Economic Operability Assessment

Analysis Report – Pacific TSA

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Prepared for:

BC Timber Sales
Strait of Georgia, Seaward-Tlasta, and Skeena Business Areas

BRITISH COLUMBIA

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Ministry of Forests, Lands and Natural Resource Operations

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1 Introduction

An economic operability assessment was completed as part of the Pacific TSA timber supply review (TSR). The economically operable area forms one of the netdown items used to classify the timber harvesting land base (THLB) for the TSR. Areas that are classified as un-economic for harvest operations will be removed from the THLB.

The economic operability analysis is a strategic, landscape level analysis of the economically operable land base. It is not a detailed operational or tactical level analysis. The objective of the analysis is to determine the land base where - on average - operations are expected to be economic in average market conditions; it is likely that some individual stands may be incorrectly classified.

Care is needed to separate economic constraints from harvest scheduling constraints. Stands classified as un-economic are expected to remain as such given the assumptions and the data used in the analysis. Changes in market conditions and cost structure of operations will lead to a different economically operable land base and require an updated analysis.

Some harvest scheduling constraints are economic in nature. There are previously harvested areas with isolated remaining older age classes within the Pacific TSA that are clearly part of the economically operable land base. However, operations in these areas are not profitable until the immature stands reach maturity and can be harvested together with the older age classes.

The Pacific TSA economic operability analysis consisted of two main phases. The first phase used a coarse filter approach focusing on physical access. The second phase – a fine filter approach - assigned values and costs to each stand with the objective to identify stands with a positive net worth. The fine filter approach included gaming with blending; highly profitable stands were blended together with stands that were initially classified as un-economic to bring operational reality to the analysis. Sensitivity analyses were included testing the impact of changes in log prices on the economically operable land base.

2 Description of the Land Base

The Pacific Timber Supply Area (TSA) was established in July 2009 from an amalgamation of various tree farm license (TFL) areas taken back by the Province through the Forestry Revitalization Act (Bill 28, 2003). The Pacific TSA covers approximately 698,041 ha. It consists of 30 Blocks located on Vancouver Island, the Sunshine Coast, the Mainland Coast, and Douglas Channel (Figure 1). The Blocks range in size from 76 ha to 405,000 ha.

BC Timber Sales (BCTS) is the major operator in the Pacific TSA, holding approximately 93% of the AAC, with First Nations Tenures making up the remaining cut. At the time the TSR was initiated, the TSA was spread over three BCTS Business Areas (BA): Strait of Georgia (TSG), Seaward-Tlasta (TST), and Skeena (TSK). Since the analysis data set was prepared, the BCTS has initiated a transition of TSA Blocks in the Sunshine Coast (Blocks 21, 22, and 23) from the TSG BA to the Chinook BA (TCH). This transition will be complete by March 31, 2016. For the purposes of this analysis, all documentation associated with these Blocks will remain with a reference to TSG.

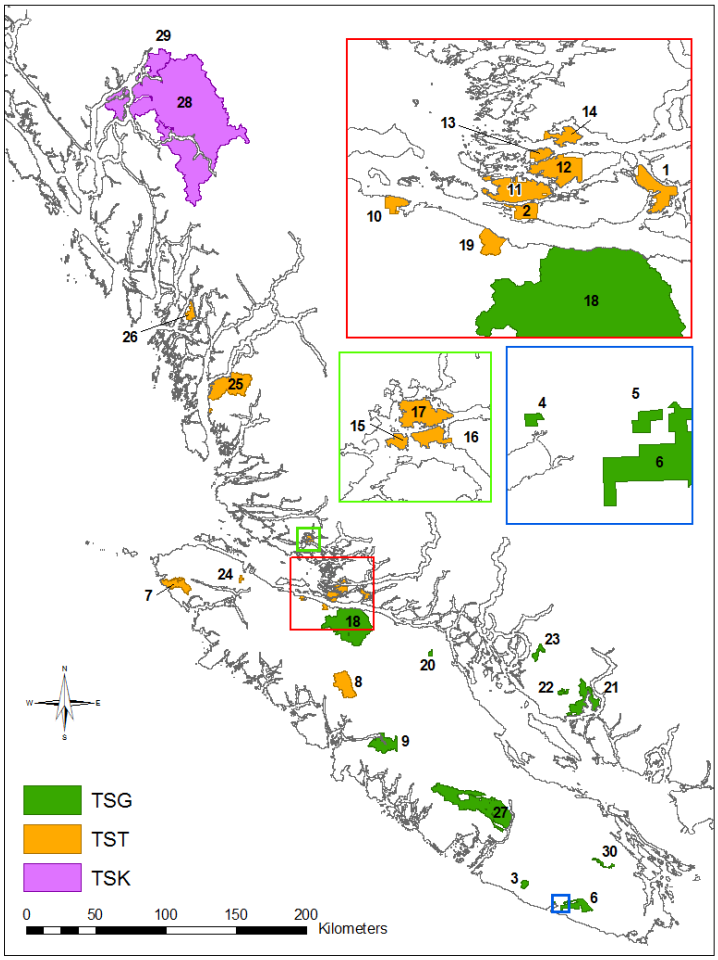

Figure 1: Pacific TSA Blocks

Due to the extent of the TSA, its terrain is variable including low elevation islands, outlying coastal mainland areas, inland regions of high mountains and productive valleys. The forests of the Pacific TSA are dominated by three main biogeoclimatic zones including Coastal Western Hemlock (CWH), Mountain Hemlock (MH) and alpine (CMA).

The southernmost portion of the Pacific TSA is more densely populated with a long harvest history, while the mid coast and north coast parts of the TSA are remote and sparsely populated.

3 Data Sources

This project was completed simultaneously with the Pacific TSA TSR and used the same data sources. The following data and data sources were used for the economic operability project:

Table 1: Spatial Data Sources

Layer Name	Description	Source	Vintage
pacific_tsa	Pacific TSA boundary	BCGW	2014
ogma	Legal, non-legal, and draft Old growth management areas	BCGW and BCTS	2014
f_own	Generalized ownership	BCGW	2014
wdlt_cf	Managed forests – woodlots, community forests, and First Nations Woodland Licenses	BCGW	2014
clab_ir	Federal Indian Reserves	BCGW	2014
parks	Provincial parks and protected areas	BCGW	2014
conserve	Conservancies	BCGW	2014
survey_pa	Survey parcels	BCGW	2014
clayoquot_reserves	Clayoquot sound no harvest areas	GEOBC	2011
terrain	Terrain stability and ESA mapping	BCTS	various
vqo	Visual quality objectives	BCGW and BCTS	2014
UWR	Ungulate winter ranges	BCGW	2014
WHA_legal	Wildlife habitat areas	BCGW	2014
ebm_grizzly	grizzly habitat	EBM	2013
water_polys	Lakes, Rivers and Wetlands	FESL (TRIM, VRI, BCTS)	2014
aoa_final	Archeological potential	FLNRO	2014
recreation	recreation areas (trails, huts, etc)	BCTS and BCGW	2014
arch_sites	Archeological and historic sites	BCTS (FNLR)	2014
vri_final	VRI plus depletions	FESL (BCGW, BCTS, FLNRO)	2014
rds_tsr	Roads	BCTS and FESL	2014
woodsheds	Woodsheds are spatially defined areas within the TSA that are tributary to the same appraised point of origin and are located within the same supply block.	FESL, based on BCTS notes	2015
25m DEM	Digital elevation model at 25m resolution	FESL, derived from TRIM	2014
roads	Existing, deactivated, and future roads	BCTS	2014
recent_harvest	Depletions from 2014 and 2015	BCTS	2015

4 Methodology

4.1 Summary

The following steps describe the overall methodology:

1. Accessible land base was defined using the existing and planned road network.
    a. Areas within a 200 to 300 m distance from a road were classified as conventional harvest areas;
    b. Areas outside of the conventional harvest areas were classified helicopter harvest areas, if they were located within 2,000 m from the coast or a road;
    c. Areas more than 2,000 m from a road or the coast were considered inaccessible.
    d. Results were reviewed by operational staff. Changes were made where appropriate.
2. Conventional areas were further split into cable and ground:
    a. If the slope was less than or equal to 40% and the distance to the nearest road was 20 m or less the harvest method was classified as ground;
    b. If the slope was greater than 40% or the distance to the nearest road was greater than 20 m, the harvest method was classified as cable;
    c. The general methodology was reviewed by operational staff.
3. The maximum working land base was defined.
    a. Non-forest, private lands, inaccessible areas, parks, etc were excluded from the landbase.
4. Cost to harvest each stand was estimated:
    a. Average operating costs were standardized to per cubic meter based on information provided by Price Huber & Associates Inc. for each Pacific TSA Block. Some costs were adjusted in TSK based on local knowledge.
    b. Road building costs (per km) by slope and major structure costs were provided by BCTS for each Pacific TSA Block;
    c. Road building and major structure costs were shared between the unharvested conventional stands accessed by that road.
5. Stand value was calculated for each stand in the maximum working land base. Stand value consists of:
    a. Volume by species in the current vegetation resource inventory (VRI);
    b. Grade by species; historic grade distributions were used to estimate the current grade distributions;
    c. Selling price by grade; average Vancouver Log Market (VLM) prices for the last 10 years were used to estimate the selling price.
6. Profit before road building costs was calculated for each stand. Profit consists of the difference between the estimated stand value and the estimated cost to harvest the stand. Stands with a positive profit are considered economic to harvest. All previously harvested stands were

considered economic with the exception of previously harvested unroaded areas; these were assessed using helicopter harvesting related criteria.

7. Each road was assessed as to whether the total positive profit from the conventionally harvestable stands accessed by it covers the road and major structure building costs.
8. The economic operable land base can be expanded by harvesting profitable stands along with marginally unprofitable stands. This was simulated in the project by blending profitable stands with unprofitable stands after road costs were covered. Blending of stands can only occur within a woodshed. Woodsheds are spatially defined areas within the TSA that are tributary to the same appraised point of origin and are located within the same timber supply block.
9. Results were reviewed by operational staff. Changes were made where appropriate.

4.2 Accessible Land Base (Coarse Filter)

The main input for defining the accessible land base was the road network. A road dataset consisting of all existing, deactivated, and proposed roads was provided by BCTS. Permanently deactivated roads were not included in the project. Deactivated roads that could be reactivated in the future were included in the analysis.

A slope dataset for the study area was derived from the TRIM DEM at 25 m resolution. Slope was used to classify conventional harvest areas into cable harvest areas and ground based harvest areas.

4.2.1 Road Buffers

All roads were buffered by 300 m or 200 m to delineate helicopter and conventional harvest areas. The 200 m buffer was used in areas with steeper slopes. The buffer widths for different Pacific TSA Blocks are shown in Table 2.

Table 2: Road buffers in different Pacific TSA Blocks

BCTS Business Area	Blocks with 200 m Road Buffer	Blocks with 300 m Road Buffer
TSG	9, 18, 21, 22, 23, 27	3, 4, 5, 6, 20, 30
TST	8, 19, 25, 26	1, 2, 7, 10, 11, 12, 13, 14, 15, 16, 17, 24
TSK	28, 29	

Roads and coastlines were also buffered by 2,000 m to define the helicopter harvest areas. These buffers were classified as follows:

1. Areas within 300 m of a road (or 200 m) are conventional harvest areas;
2. Areas between 300 m (200 m) and 2,000 m from a road are helicopter to land harvest areas;
3. Areas within 2,000 m of the coast are helicopter to water areas;
4. All areas more than 2,000 m from a road or the coast were considered inaccessible.

These areas were mapped and forwarded to BCTS for review. Changes in the classification were made based on local knowledge.

4.2.2 Slope Classification and Harvest Method

Once the review and required changes were complete, the conventional harvest areas (as defined above) were further split into cable or ground harvest, based on slope, as follows:

- If the slope was less than or equal to 40% and any part of the polygon was 20 m or less from the nearest road, the harvest method was classified as ground;
- If the slope was greater than 40% or the entire polygon was further than 20 m from the nearest road, the harvest method was classified as cable;

This classification was intended to ensure that gentle slopes with no direct access to a road were classified as cable.

The ground versus cable harvest areas were mapped and forwarded to BCTS for review. The results of removing inaccessible area (coarse filter) are presented in Table 3. In the TSR netdown, inaccessible areas are removed from the THLB.

Table 3: Harvest Method Area Summary

Block	Cable	Ground	Helicopter to land	Helicopter to water	Inaccessible	Total
1	449	1,559		328		2,336
2	52	950		15		1,017
3	1,129	859	306			2,294
4	0	70	5			76
5	14	184	0			198
6	3,406	5,421	1,403		2	10,233
7	2,948	7,831	621			11,400
8	2,919	3,296	11,622		514	18,351
9	3,200	1,971	7,148	3,198	1,107	16,623
10	74	724				798
11	459	2,699		300		3,459
12	192	2,659	20	214		3,085
13	50	584		11		645
14	151	862		115		1,128
15	55	201		3		259
16	155	327		38		521
17	279	704		131		1,114
18	14,430	17,899	26,590		225	59,145
19	103	48	990		209	1,350
20	54	694	86			834
21	4,900	6,122	4,714	4,676	192	20,604
22	161	1,420	119			1,700
23	977	645	2,074		23	3,719
24	15	998	2			1,015
25	3,979	4,598	18,772	6,496	3,720	37,565
26	520	1,510	1,051	2,396		5,476
27	17,402	16,541	27,831	350	2,169	64,293
28	10,641	13,849	102,551	47,892	230,346	405,279
29	1,130	1,526	10,139	3,032	5,626	21,454
30	385	1,670	14			2,070
Total	**70,230**	**98,426**	**216,060**	**69,193**	**244,132**	**698,041**

4.3 Fine Filter Analysis

The fine filter analysis introduces a fine filter to assign the total harvest costs and values to each stand. Both costs and values were applied in dollar amounts to facilitate direct comparisons and sensitivity analysis.

4.3.1 Maximum Working Land Base

Maximum working land base (MWLB) was used as the reference land base for the fine filter analysis. This land base represents a preliminary netdown, where only permanent, legally established and explicit 100% land base netdowns are applied. The following areas were removed from the TSA land base:

Table 4: Maximum Working Land Base Netdown

Description	Net Area (ha)	Gross Area (ha)
Total Pacific TSA	**698,041**	
Inaccessible Areas (from coarse filter)	244,132	244,132
Non-Crown	5,424	5,551
Non-Forest	82,602	264,157
Non-Commercial Brush	9,967	31,199
Parks and Protected Areas	7,264	11,050
Ungulate Winter Range	15,308	24,085
Wildlife Habitat Areas (legal)	1,217	1,582
EBM Grizzly Habitat Class 1	585	725
Clayoquot Reserves	3,075	5,526
Old Growth Management Areas (legal)	18,572	26,518
VQO Preservation Areas	25,878	728
Terrain Stability Class 5	324	40,903
Archeological Sites	743	840
Recreation Areas (legal)	632	2,892
Maximum Working Land Base	**282,318**	

The maximum working land base is a much larger area than the eventual THLB. Using a larger area for the fine filter analysis allows for future changes in the THLB netdown without the need to re-assess economic operability. Table 5 shows the area of the MWLB by Block.

Table 5: Maximum Working Land Base by Block

Block	MWLB (ha)		Block	MWLB (ha)
1	2,245		16	474
2	979		17	1,081
3	1,824		18	39,725
4	63		19	927
5	192		20	506
6	7,354		21	15,377
7	9,393		22	1,588
8	10,197		23	2,250
9	10,170		24	989

Block	MWLB (ha)		Block	MWLB (ha)
10	762		25	15,916
11	3,288		26	4,719
12	3,039		27	46,461
13	611		28	88,427
14	1,060		29	10,489
15	256		30	1,956
Total				**282,318**

4.3.2 Previous Harvest

All conventional stands that were previously harvested or established since 1965 were considered economic by default. In helicopter accessible areas, stands under 50 years old with at least 30% Douglas-fir, cedar or cypress were considered economic.

4.3.3 Costs

Harvest costs include all harvesting, transport and overhead costs, except stumpage costs. Cost information is based on the "Licencee Benchmark Logging Cost Project Report" by Price Huber & Associates Inc. completed in July 2010 and updated in March 2015.

The Licensee Benchmark Logging Cost Project Report was originally designed to assist BCTS staff to prepare logging cost estimates for timber sales. The information was acquired through surveys and interviews from a number of sources, which are confidential. The costs are based on generalized assumptions and they are provided for various operating areas within the Pacific TSA.

In TSK, the initial costs in the report were modified based on local knowledge. Costs for hauling, booming, towing, barging, engineering, and silviculture were adjusted.

Average harvesting and transport costs were assigned to each stand based on its Pacific TSA Block (location). The yarding costs were broken down based on the harvest method:

- Ground-based harvesting
- Cable harvesting
- Helicopter harvesting

Stands that require future road construction to provide access had road building costs assigned to them as per section 4.3.2.1.

The following costs were included (not all costs apply to every Block):

- Falling
- Chucking
- Yarding
- Helicopter drop
- Mechanical processing
- Loading
- Hauling
- Road maintenance
- Booming
- Towing
- Barging

- Mobilization
- Overhead
- Log brokerage
- Waste assessments
- Crew boat
- Crew services
- Camp costs
- Engineering
- Silviculture

All the costs listed above were applied on a per cubic meter basis.

Hauling costs were calculated based on an average distance from the Block to the nearest log dump or highway accessed mill and consisted of the following factors shown below with an example in Table 6.

Table 6: Example of hauling cost calculation

Factor	Value
Round trip distance on paved road:	8 km
Round trip distance on gravel road:	38 km
Time on paved road:	0.1 hr
Time on gravel road:	1.52 hr
Time to load/unload:	1 hr
Total time per load:	2.62 hr
Number of loads/day:	4
m^3 per load:	46
m^3/day:	184
cost/day:	$1,200
Cost/ m^3:	**$6.52**

The cost of $\$6.52/m^3$ would then be applied to all stands within the Block as the hauling cost.

4.3.3.1 Road Construction

Road building costs were assessed separately from other costs. All proposed, deactivated, and semi-deactivated roads were split by Block and slope, and the total cost to build or reactivate each road was calculated. Road building costs attributable to sections of roads outside the Pacific TSA were deducted from the total costs for each road.

The total cost for each road was shared between all MWLB conventional areas that are accessed by that road. All conventional harvest polygons in the MWLB were linked to the closest road. The road building costs were shared by the stands accessed by that road.

Reactivation of deactivated and semi-deactivated roads in previously harvested areas was assumed to be economic in the TSG and TST business areas. This was based on the principle that previously harvested stands were considered economically operable in the future.

However, in the TSK business area many semi-deactivated roads were not originally built for timber harvesting. Rather, other industries required them for their operations. In TSK, only those semi-deactivated roads that access areas where more than 50% of the area is previously logged were assumed to be economic.

4.3.3.2 Structure Costs

Costs (by Block) to build bridges, install culverts, and reactivate or build new log dumps were received from BCTS. Point locations for all these features were also provided. The costs for larger bridges (over 10 m in length) were added to the road construction costs and shared by the stands accessed by the road. The costs of culverts, log dumps and bridges less than 10 m in length were ignored.

4.3.4 Values

Each stand in the Pacific TSA MWLB was assigned a value ($/m^3) based on its species distribution, estimated grade distribution for each species, and historical average Vancouver log market values by species and grade. The data was provided by the Timber Pricing Branch of the Ministry of Forests, Lands and Natural Resource Operations (FNRO). Due to the lack of grade distribution data for second growth stands, only old growth grade distributions and prices were used in the analysis.

Values were calculated as:

Value ($) = Species Volumes ($m^3$/ha) x Area (ha) x Grade Distribution by Spp x Log Price by Spp and Grade Distribution ($/$m^3$)

Stand species volumes were based on adjusted (where available) VRI volumes by species. Since previously logged roaded stands are assumed to be economic, only stands older than 50 years of age were assessed.

4.3.4.1 Grade Distributions

Grade distributions from 1995 to 2014 scale data for the Pacific TSA were acquired from the Timber Pricing Branch of FLNRO. Due to the changing makeup of the harvest over this time period, only grade data from 2005 onwards was used to represent the harvesting in the TSA. Scale data was linked to each TSA Block by its opening id.

The average harvested grade distributions were summarized for each species and TSA Block. In cases where there was limited past harvesting for a species in a Block, the species and Block were grouped with neighbouring Blocks with similar ecologies. At the end, 98 grade distributions were used for species in the 30 TSA Blocks. Table 7 presents the average grade distributions for the TSG and TST business areas. Table 8 shows the same for the TSK business area. Figure 2, Figure 3, and Figure 4 show the grade distribution by species for each business area.

Table 7: Average grade distributions by business area, TSG and TST

Business Area	Species	Coastal Grade Distributions															
		B	C	D	E	F	G	H	I	J	K	L	M	U	W	X	Y
TSG	Cw	0%	0%	3%	0%	2%	0%	29%	12%	21%	4%	6%	5%	10%	0%	5%	3%
	Cy	0%	0%	3%	0%	4%	0%	28%	10%	15%	0%	0%	0%	11%	0%	11%	18%
	Dr	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	82%	0%	18%

Business Area	Species	Coastal Grade Distributions															
		B	C	D	E	F	G	H	I	J	K	L	M	U	W	X	Y
	Fd	1%	5%	2%	0%	2%	0%	18%	16%	41%	0%	0%	0%	9%	0%	3%	3%
	HwBa	0%	0%	2%	0%	3%	0%	22%	11%	28%	0%	0%	0%	14%	0%	11%	9%
	Pine	0%	0%	1%	0%	1%	0%	21%	16%	21%	0%	0%	0%	22%	0%	9%	9%
	Ss	0%	0%	0%	0%	0%	1%	18%	20%	39%	0%	0%	0%	14%	0%	4%	3%
TST	Cw	0%	0%	2%	0%	1%	0%	27%	10%	17%	6%	10%	7%	11%	0%	4%	5%
	Cy	0%	0%	3%	0%	3%	0%	32%	11%	24%	0%	0%	0%	11%	0%	6%	10%
	Dr	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	75%	0%	25%
	Fd	1%	11%	3%	0%	3%	0%	24%	13%	27%	0%	0%	0%	11%	0%	3%	3%
	HwBa	0%	0%	1%	0%	2%	0%	21%	10%	40%	0%	0%	0%	14%	0%	7%	5%
	Pine	0%	0%	0%	0%	0%	0%	5%	2%	61%	0%	0%	0%	11%	0%	8%	13%
	Ss	0%	0%	2%	1%	1%	2%	32%	24%	17%	0%	0%	0%	10%	0%	4%	7%

Table 8: Average grade distributions by business area, TSK

Business Area	Species	Interior Grade Distributions				
		1	2	4	6	Z
TSK	Cw	32%	47%	21%	0%	0%
	Cy	33%	51%	16%	0%	0%
	Fd	14%	82%	4%	0%	0%
	HwBa	32%	40%	28%	0%	0%
	Pine	0%	39%	61%	0%	0%
	Ss	34%	52%	15%	0%	0%

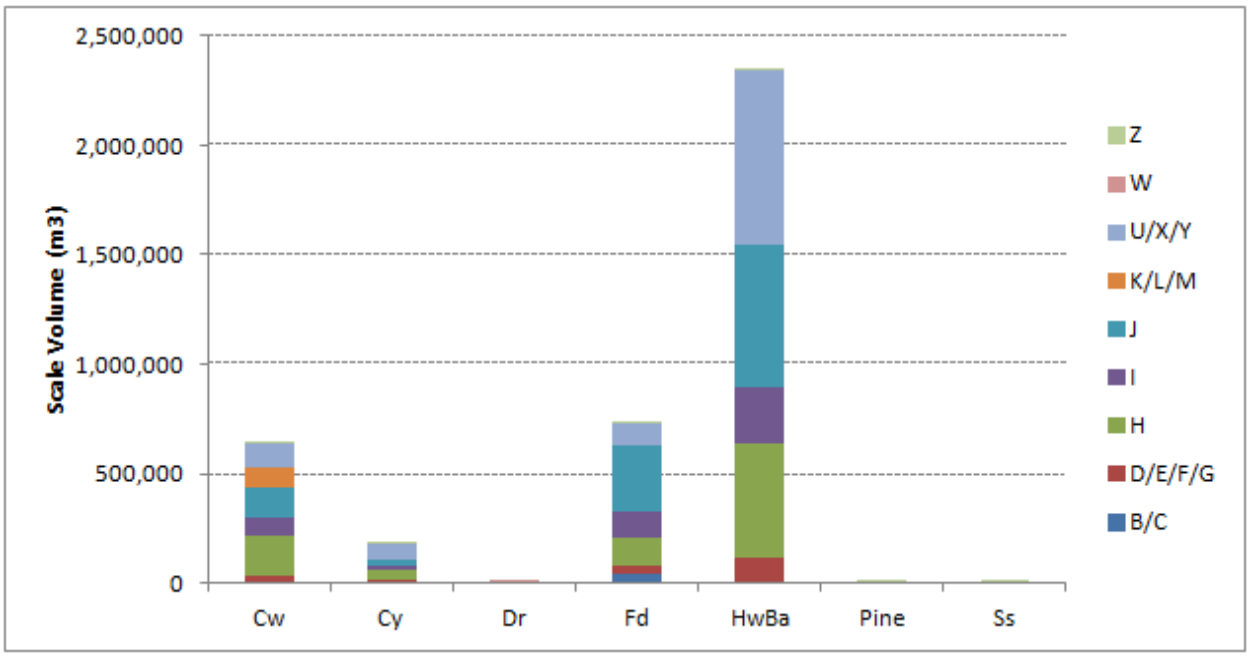

Figure 2: Grade Distribution by Species, TSG Business Area

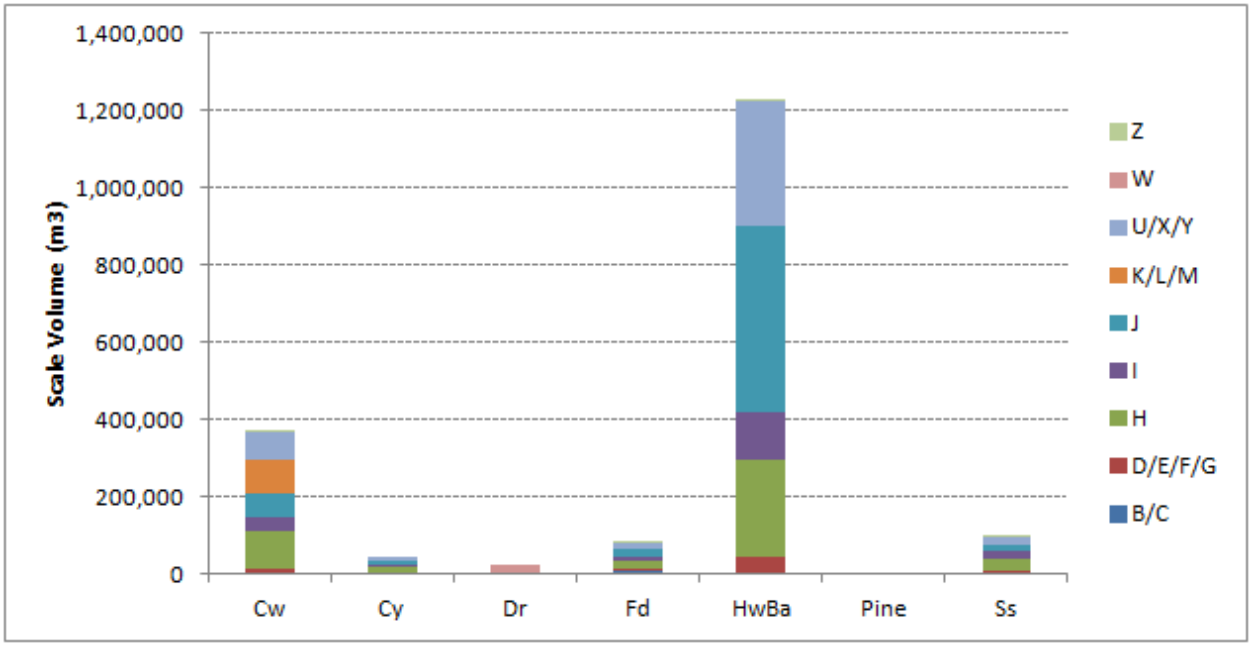

Figure 3: Grade Distribution by Species, TST Business Area

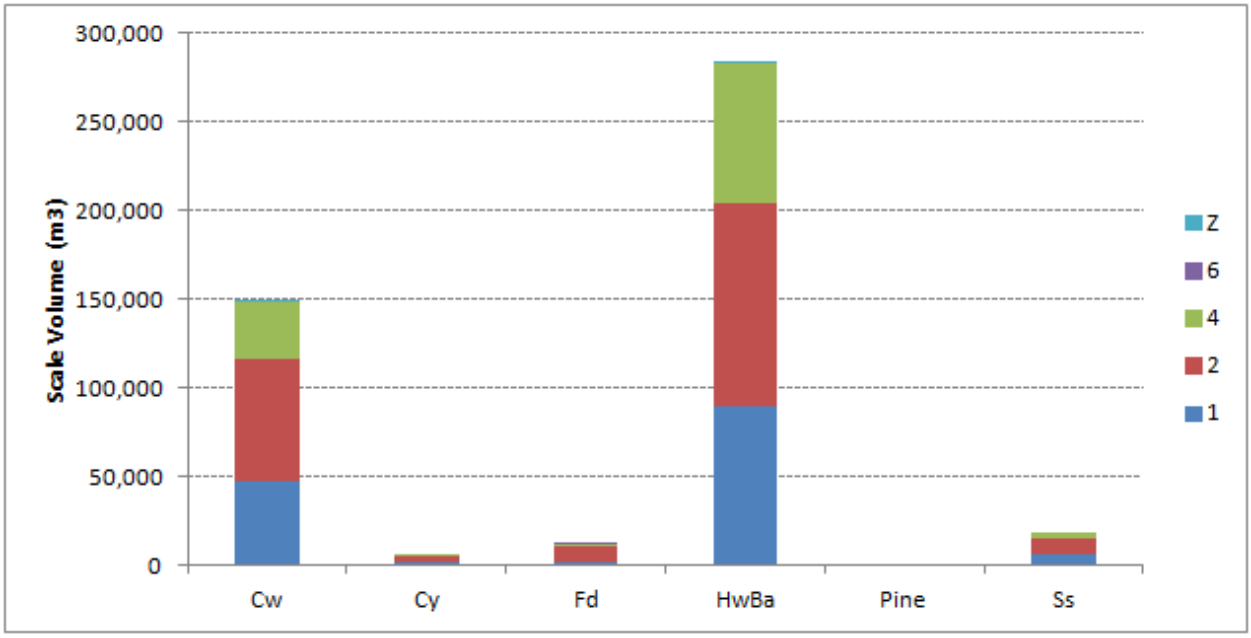

Figure 4: Grade Distribution by Species, TSK Business Area

4.3.4.2 Log Values

FLNRO coastal domestic monthly log prices by species and grade from 2005 to 2014 where used to generate the average log prices used in the analysis. Prices were adjusted for inflation using Statistics Canada Consumer Price Index values, and averaged for the period of 2005 to 2014 (Table 9). The averages were volume weighted. This minimizes the impact associated with small or zero volumes in some months.

Prices for Skeena interior grades (numbers) were generated by weighted averages of coastal grade prices. Sawlog grades (grades 1 and 2) were assumed to equate to coastal sawlog grades B to M, and grade 4 was assumed to be composed of coastal U, X and Y grades. The weighting between the coastal prices was based on the relative amounts of these coastal grades in the mid-coast Blocks (Blocks 25 and 26).

Table 9: Old growth log prices by species and grade (2005 – 2014)

Species	Business Area	Grade	Average Price $/m^3	Standard Deviation $/m^3
HwBa	TSG, TST	D	147.76	23.85
		F	109.94	11.04
		H	72.12	7.52
		I	54.82	6.01
		J	52.85	5.77
		U	43.52	4.40
		X	42.23	4.88
		Y	40.56	5.05
Cw	TSG, TST	D	300.92	51.72
		F	262.53	49.06
		H	184.05	30.83
		I	129.43	28.88

Species	Business Area	Grade	Average Price $/m^3	Standard Deviation $/m^3
		J	144.00	30.97
		K	176.65	31.53
		L	143.50	27.64
		M	99.67	22.08
		U	68.71	26.04
		X	50.67	18.95
		Y	9.14	3.54
Cy	TSG, TST	D	477.54	138.62
		F	286.47	59.09
		H	148.63	23.25
		I	96.39	16.68
		J	80.27	14.42
		U	51.34	9.55
		X	47.40	17.02
		Y	16.43	5.21
Fd	TSG, TST	B	214.94	41.59
		C	153.33	25.87
		D	402.70	68.52
		F	275.46	38.70
		H	142.78	19.96
		I	96.84	20.77
		J	80.81	16.23
		U	52.18	7.71
		X	38.39	5.20
		Y	33.23	6.71
Ss	TSG, TST	D	419.93	105.12
		E	346.95	84.55
		F	303.94	80.72
		G	237.52	54.20
		H	126.64	39.09
		I	76.09	17.00
		J	69.72	10.19
		U	47.03	5.89
		X	42.97	8.45
		Y	41.55	8.90
Dr	TSG, TST	X	69.56	13.12
		Y	41.88	19.17
Pine	TSG, TST	D	0.00	0.00
		F	154.28	94.27
		H	116.33	68.29
		I	75.38	41.20
		J	57.75	32.69
		U	55.08	21.42
		X	46.14	18.56
		Y	45.11	18.06
Cw	TSK	1	158.68	30.39

Species	Business Area	Grade	Average Price $/m^3	Standard Deviation $/m^3
		2	158.68	30.39
		4	47.53	17.97
Cy	TSK	1	108.52	18.86
		2	108.52	18.86
		4	37.24	9.92
Fd	TSK	1	133.31	22.64
		2	133.31	22.64
		4	46.24	7.10
HwBa	TSK	1	63.82	7.03
		2	63.82	7.03
		4	42.01	4.79
Ss	TSK	1	131.13	34.72
		2	131.13	34.72
		4	43.94	7.62

4.3.4.3 Log Exports

The log export market is an important market for logs produced from many of the Pacific TSA Blocks. All logs – with the exception of cedar and cypress – produced within the Pacific TSA are exportable under the Forest Act and current policies, provided that they fall under a blanket exemption, or that an exemption permit is issued under the surplus criteria.

Certain areas of the Province are covered by blanket export exemptions issued under Order-In-Council (OIC). Blocks 25 and 26 of the Pacific TSA fall under the Mid Coast Blanket OIC. Under this OIC, 35% of the volume harvested under any tenure in any single year may be exported (other than Cedar and Cypress). Volumes harvested above this percentage may be exported under the surplus criteria.

Blocks 28 and 29 of the Pacific TSA fall under the Northwest Interior Blanket OIC. Under this OIC 20% of the volume harvested (other than cedar and cypress) may be exported. Volumes harvested above this percentage may be exported under the surplus criteria.

Billed volume data from 2008-2014 was compared to 2008-2014 BCTS export data for each business area, tree species and grade. The percent of the billed volume for each tree species and grade that was exported was calculated for each business area (Table 10).

The log prices were increased by an export premium multiplied by the percent of the exported grade to create a blended average price between domestic and exported logs. This analysis tested the impact of $\$30/m^3$ price premium on the economically operable land base.

Table 10: Estimated export percent 2008 - 2014

Business Area	Species	Export percent for Grade														
		1	2	4	6	D	E	F	G	H	I	J	U	W	X	Y
TSG	Fd									39%	39%	29%	3%		0%	1%
	HwBa					16%		19%		50%	31%	43%	4%		0%	0%
	Ss									39%	85%	53%	4%			
TSK	HwBa	52%	40%	4%	0%											
	Ss	75%	45%	17%	0%											
TST	Fd									47%	44%	14%	2%		0%	
	HwBa					20%		25%		42%	25%	38%	4%		0%	0%
	Ss					5%	13%	10%	17%	65%	66%	40%	7%		1%	0%

4.3.4.4 High markets and low markets

Two market price sensitivity analyses were completed: the low price sensitivity used the average domestic price subtracting 2 standard deviations from it. The high prices sensitivity analysis added two standard deviations to the average price.

Two standard deviations around the mean were considered a reasonable indicator of market fluctuations after investigating the log value data. For most species and grades, two standard deviations captured the highs and the lows of the market cycles. Figure 5 provides an example for HemBal grade H inflation adjusted price between 2005 and 2014.

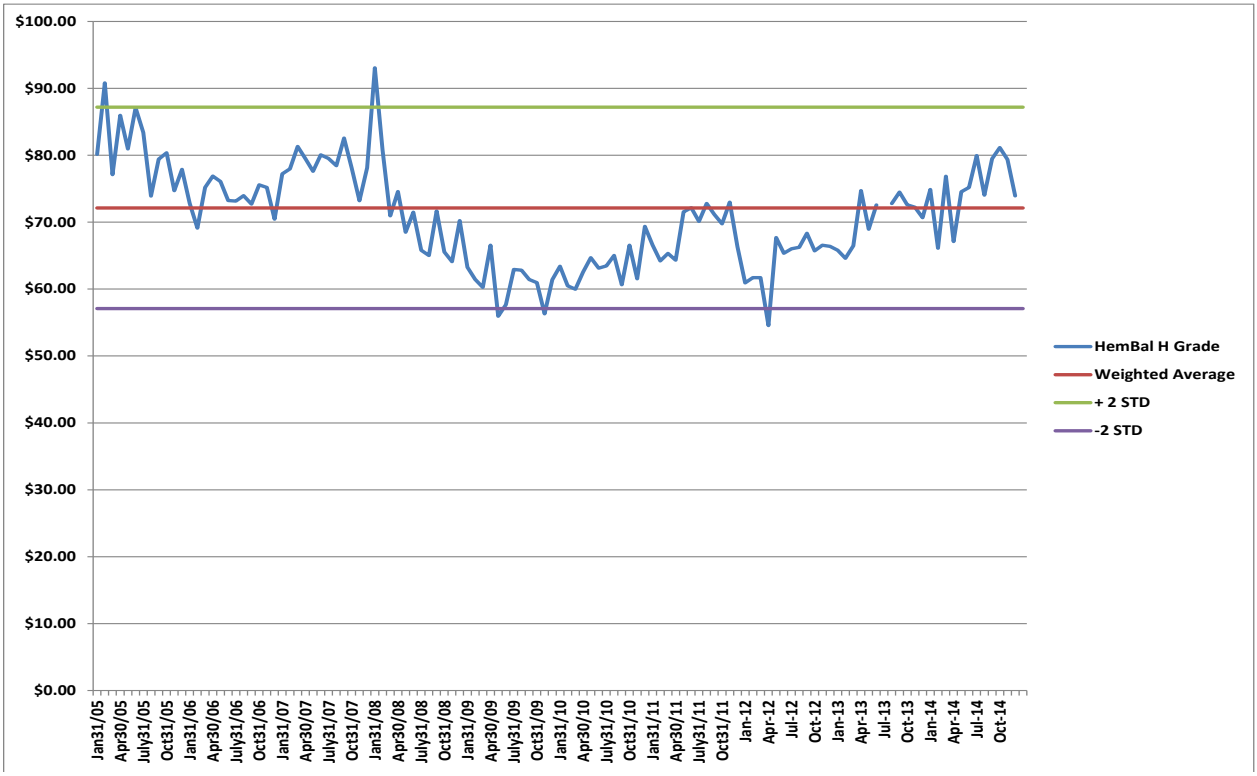

Figure 5: Volume weighted inflation adjusted average price for HemBal, H-grade, 2005 – 2014

4.3.4.5 Stand Values

Final value inputs for the Pacific TSA stands were based on the species and grade values in Table 9, and the grade distributions in Table 7 and Table 8. The impact of log exports was tested by adjusting the values by export percentages (Table 10) and by adding an export premium of 30$/m^3 to each exported cubic meter for grades shown in Table 10. Each stand in the TSA was assigned a value reflecting its volume and species distribution, historic grade distribution and historic average price.

4.3.4.6 Profit or Net Stand Value before Blending

Projected harvest costs – before road building costs – per polygon (forest stand) were subtracted from stand values for each polygon. This calculation was completed for each polygon in the MWLB resulting in an estimate for an economically operable land base by polygon, before road construction costs.

4.3.4.7 Blending

Net stand value estimates of individual polygons do not reflect tactical and operational reality, because in operations the harvest of marginally economically inoperable stands is often made possible by the harvest of valuable, economically operable timber. This practise is called blending and it can occur in spatially defined units (woodsheds). BCTS faces the same cutblock blending rules as the major licensees; the cutblocks must meet the requirements outlined in the Coast Appraisal Manual (TSG, TST) and the Interior Appraisal Manual (TSK). The areas within which cut block blending is allowed are called woodsheds in this analysis. Table 11 lists all the woodsheds in the analysis. The first part of the woodshed name denotes the Block(s) it covers. Some of the larger Blocks are split into several woodsheds, while smaller Blocks may be grouped together to form a woodshed.

Table 11: Woodsheds in the Pacific TSA

Woodshed	Area (ha)	MWLB Area (ha)		Woodshed	Area (ha)	MWLB Area (ha)
1	2,336	2,245		28A-5	925	727
10-19	2,148	1,689		28A-6	17,410	6,459
11	3,459	3,288		28A-7	174,791	20,928
12	3,085	3,039		28A-8	100,347	28,601
13	645	611		28B-1	20,697	4,691
14	1,128	1,060		28B-2	52,279	2,701
15-16-17	1,894	1,810		28C-1	1,077	944
18 - EvNa	23,140	15,618		28C-2	412	324
18 - Tsit	36,004	24,107		28C-3	4,846	2,216
2	1,017	979		28C-4	2,752	1,447
20	834	506		28C-5	6,272	3,196
21 - 1	10,739	7,351		28D	4,157	3,426
21 - 2	5,710	4,835		28E	1,135	1,010
21 - 3	5,855	4,780		28F	889	879
23	3,719	2,250		28G	530	413
24	1,015	989		28H	93	93
25	37,565	15,916		29	21,454	10,489
26	5,476	4,719		3	2,294	1,824
27 - 1	52,767	41,592		30	2,070	1,956
27 - CLAY	11,526	4,869		4, 5, 6	10,507	7,609
28A-1	1,526	1,414		7	11,400	9,393

Woodshed	Area (ha)	MWLB Area (ha)		Woodshed	Area (ha)	MWLB Area (ha)
28A-2	2,826	1,146		8	18,351	10,197
28A-3	2,549	1,642		9 - BURM	10,644	6,038
28A-4	9,767	6,171		9 - JACK	5,979	4,131

This analysis simulated cut block blending by ranking the negative profit stands in descending order of profit/ha and then using the positive profits from the economically operable stands to cover their harvesting costs. In areas where road building or reactivation was not required, the negative profit stands were added to the economically operable land base until the positive profit was used up.

In areas where road construction was required, the road building and re-activation costs were covered first before any profits from economically operable stands were assigned to negative profit stands.

4.3.4.7.1 Land Base for Blending

Areas that were expected to be removed from the land base in the final land base netdown were not allowed to contribute to blending.

4.3.4.7.2 Conventional Harvest Areas

Existing and deactivated roads (with some exceptions in TSK) were considered economic. All positive profit stands accessed by these roads were available to support other marginally uneconomic areas within the same woodshed.

For proposed roads and those deactivated roads that were assessed, all positive profits from stands attached to each road were summed up and compared to the road building costs for that road. If the profit was adequate to cover the road building costs, the remaining profit (if any) was used to support other roads and stands within the woodshed.

If the positive profits were not adequate to cover the road building costs, the positive profit stands attached to the planned road were grouped as one blending unit. This blending unit could then receive funding from other areas within the woodshed to determine whether the road could be paid for or not. If the road could be paid for by blending, any remaining negative profit stands along the road entered the pool of stands needing to be supported by economically operable stands.

If no positive profit stands existed on the planned road, all stands accessed by that road were grouped together to form a blending unit. Profits that remained from other areas could be used to support these blending units. If the road could not be built after this support, the road was deemed uneconomic to build and all stands attached to that road were classified as uneconomic.

The negative profit stands and road blending units were all ranked by profit/ha and funded by the profitable stands within the woodshed.

4.3.4.7.3 Helicopter Harvest Areas

In helicopter harvest areas all positive profits from economically operable stands were summed up by woodshed. These stands were available to support others within the same woodshed. The negative profit stands were added to the economically operable land base until the positive profit was used up.

Helicopter to land polygons were classified as uneconomic if the road building through conventional harvest areas to access these polygons were deemed uneconomic as per section 4.3.3.7.2.

4.3.4.8 Notes

- Previously harvested stands (conventional harvest) were considered economic by default. They were not used to support any other stand in a woodshed.
- It was expected that operational review would reveal any previously harvested stands that may not be economically operable.
- Previously harvested helicopter polygons were considered economic by default only if more than 30 % of the stand consisted, or was predicted to consist, of any combinations of Yc, Cw or Fd. Otherwise the stands were classified as uneconomic.
- As discussed before in this document, reactivation of roads within previously harvested areas was assumed to be economic with some exceptions (TSK).
- There was no blending of cut blocks between conventional harvest areas and helicopter harvest areas.

5 Results

5.1 Scenarios

Two scenarios were completed; one at a $0/m^3 export premium and the other at $30/m^3 export premium. For both scenarios the economically operable land base was determined at low, average and high historic prices; it was also determined separately for conventional and helicopter harvest areas.

Table 12 and Table 14 show the economically operable MWLB for each scenario by harvest method.

Table 13 and Figure 6 show a break-down of the economically operable MWLB area by leading species for the $0 export premium scenario. Figure 7 and Table 15 show the same break-down by leading species for the $30 export premium scenario.

In all cases, 60% or more of the economically operable area is hemlock or balsam leading.

Table 12: Economically Operable MWLB area, $0 export premium

Block	Low Prices			Avg Prices			High Prices		
	Conventional Harvesting	Helicopter Harvesting	Total	Conventional Harvesting	Helicopter Harvesting	Total	Conventional Harvesting	Helicopter Harvesting	Total
1	781		**781**	985		**985**	1,594		**1,594**
2	385		**385**	595		**595**	943		**943**
3	1,660	10	**1,670**	1,702	10	**1,712**	1,702	94	**1,795**
4	11		**11**	18		**18**	60		**60**
5	26		**26**	140		**140**	192		**192**
6	3,843	18	**3,862**	6,495	18	**6,513**	6,694	18	**6,712**
7	5,466	19	**5,485**	8,964	19	**8,983**	9,141	101	**9,242**
8	4,017	558	**4,575**	5,004	558	**5,562**	5,135	660	**5,795**
9	2,074	243	**2,317**	4,065	243	**4,307**	4,440	1,558	**5,998**
10	407		**407**	560		**560**	754		**754**
11	541		**541**	735		**735**	1,426		**1,426**
12	1,696		**1,696**	1,741		**1,741**	2,166		**2,166**
13			**0**	28		**28**	366		**366**
14	364	11	**374**	611	11	**621**	938	11	**948**
15	69		**69**	161		**161**	249		**249**
16	207		**207**	314		**314**	456		**456**
17	283		**283**	764		**764**	971	7	**978**
18	19,019	1,208	**20,227**	25,532	1,208	**26,741**	27,893	1,660	**29,554**
19			**0**	34		**34**	146		**146**
20	104		**104**	506		**506**	506		**506**
21	5,683	1,069	**6,752**	9,891	1,100	**10,991**	10,039	2,449	**12,488**
22	539	2	**542**	1,494	2	**1,496**	1,501	39	**1,540**
23	974	58	**1,033**	1,479	58	**1,538**	1,526	171	**1,697**
24	348		**348**	947		**947**	987	0	**988**
25	3,215	617	**3,831**	5,391	617	**6,008**	7,034	617	**7,651**

Block	Low Prices			Avg Prices			High Prices		
	Conventional Harvesting	Helicopter Harvesting	Total	Conventional Harvesting	Helicopter Harvesting	Total	Conventional Harvesting	Helicopter Harvesting	Total
26	539	39	**579**	1,360	39	**1,400**	1,912	125	**2,036**
27	19,095	2,524	**21,619**	28,230	2,524	**30,755**	30,010	3,657	**33,667**
28	5,747	1,158	**6,904**	8,741	1,158	**9,899**	15,816	1,416	**17,232**
29	96	34	**130**	847	34	**881**	1,940	77	**2,017**
30	327	0	**328**	1,944	0	**1,944**	1,949	0	**1,949**
Total	**77,518**	**7,570**	**85,088**	**119,278**	**7,600**	**126,878**	**138,485**	**12,661**	**151,146**

Table 13: Economically Operable MWLB Area by Leading Species, $0 export premium

Leading Species	Economically Operable Area (ha)		
	Low Price	Average Price	High Price
Cedar	9,078	18,766	22,516
Hemlock/ Balsam	50,671	71,757	88,694
Douglas Fir	18,701	28,582	31,089
Other	6,638	7,773	8,848
Total	**85,088**	**126,878**	**151,146**

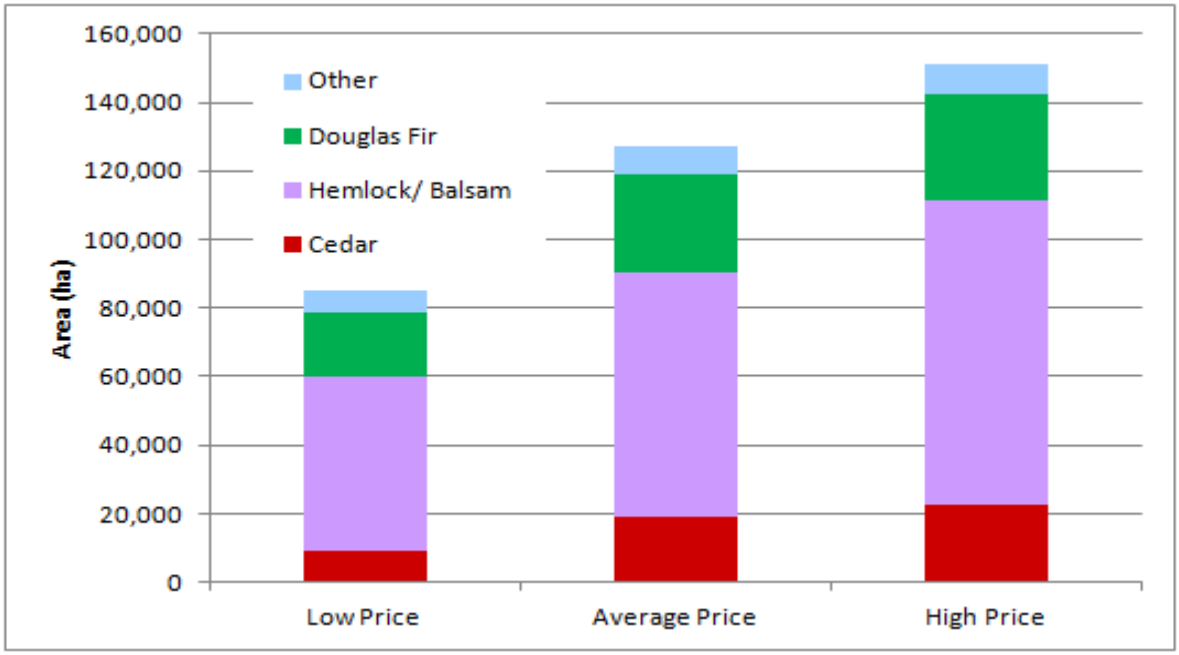

Figure 6: Economically Operable Area by Leading Species, $0 Export Premium

Table 14: Economically Operable MWLB area - $30 export premium

Block	Low Prices			Average Prices			High Prices		
	Conventional Harvesting	Helicopter Harvesting	Total	Conventional Harvesting	Helicopter Harvesting	Total	Conventional Harvesting	Helicopter Harvesting	Total
1	781		**781**	1,064		**1,064**	1,791		**1,791**
2	385		**385**	649		**649**	966		**966**
3	1,695	10	**1,705**	1,702	10	**1,712**	1,702	101	**1,803**
4	11		**11**	47		**47**	60		**60**
5	26		**26**	145		**145**	192		**192**
6	3,904	18	**3,922**	6,589	18	**6,607**	6,694	19	**6,713**
7	5,618	19	**5,637**	9,019	19	**9,038**	9,183	116	**9,299**
8	4,163	558	**4,721**	5,093	558	**5,651**	5,150	694	**5,844**
9	2,219	243	**2,462**	4,195	309	**4,504**	4,474	1,869	**6,343**
10	407		**407**	721		**721**	754		**754**
11	541		**541**	814		**814**	2,250		**2,250**
12	1,696		**1,696**	1,764		**1,764**	2,638		**2,638**
13			**0**	38		**38**	473		**473**
14	364	11	**374**	683	11	**694**	979	11	**989**
15	69		**69**	191		**191**	249		**249**
16	207		**207**	356		**356**	456		**456**
17	283		**283**	880		**880**	971	9	**980**
18	19,466	1,208	**20,674**	26,852	1,208	**28,061**	27,963	1,804	**29,766**
19			**0**	40		**40**	147		**147**
20	104		**104**	506		**506**	506		**506**
21	6,996	1,069	**8,065**	9,967	1,115	**11,082**	10,046	2,993	**13,039**
22	1,081	2	**1,083**	1,495	2	**1,497**	1,501	57	**1,558**
23	1,065	58	**1,124**	1,489	58	**1,548**	1,530	201	**1,731**
24	400		**400**	947		**947**	987	0	**988**
25	3,215	617	**3,831**	5,684	617	**6,301**	7,045	617	**7,661**
26	539	39	**579**	1,473	39	**1,512**	1,912	130	**2,041**
27	21,436	2,524	**23,961**	29,447	2,524	**31,971**	30,072	4,404	**34,476**
28	5,747	1,158	**6,904**	11,172	1,158	**12,330**	17,065	1,713	**18,778**
29	280	34	**315**	1,837	34	**1,871**	1,944	114	**2,058**
30	420	0	**421**	1,947	0	**1,947**	1,949	0	**1,949**
Total	**83,120**	**7,570**	**90,689**	**126,804**	**7,682**	**134,486**	**141,648**	**14,851**	**156,499**

Table 15: Economically Operable MWLB area by leading species, $30 export premium

Leading Species	Economically Operable Area (ha)		
	Low Price	Average Price	High Price
Cedar	9,627	19,444	23,045
Hemlock/ Balsam	52,276	78,340	92,425
Douglas Fir	22,135	28,725	31,904
Other	6,651	7,977	9,125
Total	**90,689**	**134,486**	**156,499**

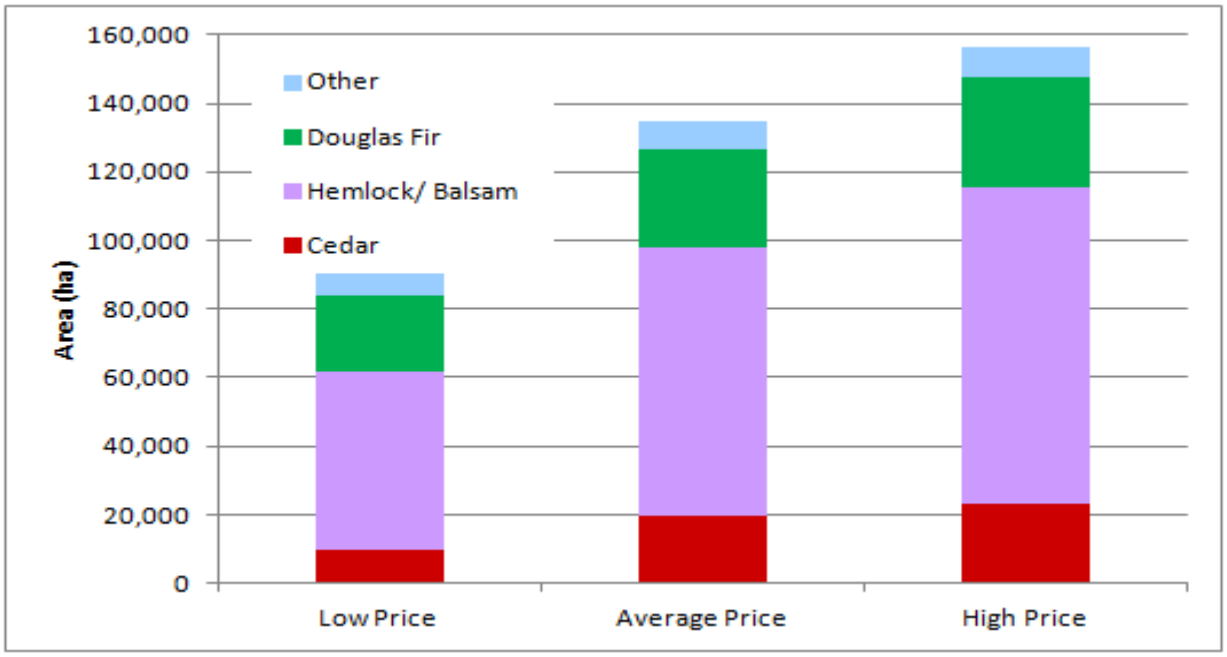

Figure 7: Economically Operable MWLB area by leading species, $30 export premium

5.2 Review of Results by Operational Staff

Spatial results for both the $0/m^3 and the $30/m^3 export premium scenarios using average historic prices were forwarded to the BCTS field staff for review. It was generally found that the $30/m^3 premium scenario was closest to operational reality; the somewhat larger economically operable land base often matched past harvest areas and recently laid-out harvest blocks better. The field teams flagged areas that were known to be economic or uneconomic. These changes were incorporated into the economic operability base case layer. No changes were made for areas that the operational staff was not familiar with.

In TSG only minor changes were made. In TST, more areas were changed to economically operable; the depletion coverage had missed some previously harvested stands and there were other stands that the analysis had classified uneconomic due to slightly overestimating the harvest costs. In TSK, additional areas were deemed uneconomic based on field review. The net result of the field team reviews was an increase in the overall economically operable land base of just under 3,000 ha.

Table 16 and Table 18 show the economically operable area after the field team reviews for the $0 and the $30 export premium scenarios. Table 17, Table 19, Figure 8, and Figure 9 show the economically operable area by leading species.

Table 16: Economically Operable MWLB area after field team review, $0 export premium

Block	Low Prices			Average Prices			High Prices		
	Conventional Harvest	Helicopter Harvest	Total	Conventional Harvest	Helicopter Harvest	Total	Conventional Harvest	Helicopter Harvest	Total
1	1,429		**1,429**	1,633		**1,633**	1,870		**1,870**
2	712		**712**	920		**920**	978		**978**
3	1,660	10	**1,670**	1,702	10	**1,712**	1,702	94	**1,795**
4	11		**11**	18		**18**	60		**60**
5	26		**26**	140		**140**	192		**192**
6	3,843	18	**3,862**	6,495	18	**6,513**	6,694	18	**6,712**
7	5,466	19	**5,485**	8,964	19	**8,983**	9,141	101	**9,242**
8	4,017	549	**4,566**	4,979	549	**5,528**	5,110	627	**5,737**
9	2,074	243	**2,317**	3,956	243	**4,199**	4,301	1,254	**5,554**
10	407		**407**	560		**560**	754		**754**
11	1,980		**1,980**	2,173		**2,173**	2,534		**2,534**
12	2,517		**2,517**	2,562		**2,562**	2,719		**2,719**
13	383		**383**	410		**410**	582		**582**
14	408	11	**418**	655	11	**665**	938	11	**948**
15	69		**69**	161		**161**	249		**249**
16	207		**207**	314		**314**	456		**456**
17	283		**283**	764		**764**	971	7	**978**
18	19,117	1,347	**20,464**	25,350	1,347	**26,697**	27,577	1,760	**29,337**
19			**0**	34		**34**	146		**146**
20	104		**104**	506		**506**	506		**506**
21	5,683	1,069	**6,752**	9,891	1,100	**10,991**	10,039	2,449	**12,488**
22	539	2	**542**	1,494	2	**1,496**	1,501	39	**1,540**
23	974	58	**1,033**	1,479	58	**1,538**	1,526	171	**1,697**
24	348		**348**	947		**947**	987	0	**988**
25	3,215	617	**3,831**	5,391	617	**6,008**	7,034	617	**7,651**
26	543	85	**629**	1,364	85	**1,450**	1,912	121	**2,033**
27	19,132	2,631	**21,763**	28,262	2,631	**30,892**	30,010	3,758	**33,768**
28	5,746	1,158	**6,904**	8,723	1,158	**9,881**	14,998	1,403	**16,401**
29	96	34	**130**	847	34	**881**	1,940	77	**2,017**
30	327	0	**328**	1,944	0	**1,944**	1,949	0	**1,949**
Total	**81,317**	**7,851**	**89,168**	**122,639**	**7,882**	**130,521**	**139,376**	**12,507**	**151,883**

Table 17: Economically Operable MWLB area by leading species, after field team review, $0 export premium

Leading Species	Economically Operable Area (ha)		
	Low Price	Average Price	High Price
Cedar	9,188	18,768	22,284
Hemlock/ Balsam	54,490	75,252	89,807
Douglas Fir	18,734	28,612	30,967
Other	6,756	7,888	8,825
Total	**89,168**	**130,521**	**151,883**

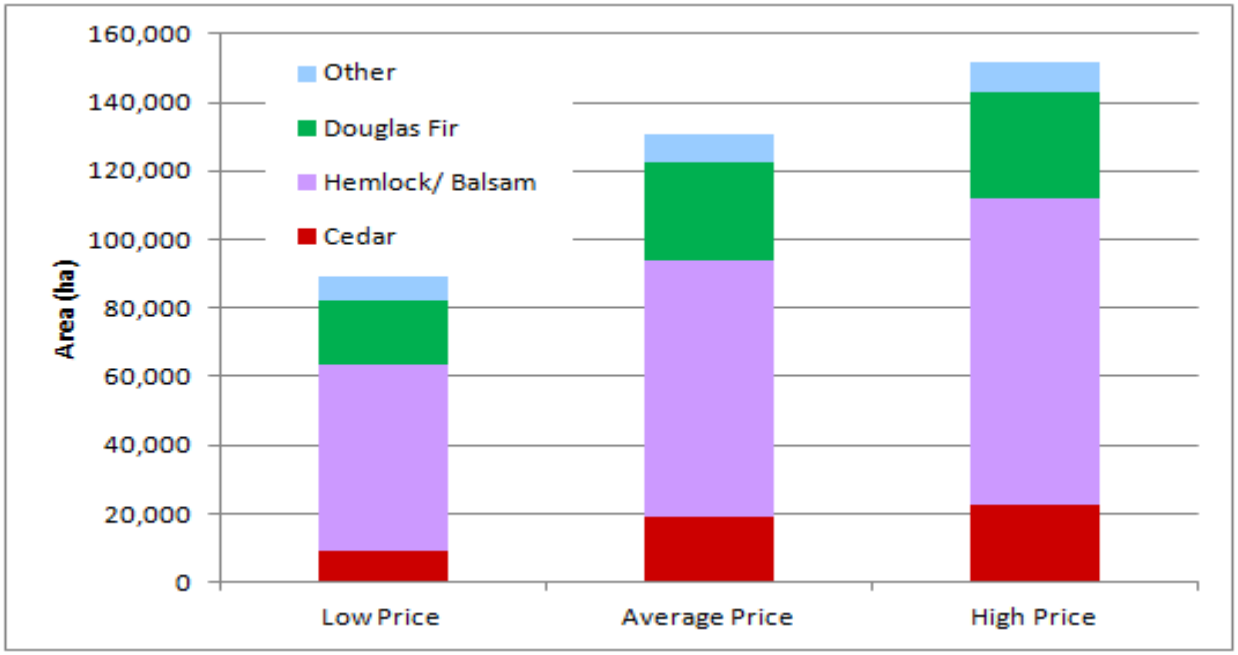

Figure 8: Economically operable MWLB area by leading species, after field team review, $0 export premium

Table 18: Economically Operable MWLB area, after field team review, $30 export premium

Block	Low Prices			Average Prices			High Prices		
	Conventional Harvest	Helicopter Harvest	Total	Conventional Harvest	Helicopter Harvest	Total	Conventional Harvest	Helicopter Harvest	Total
1	1,429		**1,429**	1,712		**1,712**	1,905		**1,905**
2	712		**712**	972		**972**	978		**978**
3	1,695	10	**1,705**	1,702	10	**1,712**	1,702	101	**1,803**
4	11		**11**	47		**47**	60		**60**
5	26		**26**	145		**145**	192		**192**
6	3,904	18	**3,922**	6,589	18	**6,607**	6,694	19	**6,713**
7	5,618	19	**5,637**	9,019	19	**9,038**	9,183	116	**9,299**
8	4,156	549	**4,705**	5,068	549	**5,616**	5,125	659	**5,784**
9	2,219	243	**2,462**	4,055	302	**4,356**	4,334	1,496	**5,830**
10	407		**407**	721		**721**	754		**754**
11	1,980		**1,980**	2,245		**2,245**	2,813		**2,813**
12	2,517		**2,517**	2,571		**2,571**	2,842		**2,842**
13	383		**383**	421		**421**	595		**595**
14	408	11	**418**	727	11	**738**	979	11	**989**
15	69		**69**	191		**191**	249		**249**
16	207		**207**	356		**356**	456		**456**
17	283		**283**	880		**880**	971	9	**980**
18	19,548	1,347	**20,895**	26,669	1,347	**28,017**	27,646	1,895	**29,541**
19			**0**	40		**40**	147		**147**
20	104		**104**	506		**506**	506		**506**
21	6,996	1,069	**8,065**	9,967	1,115	**11,082**	10,046	2,993	**13,039**
22	1,081	2	**1,083**	1,495	2	**1,497**	1,501	57	**1,558**
23	1,065	58	**1,124**	1,489	58	**1,548**	1,530	201	**1,731**
24	400		**400**	947		**947**	987	0	**988**
25	3,215	617	**3,831**	5,684	617	**6,301**	7,045	617	**7,661**

Block	Low Prices			Average Prices			High Prices		
	Conventional Harvest	Helicopter Harvest	Total	Conventional Harvest	Helicopter Harvest	Total	Conventional Harvest	Helicopter Harvest	Total
26	543	85	**629**	1,473	85	**1,558**	1,912	121	**2,033**
27	21,473	2,631	**24,104**	29,478	2,631	**32,109**	30,072	4,504	**34,576**
28	5,746	1,158	**6,904**	10,997	1,158	**12,155**	16,020	1,684	**17,704**
29	280	34	**315**	1,837	34	**1,871**	1,944	114	**2,058**
30	420	0	**421**	1,947	0	**1,947**	1,949	0	**1,949**
Total	**86,897**	**7,851**	**94,748**	**129,948**	**7,956**	**137,905**	**141,136**	**14,597**	**155,733**

Table 19: Economically Operable MWLB area by leading species, after field team review, $30 export premium

Leading Species	Economically Operable Area (ha)		
	Low Price	Average Price	High Price
Cedar	9,737	19,443	22,757
Hemlock/ Balsam	56,074	81,639	92,179
Douglas Fir	22,169	28,748	31,720
Other	6,769	8,074	9,077
Total	**94,748**	**137,905**	**155,733**

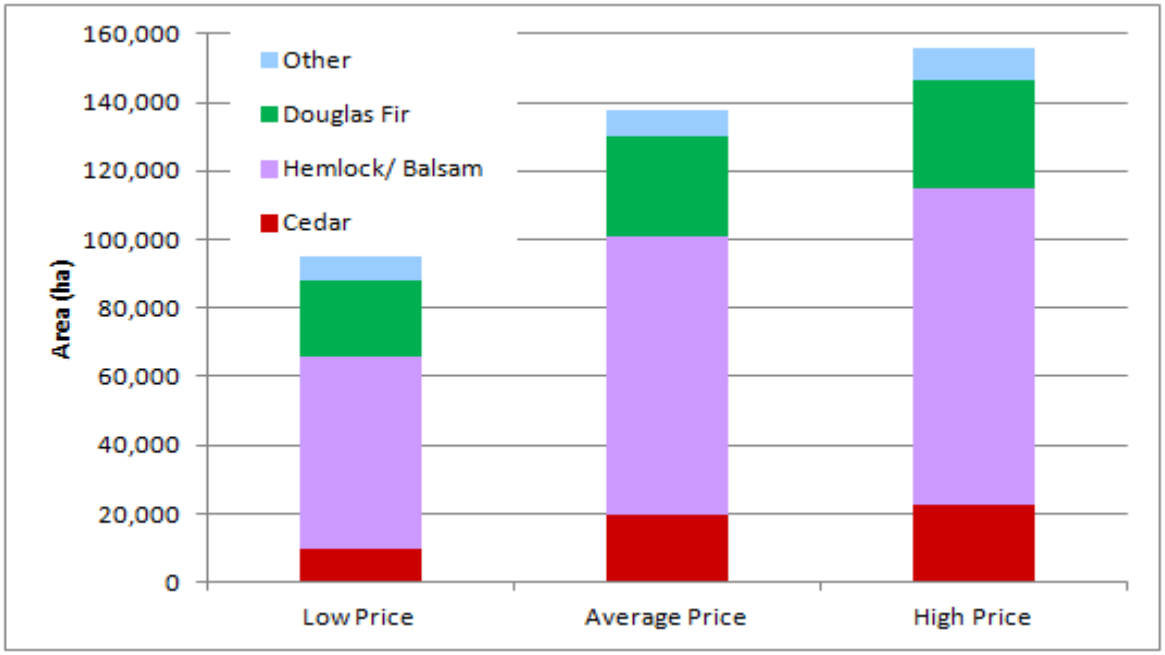

Figure 9: Economically Operable MWLB area by leading species, after field team review, $30 export premium

5.3 Synopsis and Application in TSR

5.3.1 Synopsis

The land base of the Pacific TSA of 698,041 ha was analyzed. A total of 244,132 ha were deemed to be inaccessible.

The maximum working land base was defined by removing stands that can never be candidates for harvesting, such as non-forest, private lands, parks, etc. from the land base. The total reduction was 415,757 ha; however, as this reduction overlapped with already reduced inaccessible areas, the net land base reduction was less at 171,591 ha with 282,318 ha remaining as the maximum working land base.

Costs and stand values were calculated for each forest stand; profit consists of the difference between the estimated stand value and the estimated cost to harvest the stand. Stands with a positive profit are considered economic to harvest. The economic operable land base can be expanded by harvesting profitable stands along with marginally unprofitable stands. This was simulated in the project by blending profitable stands with unprofitable stands after road costs were covered. Blending of stands can only occur within a woodshed. Woodsheds are spatially defined areas within the TSA that are tributary to the same appraised point of origin and are located within the same timber supply block. In this phase, 140,663 ha of forest were deemed inoperable and removed from the land base with 141,655 ha remaining as economically operable.

Results were reviewed by operational staff. Changes were made where appropriate. The changes resulted in a net increase of 2,891 ha bringing the economically operable land base to 144,546 ha. Not this entire land base is harvestable, as it includes areas that need to be removed as per current practises and legislation. These removals reduce the available land base for harvesting by 42,386 ha to 102,178. The remaining land base is called the THLB. A detailed description of the land base netdown is provided in the Pacific TSA Timber Supply Review Information Package, (Forest Ecosystem Solutions, 2015).

Table 20: Simplified area netdown, Pacific TSA

Description	Net Area (ha)	Gross Area (ha)
Total Pacific TSA	**698,041**	
Inaccessible Areas (from coarse filter)	(244,132)	(244,132)
Apply permanent, legally established and explicit 100% netdowns.	(171,591)	(415,757)
Maximum Working Land Base	**282,318**	
Economically Inoperable Area After Analysis	(140,663)	(140,663)
Area Added After Field Review	2,891	2,891
Economically Inoperable Area After Field Review	(137,773)	(137,773)
Economically Operable Land Base	**144,564**	
Complete THLB Netdown	(42,386)	(527,281)
Timber Harvesting Land Base	**102,178**	

5.3.2 Application in TSR

According to the BCTS operational staff, the scenario based on the $30.00 per m^3 export premium reflects their operational reality well. In the conventional harvest areas, the results from this scenario using average market prices will be used as the basis for the on-going timber supply review for the Pacific TSA and the associated THLB netdown.

Helicopter harvest areas in the Pacific TSA are generally considered marginally economic. It is assumed that harvest in most of these areas is economic only during the market cycles with high log prices. The TSR base case will analyze the helicopter harvest area separately to determine a sustainable harvest level from these areas. The economically operable land base for all helicopter areas will be based on the high historic prices and a $30.00 per m^3 export premium, with the assumption that a helicopter partition will be applied.

The total economically operable land base for use in TSR is 144,546 ha, made up of 129,948 ha of conventional harvest areas and 14,597 ha of helicopter harvest areas. As discussed above, the total economically operable land base is reduced to 102,178 ha, once a full land base netdown is applied to the TSA. The THLB of 102,178 ha consists of 92,811 ha conventional THLB and 9,367 ha of helicopter harvest THLB. The economically operable area and the THLB by Block are shown in Table 21. Table 22 summarizes the operable area and the THLB by leading species.

Table 21: Economically Operable Land Base for TSR

Block	Maximum Working Land Base (ha)			Timber Harvesting Land Base (ha)		
	Conventional Harvest	Helicopter Harvest	Total Economically Operable	Conventional Harvest	Helicopter Harvest	Total
1	1,712		**1,712**	1,275	0	**1,275**
2	972		**972**	776	0	**776**
3	1,702	101	**1,803**	1,102	66	**1,168**
4	47		**47**	5	0	**5**
5	145		**145**	62	0	**62**
6	6,589	19	**6,608**	4,755	10	**4,765**
7	9,019	116	**9,135**	6,663	79	**6,741**
8	5,068	659	**5,727**	3,731	448	**4,178**
9	4,055	1,496	**5,551**	3,070	998	**4,068**
10	721		**721**	615	0	**615**
11	2,245		**2,245**	1,779	0	**1,779**
12	2,571		**2,571**	2,026	0	**2,026**
13	421		**421**	314	0	**314**
14	727	11	**738**	544	8	**553**
15	191		**191**	111	0	**111**
16	356		**356**	244	0	**244**
17	880	9	**889**	631	0	**632**
18	26,669	1,895	**28,564**	21,440	1,400	**22,840**
19	40		**40**	29	0	**29**
20	506		**506**	424	0	**424**
21	9,967	2,993	**12,960**	7,629	1,823	**9,452**
22	1,495	57	**1,552**	1,154	48	**1,202**
23	1,489	201	**1,691**	1,162	163	**1,325**
24	947	0	**947**	800	0	**801**
25	5,684	617	**6,301**	2,450	346	**2,795**
26	1,473	121	**1,594**	966	74	**1,040**
27	29,478	4,504	**33,982**	18,095	2,646	**20,741**
28	10,997	1,684	**12,681**	7,862	1,188	**9,050**
29	1,837	114	**1,950**	1,499	69	**1,568**
30	1,947	0	**1,947**	1,602	0	**1,603**
Total	**129,948**	**14,597**	**144,546**	**92,811**	**9,367**	**102,178**

Table 22: Economically Operable Land Base by leading species

Leading Species	MWLB		THLB	
	Area (ha)	Percent	Area (ha)	Percent
Cedar	21,396	15%	13,984	14%
Hemlock/ Balsam	83,012	57%	62,485	61%
Douglas Fir	31,712	22%	21,555	21%
Other	8,425	6%	4,154	4%
Total	**144,546**	**100%**	**102,178**	**100%**

References

Ministry of Forests, Lands and Natural Resource Operations, Timber Pricing Branch, January, 2014. Coast Appraisal Manual. Includes Amendments 1 (March 2014), 2 (April 2014), 3 (August 2014) 4 (March 2015) and 5 (April 2015).

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