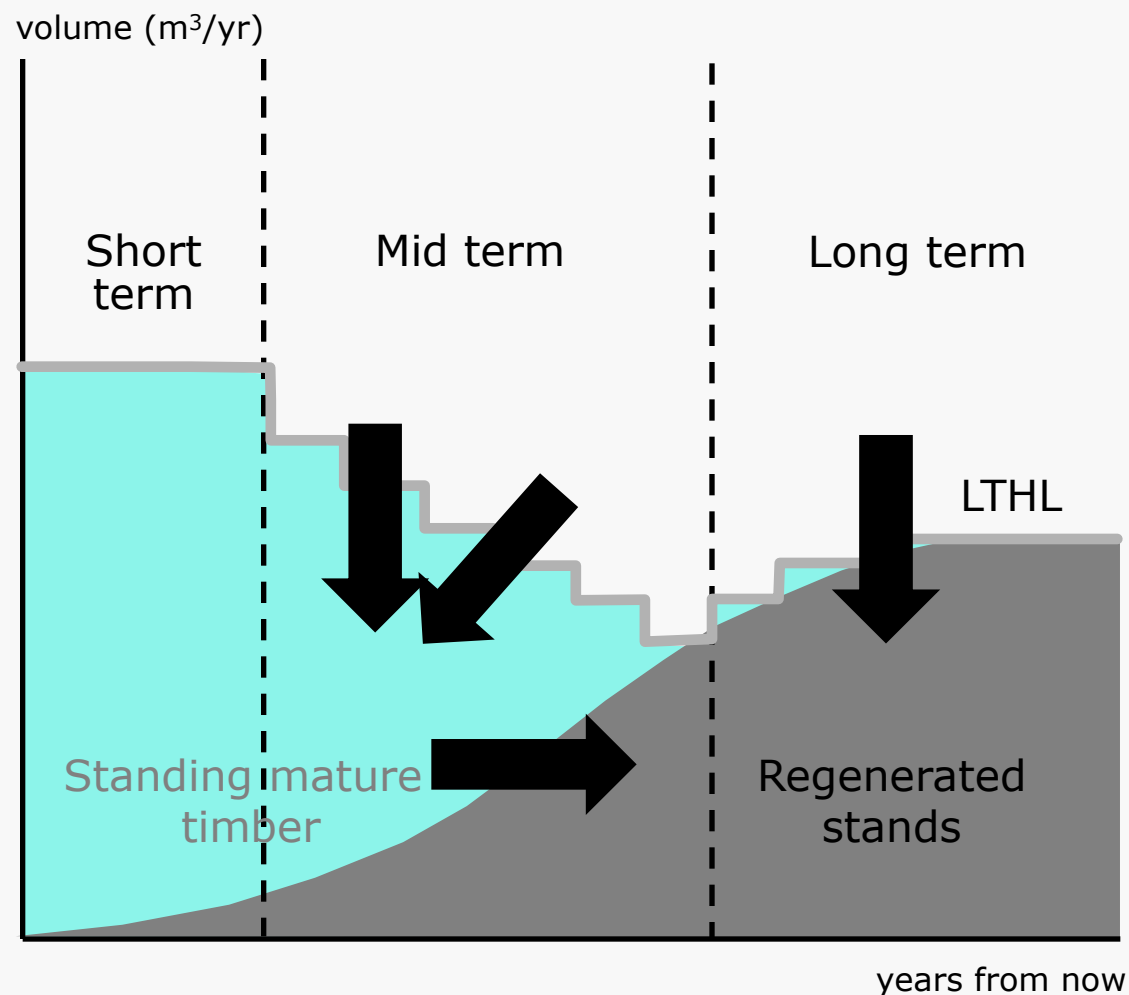
# Impact of minimum operability

- Earlier operability



# Impact of minimum operability

- Later operability



# Timber Quality Situation

- Provincial target of 10% of AAC consists of premium logs.
- Current projection is for quality (piece size) to decline because of shorter rotation ages.
- Long rotation management plus incremental silviculture can have an upwards effect on trend.

Table 46. Definition of Premium, Standard and Merchantable Sawlogs

Quality Class	Products	Species	Min Stand DBH
Premium Sawlog	Peelers, poles, house-logs and high grade sawlogs	All except deciduous	>32.5
Standard Sawlog	Sawlogs		27.5-32.5
Merchantable			>12.5, 15 or 17.5 (depending on initial DBH utilization spec.)

# Habitat Quality / Non-Timber

- Information over and above what is in legislation/policy?
- Climate change will alter ecosystems, species selection?
- Interaction with fire management?



# Working Targets

- **Timber Supply**

- Short term (0-20)
  - Minimize non recoverable losses where practical
- Mid Term (20-100 yrs)
  - Minimize the depth and duration of trough
- Long term (100yrs+)
  - ???????????

- **Timber Quality**

- Maintain diversity of stand types and ages across the land base – range of products (house logs/peelers, MSR)

- **Habitat / Non Timber**

- Minimize negative impacts on ecosystems and species
- Manage consistently with LRMP guidelines/policy



# Major Silviculture Strategies – Timber Supply

- Fertilization
- Genetic improvement
- Species mix
- Rehabilitation
- Secondary structure and management
- Harvest priorities
- Economic constraints? Haul distances?
- What are the current strategies?



# Major Silviculture Strategies – Timber Quality

- ?



# Major Silviculture Strategies – Habitat Quality/non-timber

- Habitat Supply beyond regulations/legal/policy
  - ?
- Climate change
  - ?
- Fire management
  - ?

