

Standards for Forest Investment Account Operability Projects (April 2008)

Introduction

The purpose of this document is to provide guidance for operability projects that are funded under the Land-Base Investment Program of the Forest Investment Account (FIA). The operability of a forest stand or group of stands describes if the timber on the area can be physically and/or economically harvested. The focus of LBIP operability projects is to provide information for input into timber supply analyses that support allowable annual cut (AAC) determinations by the provincial chief forester. Assessing the economic operability of stands or groups of stands is subject to significant uncertainty primarily due to uncertainties about future markets. Additional uncertainty stems from the considerable flexibility that forest operators have in grouping stands into cutting permits or even annual portfolios; that is, a given stand may appear uneconomic to harvest individually, but may be operable when grouped with other stands. Therefore, recognition of uncertainty is an important aspect of operability classification projects, and addressing uncertainties will normally involve thorough discussions among stakeholders, and development of flexible and transparent classifications that facilitate examination of the impacts of uncertainty.

Background

This background discussion provides some information on the types of considerations that define if an area of forest will likely contribute to timber supply within the context of AAC determinations, and to outline some principles that should be considered in developing operability classifications.

In forestry, operability classifications are used to describe if the timber on an area can be physically and/or economically harvested, as well as the harvesting system and technology that will likely be suitable for use (e.g., ground-based, cable, helicopter). Operability classifications can also describe the timber, terrain and economic factors that define operability. Ultimately, operability comes down to economics; physical and terrain features infrequently make harvesting impossible, they only increase costs associated with harvesting.

Forest management and operational considerations that define operability include:

- Costs for road and bridge construction; road reactivation; road maintenance; tree-to-truck; loading/hauling; booming/barging; dump/sort/scale; crew transport; camp/accommodation; silviculture; management/planning overhead. Some of these costs are based on points of appraisal or mill location.
- Physical barriers to development and operations (may affect costs).
- Spatial arrangement of stands (some stands could be operable if close to higher-quality stands). Therefore, stand-by-stand analysis may not assess true operability (see Figure 1).
- Watershed or landscape-level assessment of cumulative volume/value over which costs must be amortized (i.e., assessment of the sufficiency of timber volumes in a watershed to cover expense of bridge or road network construction).
- Impacts of non-timber objectives on operability. For example, costs to log a stand subject to VQOs may be higher than those in a non-constrained area. This could also apply to areas with sensitive soils or steep slopes (i.e., need to use alternative harvest or silvicultural systems may increase unit costs). Further, it is possible that management for, or protection of non-timber

values might present a physical barrier to access of timber (i.e., may not be able to build a road).

- Timber value based on specific end products (e.g., grade; species; quality proxies such as forest cover label, stocking class, site index, mill-specific lumber recovery factors).

In general, an area or stand will be accessible or operable if the value of the harvested material meets or exceeds the costs of accessing and operating.

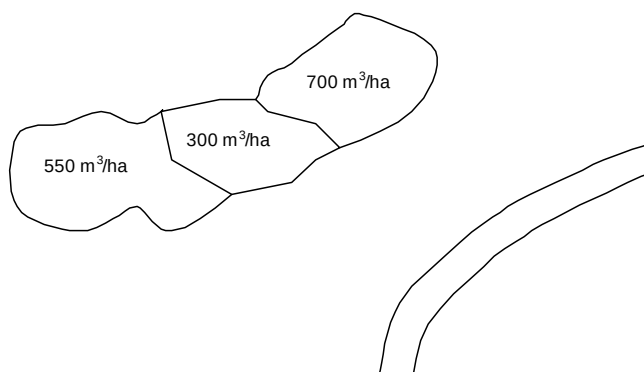


Figure 1a. Three hypothetical coastal BC blocks with nearby mainline, no secondary access roads. The middle block would likely be classified as inoperable on its own, given its low volume, and therefore value.

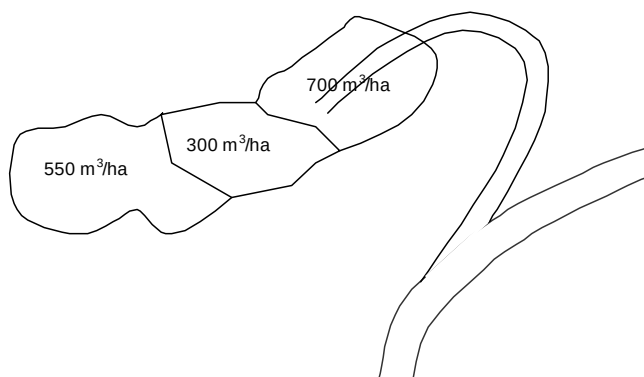


Figure 1b. Secondary access road built to higher-volume stands. Lower-volume stand could now be operable, since the cost of accessing the block is relatively small. If there were plans to build road to the 550 m³/ha block, there would be no incremental access costs for the middle block.

Scale of assessment

The scale at which costs and values are assessed – that is, for an individual stand, a group of stands, or a broader area such as a watershed or supply block – can affect the assessment of operability. As noted above, operators have considerable flexibility to grouping stands into cutting permits or even annual portfolios when determining whether or not they will harvest a particular stand. A given stand may appear uneconomic to harvest individually, but may be operable when grouped with other stands.

In addition, the operability of stand may change if they are assessed in the context of the entire landscape or watershed and of the ability to schedule operations across the area (e.g. is the volume and quality of wood in the watershed sufficient to absorb the construction of access infrastructure. See Figure 2)

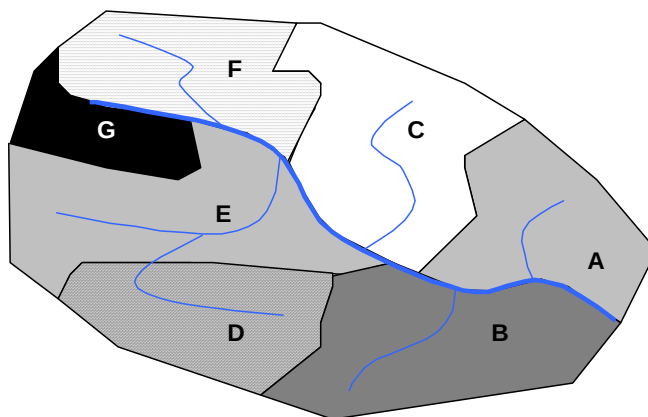


Figure 2. Hypothetical management unit with several access areas or watersheds. The above figure represents a management area with seven watersheds or geographically distinct areas. In most forest estate modelling, the geographic distribution of harvesting is not explicitly controlled. There is often implicit control since forest cover requirements limit the amount of recent disturbance. However, an implicit assumption is that harvesting can move anywhere in the larger unit to achieve a harvest target, regardless of the cost, and regardless of how small the harvest is. For example, one-seventh of the harvest could come from each watershed in a given period (year, 5year period, decade). This type of geographic dispersion may or may not be practical or economically feasible depending on the size of the unit, the overall harvest level, and the number of operators.

Stumpage

Practitioners are not in full agreement about whether stumpage costs should be included when defining economic operability for AAC determination. A study on this topic¹ noted a number of factors about methods that assign operability using costs and values from the stumpage appraisal system:

- Such methods have generated a large number of negative margins on a stand or watershed basis, particularly on the coast
- Other than road construction costs, appraisal costs tend to overestimate the true costs experienced within many management areas
- Use of the MFR Coastal log selling price averages ignore many of the higher “spot prices” or log export prices that a prudent log trader can achieve on the Vancouver Log Market. The possibility of potential log export revenues is also similarly discounted under the appraisal system methodology

In defining the costs to be included in an operability model that involves subtracting explicit costs from explicit values, a decision must be made as to whether stumpage should be considered a cost. While there is disagreement on this matter, it is generally agreed that the stumpage system

¹ A Survey Of B.C. Government And Industry Forest Practitioners To Examine The Rationale For Including Or Excluding Stumpage Costs Within Economic Operability Studies Used To Determine The Timber Harvesting Land Base. By Forest Ecosystem Solutions Ltd. and D.E. Gytton & Associates. April 2006

in BC does not provide perfect assessment of the true economic rent. Hence, there is good rationale for including stumpage as a cost, at least until a better stumpage system evolves (i.e. one that accurately defines true economic rent). Nevertheless, there is still uncertainty about whether or not stumpage should be included as a cost. Therefore, if costs are to be directly incorporated into an operability model, this issue should be addressed explicitly in developing the classification method.

Assigning Value

Market fluctuations make it difficult to derive a static operability classification that will characterize areas as either operable or inoperable under any foreseeable condition. Nevertheless, as currently practiced, timber supply analysis requires that a stable timber harvesting land base be defined. Almost any operability assessment involves assumptions about what the future demand or market may be like. The form of the assumption may be how many years of past harvests are mapped and correlated with forest cover and other data to indicate what types of stands are being harvested currently, and might be harvested in the future. Or the assumption might be related to the market conditions employed in deriving the prices that are applied to the timber coming from stands. An additional assumption that is almost unavoidable given the lack of grade information on the forest inventory (and the prohibitive cost of collecting such information on a comprehensive basis) is that the quality and price structure for stands that might be harvested in the future is reflected in recently harvested stands.

Given uncertainties about markets and values, it is almost always worthwhile in timber supply analysis to assess the sensitivity of timber supply to shifts in operability related to changing markets and prices.

Overall approach – level of detail,

Historically, operability classifications in British Columbia involved expert, and usually subjective, assessments of wood quality and demand, terrain, ability to access an area, and sometimes other characteristics such as the environmental sensitivity. It often was not clear or explicit how classes were defined, or if the nature of surrounding stands and the broader landscape context were factored into the classification. The lack of transparency in such expert-based, subjective approaches provided little opportunity to assess the implications of uncertainty in the classification.

In response to the lack of transparency in the subjective approaches, practitioners have developed a few alternatives. These approaches include matrices that assign operability based on correlation of recent harvesting with variables such as distance from processing centres, harvesting system (itself based on soils and terrain), and forest cover²; harvest system mapping³; log market and appraisal based assessments⁴; and use of actual revenues, costs and mill

² For example, BC Ministry of Forests. Mackenzie Timber Supply Area Analysis Report, April 2001 and BC Ministry of Forests. Prince George Timber Supply Area Analysis Report, September 2001

³ Bulkley TSA Harvest Method Mapping Pilot Project operability study

⁴ East Kootenay Timber Merchantability Analysis, June 7, 2001. By Oliver Thomae, and recent FIA studies available on the Ministry of Forests and Range Library website, for example, Arrowsmith TSA operability assessment, Timberline Inventory Consultants, March 2006 www.for.gov.bc.ca/hfd/library/FIA/2006/LBIP_6440001.pdf

conversions experienced by licensees⁵. While use of explicit cost and value information is desirable in principle⁶, at this time, there is no obvious correct method given existing uncertainties and the nature of the underlying forest inventory data. In choosing an approach, the quality of the available information and the available time and budget should be considered.

Operability studies under FIA

The purpose of an operability study funded under the Forest Investment Account is to provide information for use in timber supply analysis that supports Chief Forester AAC determinations.

As discussed in the background section, assessing operability is usually subject to uncertainty. Recognition of uncertainty is an important aspect of operability classification, and addressing it normally involves thorough discussions among stakeholders and development of flexible and transparent classifications that facilitate examination of the impacts of uncertainty.

The operability study should typically involve two phases: (1) a problem analysis and definition of the approach to be used, including decisions on how uncertainties and other identified issues will be addressed, and (2) development of specific methods and algorithms, collection of information, and application of the method and information to develop the operability classification.

The purpose of the first phase is to develop a detailed problem analysis of operability and access issues, including a description of information and analysis/modelling needs. This first phase should involve discussions between industry proponents and Ministry of Forests and Range staff to ensure a common understanding of issues, and agreement on how those issues will be addressed in the operability classification, including how the classification will be employed in developing inputs for timber supply analysis in support of the AAC determination. The details of these latter steps may need to be worked out in the second phase, however, the general issues should be clear to both industry and ministry staff early in the operability study.

The second phase will involve development of data preparation methods and/or model algorithms to improve representation of operability and access issues in TSR analyses, based on the findings of the problem analysis.

Over-riding principles that should be considering in developing the operability classification are:

- **Focus on economic considerations**
 - The operability classification should be based on terrain and forest characteristics that affect the economic feasibility of harvesting timber from the area.
 - An area should not be classified as inoperable solely due to environmental sensitivity or presence of non-timber values. Operability should focus on the economic feasibility of harvesting the areas. Where possible, when defining the land base available for timber

⁵ Operability analysis for the Mackenzie Timber Supply Area: phase 2, Forest Ecosystem Solutions Ltd.
www.for.gov.bc.ca/hfd/library/FIA/2006/LBIP_2418004.pdf

⁶ Coast Forest Region, Ministry of Forests and Range, Operability Mapping Technical Reference. November 20, 2006 and Coast Forest Region, Ministry of Forests and Range, Coast Forest Region Operability Review Phase 1. April 20, 2006.

harvesting, environmental sensitivity or non-timber values should be handled separately from operability.

- **Flexibility**
 - Assigning value to stands is difficult since past market prices may not be applicable to remaining stands, and the link between stand attributes (e.g., forest cover label) and quality or grade is not clear.
 - Given the uncertainties associated with the likelihood of market change, with assigning value to specific stands, and with assigning net value thresholds given flexibility to group stands into cutting permits or other harvest unit portfolios, it is necessary that the classification of economic operability be flexible to allow analysis of the uncertainties.
- **Repeatability**
 - To be repeatable, a classification must be based on a clearly defined, systematic, and understandable method and use readily available data. Another forestry practitioner should be able to apply the method and relevant data and arrive at a similar classification. If that is not possible, some aspect of the method is subjective or undefined. Repeatability enhances understanding of and trust in the classification.
- **Transparency**
 - Transparency is necessary for flexibility and repeatability. It also enhances public trust in the product. The ability to understand how the various components of a classification contribute to the final assignment of an operability class is needed to facilitate analytical work with the classification.
 - Difficulties have been experienced in reaching agreement on and applying classifications that rely on information private sector licensees define as proprietary. If proprietary information is to be used in deriving the operability classification, arrangements must be made to enable Ministry of Forests and Range staff to understand the nature of the information and the impact of using it relative to more publicly available information.
 - If the method involves explicit assessment of costs, documentation should be clear on what cost elements are included.
 - Similarly, the information used to assign or infer value to stands, whether it is harvest mapping, general log or product market prices, or actual revenues, should be clear. The date or time period over which the information was collected should also be clear (e.g. market prices in 1995, or harvests from 2003-2006).
 - If applicable, any threshold values, such as minimum net value, should be explicit. Choice of thresholds should be discussed with Ministry of Forests and Range staff, and approaches to uncertainties agreed to.
- **Appropriate use of data**
 - The purpose in using estimates of economic operability in timber supply analysis is to recognize that it is likely that some forest stands and areas will not be economically operable now or in the future. The purpose is not to attempt to predict which stands will be harvested over different time frames. AAC determination is a strategic decision, not an operational one.

- Proponents should discuss the proposed operability classification method with Ministry of Forests and Range experts, depending on the types of data and approach to be used. Expertise in revenue and appraisal, tenures, economics and timber supply analysis may be relevant particularly if detailed information from the appraisal system or private company records is to be used.
- **Consistency with available resources**
 - The available budget and time should be considered when deciding on the level of detail to be used.
 - A few options are available for operability classifications that are intermediate between expert-drawn lines (which normally lack transparency) and full assessment of stand-level costs and values. Examples include systems used for the Queen Charlotte and Bulkley TSAs for TSR2 in which harvest system and access-difficulty classes were assigned and cross-referenced with general value classes. Merchantability matrices were developed for some timber supply areas in the north east, based on distance to mills, harvest system and forest cover label. Clearly there is more uncertainty associated with a more general classification system, in particular related to potential omission of important variables. However, it is usually better to have a more general but complete classification than a detailed but incomplete one.

Project deliverables

The final report must submitted and include:

- documentation of the issues that arose during design of and discussions about the operability approach, and how they were addressed in the classification.
- a detailed description of the logic used to assign operability-related classifications.
- a data dictionary describing the applicable codes that comprise the classification and their meaning or interpretation, as well as the format of the classification (character/numeric, variable length).
- maps and/or a spatial database of the operability classifications (i.e. base case and relevant alternate scenario used to assess the impacts of uncertainties)

If new mapping is to be done (that is, work beyond assigning attributes to previously-existing polygons or resultants), the applicable mapping standards will need be to be developed in consultation with the FIA technical contact and Ministry of Agriculture and Lands, Integrated Land Management Bureau, and may involve requirements to follow base mapping Standard Operating Procedures and other related standards. Base mapping standard operating procedures can be found at: <http://ilmbwww.gov.bc.ca/bmgs/pba/sop/>