

*Morice and Lakes Timber Supply Area
Innovative Forest Practices Agreement*

Lakes TSA Type 2 Silviculture Investment
Strategy Update

Analysis and presentation by
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June 6th, 2008



Type II Silviculture Investment Strategy

Produce analysis report for decision support

Plan to spend public silviculture funds to improve the Timber and Habitat Supply of this Management Unit

Uses consistent format and content so that the information can be consolidated to regional and provincial levels and compared between units



Presentation Overview:

Part 1 – Comparing of Type 2 Base Case with Type 2 Revised Base Case

Part 2 – Incremental Silviculture Sensitivities

- Fertilization
- Genetic Worth
- Rehabilitation



Lakes Type 2 Base Case Scenario
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Full SRMP Scenario

- Includes management requirements and mitigation measures from FRPA Scenario
- It also includes new government objectives



Policy based modelling assumptions

- Harvest excluded from North and South OGMA's
- Lakes North and South Wildlife Connectivity Networks / Corridors
- No green-up adjacency requirements
- Patch size distribution targets
- WTR in the Lakes North was maintained at 10%
- WTR levels in the South were maintained between 9 and 16%

BEC Subzone	% of cutblock to be retained as WTP					
	Chelaslie	Ootsa	Intata	Cheslatta	Francois Lake West	Francois Lake East
SBSdk	>12	>12	>16	>12	>13	>13
SBSmc2	>12	>12	>16	>12	>13	>14
ESSFmc, ESSFmcp	>9	>9	>9	>9	>12	>9

Table 8 from Lakes South SRMP

Mitigation driven modelling assumptions

- Best of the worst first harvest priorities
- Volume matching to recovery curves for MPB depleted stands
- Plan to perspective VQO adjustments
- Forest productivity curves for future plantations
 - Higher spruce component
 - Lower pine component
 - No area reductions for future landings



Other Modelling Assumptions

- Partial cuts in Lakes North connectivity corridors
 - Non-pine coniferous leading stands within a sub-set of the VEGBIO corridors.
 - 16,000 hectares
 - 30% removal
 - Return interval SBS 100 years.
 - Return interval ESSF 120 years.



Lakes Type 2 Revised Base Case

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Basic Silviculture Scenario

Important Differences

- A detailed ordered net-down analysis was conducted
- Comprehensive harvest depletion updates
- Wildlife tree reserves within harvest blocks
- The assumptions for plantations were set back to basics.
- Non-recoverable losses due to MPB mortality were updated
- Partial cutting assumptions on 16,000 ha were dropped

The THLB used for analysis has decreased incrementally over the years.


We are now using a THLB that is 137,650 hectares or 23% lower than that used in TSR2.

From the Type 2 Base Case to the Revised Base Case, the THLB declined by 32,300 hectares or 7.1%.

Analysis	THLB (hectares)
TSR 2	589,988
IFPA Base Case	571,925
IFPA FRPA Implementation	514,214
Type 2 Base Case / IFPA Full SRMP	484,300
Type 2 Revised Base Case / Basic Silviculture	452,339

Lakes TSA Type 2 SIS Revised Base Case Classification	Gross	Net
Lakes TSA	1,121,620.0	1,121,619.9
Reductions to Total Land Base		
Unclassified Lands	262.3	262.3
Natural Non-Treed Non-Productive	164,140.0	164,187.4
Total Productive Land Base		957,170.2
Reductions to Total Productive Landbase:		
Deforested Lands for Agriculture and Settlement	29,450.1	29,407.8
Deforested Lands for Timber Harvesting and Forest Management	12,107.2	10,643.9
Natural Treed Non-Productive	10,843.1	10,815.9
Net Productive Land Base:		906,302.5
Lands to which Volume Based Tenure Agreements cannot be Granted	313,713.8	267,509.2
Forested Area where Land Based Tenure Agreements Apply:		638,793.3
Reductions to Volume Based Tenure Agreement Lands:		
Non-Commercial Cover	4,079.6	2,106.5
Non Merchantable Forest Types	71,184.5	30,765.9
Low Productivity Sites	4,421.3	4,301.4
Environmentally Sensitive Areas	36,426.2	21,342.5
Inoperable	2,802.4	33.8
Recreation Areas	4,839.1	1,742.3
Riparian Management Areas	46,990.0	26,947.0
Areas Unavailable due to Economic Constraints	0.0	0.0
Old Growth Management Areas	89,288.0	55,443.0
Wildlife Tree Retention	117,016.4	42,564.2
Mountain Goat Habitat Access Management	6,601.7	1,207.3
Current Timber Harvesting Land Base:		452,339.2
Future Reductions:		
Conversion to Agriculture	2,010.1	1,039.5
Deforested Lands for Timber Harvesting and Forest Management	16,379.7	7,919.4

Revised Base Case Assumptions Harvest Updates

- Period one (2003–2007) harvest was based only on known harvest.
 - Harvest which occurred prior required setting those young stands on TIPSY curves at the appropriate age.
 - Harvest that occurs after 2007 is model driven.
 - In block reserves were explicitly accommodated.
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Revised Base Case Basic Silviculture Assumptions

- basic silviculture
- PEM/SIBEC
- 1600 stems per hectare
- No genetic improvements / fertilization



Updated MPB mortality projections

- The Full SRMP Scenario / Type 2 Base Case
 - 2003 BCMPB projections.
 - Stands as young as 60 years experienced mortality.

The Type 2 Revised Base Case / Basic Silviculture

- 2003 BCMPB projections.
- Stands as young as 60 years experienced mortality.



Type 2 Revised Base Case Harvest Results

Period 1 (2003 – 2007) Harvest level of only 1.63 million m³/yr

Periods 2 and 3 are similar

Period 4 (2018–2022) Harvest Level lower

The short term harvest level was on average 416,400 m³/yr or 27% lower in the Revised Base Case.



Type 2 Revised Base Case Harvest Results

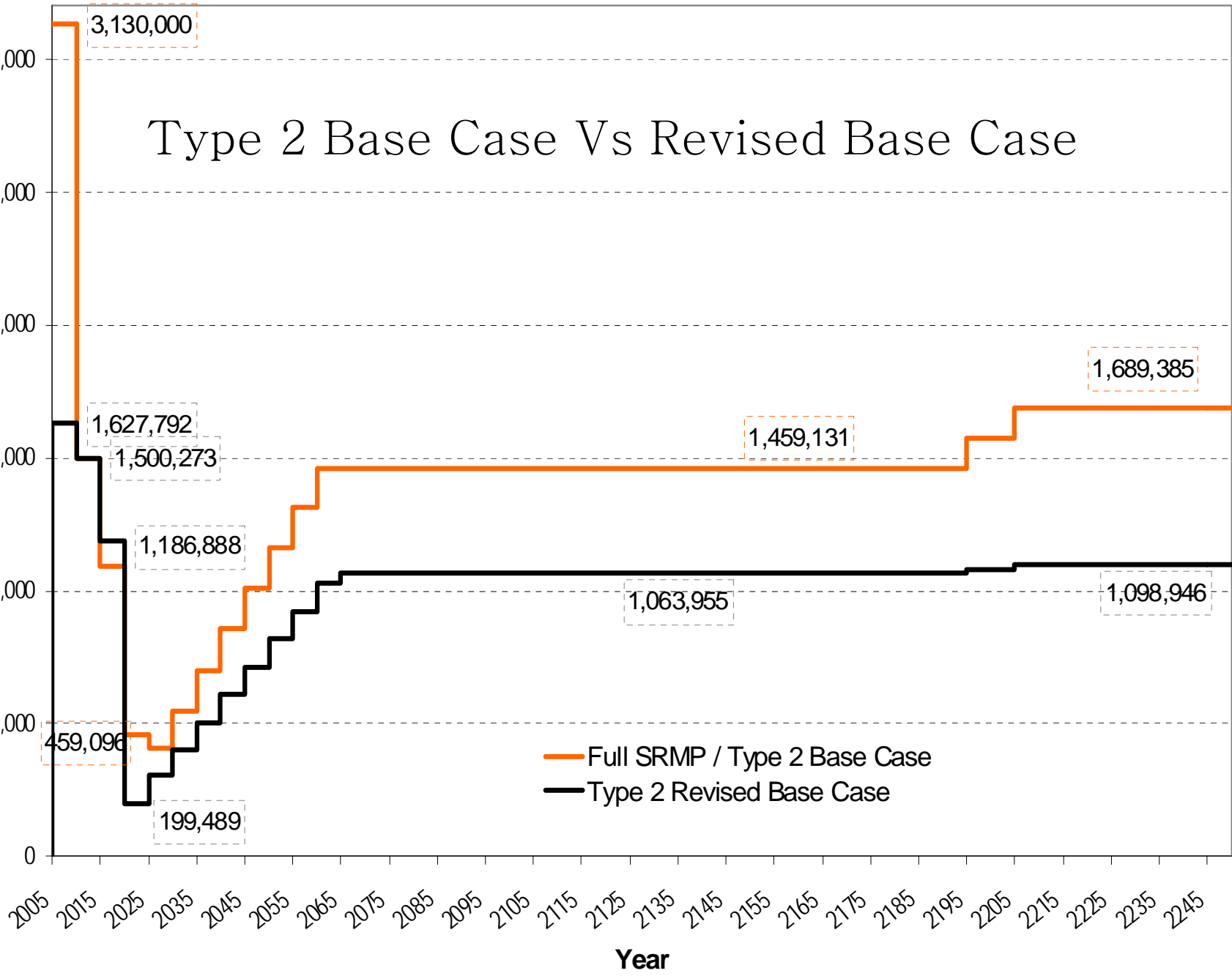
- The minimum harvest level occurred 5 years earlier
207,500 m³/yr or 20% lower
- The average mid-term harvest level
332,000 m³/yr or 28% lower.
- Average LTHL 467,000 m³/yr or 30% lower in the Revised Base Case.



Type 2 Base Case Vs Revised Base Case

Annual Harvest (m³)

— Full SRMP / Type 2 Base Case
— Type 2 Revised Base Case



Factors Affecting Short Term Harvest Levels

Period 1 harvest levels are far below the 3.13 million m³/yr expected during the uplift.

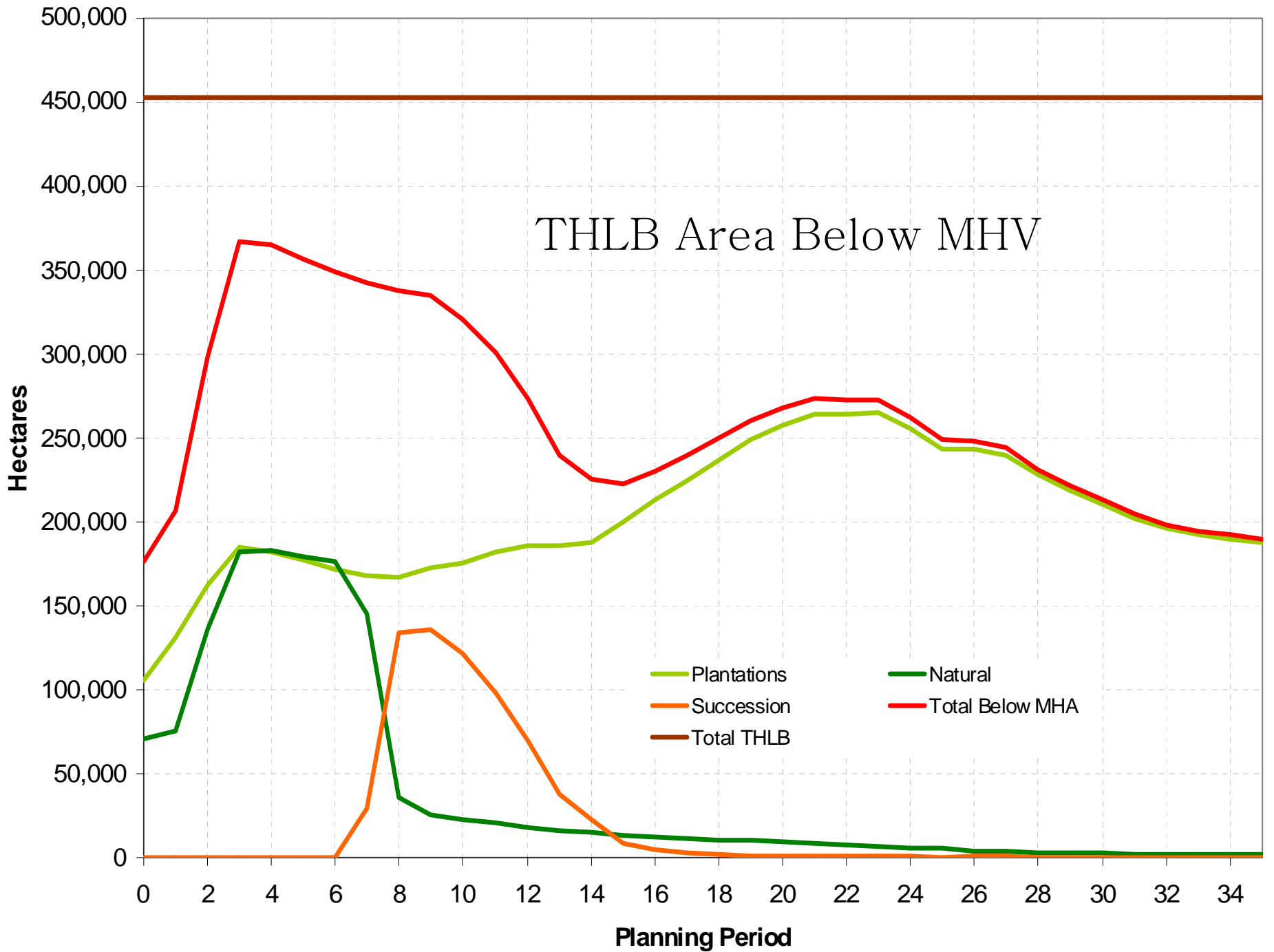
Rather than enforcing the uplift level known harvest was used.

Only 1.6 million m³/yr was achieved 2003 to 2007

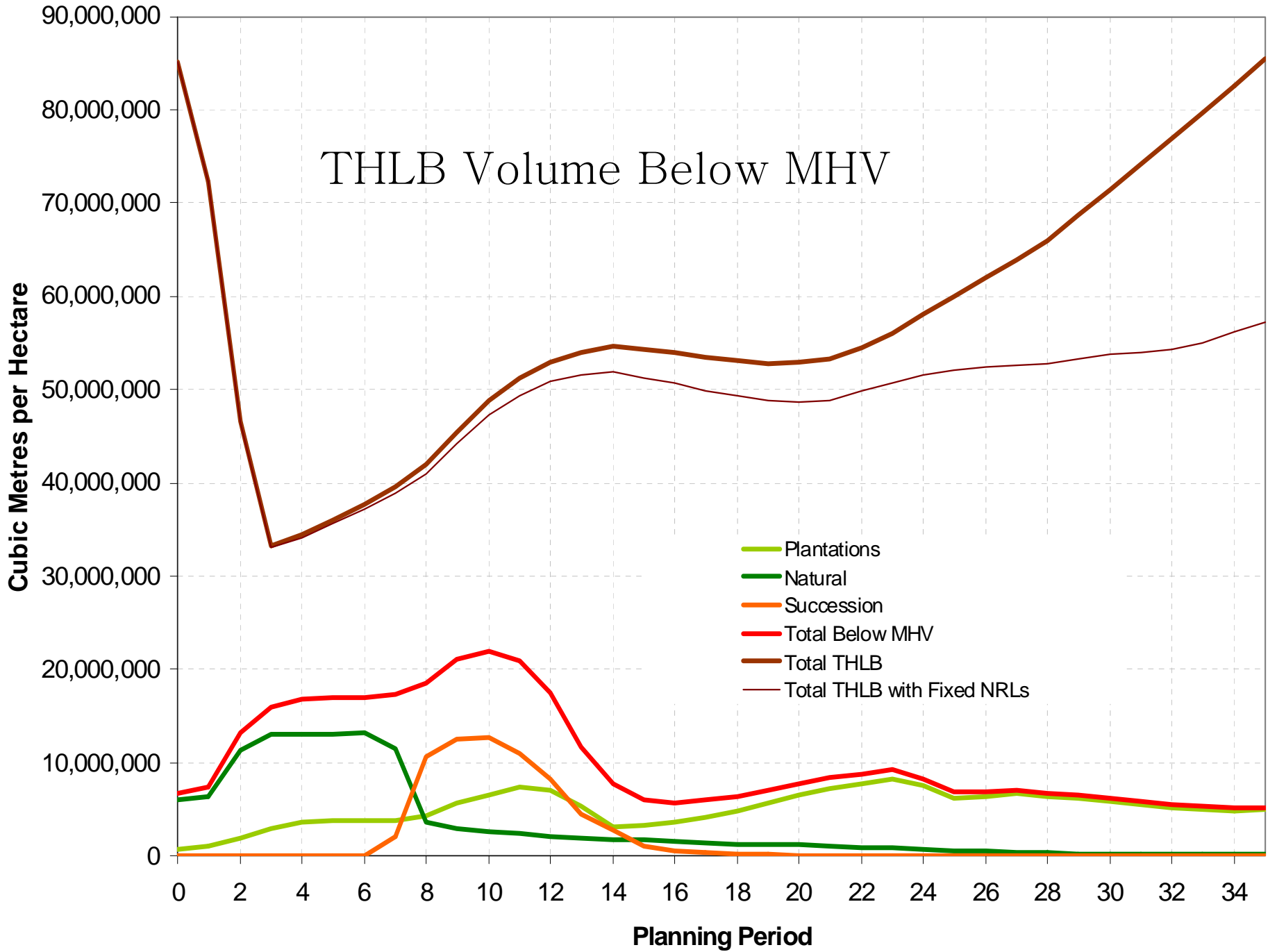
Harvest Billing Summaries were compiled for comparison

The range was from 1.7 million m³/yr to 1.9 million m³/yr

The THLB declined by approximately 7.1% so, adjust the HBS range downward by 7.1%; from 1.5 million m³/yr to 1.7 million m³/yr



THLB Volume Below MHV



Revised Base Case Results

Factors Affecting LTHL

- Removing the forest productivity assumptions from the managed stand yield tables – significant
- Genetic worth volume improvement
 between 16% and 30% for most plantations.
 (Removed to meet with basic silviculture assumptions)



Revised Base Case Results

Factors Affecting LTHL

- 7.1% decrease in THLB accounts for roughly 7.1% of the difference in mid and long-term harvest levels.
- The AAC uplift was intended to expedite the harvest of dead and dying pine stands.
 - The incomplete utilization of the uplift will have some influence on the mid and long term harvest levels.
 - Fewer dead pine stands were converted to managed stands

Revised Base Case Results

Factors Affecting LTHL

LTHL Comparison with the IFPA Base Case.

THLB is 21% lower in the Type 2 Revised Base Case, but LTHL of the Type 2 Revised Base Case is only 18% lower.

[Average mid-term harvest level in the Type 2 Revised Base Case is 23% higher than the IFPA Base Case.]



Incremental Silviculture Sensitivities

Fertilization Sensitivity



Fertilization Sensitivity 6,200 hectares were selected

Selection Criteria


Include:

Douglas fir leading with site index between 5 and 24, or spruce leading with site index between 15 and 24.

Avoid:

Cut blocks and areas harvested by the model in the Type 2 Base Case Scenario between 2008 and 2017

Area Specific Constraints: VQOs, Wildlife Corridors, etc.



Fertilization Sensitivity 6,200 hectares selected

Treat maximum 600 hectares per year (3,000 ha / period)

Two Priority Groups

Priority 1 Single Fertilization: 5,500 hectares

40 to 80 years old

Deferred until 15 years after treatment

Priority 2 Multiple Fertilization: 700 hectares

15 to 40 years old

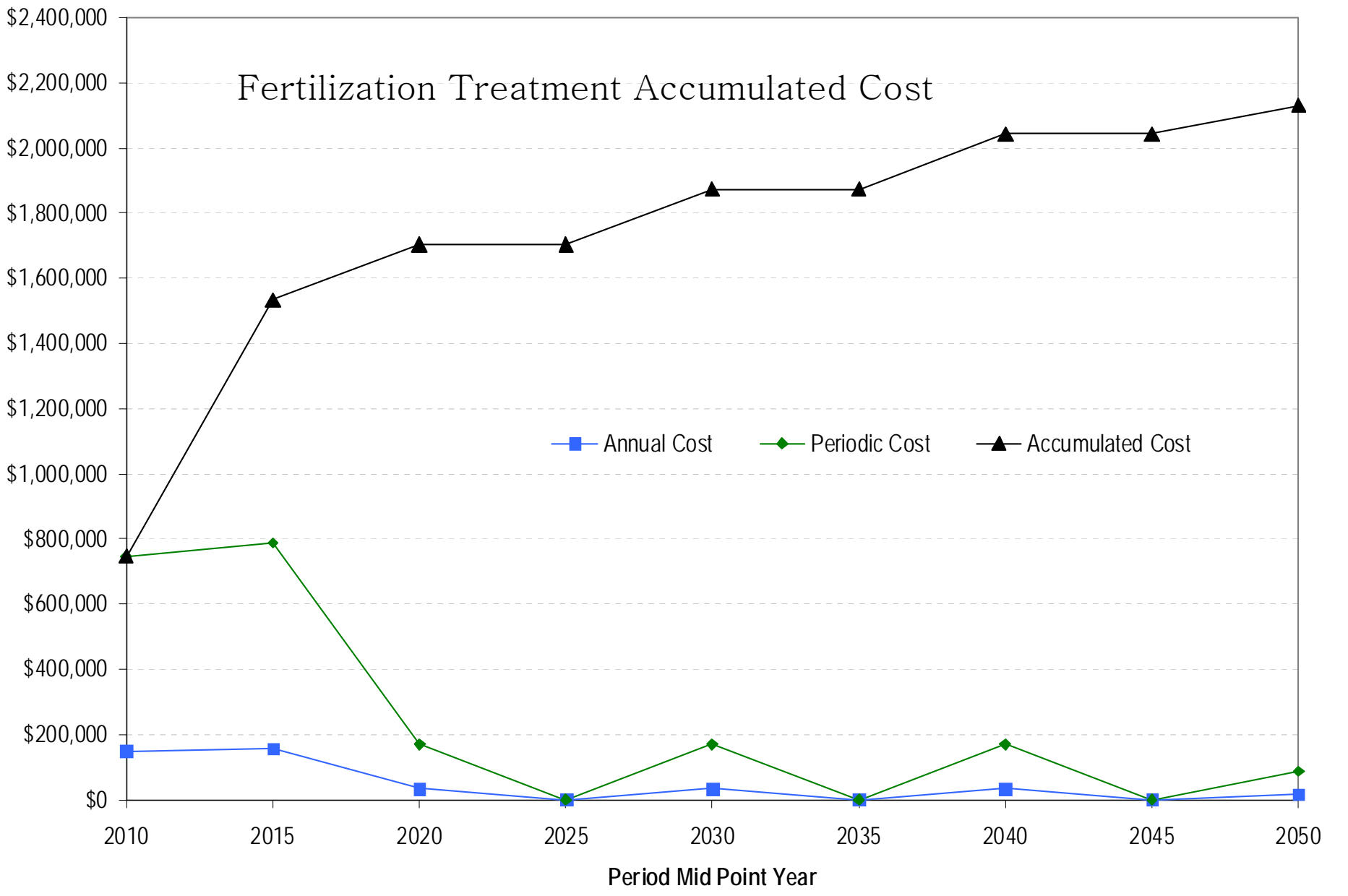
Fertilized once every 10 years until age 80

Deferred until 15 years after treatment

Fertilization Cost Schedule

Planning Period	Period Mid Point Year	Priority 1 Fertilized Area (Ha)	Priority 2 Fertilized Area (Ha)	Fertilized Area (Ha)	Periodic Cost	Annual Cost	Accumulated Cost	Person Days and Accumulated Person Days	
2008 to 2012	2010	2307	680	2987	\$746,746	\$149,349	\$746,746	300	
2013 to 2017	2015	3149	0	3149	\$787,210	\$157,442	\$1,533,956	315	615
2018 to 2022	2020	0	680	680	\$170,008	\$34,002	\$1,703,964	68	683
2023 to 2027	2025	0	0	0	\$0	\$0	\$1,703,964	0	683
2028 to 2032	2030	0	680	680	\$170,008	\$34,002	\$1,873,972	68	751
2033 to 2037	2035	0	0	0	\$0	\$0	\$1,873,972	0	751
2038 to 2042	2040	0	680	680	\$170,008	\$34,002	\$2,043,980	68	819
2043 to 2047	2045	0	0	0	\$0	\$0	\$2,043,980	0	819
2048 to 2052	2050	0	349	349	\$87,269	\$17,454	\$2,131,248	35	854


Fertilization Treatment Accumulated Cost



Fertilization Sensitivity

Initial Results

Compared with Type 2 Revised Base Case

- The short term average harvest level was 6,200 m³/year or 0.5% lower
 - The minimum harvest level was also slightly lower; 5,000 m³/year or 1.6%.
 - The mid-term harvest level was 13,000 m³/year or 1.3% higher
 - The long-term harvest level was 30,600 m³/year or 2.4% higher
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Fertilization Sensitivity

Initial Results Discussion

Minor short term impacts were due to deferral assumptions

Improved mid and long term harvest levels were exaggerated due to modeling assumptions

We replaced unfertilized VDYP curves with Fertilized TIPSU curves.

Time zero growing stock on selected stands was 900,000 m³ higher or ~150 m³/ha higher

Fertilization Sensitivity

Refined Assumptions

Two sets of TIPSYS outputs were generated; one with fertilization applied and one without.

A comparison ratio was calculated for each of the volume data points.

The ratio was applied as a multiplier to the volume data points of the Revised Base Case curves.

Fertilization Sensitivity

Results with Refined Assumptions

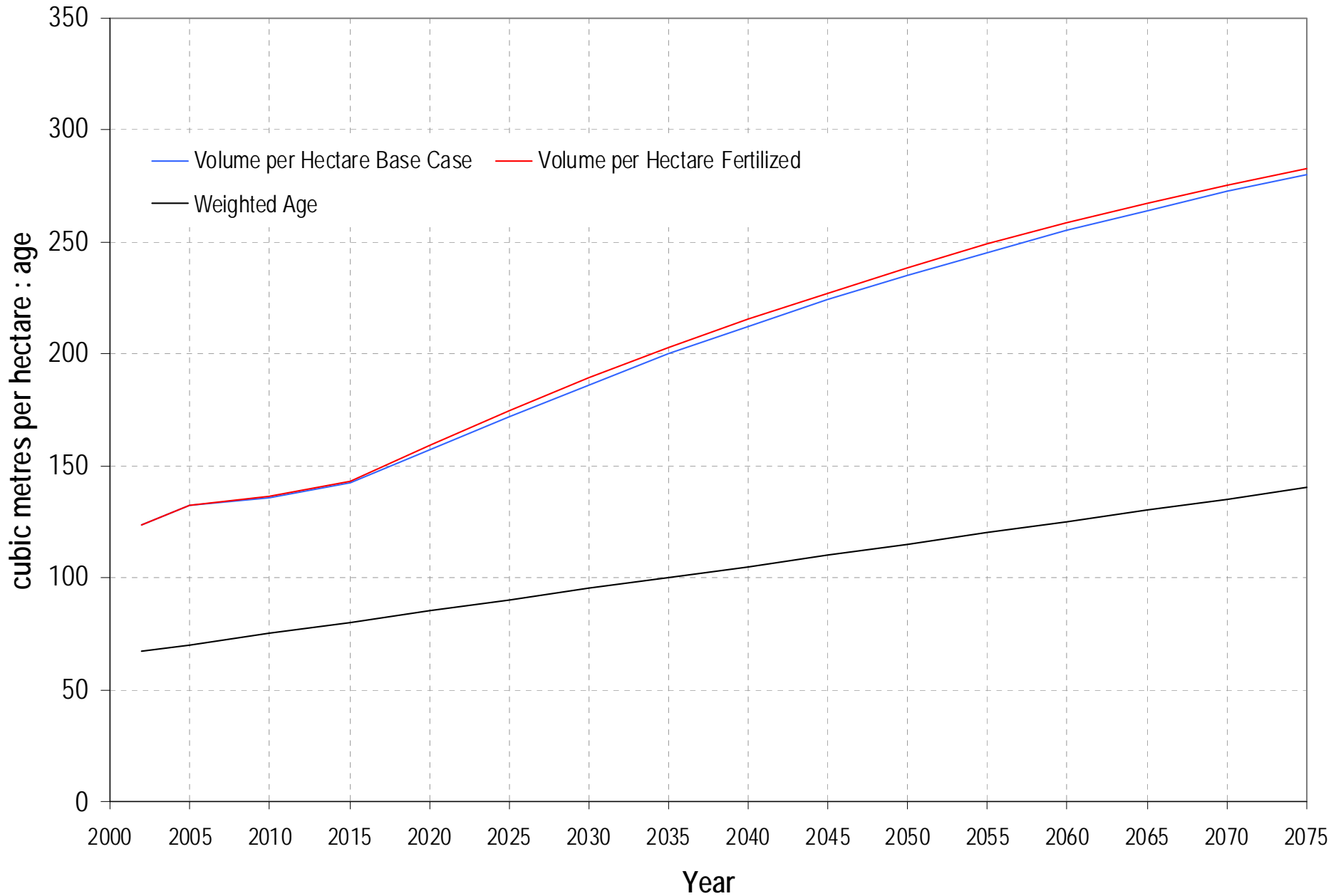
No harvest response to fertilizing 6,200 hectares.

Only 1% of the THLB was treated.

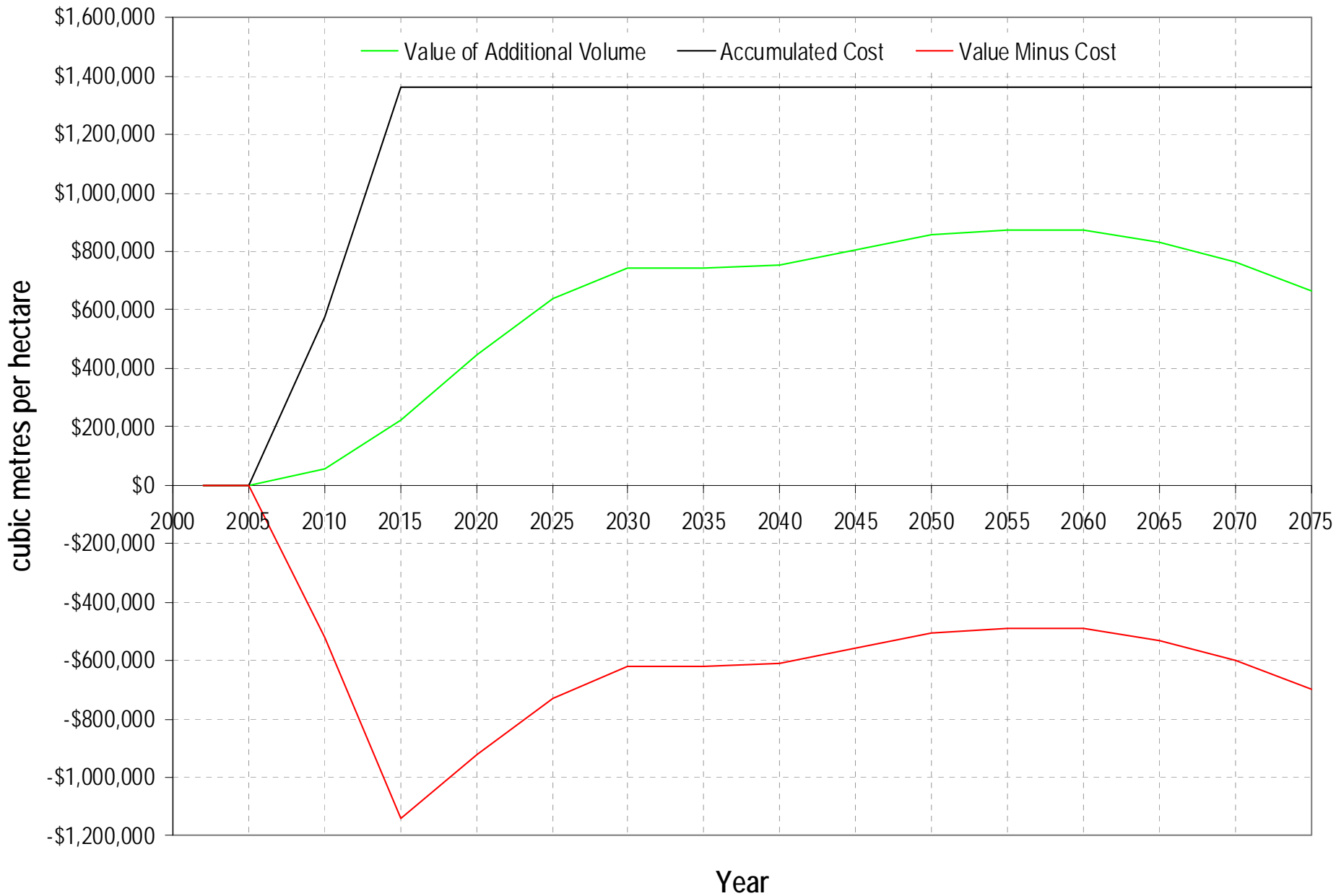
Of that 1%, about 92% were mature stands (weighted age of 67 years) – mild response to single fertilization

The other 8% that was fertilized had a significant response to multiple fertilizations.

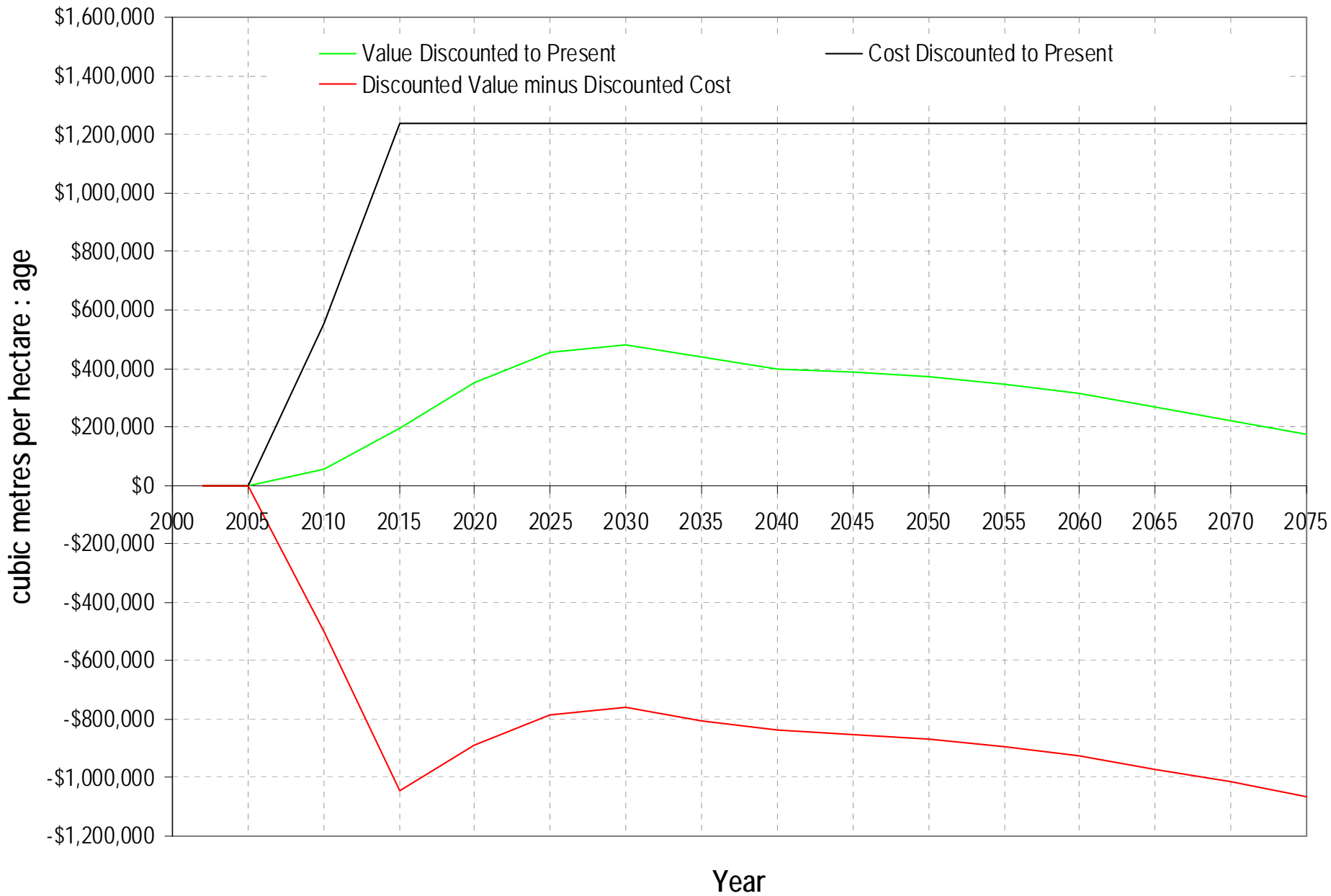
Cost Benefit Analysis to Follow



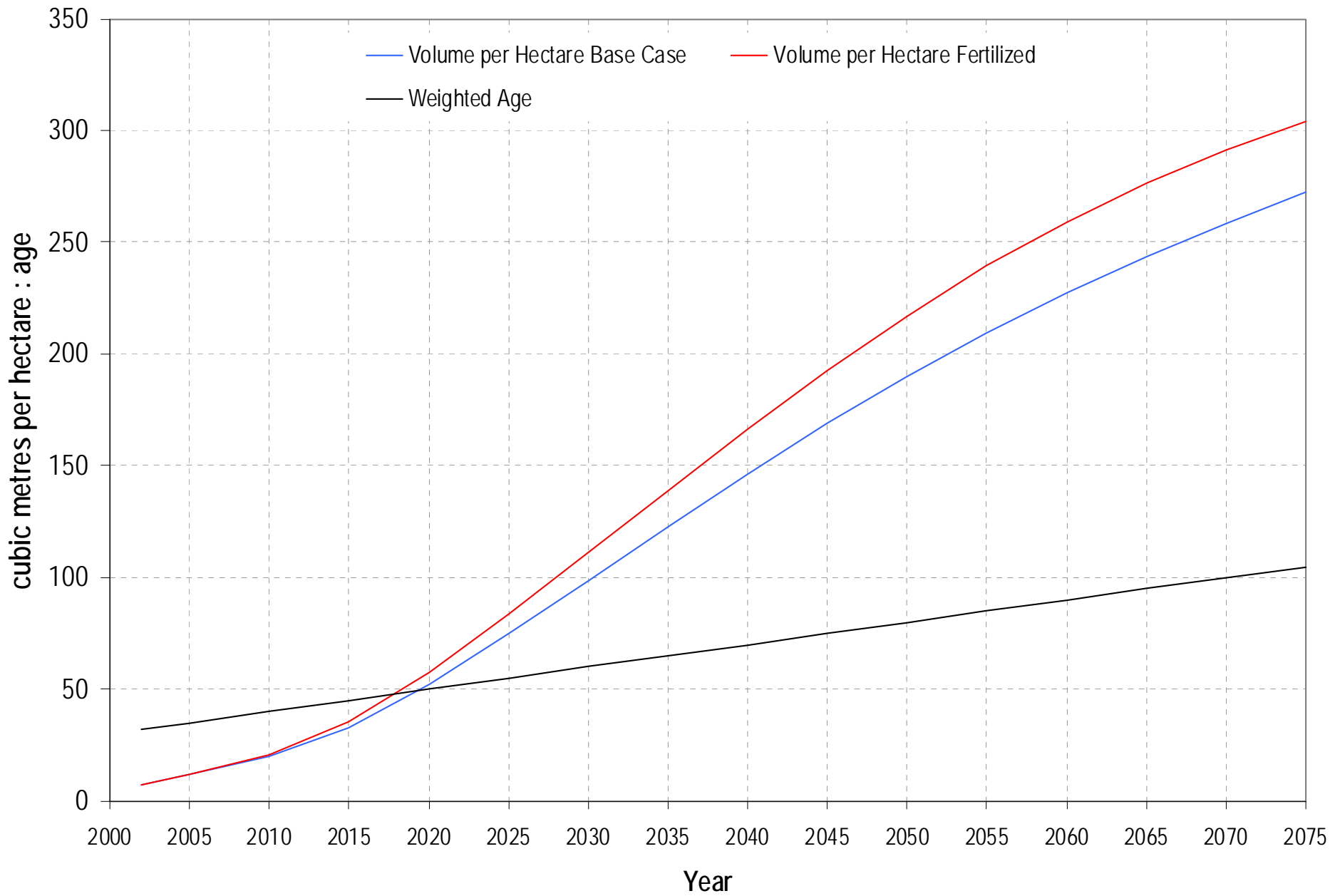
Priority 1 Single Fertilization Response



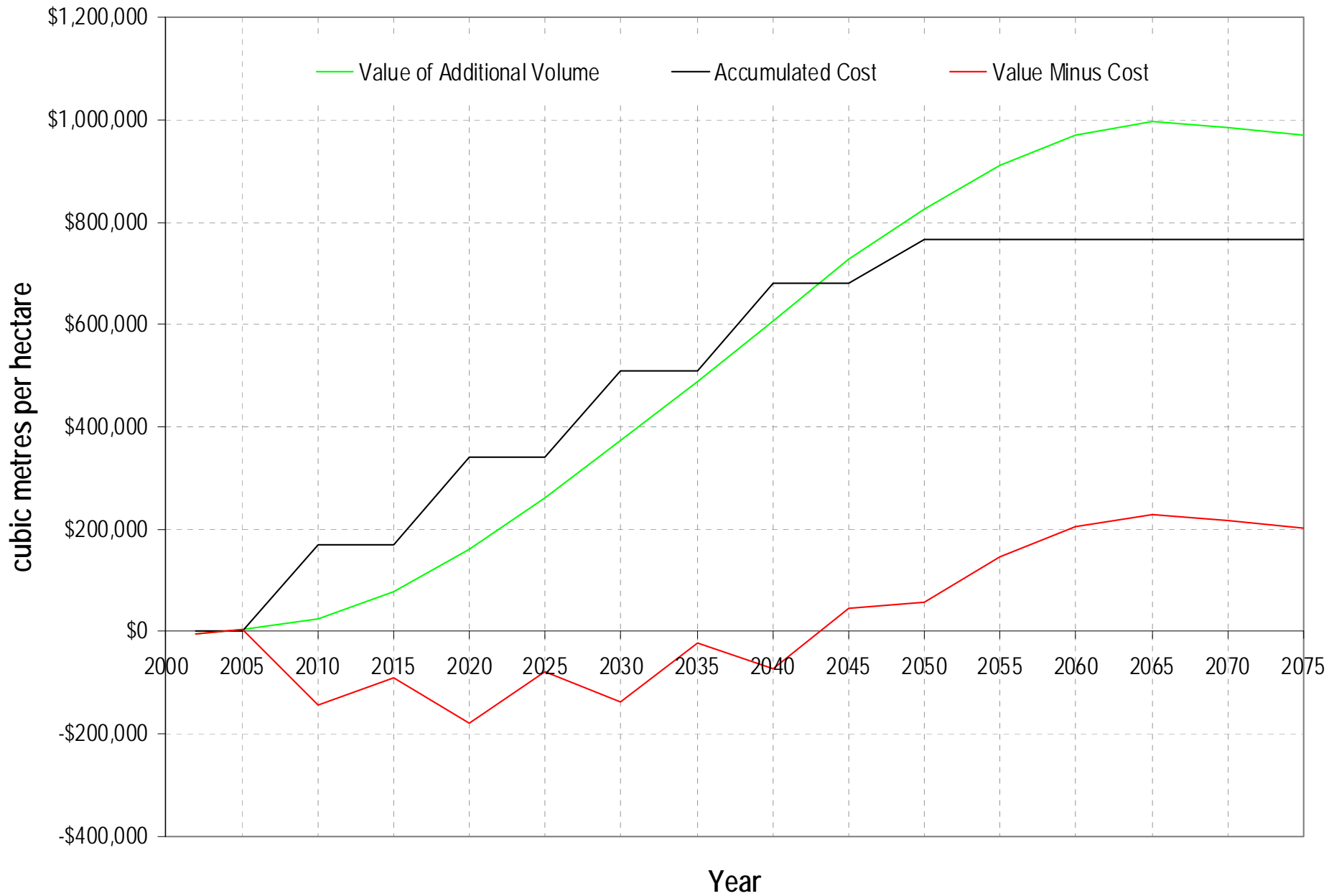
Priority 1 Single Fertilization Cost and Value Gained



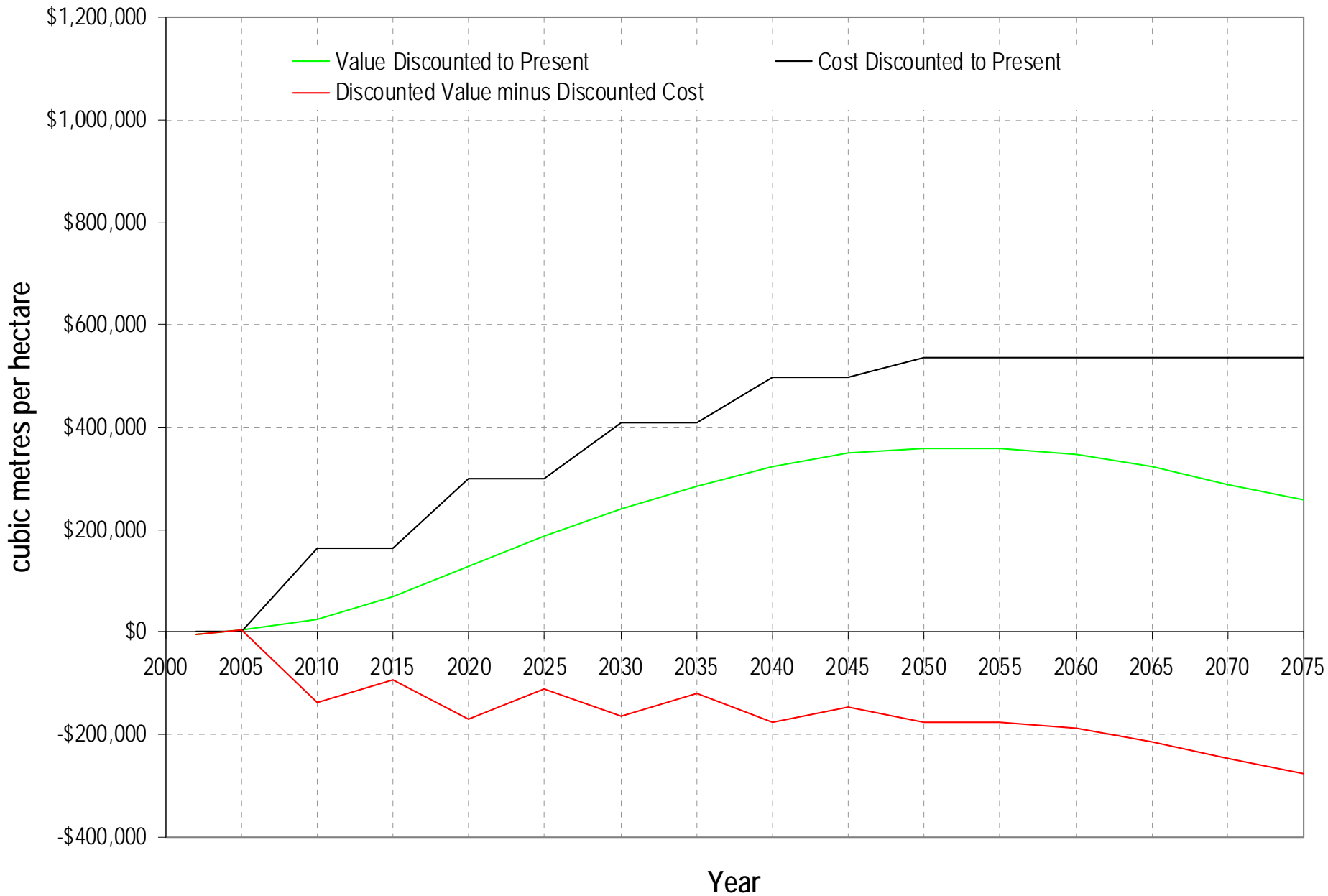
Priority 1 Single Fertilization Cost and Value Gained - Discounted



Priority 2 Multiple Fertilization Response



Priority 2 Multiple Fertilization Cost and Value Gained



Priority 2 Multiple Fertilization Cost and Value Gained Discounted

Incremental Silviculture Sensitivities

Genetic Worth Sensitivity



Genetic Worth Sensitivity

Specifications

SPU code	SPU #	2008	2018
		Seedling Availability / Volume Gain	
Pl BV low	17	54% / 10%	100% / 13%
Sx BV low	35	80% / 16%	100% / 23%
Sx PG high /	42	100% / 19%	100% / 20%
Sx BVP high			
Sx PG low /	14	87% / 28%	100% / 31%
Sx BVP			

Genetic Worth Sensitivity Results

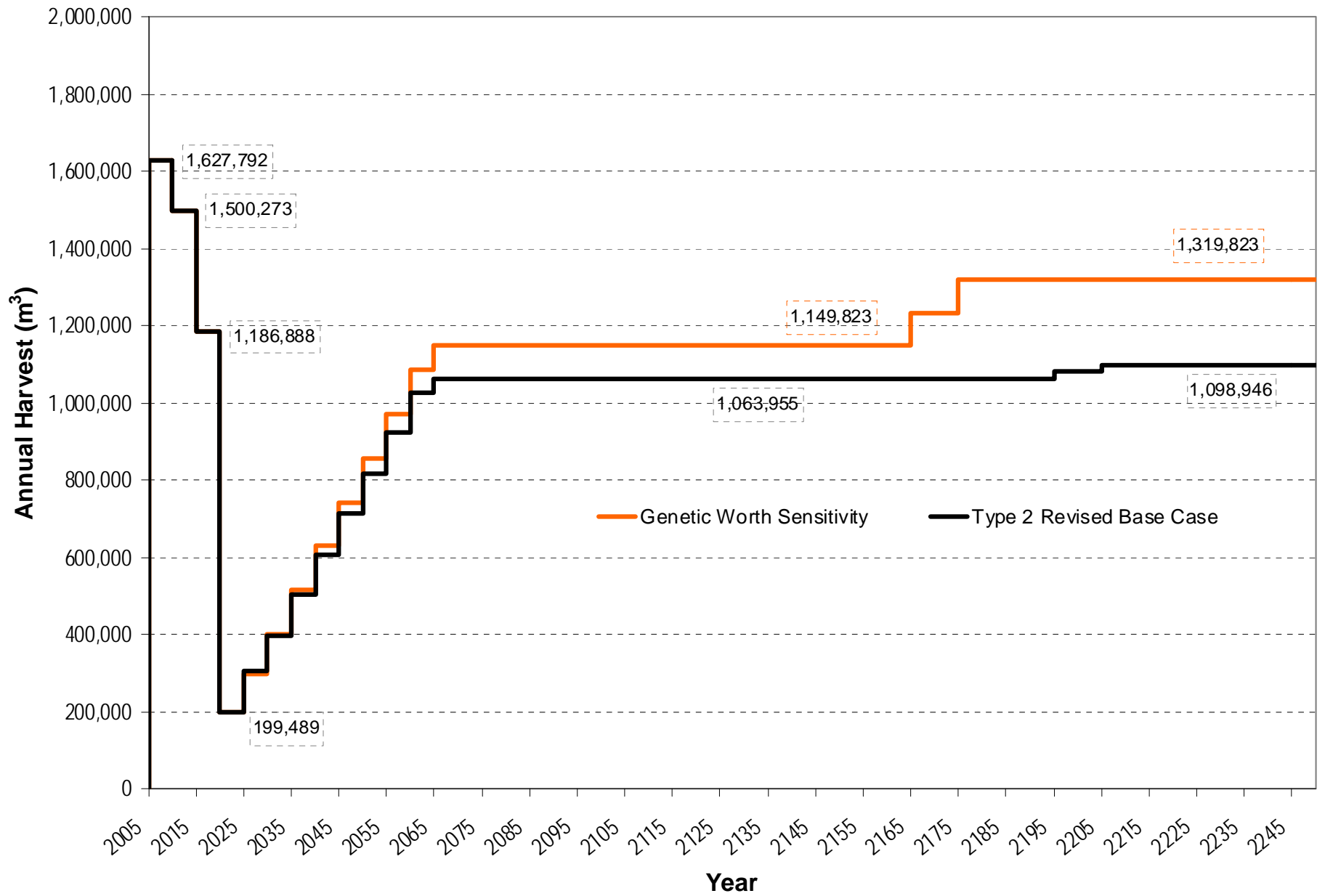
The average of the short term harvest levels is unchanged from Base Case to the Genetic Worth Sensitivity.

The minimum harvest level is also unchanged.

Mid-term harvest levels are on average 73,000 m³ / year or 7.4% higher in the Genetic Worth Sensitivity.

The long term harvest level is on average 169,372 m³ / year or 15.7% higher in the Genetic Worth Sensitivity.





Type 2 Genetic Worth Relative to Type 2 Revised Base Case Harvest Flow

Incremental Silviculture Sensitivities

Rehabilitation Sensitivity



Rehabilitation Selected Areas

Case A: "bio-energy" rehabilitation opportunity ~ 45,000 ha

Merch Vol between 40 and 140 m³/ha

Case B: "traditional" rehabilitation opportunity ~ 5,000 ha

Merch Vol below 40 m³/ha



Rehabilitation Sensitivity Specifications

Revised Base Case harvest schedule applied as a fixed schedule harvest for 25 years

Rehabilitation = forced harvest of selected stands despite even though below MHV

Rehab harvests occur at 12,900 hectares per 5 year period

All 50,000 hectares were harvested from 2008 through 2027.

No adjustments were made to seral stage constraints.

Rehabilitation Sensitivity Results

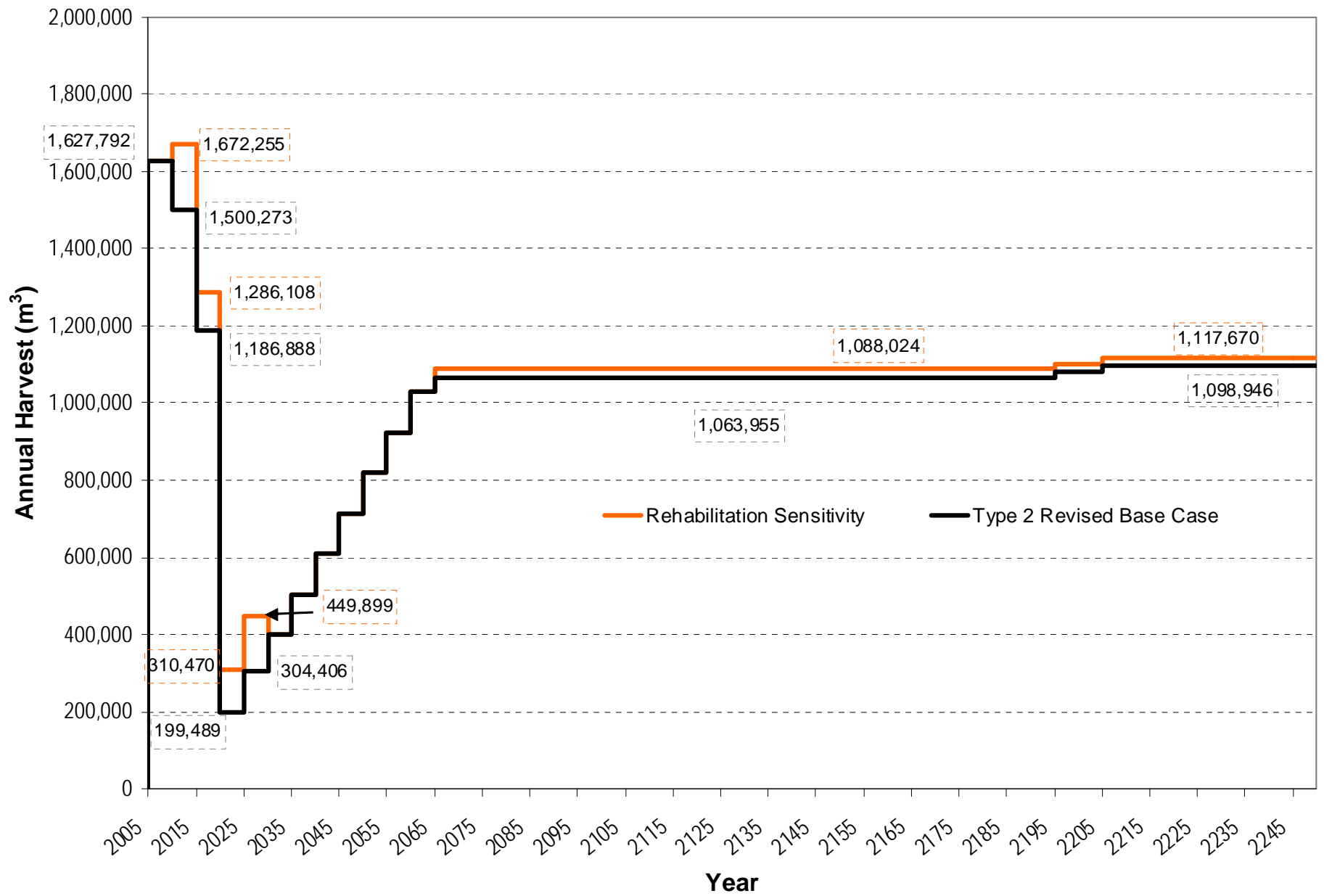
Short term average harvest level is 95,606 m³ / year or 8.5% higher

The minimum harvest level is 111,000 m³ / year or 36% higher.

The mid-term harvest level is 21,128 m³ / year or 2.5% higher

The average LTHL is 22,000 m³ / year or 2.0% higher





Type 2 Rehabilitation Relative to Type 2 Revised Base Case Harvest Flow

Rehabilitation Sensitivity Results Discussion

Short, Mid, Long and Minimum harvest levels respond positively.

Period 2, 3, 4 and 5 harvest level responds due to harvesting uneconomic stands.

This enhances recovery by increasing the area on productive, managed stands.

