Coast Forest Region
Operability Review

Phase I

Submitted to :

Jim Brown
Timber Supply Forester
Coast Forest Region

April 20, 2006

Submitted By:

FORSITE
Forest Management Specialists

213 – 1720 14th Avenue
Campbell River, B.C.
V9W 8B3
Ph: (250) 286-3806 ext 3
Contact : Mike Landers
mlanders@forsite.ca

TABLE OF CONTENTS

Executive Summary

A provincial review of economic operability assessments methods was undertaken by Forest Analysis Branch in 2001 and summarized issues and problems associated with past approaches. The review included the development of a conceptual model for operability mapping in the Coast Forest Region.

Recently, the Ministry of Forests and Range has undertaken a review of current operability mapping across Timber Supply Areas (TSAs) in the Coast Forest Region. The report presented here is a key step in that process. This project investigates the current state of mapping and known obstacles to obtaining new mapping, while also determining priority management units for new operability mapping.

To capture all of the unique elements in each of the TSAs an extensive literature review and interview process was conducted. Several documents, including the Chief Forester's AAC Determination Rationale's were reviewed (See Appendix 1 for a complete list). Included in this literature review were project reports detailing the application of economic principles and thresholds in the identification of the operable landbase.

Each of the 9 Coastal TSAs was evaluated and ranked based on circumstance and need for new operability mapping. The Mid Coast TSA was ranked as the highest priority with the Queen Charlotte TSA being next on the list.

Barriers to implementation of new economic operability mapping projects are discussed along with recommendations and discussion including proposed applications for economic operability mapping.

Acknowledgements

The cooperation and contributions from several key people have lead to the successful implementation of this project. The following people have contributed to and shaped the outcome of this project:

Ministry Staff:
Jim Brown, Timber Supply Forester, Coast Forest Region
John Andres, Stewardship Forester, MOFR, Campbell River Forest District
Andre Germain, Operations Manager, MOFR, Squamish Forest District
Dan Biggs, Stewardship Forester, MOFR, South Island Forest District
Doug Rice, Planning Forester, BCTS, Seaward
Diedre Haight, Planning Officer, BCTS, Seaward
Glenn Smith, Stewardship Forester, MOFR, Port McNeil Forest District
Mike Grainger, Steward Ship Officer, MOFR, North Coast Forest District
Gene MacInnes, Operations Manager, Chilliwack Forest District
Barry Miller, Stewardship Forester, MOFR, Sunshine Coast Forest District
Christina Mardell, Stewardship Forester, MOFR, Port McNeil Forest District
Christine Fletcher, Manager, Policy and Development, Victoria
David Flegel, Operations Manager, MOFR, Bella Coola Field Office

Industry Contributors:
David Byng, Western Forest Products Inc
Paul Bavis, Western Forest Products Inc
Lazslo Kardos, International Forest Products Limited
Peter Kofoed, Cascadia Forest Products

Forsite Contributors:
Cam Brown, Strategic Planning Forester
Diana Wood, Coastal Forestry Supervisor

1 Project Background

There is currently some concern that operability mapping in some coastal TSAs is not accurate. This opinion is shared by both ministry staff and licensees in some areas. In an effort to identify and address these issues, the Ministry of Forests and Range has begun a review of operability mapping in the Coast Forest Region.

Several recently completed operability mapping projects have included explicit economic considerations in the assessment process in addition to physical attributes. In past operability mapping, the economic attributes have typically been implied using volume thresholds. In contrast to this method, the approach taken in recent projects uses economic margin specified in dollars per cubic meter for each stand. A threshold value is then chosen to define the economically viable landbase. This methodology confirms that the size of the economically operable landbase can be very sensitive to changes in harvesting costs and timber values. Greater detail on these concepts is provided in subsequent sections.

1.1 Project Description

A provincial review of economic operability assessments methods was undertaken by Forest Analysis Branch in 2001. This report summarized issues and problems associated with past approaches. The review included the development of a conceptual model for operability mapping in the Coast Forest Region.

The Ministry of Forests and Range has now undertaken a review of current mapping across TSAs and TFLs in the Coast Forest Region. This project is a key element of this process and will report on the current state of mapping, known obstacles to obtaining new mapping, and priority management units for new operability mapping.

This project has been split into two phases. The first phase provides the investigation and review described. The second phase will develop an Operability Mapping Resource Document. The phase one review involved the following steps:

1. Investigation and summary description of operability classifications and mapping methods applied in coastal management units with particular emphasis on economic considerations;
2. An examination of operability issues identified in Timber Supply Review (TSR) documents and from consultation with MOFR district staff and industry representatives. Focus was applied to determining how best to apply and incorporate economic parameters in operability assessments;
3. A summary document was developed describing the results of the assessment and described the current state of operability assessments in the region, and key concerns about current operability mapping;
4. An assessment of which TSAs are in need of new operability mapping and a description of the known obstacles to completing the necessary assessments.

1.2 Methods

This project required extensive investigation into current management practices as they relate to operability mapping. The Coast Forest Region is an expansive region covering 9 timber supply areas. Since TSR 1 (pre-1997) and even prior to TSR 1 operability mapping has continued to evolve in each of these management units. In each case

operability mapping has evolved to meet the needs of planning and operational staff specific to the issues and challenges in each of the respective management units. To capture and understand each situation in each TSA required that current situations and recent work be investigated.

To capture all of the unique elements in each of the TSAs an extensive literature review and interview process was conducted. Several documents were reviewed (See Appendix 1 for a complete list). Included in this literature review were historical project reports detailing the explicit application of economic principles and thresholds in the identification of the operable landbase. Chief Forester AAC Determination Rationale documentation was also reviewed for each of the TSAs.

1.3 Operability Issues and Definitions

According to the Forest Investment Account (FIA) operability standards document[1] the term operability refers to the stand and local level physical and economic issues that affect harvest feasibility. The FIA document then continues to describe how operability classifications are used to describe if, and sometimes how, timber can be harvested.

The key elements of an operability review can be broken down into two categories:

Physically Operable: The subset of the land base where existing harvest systems could feasibly operate to remove timber. With the advent of systems such as heli-logging and long-line skylines, very little if any of the forested land base is now considered physically inoperable. Cost not withstanding it is possible to remove any tree from anywhere in a TSA. Thus, the task of defining physically operability is better viewed as harvest system mapping – that will allow economic considerations to be meaningfully incorporated.

Economically Operable: The subset of the land base where it is deemed to be economically viable to harvest timber and regenerate the site under a given set of cost assumptions about market conditions. Typically, each stand is evaluated in isolation and assigned a net value and this value is then used to evaluate operability'.

The operable landbase which contributes to timber supply should be viewed as dynamic, capable of changing significantly over time as a result of external forces that change economic operability. Economic operability is influenced by a number of forces both internal and external to the forest industry and the management of forest resources. These factors include but are not limited to the following principles:

1. Technology affects economic operability on both the harvesting and milling side of the equation in the following ways:
    a. Improvements in harvesting technology will reduce costs making stands which once appeared economically inoperable more attractive;
    b. Improvements in milling technology will allow products to be produced at less cost, potentially making it possible to pay more for logs (higher log values).
    c. Changes in wood use technology (manufacturing and construction) develop new markets and penetrate existing ones adding value to the final product which in turn puts new demand on resources and increases log values.

[1] www.for.gov.bc.ca/hcp/**fia**/landbase/OperabilityStandards.pdf

2. Politics and government policy are externalities which are capable of putting pressure on costs and prices in the following ways:
    a. Foreign building codes may change rendering existing product lines less valuable;
    b. Increased regulatory requirements can increase costs lowering the net value of stands,
    c. Stumpage rates and appraisal policy may increase or decrease the net value of stands.
3. International trade policy and world markets can have huge impacts on domestic markets putting intense pressure on price and value with little or no warning in the following ways:
    a. Fluctuating currency values and exchange rates impact revenues in positive and negative ways dependant on the direction of the movement in rates and corporate exposure;
    b. Trade disputes can result in protectionist tariffs and countervailing duties being imposed which limit market access reducing demand causing prices to fall making marginal stands less viable;
    c. Quotas may be imposed skewing the economic operability threshold between producers with quota and those without.

All of these points noted can potentially influence costs and/or values in a typical business cycle. The above is not intended to be a comprehensive list but rather an illustration of the range of possibilities putting pressure on economic operability thresholds. Uncertainties regarding the movement of these pressures make it difficult to choose a market condition which represents an average or range of expected future market conditions.

It should be noted that there is also a tendency to allow other landbase netdowns to fetter the operability definition process. Other landbase netdowns such as those for sensitive soils, riparian reserves zones, wildlife and biodiversity (to name a few) should not form part of the initial operability equation. The economically operable landbase is a subset of the physically operable. Once the economically operable landbase has been identified net downs necessary to address resource management objectives can then be applied to determine the timber harvesting landbase (THLB). This will allow the opportunity cost of the resource management netdowns to be accurately accounted for.

1.4 Economic Operability – Current Practice

Evaluating economic operability is not a new concept. Documents and analysis reviewed during the course of this assessment date back to 1993 and it was not a new idea at that juncture. Since that time the issue of economics and operability has attracted additional attention and scrutiny. This is particularly evident in the last five years. The economic variability of markets was poignantly illustrated in 2003 when record market lows (in stark contrast to the record highs in 1995) were realized in the British Columbia forest industry.

Economic uncertainly is a reality which tests the ability of business and enterprise to respond to market conditions. Forward looking, innovative organizations will thrive and prosper as business cycles occur, meanwhile those unable to adapt will fail.

Improvements in Geographic Information System (GIS) technology in the last decade have enabled a much finer resolution for tracking, analyzing and measuring inventories of all sorts across huge landscapes. This has allowed new methods for measuring operability to be explored. Recently the following conceptual design has been applied in two coastal TSA's (Fraser and Kingcome) and is being applied in the Arrowsmith TSA by Timberline Forest Inventory Consultants[2].

1. Establish logical woodshed boundaries, based on common access and wood flow considerations (scale will vary significantly between coast and interior units).
2. Develop a GIS resultant coverage incorporating the following themes:
    - woodshed boundaries
    - existing forest cover
    - thematic coverages relating to operational considerations (e.g., slope, soil stability)
    - thematic coverages defining exclusions for other values (e.g., recreation, riparian)
3. Define the potentially operable landbase within each woodshed through a manual projection of potential future roads and then buffering of all roads.
4. Establish access costs for each woodshed through engineering overview assessment and/or GIS thematic analysis.
5. Develop localized timber value/m^3 and harvest cost/m^3 relationships based on appraisal system parameters (coastal or interior) under a specific set of market conditions.
6. Develop stand level yield curves and assign minimum harvest ages (MHA) based on positive value-cost thresholds.
7. Aggregate stand level yield curves for analysis purposes (aggregation must consider similarity in MHA values).

When completing an analysis such as that detailed above, steps four through seven may be repeated to assess and evaluate different market, cost, and value scenarios. Typically several combinations of the "market force" factors are evaluated to determine the sensitivity of the economically operable landbase to changes in economic parameters.

Increasing pressure on the landbase resulting from other land use planning initiatives such as those aimed at maintaining and protecting biodiversity have necessitated that the "operable" landbase be more concisely defined to prevent conflicts in the future regarding land use. Recent work has focused on illustrating the sensitivity of the landbase to economic considerations and at identifying a dynamic and tangible spatial definition of the economically operable landbase. Applying the methodology above in the Kingcome TSA[3], showed the operable landbase varying between 423,571 ha using 1995 maximum log values and 142,730 ha using 2004 minimum log values.

2 Coast Forest Region Operability

The following sections provide a summary of the present situation in each of the 9 TSAs in the region. Each section is a summary of the investigation conducted during the interview process with ministry and industry staff in each of the TSAs. The table in each section provides a brief qualitative summary of the existing operability mapping in each management unit. The reference year refers to the year that the operability mapping was completed; revisions if any are indicated. Threshold format refers to the means by which operability was defined. Thresholds are typically volume or value based. The

[2] Economic Timber Supply Operability Assessment Review, Timberline Forest Inventory Consultants Ltd., December 2001,
[3] Economic Operability Assessment of the Kingcome Timber Supply Area, Timberline Forest Inventory Consultants Ltd, Undated.

classifications are indicative of the operability classes in use; completeness of this information was highly variable between units.

2.1 Arrowsmith TSA

TSR:	Reference Year	Productive Area Excluded	Revisions	Threshold Format	Classifications
TSR2 (09/2002)	2005 – in progress	NA	NA	Economic update	TSR2: Operable: Ground based Operable: Long Line Heli Marginal & Inoperable
Performance in the inoperable	Some performance recorded, however, it does not currently meet expectations				
Significant Local Issues	• Specialized operability classifications are required for colluvium and other special site types • Errors in the current (1994) operability coding is known to incorrectly exclude about 1500 hectares of forested area.				

Table 1. Arrowsmith TSA Operability Attributes

The Arrowsmith TSA is in a transitional situation. Table 1 outlines the administrative situation in the Arrowsmith TSA. In his TSR2 determination the Chief Forester indicated that operability mapping in the West coast and Nanaimo supply blocks should be updated along with an examination of operability west of Duncan.

As a result an economic operability assessment was commissioned in 2005 for anticipated use in the TSR3. This new operability mapping which has recently been undertaken is a prioritization of the Arrowsmith TSA in order to satisfy determination instructions prior to TSR3.

TSR3 was commissioned at the beginning of 2006 and will incorporate and "test" the economic operability analysis.

2.2 Fraser TSA

TSR:	Reference Year	Productive Area Excluded	Revisions	Threshold Format	Classifications
III (08/2004)	1996	246,751 ha (38.8%)	2001	Volume	NA
Performance in the inoperable	• Yes, all blocks projected on FDP's (to 2001) in the inoperable prior to the 2003 analysis were considered operable.				
Significant Local Issues	• Licensee position is that the economic operability "line" is too conservative, presently conducting research to support this position. • Very limited calibration data (sample plots) available outside existing operability lines • Economies of scale, many smaller operators are not able to support the expansive infrastructure in the TSA which will lead to areas becoming uneconomical as the infrastructure deteriorates.				

Table 2. Fraser TSA Operability Attributes

The Fraser TSA was one of the first TSAs to have its operability updated using the methodology described earlier, however, this new operability mapping has not been

used in TSR. Table 2 outlines the administrative situation in the Fraser TSA. TSR3 used the existing operability mapping which was later considered to be too conservative by the Fraser TSA Co-operative. Operability revisions for TSR3 in the Fraser TSA were based on 1996 operability lines in conjunction with minimum volume thresholds to identify inoperable stands (these ranged between 300 and 350 m^3/ha . Accommodation beyond those lines included the addition of FDP blocks as indicted above.

The Chief Foresters position at the time of the determination was that operable landbase was unlikely to be overestimated by the inclusion of these blocks because of the extensive list of exclusions already applied. The cooperative group commissioned the economic operability study in this TSA with the expectation that is will address many of their concerns. The expectation is that the new economic operability will be used in TSR4.

2.3 Sunshine Coast TSA

TSR:	Reference Year	Productive Area Excluded	Revisions	Threshold Format	Classifications
II (01/2002)	1993	135,245 ha (31.6%)	1998*	Volume	A-Heli, B-Conventional
Performance in the inoperable	• Considerable, to the extent that the inoperable is viewed as substantially overestimated– helicopter operations frequently extend well into the inoperable.				
Significant Local Issues	• Highest degree of deviation from operability mapping is most evident during market highs. • Anticipate that additional operability classifications would be appropriate for the land base.				

*very limited amount of modification actually took place.

Table 3. Sunshine TSA Operability Attributes

The Sunshine coast TSA is working with operability mapping completed in 1993, 2 years prior to the market peak in 1995. Since that time performance in the inoperable has risen as high as 20%. Under current market conditions the operable area is still considered underestimated. Significant performance has been identified in Douglas-fir, western red cedar and yellow cedar stands identified as inoperable, especially in the mid to higher elevation levels throughout the TSA.

It is speculated by district staff that the volume thresholds that were used to identify the operable area in 1993 were overly conservative and included netdowns for non-forest values. Table 3 outlines the administrative situation in the Sunshine TSA. The most problematic area of the operability inaccuracy occurs in the stand types noted earlier that fall within the mid to higher elevation levels throughout the TSA.

The TSR2 determination in the Sunshine Coast TSA was in January 2002 however, a postponement order has delayed the next determination until 2011. Regardless of the postponement order this TSA should be considered as a high priority for operability mapping review. Presently this TSA has an AAC of 1,143,000 m^3 representing a substantial contribution to the regional cut. Assessment by operational staff in the TSA indicates that too much area is classified as inoperable. This deficiency should be addressed in priority sequence.

2.4 Soo TSA

TSR:	Reference Year	Productive Area Excluded	Revisions	Threshold Format	Classifications
II (10/2000)*	1992	99,075 ha (33.1%)	1998	Volume/Site Index	Heli, Conventional & Inoperable
Performance in the inoperable	• Yes, approximately 40% of helicopter comes from area coded as non contributing				
Significant Local Issues	• Inventory is not accurate and does not capture species composition making performance monitoring difficult. • SIBEC adjustment is very likely to bring many stands into the operability based on current criteria. • Strict application of economic operability principles would exclude all the hemlock stands				

*Postponed until 2010

Table 4. Soo TSA Operability Attributes

The Soo TSA district operational staff are working with operability mapping completed in 1992 and modified in 1998. Modifications the operability mapping were aimed at addressing increased helicopter harvest rates. Helicopter harvest systems were not commonplace in the TSA in the past. Consequently, there was a substantial amount of merchantable timber constrained by harvest system capability. Table 4 outlines the administrative situation in the Soo TSA.

In response to the increasing prevalence of helicopter harvest systems in recent harvest history the operability lines were revisited to include stands previously considered inoperable. Of the new area included 24% was done so on the basis of reconnaissance and the remainder was based on leading species, site index and expected volume criteria. This proved to be problematic due to the unreliable nature of the forest inventory.

Current operability mapping incorrectly excludes some low-site hemlock stands and incorrectly includes other Douglas-fir sites. These errors are no longer viewed as compensating. There is also significant concern that the inventory profile is not being harvested according to distribution on the operable landbase; this problem is viewed as a deficiency in the accuracy of the inventory.

The TSR2 determination in the Soo TSA was effective in 2000. The next determination has been postponed until 2010 by the Chief Forester. Operations staff have concerns about the current operability mapping and its consequential effect on the harvest profile. This TSA should have its operability mapping revisited to incorporate economic parameters into the assessment. Using economic parameters in conjunction with the wealth of local knowledge collected by operations staff would further the accuracy of the operability assessment, which should be completed for inclusion in TSR3.

2.5 Strathcona TSA

TSR:	Reference Year	Productive Area Excluded	Revisions	Threshold Format	Classifications
III (08/2005)	1997	86,265 ha (25%)			NA
Performance in the inoperable	• 13% between 1996 and 2005 in a sample area of 8,833 ha				
Significant Local Issues	• Licensees expressed concern about inventory and operability prior to determination recommending postponement until better data could be collected. • Significant development is projected in the inoperable • Decline in hemlock markets has lead to an increased dependence on cedar and Douglas-fir				

Table 5. Strathcona TSA Operability Attributes

Operability mapping for the Strathcona TSA was completed in 1997. Table 5 outlines the administrative situation in the Strathcona TSA. The procedure used to map operability includes a polygon by polygon review of aerial photographs correlated with field reviews. The assessment of harvest feasibility included a review of economic attributes and a consideration of "physical access factors".

Physical accessibility is viewed as one of the most difficult aspects to address in the Strathcona TSA. Ministry staff has indicated that predicting operability is much easier in areas where primary access (development infrastructure) is already in place. In contrast, areas where primary access is not in place are much more difficult to assess given the additional costs associated with initiating a timber development infrastructure from the beach.

The current underutilization of hemlock stands is a persistant concern. If the under utilization continues the operability for the TSA may have to be revisited. However, this TSA is not considered a priority for re-evaluation of its operability mapping at his time. Additional data on the harvest profile should be collected to investigate the underutilization of hemlock at which time further action can be taken as necessary.

2.6 Kingcome TSA

TSR:	Reference Year	Productive Area Excluded	Revisions	Threshold Format	Classifications
II (10/2002)	1993	236,104 ha (40.3%)	2001 review	Volume	Operable/Inoperable by Zone
Performance in the inoperable	• Prior to new operability mapping performance in some stand types was significant (M&T low site license)				
Significant Local Issues	• New economic operability recently completed				

Table 6. Kingcome TSA Operability Attributes

The above figures in Table 6 correspond with TSR2 data sets. The 2001 review of the operability in the Kingcome TSA was not a fine resolution investigation. The review included broad sweeping suggestions such as "increase the THLB in Zone 1 (the West

Coast of Vancouver Island) by 10% to reflect increased logging activity in low volume cedar stands".

Recently the Kingcome TSA has had an economic operability assessment completed for the entire TSA to address some of these shortcomings and inaccuracies in the operability. Noted earlier the economic operability assessment provides a dynamic range of values for the operable area dependant on what economic threshold is selected (conclusions assume that the input values and costs are accurate and appropriate). This new operability is expected to be used in TSR3. Ministry operational staff remains cautiously optimistic regarding the application of this new method.

The Kingcome TSA will be soon in a situation much like the Fraser TSA. TSR3 will incorporate the economic operability into the analysis and the results of the operational implementation should be closely monitored to provide feedback on success and shortcomings.

2.7 Mid Coast TSA

TSR:	Reference Year	Productive Area Excluded	Revisions	Threshold Format	Classifications
II (06/2000)	Pre 1989	414,202 ha (50.5%) to 619,924 ha (75.7%)*	1991-92	Volume by geographic location	Conventional and heli
Performance in the inoperable	• Significant primarily heli with Interfor and Kvamua performing				
Significant Local Issues	• Highly questionable forest cover inventory • CCLRMP land use designations – Ecosystem Based Management • Remote locations in harsh climates				

* defining the inoperable was a difficult task and was analyzed in a number of scenarios in the analysis report.

Table 7. Mid Coast TSA Operability Attributes

In preparing the TSR2 determination the Chief Forester and staff analyzed several scenarios based on differing operability criteria before making a decision; this exhaustive work was required to address the magnitude and number of uncertainties in the Mid Coast TSA affecting around. Table 7 outlines the administrative situation in the Mid Coast TSA as it was prior to the completion of the CCLRMP.

The difficulties in the Mid Coast were primarily those arising from performance in the marginal stands and performance in undeveloped areas. Including too much marginal land base or too much undeveloped land base could lead to overly optimistic harvest forecasts based on an unrealistic harvest profile. Initial harvest forecasts relied heavily on non conventional harvesting in unproven geographic areas. The final solution after much analysis was to partition the AAC. Between 1992 and 1998 performance in the partition exceeded expectation by 2% (totalling 15%) supporting the partition and its effectiveness.

In his determination the Chief Forester acknowledges that it is very difficult to define operability "…over such a large, variable and complex area as encompassed by this TSA, with any degree of precision". He continues to say that there are likely some areas that may be operable by conventional means that presently lie outside the operability lines. Final direction in the TSR2 determination indicated that an in-depth operability review should occur prior to the next determination.

The only way to overcome these difficulties is through experience and improved resource inventory information. Concerns regarding the accuracy of existing inventories are the dominant concern for the ministry staff and industry personnel who participated in this process. Highly visible specific examples of inaccuracies were discussed:

1. Greaves Island[4] was discussed as being highly operable yet it contributes little based on inventory information.
2. Walkam Bay[5] was discussed as an area showing substantial contribution yet field evidence suggests otherwise.
3. Carter lake[6] was pointed out as an area where there are quality stands however the access is highly questionable.

These examples were raised to illustrate the inaccuracy of the existing operability mapping.

Ecosystem Based Management (EBM) is expected to put downward pressure on economic operability by increasing costs associated with planning, development and harvesting. These pressures are expected to be more significant in areas that are more remote and undeveloped. Projections made by Ministry of Sustainable Resource management (MSRM, now Integrated Land management Bureau) in September 2005 suggest that these impacts will range between 8 and 13 percent reductions to the operable area on average based on "mid-cycle prices". The range projected by MSRM was 0 to 19 percent. Ministry of Forests Coast Region is expecting these figures to be much higher when finally implemented.

The TSR2 determination for the Mid Coast TSA dates back to 2000. TSR3 is behind schedule as a result of the Central Coast LRMP. Now that the LRMP is coming to a close and land use designations have been affirmed in government to government negotiations a greater level of certainty in that regard is available in the Mid Coast TSA. At one point the AAC for the Mid Coast TSA was 1,000,000 m^3 which is a substantial contribution to the Coast Region's harvest volume. Now that the land base has changed substantially and a new management paradigm is in place the operability of the remaining contributing land base should be considered as the highest priority for re-evaluation and inclusion in TSR3.

[4] Lat 51 17 22.38 : Long 127 60 51.53
[5] Lat 51 24 10.94 Long 127 05 34.82
[6] Lat 52 52 54.48 Long 128 20 15.90

2.8 North Coast TSA

TSR:	Reference Year	Productive Area Excluded	Revisions	Threshold Format	
III (07/2004)*	1991	639,659 ha (84.3%)	1994/1996/ 2001	$ value#	
Classifications	• Conv_Log – Areas previously harvested under conventional harvesting systems • Con_4 – All tree species ≥400m^3/ha within a conventional zone, on slopes <60% and height class ≥4 • Conv_marg - Combination Cw ≥ 250m^3/ha within a conventional zone, on slopes <60% and height class ≥3 • Heli_Log – Areas previously harvested under non-conventional harvest systems • Heli_350 – All tree species with leading volume species ≥350m^3/ha within a helicopterl zone, on slopes <60% and height class ≥4 • Heli_CW_250 – Leading Cw stands with leading volume ≥ 250m^3/ha within a heli zone, on slopes <60% and height class ≥3				
Performance in the inoperable	• Substantial performance has been observed, quantification not available.				
Significant Local Issues	• Substantial discrepancies on both sides of the operability line. • NCLRMP land use designations – Ecosystem Based Management • Viability of the area North of the Nass River, presently 13% of the THLB • Absence of primary access makes significant area inoperable				

* Data package only, no determination.
# threshold dollar values (acceptable harvesting cost figures) were adjusted to address sharp rise in prices.

Table 8. North Coast TSA Operability Attributes

Considerable upward pressure was placed on the North Coast TSA operability during the market surge that occurred in 1994/95. The North Coast TSA has a large productive area which is presently excluded (see Table 8). This exclusion is partially attributed to uncertainty regarding economic operability.

Notable in the TSR2 determination is the request from Interfor to increase the size of the operable landbase and the reluctance of ministry to do so without demonstrated performance. Speculation is that improved markets may lead to increased harvesting in the area north of the Nass, however the lack of performance there to date (even in good markets) raises uncertainty about the economics of harvesting in this area.

District staff have specific concerns relating to the identification of harvest systems given that much of the area is undeveloped. This is compounded by the general inaccuracy of the forest cover inventory and uncertainty regarding performance in marginal stands; hemlock in particular, due to wood quality.

EBM in the North Coast TSA is projected to have substantial impacts on the economic viability of the landbase by increasing operating costs in the same manner as the Mid Coast. MSRM projections here are expected to be more significant reducing the economically viable landbase by up to 51 percent, incremental to the new land use designations which are part of the LRMP.

Given that the North Coast TSA is partway through the TSR3 process it is not considered a high priority in the short term for economic operability re-evaluation. However, there is substantial uncertainty around the operable landbase and further work would help reduce this uncertainty. Much of the experience gained in the re-evaluation of the Mid Coast TSA will be extendable to the North Coast when the time comes. In fact it would likely be prudent to wait and see the outcome of revisiting the Mid Coast evaluation prior to embarking on a similar project in the North Coast TSA.

2.9 Queen Charlotte TSA

TSR:	Reference Year	Productive Area Excluded	Revisions	Threshold Format	Classifications
II (10/2000)	1990's	228,076 ha (64.5%)		Volume/ system/ stand type	Conventional/ Aerial by access class and species
Performance in the inoperable	• Cutblocks are regularly projected outside the operable landbase.				
Significant Local Issues	• Access classification is one of the most difficult factors to assess due to the disperse nature of the TSA. • HG/QCI LUP • Suspect/unreliable forest cover data				

Table 9. Queen Charlotte TSA Operability Attributes

Operational staff in the Queen Charlotte Forest district did not participate in this process. Table 9 outlines the administrative situation in the Queen Charlotte TSA. Staff in other districts who have previous experience in that district did provide their opinions which complimented the authors own recollection. The forest cover data for this TSA is suspect and requires updating. The TSA is also characterized by an expansive undeveloped area in the North that is physically operable but marginally economic. In many of these areas there is no existing infrastructure.

In the recent past considerable effort has been applied in this TSA both inside and outside the LRMP process to identify and measure the THLB and second growth harvest opportunity. There are specific areas where operability is suspect and may be overstated and are of noted concern in TSR documents.

Recent efforts have focused on identifying and assessing the economic operability of second growth forests[7]. Recent analysis completed by Cortex concludes that certain stand types are only operable if the development costs are subsidized by higher value stands. However, the speculation and conclusion of the Cortex report noted is that eventually all stands will become economically viable via the development of new technology, markets and investment.

Government has made agreements to complete TSR3 soon after the LRMP for the Islands is complete. These agreements will make the QCI TSA a priority unit for evaluation once the land use agreements are in place. However, there may be rationale to wait and evaluate the results from the Mid Coast for extension to the QCI/HG TSA.

2.10 Common Themes and Issues

The numbered list which follows represents a consolidation of the issues, concerns and opinions expressed during the interviews and conversations with industry and ministry planning staff who contributed to this undertaking:

1. There is a general concern that economic operability mapping projects will be based on unreliable information and therefore, be of little value. Inventory data

[7] Second Growth Timber Opportunities on Haida Gwaii / QCI, Cortex Consultants, July 2004

must be updated prior to completing economic operability mapping and cost and value inputs must be relevant to the area being assessed.

2. Determining how much economically marginal timber to include in the contributing landbase is essential to sustainable management of the resource. Overestimating the landbase will lead to over harvesting in poor markets as high value stands are targeted and low value stands are ignored.
3. The operable landbase needs to be optimistically defined to reduce the potential for conflicts between other resource planning objectives. Other agencies tend to view the "non-contributing" as constrained and therefore assume that there will be no economic implications associated with "additional" constraints. An optimistic operable landbase will maintain options.
4. Overly optimistic landbase assumptions may lead to higher AACs that are in reality are not sustainable unless rigors efforts are applied to harvesting the profile consistently over the business cycle.
5. Economic operability assessments should not be interpreted as definitive but rather a starting point for evaluation. Assessments should be driven down to the stand level and will require ocular optimization to ensure that otherwise economically operable timber is not isolated on the basis of the averages used to arrive at the economically operable net value.
6. Stand level economic operability assessments do not consider the viability of neighbouring stands and the extent to which they occur. It is possible to have a very marginal stand be in the middle of some very high value stands that make it operable simply because logging will be going on all around it. The opposite is also true where a high value stand is essentially isolated and not viable on its own. Stand level assessments are a good input into an operability review but should not be considered the final product. A final product is completed when economic mapping, woodshed context, local knowledge, and common sense are integrated into an operability map.
7. Determining stand net values based on average value and average cost may be of limited value for operability evaluation. Economic operability assessments may be better suited to identifying relative value and not absolute value.

3 Issues Assessment

3.1 Barriers to Application of New Operability Assessments

Forest Cover Inventory

Accurate inventory information is the backbone of any analysis which attempts to evaluate an opportunity based on the expected cost and the expected value of the product. Currently, several coastal TSA inventories are considered very poor and unlikely to provide meaningful estimates of stand value. Collecting inventory data is a time consuming and costly process. Given the reported state of the inventory in several of the TSAs described above the production of inventory data suitable for use in economic analysis should be viewed as the most significant barrier to implementation of any economic model.

Log Grade Predictions

Grades are applied to standing inventory based on cruise estimates prior to harvest to assign "cruise grades" to projected cutblocks. These grades are used to assign value to the standing inventory for cutting permit stumpage calculations. Once harvested logs

are again graded by log scalers assigning scale grades grouping the harvested volume for distribution to market based on grade. These grades are frequently different since different stand ages, species, and productivity levels can produce very different log products. Scale grades are not estimates, they are based on cut measurement where a wood quality cross-section is available on both ends of the log. The challenge, even with accurate forest cover inventory, is converting this inventory into log grades used to evaluate stand value. Statistical prediction and estimation is necessary to link inventory labels with cruise data. Log markets assign prices to logs based on species and grade, buying, selling and trading transactions take place based on the market values for each log grade.

Log Value Predictions

Historical market conditions are often used to calculate average market values which are then used in stand level market assessments to determine "spot" economic operability. Unfortunately historical values can vary greatly and are not an accurate indication of future market conditions. Frequently these estimates lead to conservative estimates of the operable land base.

Furthermore, in a TSA scale assessment stands that are only viable in good markets will be excluded from the operable area, when it is highly likely that good markets will occur in the future. The challenge is to define how much of this type of ground should be included in the operable land base and how it is implemented in the timber supply model.

Access Cost Predictions

One of the most significant costs associated with timber harvesting can be road building costs. A stand level economic assessment must make assumptions that allocate necessary road building costs to each stand. This presents a challenge because the intent is to spread road costs over the group of stands that will be accessed by a given road. Frequently this access configuration is only an estimate based on previous operability assessment. Furthermore, it is only a subset of these stands (first pass blocks) that would need to support initial road building costs. Significant assumptions are required to work around these issues.

Harvest System (Cost) Assignment

In order to accurately assign logging costs to stands, a harvest system must first be assigned. This is best done through Total Chance Planning but is typically cost prohibitive at the TSA level so surrogates are required. Assigning harvest system based on slope and proximity to existing roads is a typical work around, however road access must first be projected to its full extent in the TSA. This can still represent a significant amount of work.

Another typical cost surrogate is the Coast Appraisal Manual cost allowances. Appraisal allowances are based on average historical experience for the region as the available data permits. As with any average value the risk remains that the other points on the curve (which result in the average value) may be excluded if the average value is assumed to be definitive and plugged back in to the evaluation equations. Furthermore, if the data set used to derive the average is not representative of the area being evaluated results will be questionable and of limited value. Statistical analysis is required to determine the standard deviation required to capture the "right" landbase.

Assumptions regarding the de facto inclusion of second growth stands also need to be identified at this stage.

Stumpage

There are numerous arguments for the inclusion or exclusion of stumpage rates in economic operability evaluations. Stumpage is the direct economic rent paid to the crown to harvest trees on crown land set by policy, not market forces. Stumpage is assigned relative to the net value of stands has been assessed based on cruise data collected; the minimum stumpage value in B.C. is $\$0.25/m^3$ regardless of actual value. Cutting permit configuration (block blending) allows high value blocks to subsidize lower value blocks that may otherwise be viewed as economically inoperable if evaluated in isolation.

Regardless of position the inclusion of stumpage in economic stand value assessments is prevented by the complexity of the variables that come together to assign a stumpage rate to a permit. The number of permutations possible in preparing a permit prevent any reasonable estimate of stumpage from being derived.

3.2 TSA Operabilty Needs Assessment Ranking

The following table summarizes the operability mapping needs and priorities for the coastal TSA's. Priorities are based on the state of the current mapping and the need to support upcoming strategic planning initiative such as TSR.

TSA	Ranked Need for New Operability Mapping	Rank Rationale
Mid Coast	Very High (1)	The Mid Coast TSA is a high profile unit behind schedule for its statutory re-determination. With the CCLRMP close to closure and the land use designations having gone through the scrutiny of Government-to-Government negotiations it would be inconsistent with responsible stewardship to delay the process any longer. The Mid Coast TSA now has a confirmed landbase with a greater degree of certainty and a new management paradigm to evaluate. Significant changes (reductions) to the landbase and new management principles (EBM) coupled with the unreliable forest inventory data necessitate prompt, thorough and planned action.
QCI/HG	Very High (2)	The LRMP in this unit is nearing closure and government has made commitments to First Nations to commence with TSR promptly after the LRMP land use issues have been resolved. Both the operability mapping and forest cover inventory are considered poor. This unit is also over due for its statutory re-determination, having a TSR2 determination dating back to 2001.

TSA	Ranked Need for New Operability Mapping	Rank Rationale
North Coast	High (3)	In this unit, both the operability mapping and the forest cover inventory information are described as inaccurate and unreliable. Exacerbating this situation is the reduction in land base and institutionalization of a new management paradigm following the North Coast LRMP. This TSA has already begun the TSR3 process and the data package is complete thus it is not ranked very-high.
Sunshine Coast	High	Current mapping significantly underestimates operable land base. Not ranked very-high because a postponement order has delayed TSR3 until 2011. This postponement removes the pressure administratively but not operationally to revisit the definition of the operable landbase.
Soo	High	Current mapping significantly underestimates operable land base. Not ranked very-high because a postponement order has delayed TSR3 until 2010. Current VEG inventory is unlikely to give accurate estimates of stand value. This postponement removes the pressure administratively but not operationally to revisit the definition of the operable landbase.
Strathcona	Low-Mod	Mapping likely underestimates the operable land base but it is generally considered a reasonable reflection of operability – with a few issues around Hw utilization.
Kingcome	Low	Has recently completed mapping using economic criteria. Could use refinement into a final product.
Arrowsmith	Low	Mapping currently being updated using economic criteria.
Fraser	Low	Mapping using economic criteria completed in 2003. Could use refinement into a final product.

Performance in the units with stand level economic considerations built into the current operability mapping (Kingcome / Arrowsmith / Fraser) should be monitored to provide feedback to future projects.

Several of the units identify poor forest cover inventory data. Completion of a new inventory would be preferred prior to stand level economic assessments but where this is not possible, these assessments should still be considered a critical input into a refinement of operability mapping. These situations will need to rely more heavily on local knowledge when using the economic assessment data to define the operable land base.

4 Discussion & Recommendations

4.1 Implementation Recomendations

Inventory

The economic operability assessment technique which has been applied in 3 Coast Region TSAs to date is a valuable and useful tool capable of rapidly illustrating landbase sensitivity to market pressures on cost and value. However, the effectiveness of this technique is entirely dependant on reliable inputs. Similar to ocular inspection and local knowledge operability evaluations, economic operability assessed using the net value method has the potential to be similarly inaccurate.

Economic operability assessments ultimately require that subjective judgments be made regarding where the economic operability threshold lies. This threshold defines the point where stands are included or excluded. In selecting a threshold margin value in an economic operability study the objective is to define a landbase which is neither too optimistic nor too pessimistic for use in timber supply forecasting.

The reliability of the above decision is dependant on three main inputs (costs, values and market forces) and sound professional judgment. These inputs are like the legs on a stool; if one is weak or absent the results of any assessment made on them is unstable and unreliable. In addition to sound judgment, accurate and reliable cost and value data are required. Judgement determines the validity of cost and value metrics. However, without an accurate and reliable forest cover inventory that captures the nuances of the landbase the validity of the other inputs is lost. Reliable economic operability evaluations cannot be made using an inventory which does not accurately reflect the landbase.

In management units where the inventory is suspect it must be addressed first. New vegetation inventories should be completed prior to engaging in an economic operability modeling exercise.

Partitions

On several occasions in TSR determination documents there is reference to a licensee seeking to expand the landbase. Such requests are typically directed at reducing minimum volume thresholds such that additional landbase is included and available for harvest. Frequently the response to such suggestions is that there is no demonstrated performance “there” and therefore, this expansion of the landbase cannot be justified.

From a strict timber supply perspective the objective of a licensee is to preserve the contributing landbase. By ensuring that the landbase is not underestimated the cut is maintained. This maintenance of the cut ensures that the licensee has discretion to manage which allows the licensee to respond to changing market conditions. When prices are good the harvest will increase in response and when markets soften the harvest levels may recede such that over the 5 year cut control period the licensee meets their cut requirements by means of average over that period.

There is risk associated with this strategy. Business cycles are typically longer than 5 years and market conditions at any given point in a business cycle do not necessarily cooperate with this strategy. The risk is that if prices remain low for an extended period only higher value stands will be harvested to maintain the enterprise. In this situation the forest inventory profile is not harvested and a disproportionate amount of high value stands are harvested. This is not sustainable and will in turn limit future harvest

opportunity. It is also easy to argue that in good markets high value stands yield incrementally higher returns which provide a great deal more incentive to harvest them while at the same time the incentive to harvest the low value stands remains low. A licensee will not want to have low value volume charged against their cut quota when there are much more lucrative alternatives elsewhere.

In the past partitions have been applied to address some of these issues with some success. However, these partitions have been based on a landbase that was not well understood (i.e. the Mid Coast) and were determined based on a relatively static assumption about the contributing landbase. Frequently economic thresholds in timber supply analysis have been based on a volume threshold. For example in the Mid Coast TSA in TSR2 an operability threshold of 500 m^3/ha was used in spite of some licensees maintaining that this threshold should be 400 m^3/ha and as low as 350 m^3/ha in some stand types. This assertion was rejected based on average performance of other licensees.

The assumption that all operators should be constrained by the same economic threshold is not sound. While market forces may drive margins for competing firms very close together the assumption that the same economic threshold should apply to all firms does not support competition, or foster innovation and technological development. Competing firms are not going to want to risk their high value quota on potentially risky low value “exploration”.

The solution to this problem is the effective use of the AAC partition. An AAC would ideally be made up of several independent harvest quotas. This basis for the distinction between the tiers is the economic operability assessment. A well calibrated economic operability model will be capable of identifying any number of desired net value economic isotherms. These economic isotherms would be like economic contours on the landbase identifying areas where the economic rent from harvesting activities is expected to be within a certain range. These economic isotherms will likely correspond with certain stand types and vary by geographic location and distribution.

Administratively too many isotherms would be impossible to administer so they will have to be grouped. Grouping the isotherms into logical groups will define the basis for the AAC tiers. The first division would represent the landbase upon which the baseline AAC for the management unit was determined. This landbase would have the highest degree of certainty associated with it. The expectation for this land base would be that the vast majority of it would be economically operable most of the time. This first tier would have an AAC and cut control associated with it. Subsequent tiers would have quota associated with them, however, in each case the quota and cut control would be independent of the other tiers.

The period over which demonstrated non performance is measured would have to be much longer than a typical cut control evaluation period. Effective AAC partitions should create an environment that fosters creativity and innovation. Government and industry should cooperatively pursue policy which makes partitions more useful. Forward looking innovative and competitive firms should be allowed to maximize their technological development to the fullest extent possible. Longer “cut control” periods on the marginally economic portion of the landbase would be necessary to allow sufficient time for innovation and investment to occur. Without sufficient certainty the investment in new technology will not occur. Providing the opportunity to innovate and excel will bring the forest industry several steps closer to world class status. Reaching this goal requires a landbase that is dynamic and responsive to changing market conditions.

4.2 Applications of Economic Operability

Clearly, spatially linked economic operability assessment tools such as the technique which has been contemplated throughout this document have their limitations. However, as long as those limitations are identified and well understood economic operability assessments are a powerful tool to have in the forest planners' arsenal. The process is easily documented, repeatable and the principles are sound making it a process whose results are easy to defend under scrutiny; provided that the assumptions are clearly identified.

Preservation of the contributing landbase is a function of the operable landbase from which it is derived. The economic operability "planning tool" has many extensions. Of particular interest should be its integration into land use planning exercises. Economic operability models could easily be used to demonstrate relative value of stands. By illustrating relative value of forest stands in a land use planning environment future clashes between resource use objectives may be avoided.

Inserting economic operability assessments into a land use planning process will allow a large operable landbase to be identified early in the process and maintained based on relative value. For example, this landbase could be described as the forested contributing landbase (FCLB) from which the timber harvesting landbase (THLB) is derived. The remainder of the forested landbase (which is often larger) could then be described as forested uneconomic. The intent here is to move away from labelling the landbase which does not contribute to the supply of harvest volume "non-contributing". This terminology in an increasingly public enterprise is misleading.

From a timber supply perspective this non-contributing area does not contribute in the sense that it is not included in timber supply forecasting models because it is not expected to be harvested and has therefore been excluded. However, this forested area which is excluded frequently dwarfs the resulting THLB and while it does not contribute to timber supply it certainly contributes to the continuance and maintenance of other values.

Appendix A. Documents Reviewed

1. Kingcome T.S.A. Timber Availability Assessment. Strathinnes Forestry Consultants Ltd. January 2001.

2. Second-Growth Timber Opportunities on Haida Gwaii/QCI. Cortex Consultants and HiMark Forest Consultants. July 2004.

3. Tree Farm License No. 46- Caycuse and Renfrew Terms of Reference- Operability Mapping.

4. Terms of Reference for a Review and Update of Operability Mapping in TFL 39. April 1998.

5. The Timber Supply Review Process: Report of the Data Analysis Working Group- Land Base Issues. Ministry of Forests. September 1997.

6. Operability (Draft). Ministry of Forests- Forest Practices Branch. April 3, 1998.

7. Opportunity Costs of Rules Defining the Timber Harvested Landbase and Harvesting Order. Cortex Consultants. July 1993.

8. Second-growth Opportunities on Haida Gwaii/QCI. Cortex Consultants.

9. Mid Coast Timber Supply Area Review. Ministry of Forests- Mid Coast Forest District. October 27-29, 1999.

10. Queen Charlotte TSA, Timber Supply Analysis. Defining Operable Land Base. October 2000.

11. Queen Charlotte Islands Timber Supply Area Harvest System and Access Classification Mapping Project Report. Rain Coast Management Group Ltd. And Clover Point Cartographics Ltd. June 1998.

12. Arrowsmith Timber Supply Area Timber Supply Review II. Ministry of Forests. February 25 and 26, 2002.

13. Fraser Timber Supply Area Review. Ministry of Forests-Chilliwack Forest District. March 2 and 3, 2004.

14. North and Central Coast LRMPs. Operability Analysis of Government-to-Government Recommendations for Stand Level Retention. Ministry of Agriculture and Lands-Sustainable Resource Development Branch. September 2005.

15. North Coast Timber Supply Analysis Data Package. July 2004.

16. Operability Classification- TFL 6. Terms of Reference. Western Forest Products Limited. June 30, 1998.

17. Land-Base Investment Program. May 8, 2003.

18. Memorandum-TFL 39 Block 6- Operable Land Base Used for AAC Determination. Ministry of Forests. June 14, 1996.

19. Soo Timber Supply Area Review. Ministry of Forests-Squamish Forest District. November 17-18, 1999.

20. Economic Operability Assessment of the Fraser Timber Supply Area. Timberline Forest Inventory Consultants. Undated.

21. Cross Subsidization and Operability Study. D.A. Ruffle & Associates Ltd. April 2003.

22. Fraser TSA Operability Assessment Problem Analysis and Conceptual Design. Timberline Forest Inventory Consultants. Undated.

23. Kingcome Timber Supply Area Economic Operability Assessment. Timberline Forest Inventory Consultants. Undated.

24. Economic Timber Supply Operability Assessment Review. Timberline Forest Inventory Consultants. December 2001.

25. Kingcome TSA Operability Assessment. Problem Analysis and Conceptual Design. Timberline Forest Inventory Consultants. March 2004.

26. Kingcome TSA Timber Availability Assessment. Strathinnes Forestry Consultants Ltd. September 2000.

27. Assessing Current Timber Harvesting Value in the Central Coast. Timberline Forest Inventory Consultants. August 2000.

28. Ministry of Forests Economic Operability Pilot Study for Haida Gwaii/ Queen Charlotte Islands. Final Report. Timberline Forest Inventory Consultants. March 31, 2003.

29. Operability Standards. Forest Investment Account. May 8, 2003.

30. TFL 10 Management Plan Comments. Forest Land Base Contributing to Timber Harvest.

31. Rationale and analysis reports for each of the 9 TSAs.

Appendix B. Inteview Summary

Attached separately