Economic Operability Implications of Stand Level Retention Recommendations Developed for the Central Coast and North Coast Land Use Planning Processes

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Crown Land Administration Division
Strategic Land Policy and Legislation Branch
Economic Analysis Section

Foreword

This report was developed in draft form in December 2004 to assess the possible implications of adopting Ecosystem-Based Management (EBM) objectives for the North and Central Coast of British Columbia. Further modelling and refinements were undertaken in 2005. *The reader should be aware that operational studies and trials applying EBM objectives have occurred on the coast since the time of writing, and that this report may not reflect more recent developments and understanding.*

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Any errors or omissions are solely the responsibility of the authors.

Table of Contents

Executive Summary

The Central Coast (CC) and North Coast (NC) Land Use Plan tables made recommendations to the provincial government about land use designations (such as protected areas) and about Ecosystem-Based Management (EBM) objectives. These types of measures could lead to higher operational costs for forest licensees, and consequently some timber volume that was previously economic may become uneconomic to harvest – the "operability effect". This report describes potential sources of increased costs and assesses their influence on economically available timber across the plan area.

BC Timber Sales (BCTS), major licensees and various staff from Ministry of Forests and Range (MFR) regions, districts and branches provided information during interviews conducted in April 2004. Based on the knowledge at the time of the EBM objectives, and experience implementing retention silviculture systems, government and industry staff expected that EBM could initially result in an increase in operational costs of between $\$3/m^3$ and $9/m^3$. Given higher fixed costs in more remote locations with marginally economic timber, staff expect that the North Coast plan area may be affected more by EBM requirements than would areas in the south Central Coast.

To assess the implications of EBM objectives and protected areas, an "operability model" was developed, which was based on the *Woodshed Model* for the Central Coast (Timberline 2000) as adapted by the authors to incorporate information obtained in staff interviews. The operability model generated results showing a weighted average cost increase due to implementing the EBM recommendations. In the model, the incremental stand level retention objectives under EBM increased overall operational costs by an average of $\$5.58/m^3$ in the Central Coast and by an average of $\$8.87/m^3$ in the North Coast. Associated with this, operable timber supply decreased by an average of 8% in the Central Coast and 16% in the North Coast.

The operable timber supply reductions occur because the proposed land use plan protected areas and landscape and stand level forest management objectives would reduce the size of the operable land base and constrain access to timber on remaining areas. It is expected that the number of economically viable woodsheds would decrease, that the economically operable timber volume and land base within each woodshed would decrease, and that additional pressure on harvesting cedar and higher quality stands would result. A shift in harvesting methods (from conventional cable to helicopter) would likely occur, as licensees attempt to offset fixed costs of roads and as changes are made in harvest patterns and silviculture systems.

Incremental costs expected under EBM ranged from $\$1.08/m^3$ in one landscape unit in the South Central Coast to over $\$21.37/m^3$ for a landscape unit in the North Coast. The expected reduction in operable volume as a result of EBM ranges from 0% in some landscape units in the South Central Coast to over 51% in one landscape unit in the North Coast. The range of impact depends on how net value in the landscape unit is affected by log prices relative to increased costs.

Provincial government stumpage revenue is expected to decrease as a result of implementing EBM. It is anticipated that initially the Coast Market Pricing System (MPS) may recognize only part of the projected cost increase, but that over time lower bids received on market volume at auction would result in reduced stumpage revenues.

BCTS and licensees will likely shift away from lower value timber and remain in the higher value stands that can accommodate the higher incremental costs associated with the EBM objectives.

The authors note the following caveats:

- This report considers only the implications of implementing the initial stand level retention EBM recommendations outlined by the CC and NC land use planning tables, and does not consider the full cost and operational impacts of the other proposed EBM objectives (such as riparian, old growth representation, cultural management), which also have the potential to affect stand value and operability.
- The impacts related to stand level retention may be greater than shown here, due to the aspatial nature of this analysis.
- Estimated costs may further increase incrementally if and when licensees adopt other aspects of the *EBM Planning Handbook*.

1. Introduction

Background

The planning tables for the Central Coast (CC) and North Coast (NC) land use plan (LUP) areas made recommendations to the provincial government with regard to land use designations (including protected areas) and implementation of Ecosystem-Based Management (EBM). The direct timber supply impacts of the plans were assessed by Fall and Morgan (2004) and Cortex (2004). However, those studies did not account for timber supply impacts that may occur due to the increased costs of implementing EBM.

An "operability effect" relates to timber volume that was previously economic to harvest, and which that becomes uneconomic due to increased costs. This report describes, for the CC LUP and NC LUP areas, the sources of increased costs and the manner in which those costs may reduce timber supply, associated stumpage revenue, and forest sector profitability in the area.

The CC and NC LUP planning tables recommended the following general EBM objectives that were quantified during timber supply modelling (Cortex 2004) and used to guide this analysis:

Retain:

- monumental cedar for First Nations cultural use;
- greater than 95% of red-listed ecosystems >60 years old;
- greater than 70% of blue-listed ecosystems >60 years old;
- greater than 15% stand level retention within cutblocks;
- greater than 90% of natural riparian forest adjacent to estuaries; and
- greater than a 1.5 tree height riparian buffer to adjacent High Value Fish Habitat in wetlands, active floodplains and active fluvial units.

In aggregate, the above objectives define "stand level retention" as considered in this report.

Methodology

The project was completed in three phases. First, interviews and consultations were held with Ministry of Forests and Range (MFR) district and branch staff to determine the cost pressures associated with implementing EBM objectives. After these pressures were quantified, a model was constructed in MS Excel to compare logging phase costs under current management and under EBM. Finally, the results from both the consultations and modelling were vetted with operational professionals to determine the plausibility of the results.

BC Timber Sales (BCTS) staff compiled cost information for representative chart areas to evaluate the implications of the LUP recommendations on BCTS programs. Interviews were conducted with staff from the BCTS Seaward-tlasta and Strait of Georgia Business Areas, with Coast Forest Conservation Initiative (CFCI) member companies, and with MFR's Economics and Trade Branch, Revenue Branch, and Coast Region office for timber valuation and appraisal information.

Licensee representatives discussed and verified information that was incorporated into the *Woodshed Model* produced for the CC LUP planning table (Timberline 2000). The model was then used to assess the potential reduction in the standing timber inventory (STI) resulting from protected areas, reserves, and management strategies under EBM, and the implications for stand level operability.

Timberline Forest Consultants were engaged to update the Central Coast woodshed analysis and query information from the North Coast to incorporate into the operability model. The model determined, based on a weighted average cost basis by landscape unit, the volume of timber that was economically available at different market levels given incremental costs expected under EBM. For the purposes of analysis, netdowns to standing inventory were considered and applied aspatially to volumes within each of the woodsheds. Additional more refined spatial analysis would be required to determine with more certainty *where* the likely cost-driven impacts would occur, and to what magnitude.

Caveats

The analysis discussed in this report provides insight into the relationships between applying EBM and related operational costs, operable volume, stumpage revenue and business implications. It should be noted that results are specifically related to stand level retention strategies proposed for the Central and North Coast planning areas and may not be applicable to other planning areas where different EBM objectives may be implemented. The analysis reported here should be interpreted to provide results that are general rather than precise. *Note: The results discussed in this report reflect the authors' understanding of EBM as of December 2004. While the text of this report has been updated to May 2007 as appropriate, none of the analysis and associated results have been updated since December 2004.*

2. Operational Costs

Cost Drivers

This study considers the extent to which fixed and variable costs would be higher under EBM than under current management requirements. The following EBM operational cost drivers were identified.

1. *Lower anticipated harvest volume to amortize fixed costs*.

   Fixed costs are those operational costs that remain constant, in total, regardless of changes in the level of timber harvesting activity. Fixed costs per cubic metre fall as harvest level increases, and are most significant in the bridge, road building and deactivation, dump/sort/scale, boom/barge, road maintenance, management, camp, accommodation and silviculture phases (with silviculture being more involved in barging, mobilization and demobilization of equipment to and from the harvested area).

   In this analysis, the protected areas are considered as established and integral to the implementation of EBM. Operable volume in each woodshed is therefore reduced proportionately to reflect the area of each woodshed affected.

   Initial licensee and BCTS estimates forecast that there could be a stand level reduction in STI of 3%-7%, depending on management unit, as a result of meeting EBM stand level objectives. The Cortex (2004) analysis indicates a reduction of 24% in short-term timber supply due to proposed protected areas and efforts to meet the EBM landscape level objectives.

The 24% projected reduction in timber supply volume comprises 8% due to protected areas and an additional 16% due to the EBM objectives recommended by the planning tables. Forest industry representatives indicated an expectation that stand level retention would result in an additional "creep" of retention over and above that recommended by the planning table, due to incremental limits of equipment, topography, harvest layout and design issues.

As there would likely be little or no change in total fixed costs required to develop a harvest area, it is expected by industry and BCTS that the fixed cost portion of operational unit cost could increase by as much as 20%. (The same fixed cost would be spread over a smaller volume). Please see the Section "*EBM Cost Estimate*" below for more information.

2. *Additional stand level retention requiring additional forest management effort*.

   Variable costs are those that vary, in total, in direct proportion to changes in the level of timber harvesting activity. Generally, the influence of EBM on phase costs is greater in tree-to-truck (conventional and helicopter), load/haul and crew transportation phases. This influence on conventional systems, as is determined later in developing roads and infrastructure, will likely pressure a shift in harvest methods away from conventional cable systems under EBM.

   Incremental planning/layout effort and additional road development will be required to log around additional stand level retention patches. Licensees describe a shift from conventional (higher fixed costs) to helicopter (higher variable cost) systems where sufficient economic margin was available. Extra costs are incurred in some cases (i.e. windthrow assessments and treatments). At the time of writing, market value was less for second growth timber, retention requirements could also affect the stand level operability of second growth stands – a licensee operating primarily in second growth in Johnstone Straits indicated that EBM will reduce the operable timber available per unit of road constructed from 11,000 m^3/km to 8,500m^3/km.

3. *Shifts in harvest profile due to EBM landscape and stand level requirements*.

   Landscape and stand level retention requirements will pre-determine the timber profile available for harvest. Retention of timber types with high ecological value normally coincide with larger dimension higher quality timber types. This is expected to effectively reduce overall average log volume by cutting permit once reserves and retention strategies have been applied.

   A reduction in average log volume (and value, as higher value timber is distributed in these reserves as well) will tend to increase variable log cost (same or more effort handling pieces for a lower volume return) and thereby reduce profitability. Licensees "retrofitting" Forest Practice Code cutblocks to EBM cutblocks usually do not have the opportunity to increase cutlbock size to offset incremental stand level retention under EBM.

4. *Application of Market Pricing System (MPS) stumpage determination*.

   Some of the incremental costs due to EBM will be incorporated into the calculation of the Estimated Winning Bid rate under the current Coast Appraisal Manual (as at February 2004). Timber Sale Licence (TSL) winning bids will influence stumpage determination if the incremental variable costs associated with EBM are explicitly recognized in their bids. In the case where the MPS has determined a minimum stumpage rate for a TSL or cutting permit, then the full cost of EBM is expected to result in a \$3-\$9/m^3 reduced bid from the TSL

holder or be borne by the licensee. If the stand is already financially marginal, additional costs under EBM are expected to make the area uneconomic to harvest under average market conditions.

5. *Learning curve associated with a new concept in forest management*.

   The application of EBM objectives will require the transition of operational plans to address management objectives that will result in a learning curve throughout many aspects of forest operations management beyond operational planning. As with any learning curve, higher operational costs are expected in the short term (i.e. additional supervision costs and lower productivity) with an easing off in costs in the longer term as experience is gained with the management system.

EBM Cost Estimate

BCTS staff provided incremental EBM cost estimates based on stand level planning requirements. For the sales administration, planning, road development and silviculture phases, EBM is expected to result in cost increases of $\$2.41\text{-}4.45/m^3$. In addition, staff estimated that EBM will increase TSL holders' harvesting costs by $\$1\text{-}4/m^3$. This suggests a total effective cost increase in the range of $\$3\text{-}9/m^3$. This range is generally consistent with the results of the Fraser Reach pilot project (Fraser Reach 1 at $\$7.80/m^3$; Fraser Reach 2 reported to be nearer $\$5/m^3$), and consistent with incremental harvest and development costs of $\$3\text{-}6/m^3$ experienced by Weyerhaeuser using variable retention silviculture systems.

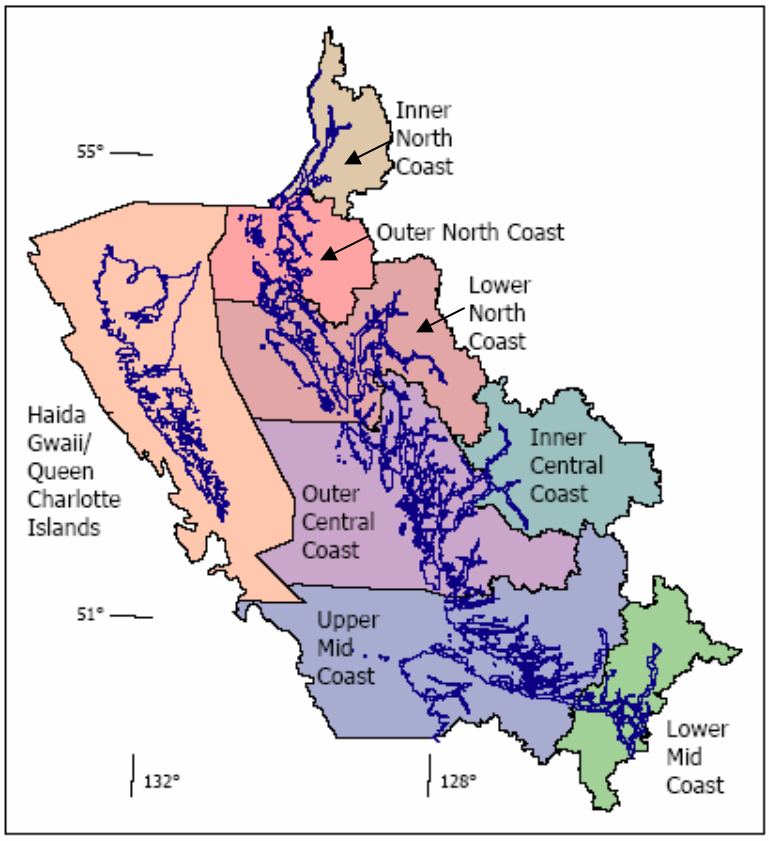
Major licensees interviewed could not project what (if any) the incremental cost difference between EBM and Variable Retention would be, but agreed that there would be reduced volume per kilometre of road development and harvesting productivity, as well as some additional inventory and assessment costs, e.g. windthrow assessment and treatment requirements.

Recent economic operability analysis indicates that Ecosystem Based Management (EBM) would increase operating costs in the Central Coast LMRP area by $\$5.58/m^3$ on average. In the North Coast LUP area, EBM is projected to increase overall harvesting costs by $\$8.87/m^3$ on average. These results are not definitive, and should be interpreted as providing an indication of short term cost increases and downward pressure on timber supply as a result of incremental stand level retention objectives implemented under EBM.

Operability

For this analysis, the stand level retention objectives modelled reflect those management objectives negotiated in Government-to-Government consultation regarding LUP table recommendations at the time this analysis work was done.

Figure 1. Subregions of North and Central Coastal British Columbia.



Central Coast and North Coast LUP plan areas

The Central Coast and North Coast LUP areas are described generally as six distinct bio-physical regions of ecological and geologic similarity, labelled in Figure 1 as Inner North Coast, Outer North Coast, Lower North Coast, Outer Central Coast, Inner Central Coast, and South Central Coast (bringing together Upper and Lower Mid-Coast).

Central Coast Analysis

Two scenarios, described below, were run through an operability model developed by the Ministry of Sustainable Resource Management (now the Ministry of Agriculture and Lands and the Integrated Land Management Bureau) to determine the effects of incremental retention on costs and the resultant impact on operable volumes.

Scenario 1 describes the effect on operable timber supply of an increase in average costs of $5.58/m^3 as a result of EBM at the top of market prices for logs on the Vancouver Log Market. Theoretically, the volume available under this scenario describes the total profile of economically available timber for harvest.

Scenario 2 examines the impact on operable timber supply of the increase in average costs of $5.58/m^3 as a result of EBM when Vancouver Log Market prices are at the mid-cycle range.

1. Top of market prices for all species and grades.

The results of this scenario indicate that although there is an average cost increase of $5.58/m^3 (with a range of $1.08/m^3 to $22.75/m^3), almost all of the volume available on the Central Coast remains economically viable.

This result suggests that the current operable land base as defined in the timber supply review process is likely appropriate, if the objective is to include all timber that would be economic to harvest over time based on historic prices. However, because log markets fluctuate and log prices are usually below "top of market" levels, a second scenario was run to determine economic operability impacts at lower price levels.

2. 10 year average species and grade values.

In this case, results indicate that the average cost increase of $5.58/m^3 (with a range of $1.08/m^3 to $22.75/m^3) affects the economic viability of accessing the standing timber inventory at mid-cycle price levels by an estimated 8.0% (with a range of 0% to 19% by woodshed over the plan area). In Table 1 below, the "Projected Operability Impact" shows the reduction in available standing timber due to higher costs making the low value or high cost species and grades uneconomic to harvest.

	Mid-Cycle Prices Operable Volume	Wtd Avg Cost of EBM	Projected Operability Impact	Volume Remaining Operable under EBM
Inner Central Coast	66%	$6.15	13%	53%
Outer Central Coast	82%	$5.80	9%	74%
South Central Coast	92%	$5.30	5%	87%
Overall CCLRMP Operability	**82%**	**$5.58**	**8%**	**74%**

Table 1. Relative loss of economic access to timber in the CCLUP plan area as a result of increased costs under EBM at mid-cycle prices

Table 2 below describes how economic operability impacts influence the relative value and costs by bio-geographic region. Costs are broken down to reflect the fixed and variable costs associated with all phases of administration, harvesting and regeneration of timber. The overall "Conversion Return" (the average net value of all timber in each sub-region) for the Central Coast plan area decreases by $5.46/m³ as a result of EBM.[1]

	Current Conditions Operating Costs				EBM Operating Costs			
Area	Current Fixed Costs	Current Variable Costs	Current Total Costs	Current Conversion Return	EBM Fixed Costs	EBM Variable Costs	EBM Total Costs	EBM Conversion Return
Inner Central Coast	$16.61	$76.95	$93.56	$7.52	$19.21	$80.50	$99.71	$1.37
Outer Central Coast	$17.46	$60.13	$77.59	$17.87	$20.08	$75.67	$95.75	$12.19
South Central Coast	$17.10	$59.56	$76.66	$27.52	$19.17	$62.80	$81.96	$22.40
Overall CCLRMP Area	**$17.11**	**$68.37**	**$85.48**	**$19.25**	**$19.50**	**$71.56**	**$91.06**	**$13.79**

Table 2. Relative value of areas in the CCLUP plan area under current operating costs and EBM operating costs at mid-cycle prices

Table 2 shows that costs increase proportionately more in the higher cost areas (Outer and Inner Central Coast). In those areas, fixed costs (already higher than in the South) are affected as less volume is available over which to amortize those higher fixed costs.

North Coast LUP plan area

For the North Coast area, Timberline Forest Inventory Consultants constructed a model to isolate the likely operability impacts consistent with the Central Coast Scenario 2 and differentiate EBM costs based on the bio-geographic areas outlined in the northern portion of Figure 1.

[1] Note that the Conversion Return is not net of stumpage – it is a measure of the surplus value to which the market pricing stumpage (MPS) system may then be applied.

Scenario 2 was run for the North Coast model (with mid-cycle prices) to determine the effect of incremental stand level retention on operational costs for the more northern plan area.[2] Table 3 (similar to Table 1), shows that EBM would increase operational costs in the NC LUP area on average by $8.87/m³ (with a range of $4.86/$m^3$ to $21.37/$m^3$ by woodshed), and reduce economically operable timber volume by 16.4% (with a range of 0% to 51% reduction by woodshed over the plan area).

	Currently Operable@ Mid-Cycle Prices	Wtd Avg Cost of EBM ($/m3)	Operability Impact	EBM Operable @ Mid-Cycle Prices
Inner North Coast	33%	$12.47	15%	18%
Outer North Coast	74%	$8.65	17%	57%
Lower North Coast	89%	$8.74	14%	75%
Overall	**70%**	**$8.87**	**16%**	**54%**

Table 3. Relative loss of economic access to timber in the North Coast plan area as a result of increased costs under EBM at mid-cycle prices

Again, the increases in costs due to EBM are a function of:

- increases in fixed costs due to reduced volume over which to amortize them, and
- the incremental effort required to administer, plan, design, harvest and regenerate forests under EBM.

Table 4 (similar to Table 2) below outlines the operating costs in the NC LUP under current operating conditions and under EBM.

	Current Conditions Operating Costs				EBM Operating Costs			
	Current Fixed Costs	Current Variable Costs	Current Total Costs	Current Conversion Return	EBM Fixed Costs	EBM Variable Costs	EBM Total Costs	EBM Conversion Return
Inner North Coast	$25.96	$88.81	$114.76	-$4.45	$29.53	$84.71	$114.24	-$18.24
Outer North Coast	$20.51	$90.32	$110.83	-$6.65	$22.57	$93.08	$115.65	-$10.94
Lower North Coast	$19.77	$82.21	$101.98	-$3.47	$24.35	$84.60	$108.95	-$9.30
Overall	**$20.73**	**$87.34**	**$108.08**	**-$5.79**	**$23.36**	**$90.60**	**$113.95**	**-$10.45**

Table 4. Relative value of areas in the NCLUP plan area under current operating costs and EBM operating costs at mid-cycle prices

It is interesting and necessary to note that, in aggregate, most of the landscape units in the North Coast are inoperable and result in a negative conversion return overall where EBM will reduce the average value of all stands by $4.66/$m^3$. Under EBM, as there will be less area that retains positive value, the area will not economically support current harvest levels and therefore there would likely be operational impacts as well. Work needs to be done to understand if the operational impacts will differ significantly from the timber supply level impacts outlined in Table 3.

There will be a learning curve in adopting EBM that will affect short run economic efficiency of the industry. However, over time operations will likely shift their approach and find some efficiencies in their methods and management strategies that may partially offset increased costs and improve profitability. Actual costs and resultant operability impacts will need to be monitored and assessed in implementation, feeding back into adaptive management processes at the core of EBM.

[2] The net value of stands in each of the woodsheds is based on an estimate of mid-cycle log prices for the species and grades historically harvested from the area.

Operational Cost Summary

Based on the identified cost drivers, limited cost data and estimates compiled from BCTS and major licensee staff, the application of the proposed stand level EBM management objectives could result in an incremental EBM cost of \$3-9/m^3, depending mostly on factors associated with bio-geographic location. This estimate is based on assumptions on how each of the proposed EBM management objectives will be implemented. Any discrepancies or misinterpretations that affect the volume available in each woodshed would directly affect costs further.

EBM cost estimates are confined to the objectives relating to stand level retention incremental to current practice. Additional costs should be expected if and when other aspects of EBM (such as additional volume retention or increased effort) are adopted.

3. Operable Volume

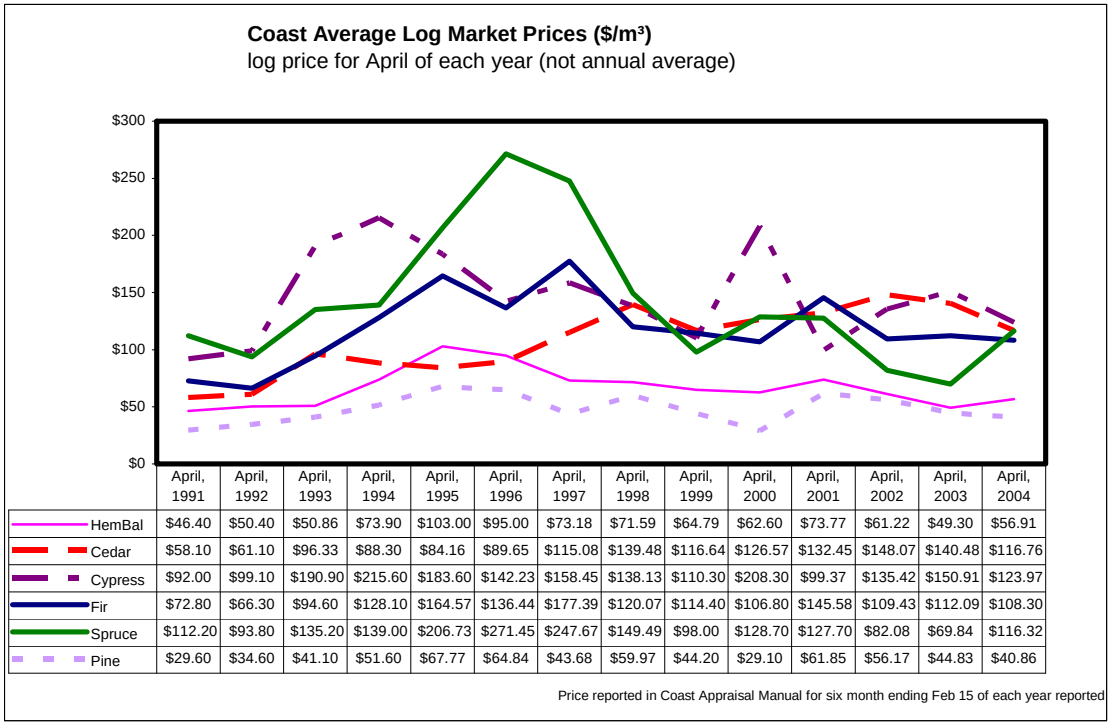
Operational Volume Drivers

Operable volume in this analysis is a function of determining the gross volume of the existing standing inventory, netting out protected areas and EBM stand level retention requirements and determining the net volume (by historical species and grade[3]) that remains economically operable within each woodshed. A model was constructed to identify the maximum volume within each woodshed that could be harvested with an aggregate positive value, based on historical market levels (see next paragraph). The model then systematically eliminated lowest value species/grade volumes until the residual aggregate value was positive. High value timber in this analysis is assumed to enable low value timber to be harvested, leaving the lowest value wood that cannot be subsidized as residual and uneconomic once the overall net conversion return for the area drops to zero. In effect, this "bundling" of lower value wood with higher value wood subsidizes the opportunity for this volume to be available to the market.[4] If bundling of the low and high value wood is not considered in modelling, the likely impact would be more dramatic.

In the following analysis, historical market levels are used to determine the likely impacts. In 1997, market prices for all species were above average and there was a higher than average total harvest from the CC LUP area. In 2000, market prices and harvests were close to averages for the past 15 years, except for cedar (for which 2000 prices were considerably higher than average). In 2003 all species values were below average market prices, except cedar again, which had an above-average price. See Figure 2 below for a summary of market prices by species on the Vancouver Log Market.

[3] As tools are not currently available to accurately predict value by grade and species for existing stands of timber using inventory information, historical data is used to approximate relative value.

[4] This may determine what is economically available, however market price is much more of a determinant of operable available timber volume. Licensees also are not obligated to "harvest the profile" of timber that is economically available.



	April, 1991	April, 1992	April, 1993	April, 1994	April, 1995	April, 1996	April, 1997	April, 1998	April, 1999	April, 2000	April, 2001	April, 2002	April, 2003	April, 2004
HemBal	$46.40	$50.40	$50.86	$73.90	$103.00	$95.00	$73.18	$71.59	$64.79	$62.60	$73.77	$61.22	$49.30	$56.91
Cedar	$58.10	$61.10	$96.33	$88.30	$84.16	$89.65	$115.08	$139.48	$116.64	$126.57	$132.45	$148.07	$140.48	$116.76
Cypress	$92.00	$99.10	$190.90	$215.60	$183.60	$142.23	$158.45	$138.13	$110.30	$208.30	$99.37	$135.42	$150.91	$123.97
Fir	$72.80	$66.30	$94.60	$128.10	$164.57	$136.44	$177.39	$120.07	$114.40	$106.80	$145.58	$109.43	$112.09	$108.30
Spruce	$112.20	$93.80	$135.20	$139.00	$206.73	$271.45	$247.67	$149.49	$98.00	$128.70	$127.70	$82.08	$69.84	$116.32
Pine	$29.60	$34.60	$41.10	$51.60	$67.77	$64.84	$43.68	$59.97	$44.20	$29.10	$61.85	$56.17	$44.83	$40.86

Figure 2 Composite species log prices on the Vancouver Log Market for 1991-2004

In the presentation of results in this report, 1997, 2000 and 2003 market years are used to depict actual, experienced market scenarios for operable volume available (total supply) from the plan area. The higher value for cedar in 2003 allows for *more* lower-value wood to be economic than in 2000 when the prices for cedar were lower and the difference between cedar and hembal was markedly less.

The key drivers in determining the available operable volume are outlined below:

1. *Protected Areas;*
2. *EBM Reserves and Management Strategies;*
3. *Operational Costs; and*
4. *Market Factors.*

Protected Areas

Protected Areas set aside from harvesting represent the largest netdown to operable standing timber. If the protection package in the CC LUP was applied to the net operable timber land base derived using 1997 log market price levels, approximately 21% of the operable standing timber inventory in the CC LUP area would be physically unavailable. If the same protection package was introduced at 2003 log market price levels, the Protected Areas would net out 32% of the operable standing timber inventory. This sensitivity is a function of less opportunity to cross-subsidize lower value volume due to lower market prices for all volumes.

In Table 5 depicted below, note that there is a significantly greater impact due to a higher proportion of protected areas in the outer coast north of Cape Caution than in the inner northern coast and area south of Cape Caution in the CC LUP (per the October 2004 LUP table proposal). Protected areas proposed for Part 13 netdowns in the northern outer coast represent over 36% of the operable timber

in the area at 1997-2003 average log market price levels. The high value timber in these areas will be unavailable to cross-subsidize adjacent areas in the woodshed, and can have a compounding effect on the viability of the woodshed as a whole.

Biogeographic Sub-Region	PA %
North of Cape Caution, Inner Coast	22%
North of Cape Caution, Outer Coast	36%
South of Cape Caution	4%
Total (in aggregate)	21%

Table 5. Protected Area distribution of netdown at average historical market levels (by area)

Balanced against the 22% and 4% foregone in the north inner and south Central Coast respectively, this sums to 21% of the operable timber in the entire plan as being in protected areas as a result of the plan.[5]

EBM Retention and Management Strategies

The EBM objectives introduced in the LUPs establish stand level retention strategies that are greater than that required under the *Forest Practices Code* or the *Forest and Range Practices Act*. Current retention at the stand level (prior to EBM implementation), as reported by industry and government, ranges between 8-12% and considers adjacent reserves outside the harvest area as contributing to in-block retention requirements. The range is the result of variation in biogeoclimatic zone and natural disturbance type requirements for Wildlife Tree Patch and Riparian Management Area retention requirements.

For the timber supply analysis, an assessment conducted by MFR Coast Region indicated that only 3.86% of volume on average is left standing in-block on the Central Coast, with adjacent reserves not contributing to in-block retention (e.g. riparian management areas, WHAs, UWR, unstable terrain). These areas are considered separately in the timber supply analysis conducted by Cortex Consultants (2004).

Under EBM, management strategies consider a minimum of 15% stand level retention which, according to MFR, would reduce available volumes incrementally by 11% (licensees report a creep in effective retention up to 19% due to site factors influenced by the pattern of natural features, operational constraints and safety concerns). As described in the first section of this report, operational costs are likely to increase given the increased planning, development and harvesting effort required applied over lower Annual Allowable Cut (AAC) and stand level volumes.

Operational Costs

To determine the effect of operational costs in the modelling exercise, the historical species and grade profile harvested from the CC LUP area was used at first to determine the market value of timber available for harvest - it should be recognized that the remaining timber is often of lower quality than that harvested in the past. A sensitivity run in the model determined cost increases due to EBM reduced the standing timber inventory (STI) by <1-14% depending on operating area. This impact however, is not likely to be apparent in the areas south of Cape Caution (<1-4% impact) and may be more significant (from 4 to 14+%) on the inner coast north of Cape Caution as a result of those factors driving operational costs listed above.

[5] As of May 2004, Protected Areas boundaries were adjusted during Government-to-Government discussions with First Nations to accommodate their interests; however these changes do not substantively change the overall estimates.

Figure 3 below depicts the netdown in STI due to Protected Areas and stand level retention as a result of increased costs under EBM basing timber values on 2000 log market prices. Note how the North Inner Central Coast line is much more sensitive (steeper at higher costs) than the area South of Cape Caution, likely because of a lower timber value profile, higher phase costs and higher fixed costs required to access timber in the area.

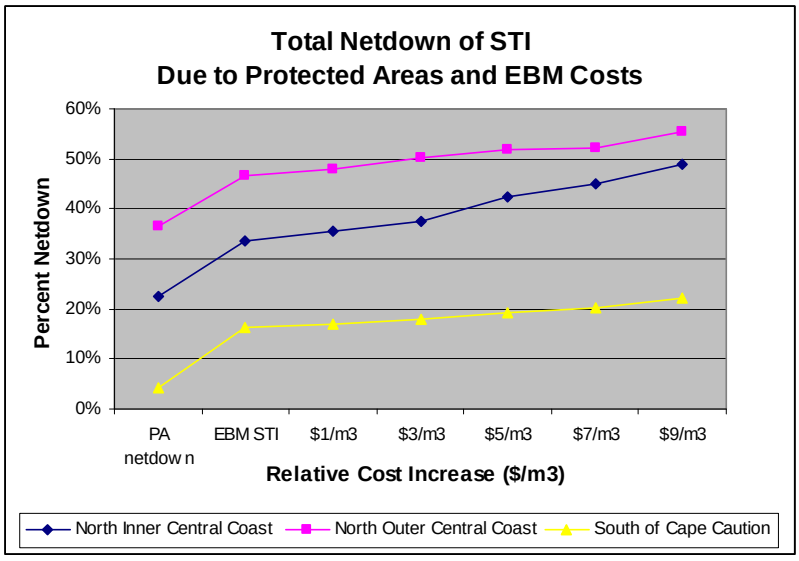


Figure 3. Operable STI under various EBM costs relative to the total THLB STI available without EBM cost considerations

In applying the operational cost increases to all phases in all 158 woodsheds in the CC LUP area, the overall stand level operability impact averages out to 8.01% overall. This variability of the total plan netdown among the three bio-geographic areas is mostly the result of losing a more significant volume of timber in protected areas on the outer northern Central Coast and a larger amount of lower value timber on the inner northern Central Coast plan areas. Managing the STI will be further compounded by boundaries associated with management units (TSA and TFL boundaries) in determining a timber supply for the areas. Further analysis and EBM pilot projects will provide more confidence in these estimates.

Even with low markets and higher costs associated with EBM, there is still a significant volume of operable standing timber inventory available in this analysis. This outlines the absolute need to determine the species, age class, and grade distribution remaining and the resultant impact on timber supply to determine how this sensitivity to changes in markets and relative valuation of the standing timber inventory will affect annual economically available harvest levels.

As depicted in the Table 3, increasing reserves and in-block retention by 11% will have an additional impact on economically available timber as a result of incremental cost increases. This impact is likely higher in the more cost sensitive marginal timber supply areas north of Cape Caution since most of those areas are already uneconomic or marginally economic under most market conditions. The effects of EBM on marginal timber supply areas are elaborated further in the Business Implications section.

As EBM-related cost increases *may* have profound impacts on the size of the economically accessible timber inventory, on future industry profitability, and on government revenues, more specific analysis by management unit, landscape unit and/or operation is warranted.

Market Factors

Market prices are the dominant factor determining the economically harvestable volume by species and grade. In determining the volume that would be affected by increased costs under EBM, a benchmark of market prices is required as the basis for comparison. The years 1997, 2000 and 2003 were chosen to highlight how independent and volatile market prices can be and how stand level operability through cross-subsidization depends not only on relative differences in value, but also on the market price for the subsidizing species.

Figure 3 above represents shifts in economic profile for the entire Central Coast LUP area based on increases in delivered wood cost. Figure 4 below illustrates the effect in the more marginal operating areas. Most significant in Figure 4 is that between 1997 and 2003 market price years there was a drop in hemlock prices, determining most of the impact shown below. Uneconomic hemlock and balsam together increase from approximately 3% residual to almost 12% residual standing inventory that cannot be subsidized by higher value timber.

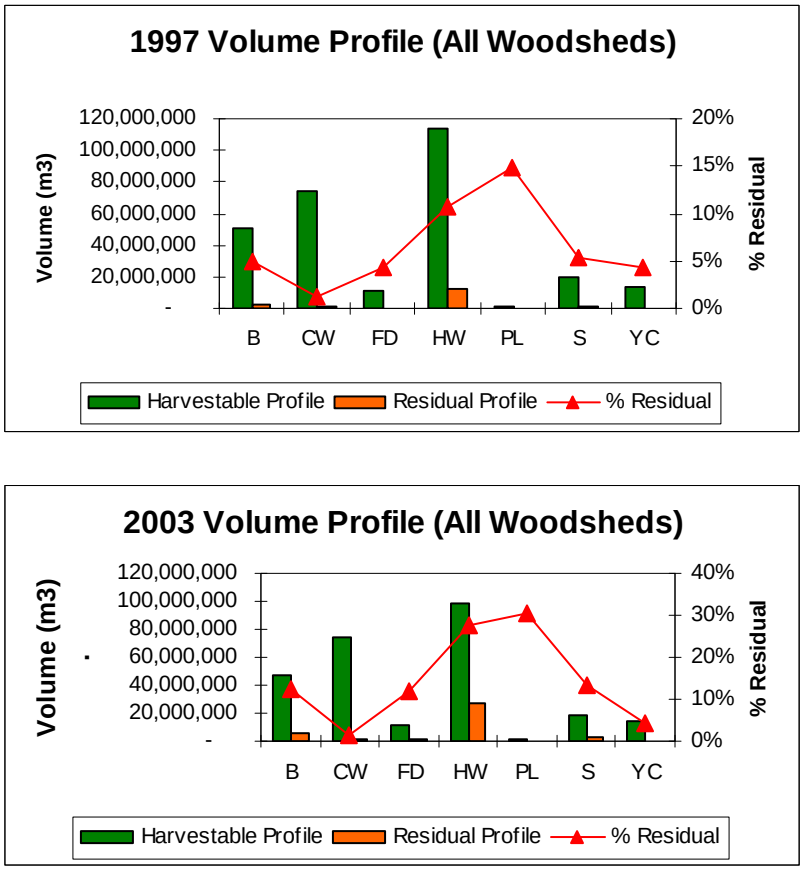


Figure 4. Economically harvestable (economic) and residual (uneconomic) volumes in 1997 and 2003

The shift in operable volume at this landscape scale of analysis is difficult to project as many factors and economies of scale affect the accessibility of timber volume from the area. This analysis takes a basic approach in determining how much below-market value volume can be harvested (subsidized by the higher value wood by bundling) to the point that the volume to be harvested within a woodshed has a marginally positive value. Thus, more residual volume in 2003 in the graphs in Figure 4 above is partly because the lower value in cedar, Douglas fir and spruce does not allow for the magnitude of bundling required to maintain financial viability in the more marginal timber.

Figure 5 below illustrates how sensitive the economic profile of the timber supply in the Central Coast plan area can be to market levels and increased costs. The shift in the yellow line (labelled below as Poly 2000) describes a lower value year for the subsidizing species, hence less marginal volume can be subsidized. The average (black line) is what was initially used to determine the relative impact of cost increases for the CC LUP area. Updates to the model in 2005 concluded those impacts described in Section 2 of this report.

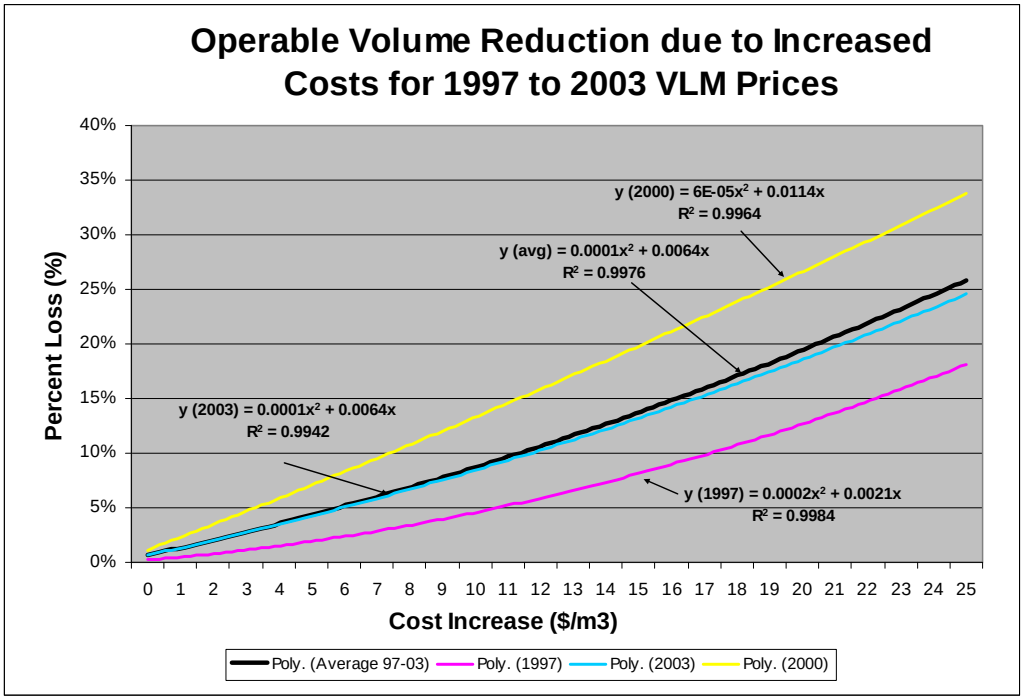


Figure 5. Sensitivity of operable volume to markets, protected areas, stand level retention, and the sensitivity to incremental costs under EBM

Figure 5 illuminates the effect of market levels on timber availability by operating area under the plan. Market sensitivity is most pronounced in the northern inner Coast portion of the CC LUP area, whereas the southern portion of the plan area shows less sensitivity and the outer northern coast seems to not be sensitive to market levels due to a low component of low value HemBal relative to other areas.

Operational Volume Summary

The currently available volume in the CC LUP area will be reduced as a function of the protection areas, reserves and stand level retention strategies proposed in the plan, and likely as a result of the cost difference resulting from plan recommendations. The majority of the volume impact is as a result of establishing protected areas, while the remainder of the operational impact results from stand level retention strategies reducing available economic volume, thereby increasing operational costs.

Those areas with better quality wood and lower total costs such as in the area south of Cape Caution will not likely see as significant a shift in stand level operability as those areas north of Cape Caution when the proposed management objectives are adopted and market levels fluctuate.

The "operability effect" of the plan is projected to impact an additional 8% of economically available volume in the Central Coast plan area, with a range of less than 1% in high markets with low costs on the south Central Coast, to over 62% in low markets and high costs in the more marginal timber supply areas of the inner north Central Coast plan area. The potential effect of EBM on short-term timber supply could be examined by incorporating the projected reduction in the standing inventory into subsequent timber supply modelling.

In the NC LUP area, incremental EBM costs are expected to be significantly more than the current North Coast MPS rate can recognize (projected at $\$2.18/m^3$, there is no room to recognize $\$8.87/ m^3$ in costs) and industry would then shoulder the burden of extra costs not recognized. It is, therefore, expected that operational volume impact within the NC plan area could be more than that identified for the CC LUP area if stand level retention requirements are similar to that in the Central Coast.

While timber supply can be maintained at the current AAC for the short term, the reduction in available inventory will reduce flexibility to absorb other uncertainties, and may require increased efforts to locate suitable timber for harvests and to plan for harvests (MFR, Forest Analysis and Inventory Branch, October 2006).

4. Stumpage Revenue

Stumpage is a function of the volume of timber billed to licensees and the rate charged for that timber. The volume billed is dependent on market demand and log market prices, and the stumpage rate (at the time of writing) is based on timber pricing policies as outlined in the MPS Coast Appraisal Manual (February 2004).

Billable Volume

The volume of timber subject to stumpage billing within the plan areas has fluctuated significantly over the past 10 years due to market conditions, forest practices policy changes affecting unit costs, and cut control policy. The result is that industry has averaged a cut control performance level of 93% for all management units in the Central Coast plan area from 1991 to 2001. The 7 year average harvest volume has been used to report total harvest and stumpage revenue expectation of the Crown.

Stumpage Rate

Stumpage rates established under MPS are a function of the estimated winning bid equation factors, tenure obligation adjustments and specified operation adjustments.

i. Estimated Winning Bid

Within the BCTS program, timber sales licensees are likely to present lower bids due to the expected higher harvesting costs under EBM. This information will feed back into the Estimated Winning Bid and influence stumpage rates on the coast. Unless a specific Tenure Obligation Adjustment is included to determine the influence of EBM on bid prices, the effect of any change in bids as a result of EBM management objectives will be incorporated into the estimates for the entire Coast. It will require defining the EBM area specifically by policy to ensure EBM costs are recognized only in those areas practicing EBM as introduced in the plans.

EBM will influence how and where licensees log, with the expectation being that licensees may shift harvest into more second growth timber, incorporate more helicopter logging in old growth stands (to avoid building more costly roads and access higher value timber), and shift away from lower value HemBal stands and marginal operating areas.

ii. Tenure Obligation Adjustments (TOA)

These tabular adjustments reflect consistent obligations of licensees in their operations on the coast. Adjustments will apply to lower volumes by harvest area (i.e. 11% incremental stand level retention), need to recognize increased effort to meet EBM management objectives (i.e. up to 20% additional layout time required). Of these adjustments TOA 5.3 Road Development (a fixed cost adjustment) will likely directly reflect the increase in costs due to the specific length of road required for each permit relative to the projected lower volume available under EBM. Other TOA's are not likely to reflect the specific influence of EBM.

iii. Specified Operations Adjustments (SOA)

The MPS may recognize some relatively minor EBM costs, such as those associated with SOA 4.4.3 Tree Crown Modification allowing for extra costs due to boundary trees requiring topping or limbing to provide for greater windfirmness along harvest area boundaries. As an example in a drainage in the North Coast, licensees spent an extra $12,000 modifying boundary trees for windfirmness as a result of shifting the block configuration to EBM variable retention strategies.

For the major licensees, the MPS stumpage rate is determined by subtracting TOA and SOA from the Estimated Winning Bid rate. Table 6 below provides a breakdown of how incremental EBM costs recognized by the current MPS model are expected to be distributed between the MPS stumpage rate and licensee operating costs. The terms SOA and TOA refer to policy sections in the Coast Appraisal Manual: SOA 4.4.3 for boundary tree modifications, TOA 5.2.4 for incremental planning, layout and design costs, and TOA 5.3 for road development costs.

	Current Adjustment	Effective EBM cost	EBM Cost recognized under MPS	EBM Cost borne by licensees under current policies
SOA 4.4.3	per tree	minor positive	minor positive	minor positive
TOA 5.2.4	$5.40/m^3	$6.97/m3		$1.57/m^3
TOA 5.3	$18.54/m^3	$19.93/m^3	$ 1.40/m^3	
Total			**$1.40/m^3**	**$1.57/m^3**

Table 6. Effective MPS stumpage implications of EBM under CAM current policies

It should be noted that other operational costs experienced by licensees operating under EBM will not be explicitly reflected in stumpage determination given the current MPS model, i.e. the costs identified in Table 6 do not represent the total expected incremental EBM cost identified in the Operational Cost section of this analysis. Instead, they will be implicit in the bids received by BCTS for the profile of sales made available for auction. The calculations above will also affect BCTS in that the Upset Rate determined for the bidding process will likely be lower, and according to one TSO manager, thereby likely result in lower bids.

Harvest Billings

Under the current Coast Appraisal Manual, MPS stumpage determination will recognize some of the increased fixed costs associated with developing the necessary road infrastructure under EBM, however other costs significantly different than coastal averages used in the CAM are assumed to be borne by licensees under the current policy structure of the manual (no SOA for EBM activities).

Prior to the implementation of EBM and shifting to the MPS in early 2004, expected stumpage revenues in the Central Coast area were projected to increase from an average of $26.77/m^3 in 2003 under the Comparative Value Pricing system to a longer term weighted average of $27.45/m^3 for the area under MPS.

South of Cape Caution	Estimated 2003 Harvest (m^3)	MPS Stumpage	EBM Stumpage
Strathcona TSA	111,694	$ 3,160,720	$ 2,289,506
Kingcome TSA	554,088	$ 14,738,348	$ 10,416,460
WFP – TFL 25, blk2	56,126	$ 1,349,880	$ 912,093
Weyerhaeuser – TFL 39 (b3,b5)	26,075	$ 368,598	$ 165,213
Scott – TFL 43 Kingcome Block	-	$ -	$ -
Interfor – TFL 45	58,944	$ 651,311	$ 191,552
Timber West – TFL 47 (Johnstone)	122,833	$ 471,113	$ 30,708
Total South of Cape Caution	**929,760**	**$ 20,739,970**	**$ 14,005,532**
North of Cape Caution			
North Coast TSA 21	24,777	$ 163,848	$ 6,194
Mid Coast TSA 19	323,772	$ 4,595,081	$ 2,069,656
WFP – TFL 25, blk5	8,152	$ 286,132	$ 222,545
Weyerheauser – TFL 39 (b7)	30,120	$ 221,002	$ 7,530
Total North of Cape Caution	**386,822**	**$ 5,266,062**	**2,305,925**
Total Harvest, Estimated Harvest and I	**1,316,582**	**$ 26,006,033**	**$ 16,311,457**

Table 7. Summary of projected stumpage revenues using volumes scaled for 2003 from management units in the CCLUP area for the MPS (2004) and EBM

Table 7 describes how the Central Coast might have contributed to the overall revenue picture for the province in 2003 under MPS and under MPS recognizing EBM. Over the past 10 years, stumpage revenues for the area - highest in 1995 and lowest in 2003 - averaged $62.8 million for the period. Under EBM, revenue will be affected by impacts resulting from both a lower billable operable volume and an EBM stumpage rate that reflect Market Pricing System (MPS) policy. As 2003 is a very low market and harvest year, the fiscal impacts of EBM to government are estimated at $28.5 million lower than average in expected stumpage revenue collected. Given the fall in average MPS rates on the coast since 2003, the difference in stumpage revenue is projected to be much less. Additionally, if licensees shift out of lower value stands (i.e. the 8% lower value volume loss on the Central Coast), stumpage rates may actually stay the same or rise and, if adequate higher value volume is available, there may not be a revenue impact as a result of EBM in the short run.

Stumpage Revenue Summary

Projected average MPS rates developed by MFR Revenue Branch, given historical cut control harvest levels, have set a stumpage revenue expectation of about $63 million from the CC LUP area at average market levels. Under the current Coast Appraisal Manual (MPS) and EBM, with both operational costs and volume reductions considered, total revenue is expected to be much lower than with the current management regime, however recent MPS rate projections bring this estimated difference down significantly

It is expected that the current Coast Appraisal Manual will recognize approximately $1.40/$m^3$ in road development differential to stumpage in each management unit under MPS due to the 11% difference in volume harvested (stand-level retention). This difference, applied to average harvest volumes from the plan area would likely result in a potential $28.5 million reduction in average expected MPS stumpage revenues from the Central Coast LUP plan area. If operations do shift away from lower value stands, this impact maybe mitigated slightly in the short run.

5. Business Implications

Analysis presented in previous sections indicates that EBM will result in higher operational costs, lower economically operable timber volume and lower government revenues. What are the business implications of these results for industry, BCTS, and government?

To understand the business implications of EBM, it is useful to recognize the business environment that currently exists within the plan area. As part of a report to the CC LUP Table on *Silvicultural Options in the Central Coast*, (MacKinnon, Rowan and Pojar, 1999) an economic comparison of operating conditions completed between similar ecosystems in the Central Coast and those on Northern Vancouver Island, revealed the following differences:

1. Timber Quantity. Forests in the both areas are dominated by HemBal, but there is a significantly higher component of Cw in the Central Coast. Average stand volume per hectare is significantly less in the Central Coast.
2. Timber Quality. Site productivity classes are relatively low in the Central Coast area particularly in the north and outer coast portion of the planning area. HemBal stands in the outer coast portion of the planning area are plagued with a higher incidence of conk and blind conk (i.e. poor quality with high waste and decay).

3. Timber Distribution. The THLB in the Central Coast planning area is relatively small (much of the landbase is comprised of swamp, rock and ice). There is a higher component of mature stands with most being older than 250 years. There has been significant harvest history in merchantable old growth stands. There is a smaller component of young and immature stands except for the southern portion of the planning area.
4. Operating Environment. Historic harvest pattern has occurred in the inner coast mountains and the southern portion of the plan area (typically higher site productivity and timber quality). Operations are now shifting to Outer Coast Mountain and Hecate Lowland areas (typically lower site productivity and timber quality) and second growth stands in the southern portion of the plan area.
5. Harvesting Methods. Harvesting operations in the Central Coast are characterized by significantly more helicopter logging, shorter haul distances, lower volume per kilometre of road constructed, more hard rock road construction, more barging requirements, more rehaul requirements and longer tow distances to tie-up. Harvest operations are more isolated, i.e. requiring crew transportation and camp facilities.

The implementation of the proposed EBM management objectives is expected to create additional challenges for industry from a planning, operational and economic perspective with the effect being pressure on the financial viability of individual woodsheds in an operating area. Proposed protected areas and landscape and stand level objectives will both reduce the size of the operable land base, constrain access to timber on the remaining land base, and result in higher costs. As a result, it is expected that:

- the number of economically viable woodsheds will decrease;
- the economically operable timber volume and land base within each woodshed will decrease;
- there will be added pressure to target stands with the highest economic value, likely resulting in more harvest pressure on cedar and higher grade quality stands; and
- there may be a shift in harvest methods to suit changes in harvest patterns and silviculture systems.

BCTS policy is to sell on the marketplace a profile representative of what industry harvests for market pricing purposes. As identified in the *BCTS North and Central Coast 2006 EBM Implementation Strategy* dated July 9, 2006, BCTS has joined CFCI and has committed to implement CFCI EBM management objectives on a voluntary basis consistent with CFCI commitments.

Industry

Implementation of the proposed EBM management objectives is expected to have the following operational consequences for industry.

1. In landscape units approaching the mid seral constraint, it is expected industry will be forced to shift away from old growth harvesting and concentrate operations on lower value second growth stands. This would occur mostly in the southern portion of the plan area which has a longer harvesting history.
2. In landscape units approaching the site series representation requirement or those with red-listed ecosystems, industry will be forced to reduce harvest levels with no identified harvest

area alternatives available. In landscape units with high concentration of riparian features requiring additional buffers and additional stand retention requirements, industry will likely need to concentrate further up slope and away from ecologically valued larger timber into smaller diameter and lower value timber types.

The Coast forest industry has had economic problems in the past, as evidenced by the KPMG (1997) cost driver study, so it is expected that any operating efficiencies under current forest management policies have been established. Higher operational costs associated with implementation of the proposed EBM management objectives will influence where, what and how timber is harvested within the planning area. Assuming industry price margins will not change under EBM (i.e. no premium available for EBM timber or lumber), the expected and necessary response is for industry to either lower costs (operating and stumpage) or to reduce revenue loss by shifting into higher value stands.

During low market conditions for certain species it is expected that industry will be under more pressure to target higher value timber types and will likely reduce volume delivered. During high market conditions, it is expected that industry will have greater opportunity to focus on delivering volume, sorting and bucking to maximize grade, and will therefore harvest closer to the species and grade profile. Expected consequences of industry targeting include:

1. At the landscape level, licensees will concentrate harvest operations on developed woodsheds, woodsheds with a positive projected value index and/or adequate volume to achieve economies of scale sensitive to market conditions. Under current MFR policy, industry has a very limited ability to shift operations at the landscape level, being constrained by timber tenure rights and forest planning and practices legislation. Industry's ability to respond to higher operational costs in the short run will be determined by its ability to generate sufficient revenue to offset those additional costs.

2. At the stand level, it is expected licensees will concentrate harvest operations on stand types with a positive value index within a given woodshed. The amalgamation of stands within a woodshed that have a positive value index will form the economically operable landbase within a given woodshed. If EBM requirements raise operational costs, it will reduce the number and size of stands with a positive value index which will in turn reduce the economically operable landbase within a given woodshed. In woodsheds with a negative or marginally positive value index, any increase in cost that reduces the economically operable landbase will tend to force industry to shutdown operations.

   Some stands in a woodshed with a negative value index will remain operationally viable however, and may be subject to harvest using alternative methods (i.e. helicopter instead of conventional cable).

3. At the stand level, industry will concentrate harvest operations on species and grade types with the highest positive value index. Currently, much of industry's harvesting is concentrated on development of higher value Cw, Hw and Fd stands and valley bottom stands which contain the higher grade timber types with correspondingly lower operating costs. Any increase in operational costs will tend to exacerbate this trend. At the time of this analysis work, BCTS in the Mid-Coast was unable to generate interest in bids of sales of HemBal stands that have less than a 1/3 component of Cw. Operationally, this creates a concern where the majority of stands within the planning area are composed of HemBal leading stands that are subject to lower than average whitewood markets.

4. The requirements of EBM and anticipated shifts in the economically operable landbase will influence harvest pattern and method. In the northern part of the planning area, the harvest pattern is shifting away from clearcut silviculture systems and becoming increasingly dominated by small, dispersed cutblocks and use of in-stand retention. While harvest pattern and silviculture system choice is influenced by many different variables, the trend the authors are currently seeing allows industry to target the highest value timber types more effectively, increasingly using variable retention silviculture systems to meet EBM management objectives.

   The concern with this trend relates to the long term sustainability. If industry is targeting the highest value stands in a selective pattern, what are the economic consequences for subsequent harvest passes and species regeneration? Does taking the highest value component from a stand render the balance of the stand more dependent on high markets?

5. The shift in harvest pattern and silviculture system has an influence on harvest method as the targeting of higher value stand types does not come without additional costs. A smaller, more dispersed harvest pattern in conventional cable system areas will likely require proportionally more road development and higher harvesting costs for a lower volume return to harvest effort. This trend will continue to pressure licensees to the proportionally higher use of helicopter logging as a means of overcoming high development costs. Industry staff indicated that at the time of this analysis work, there was a conventional to helicopter ratio of 50:50 in the northern portion of the plan area.

BCTS

It is expected that the BCTS will react in much the same way as industry, but based on somewhat different motivation. BCTS is tasked with (among other things) "…to provide a credible reference point for costs and pricing of timber…" and "…to optimize net revenue return to the Province, within the parameters dictated by our benchmarking mandate…". BCTS has the same type of profit driven motivation, but it also has an overriding objective that requires it to mimic industry operations to provide a reference point for MPS stumpage determination. Therefore, if industry is targeting higher value timber types to increase revenue, then there is an expectation that BCTS will do so as well.

BCTS is responsible for only a portion of the operable costs necessary to harvest timber. BCTS program costs involve planning and development, silviculture, administration and overhead costs, which is a different business model than for the major licensees. It is expected that BCTS will experience EBM cost increases in all but the basic silviculture phase with proportionally higher incremental costs for planning and layout and road development. BCTS cost increases will have direct impact on the profitability of the BCTS program whereas major licensees and TSL holders will be able to pass on at least a portion of the incremental EBM cost through specified operations and tenure obligation adjustments used in stumpage determination.

The planning area is covered by two different BCTS Timber Supply Offices (TSO) – Strait of Georgia (Campbell River) and Seward-tlasta (Port McNeill). With reasonably good access, low operating costs, good value timber types, the Strait of Georgia TSO expects that added EBM costs and reduced volume will decrease net revenue but should not have any appreciable effect on the timber profile offered or TSL bid pattern. On the other hand, staff in the Seward-tlasta TSO believe that added costs and reduced volume will have a significant impact on sales results particularly in the

northern portion of their TSO, i.e. north of Cape Caution. According to the Seaward-tlasta TSO staff, mature HemBal stands in the Mid Coast and northern portion of the Kingcome TSA are currently marginal. The expectation is that additional EBM costs, both to the program and to the TSL licensees, will exceed the current margin such that many woodsheds in this portion of the planning area will no longer be economically viable to the BCTS program.

6. Conclusions

In assessing the impact of the proposed EBM management objectives within the Central Coast planning area, previous analyses and information provided by staff from the BCTS and major licensees were used to draw the following general conclusions:

1. Operational harvesting costs are expected to increase as a function of reduced available volume and the incremental effort required to meet proposed EBM management objectives.
2. Operable standing timber volume is expected to be reduced because of proposed protected area constraints, proposed EBM management objective retention requirements and operational cost increases.
3. Government revenue is expected to decrease as a function of reduced billable volume and lower stumpage rates.
4. North Coast, a more marginally economic timber supply area, may not be impacted to as great an extent as the Central Coast due to a policy choice on accounting for how adjacent stands contribute to in-block stand level retention.
5. Implementation of the proposed EBM management objectives are expected to influence forest management decisions of both BCTS and major licensee operations and affect government line Ministry operations. The primary effects will likely be due to increased focus on high-value stands to cover the increased cost of EBM.

The following important caveats are noted:

- Conclusions in this report consider the implications of implementing the initial EBM recommendations outlined by the CC and NC LUP planning tables. The full cost and operational impacts of the proposed transitional EBM landscape level objectives (mid-seral and old growth representation objectives) could not be analyzed given the limited time frame, scale and scope for this analysis. Also, estimated cost increases do not include additional costs expected if and when other aspects of the *EBM Planning Handbook* are adopted by licensees or made into legal objectives by government.

- This study does not assess the ecological and other (e.g. market access) benefits intended to be achieved through EBM, nor has it assessed the landscape-unit level or licensee-level management issues that may result from implementing EBM.

- Projected reductions in available standing timber could be incorporated into subsequent timber supply modelling to determine the potential effect on timber supply over the next several years under EBM. Impacts to economic availability are likely greater than stated above due to the aspatial nature of this analysis, which does not consider where and how much volume is available, and whether it may be constrained by other regulations.

Literature Cited

BCTS EBM Implementation Team. July 2006. BCTS North and Central Coast 2006 EBM Implementation Strategy Unpublished report prepared for the BCTS Seaward (Tlasta), Skeena and Strait of Georgia Busness Areas. 11 pp.

Coast Information Team. March 2004. Ecosystem-Based Management Planning Handbook. Unpublished report prepared for the North and Central Coast Land and Resource Management Plan processes. 80 pp.

Cortex Consultants (Williams, D. and Buell, M) for the Ministry of Forests and Range, Coast Forest Region, February 2004. Analysis of the Impact on Timber Supply of the CFCI/RSP Agreement Central Coast LRMP Area. Unpublished report prepared by Cortex Consultants for the Ministry of Forests and Range, Coast Forest Region. 16 pp.

Fall, A. and D. Morgan. 2004. Final LRMP AIP Recommendations Timber Supply Impact Analysis. Report to North Coast LRMP Government Technical Team. 25 pp.

KPMG (McIntosh, R.A., Alexander, M.L., Bebb, D.C., Ridley-Thomas, C.), Perrin, Thorau & Associates, and Simons (for Ministry of Forests Economics and Trade Branch). April 1997. Financial State of Forest Industry and Delivered Wood Cost Drivers. Unpublished report. www.for.gov.bc.ca/het/costs/fin-toc.htm

Ministry of Forests and Range, Forest Analysis and Inventory Branch. Principles for Impact Analysis. October 2006. 10 pp. www.al.gov.bc.ca/clad/strategic_land/econ_analysis/projects_pubs/cabinet/principles4_impact_analysis.pdf

Pojar, J., Rowan, C., MacKinnon, A., Coates, D., and LePage, P. 1999. Silviculture Options in the Central Coast: A Report Prepared for the Central Coast Land and Coastal Resource Management Plan. Unpublished report prepared for Land Use Coordination Office. 102 pp.

Timberline Forest Inventory Consultants Ltd. August, 2000. Final Report: Assessing Current Timber Harvesting Value in the Central Coast. Unpublished report prepared for the Ministry of Forests, Vancouver Forest Region. 27 pp.