

**Morice
Timber
Supply
Area**

Sustainable Forest Management Plan



Version 3.3

March 25, 2009

The Morice Timber Supply Area Sustainable Forest Management Plan

Prepared for:

Morice and Lakes Timber Supply Areas
Innovative Forest Practices Agreement



Prepared by:

Tesera Systems Inc.



For more information please contact:

Jim Burbee, General Manager
Morice & Lakes IFPA
3003 Riverview Road
Prince George, BC V2K 4Y5
Tel: 250-564-1518
Fax: 250-562-1518
Email: venturefc@telus.net

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March 25, 2009

The Board of Directors of Tweedsmuir Forest Limited, the Timber Sales Manager, BC Timber Sales, Babine Business Area and the Morice and Lakes IFPA General Manager are pleased to present the Morice Timber Supply Area Sustainable Forest Management Plan.



Mike Dunbar, Woodlands Manager, Houston Forest Products Division of West Fraser Ltd



Jim Magowan, Woodlands Manager, Fraser Lakes Sawmills Division of West Fraser Mills Ltd



Carl Vandermark, Woodlands Manager, Canadian Forest Products

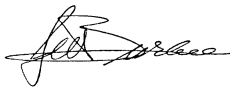


Richard Vossen, Woods Manager, Babine Forest Products Ltd.



Dave Watt, Woodlands Manager, L&M Lumber

Debbie Janning-Stewart, Timber Sales Manager, BC Timber Sales, Babine Business Area



Jim Burbee, Manager, Tweedsmuir Forest Ltd.

Foreword

Tweedsmuir Forest Ltd., a subsidiary company of licensees engaged in the **Morice and Lakes Timber Supply Areas Innovative Forest Practices Agreement (M&L IFPA)**, is pleased to present *Version 3.3* of the *Sustainable Forest Management (SFM) Plan* for the Morice Timber Supply Area (TSA).

Acknowledgements

Version 1.0 of the Morice TSA SFM Plan completed in October 2002 represented the culmination of an enormous effort by dozens of individuals in preparation of the document. Tweedsmuir Forest Ltd. recognizes and values the substantial amount of public involvement that contributed to achieve these first steps towards a collaborative approach to SFM in the Morice TSA. The tireless effort and personal time expended by public participants outside of formal meetings is gratefully acknowledged and sincerely appreciated.

Version 2.0 of the plan completed in 2004 required a great deal of effort and ingenuity on the part of the IFPA Technical Committee, Scenario Planning Team and the supporting consulting group lead by Tesera Systems Inc. The substantial contributions of these lead groups along with, resource agency staff, employees of parent companies and others engaged in supporting committee work and subsequent tasks enabled Tweedsmuir Forest Ltd. to further develop the SFM Plan to a new level of sophistication.

Version 3.0 of the plan (completed in 2005) was the result of numerous analyses that tested the technical creativity of the IFPA Technical Committee and Tesera Systems Inc. The forecasting of SFM indicators over long time horizons was designed to better understand how values are maintained on the landscape under varied management regimes. Public participants again contributed immeasurably in refining indicator functionality for implementation, and in endorsing management targets based upon learning from the analysis work. As with previous versions, the task of working through new and evolving planning processes, information gaps and innovative analysis technologies has been a challenge for many and the perseverance shown is duly noted and is recognized as a key element of bringing the SFM Plan to this stage in its evolution.

Similarly, credit is due to the parent companies of Tweedsmuir Forest Ltd for their continued support, both strategic and financial, of the SFM Plan initiative as an essential foundation to moving strategic planning objectives into the operational arena. This version of the SFM Plan has benefited from the first cycle of performance monitoring, management review and continual improvement actions that generated numerous practical improvements. This commitment to SFM is commendable and demonstrates leadership within the forest sector.

The involvement of First Nation communities in SFM planning remains a challenge and this is recognized as a shortcoming that requires continued effort. It is an objective of the IFPA Strategic Committee to demonstrate the value of collaborative planning to First Nation

communities, with the intent of increasing participation from this important segment of the greater community.

Version 3.3 SFM Plan purpose and function

The fundamental purpose of SFM Plans is to provide a management framework for developing, implementing and monitoring socially acceptable resource management plans. There are a number of strategic planning initiatives that serve specific purposes for different organizations, that while logical in their own perspectives, provide perplexing complexities when attempting to collectively deliver in practice. Examples of this within the province of BC would include; IFPA Forestry Plans, Land & Resource Management Plans, Forest Stewardship Plans, Forest Investment Plans, certification initiatives, Beetle Management Plans. The purpose of the Morice SFM Plan is to assimilate such strategic needs into a single adaptive management framework for operational planning and implementation.

The major challenge during the term of this plan will be to manage for multiple values in the face of the rapidly escalating mountain pine beetle epidemic. The most recent information and knowledge related to the current status and dynamics of this unprecedented event have been incorporated into analysis work and management strategies. The hope is that this plan enhancement will better prepare managers in all sectors to respond to the epidemic in a manner consistent with SFM values and indicator targets. Not all strategic needs will be met by this version of the Morice SFM Plan and it will continually evolve to address the broader list.

Version 3.3 of the SFM Plan builds on the previous versions (i.e. *Versions 3.1 and 3.2*) and reflects four years of SFM Plan implementation in the Morice TSA.

The overarching task of establishing an Adaptive Management System for SFM in the Morice TSA, requires the persistent commitment of many stakeholders and individuals. The ongoing, systematic pursuit of SFM will require elements of modesty, patience, persistence and co-operation to ensure that we are managing the forests and associated resources to meet our local values and expectations for generations to come.

Jim Burbee

General Manager
Morice and Lakes Timber Supply Areas
Innovative Forest Practices Agreement

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1.0 Introduction

As society affirms a greater diversity of values toward the forest land base, there is a requirement for forest management to become more engaging and accommodating of a wider set of public interests. While traditional forest management primarily focused on a sustained forest resource for timber utilization, there is now the public desire to manage the forest ecosystem toward a balance between social, ecological and economic values (Figure 1) while at the same time allowing future generations to enjoy the same benefits.

This concept is known as **Sustainable Forest Management (SFM)**, and represents the foundation by which the **Morice Timber Supply Area (TSA)** land base will be managed.

Progressing toward SFM on the Morice TSA land base requires the strong commitment of the public, forest licensees, and managing agencies to embrace innovative methods and technology. In particular, these innovative methods are being employed to obtain meaningful public input and participation, and to examine how a diversity of values can be accommodated and managed on the Morice TSA land base. This **SFM Plan** represents a culmination of effort and dedication to actively implement SFM on the Morice TSA land base.



Figure 1: Conceptual balance SFM represents

1.1 Historical Context of the Morice TSA

The area occupied by the Morice TSA has long been utilized for its abundance of natural resources. Pre-dating contemporary society, the indigenous populations were sustained by plentiful hunting and fishing resources. Most indigenous settlements were situated along watercourses and lakes, particularly as rivers provided significant fishing opportunities during salmon runs.

Non-indigenous immigration into the area first started to occur early in the 19th century with immigrants prospecting for gold in a number of the local streams. The first instances of non-indigenous settlement and development started with the building of the Overland Telegraph Line in the 1860's. Settlement was further stimulated by the construction of the Grand Trunk Pacific Railway which brought about the first instances of the forest industry with the requirement for timber for railway ties. The making of hand hewn railway ties comprised the majority of the forest industry in the Morice area in the early 1900s. Other than forestry, many of the settlers in the early 1900s also made their living through agriculture (Horn and Tamblyn 2000).

The post-World War II construction boom created a high demand for lumber and subsequently stimulated the investment and development of the forest industry in the Morice area. From 1940 through to the 1970's forestry established itself as a major industry in the region. The late 1940's marked the introduction of the first planer and gang mill. Alongside the introduction of high capacity log processing machinery, the timber trade also expanded, creating more demand for lumber. As a result, more area was made available for timber harvesting, and by the late 1950's there were 84 sawmills operating in the area. With such good prospects in the timber industry, there were plans to develop an integrated forest products complex under the formation of Bulkley Valley Forest Industries, which was to include a lumber mill, plywood plant, a stud mill and a pulp mill. Though the project failed in its early stages, the partnership of Noranda Incorporated and Mead Corporation purchased the complex under its subsidiary, Northwood

Pulp and Timber Ltd. (Canadian Forest Products Ltd. purchased Northwood in 1999) and concentrated its development on only the sawmill part of the complex in order to take advantage of the long-term stable wood supply in the area (BCMOF 2002; Horn and Tamblyn 2000). In 1978, as a further indication of the prosperous aspects of the wood supply in the Morice area, Weldwood of Canada Ltd., and Eurocan Pulp and Paper Co., established the second major sawmill in the Morice area under the joint venture of Houston Forest Products Co. (Dunbar 2002 pers. comm.)

At present, forestry is the leading employer and the main economic driver in this area. Houston, the largest community in the TSA, has a forestry dependant economy that is among the least diversified of any in the province; however, through stumpage, the Morice TSA is among the top revenue generators for the Crown. As a result, community leaders and the licensee representatives want to ensure that an equitable amount of investment and growth come back to the communities in the area. Investments in SFM can have a significant positive impact on the economies in these relatively small communities, and a positive return on government revenues through stumpage and the corporate and personal tax base.

Though forestry is the primary economic base of the area, other activities and values also contribute to the socio-economic structure of the Morice TSA. In particular, the natural abundances afforded by the area support various other sectors (e.g. agriculture, fishing, hunting, trapping, recreation/tourism, and mining) and the values and activities associated with these sectors. In sustainable forest management planning, these other activities and values which exist on the same land base must be considered and integrated into long-term planning.

With the forest sector being such a heavy influence on the socio-economic prosperity of the area, the vitality of the forest sector plays a key role in sustaining local communities. As a result, there is a strong need to ensure that the timber resources in the Morice TSA will be sustained throughout time and that the forest sector will co-exist and prosper with other activities and values that occur on the Morice TSA land base. The **Morice & Lakes Timber Supply Areas Innovative Forest Practices Agreement (M&L IFPA)** represents a strategically planned effort to accomplish this complex task.

1.2 Objectives of the SFM Plan for the Morice TSA

The fundamental purpose of SFM Plans is to provide a management framework for developing, implementing and monitoring socially acceptable resource management plans. More specifically, the purpose of the Morice SFM Plan is to assimilate such strategic needs into a single adaptive management framework for operational planning and implementation.

1.2.1 The Morice & Lakes Timber Supply Area Innovative Forest Practices Agreement

The provincial IFPA program was designed to enable licensees to explore new forest management ideas in an operational setting to enhance timber supplies, community stability and social and environmental values. The program was launched to advance seven goals of government:

- Develop socially acceptable forest management plans and practices,
- Conserve environmental values,
- Increase timber supply,
- Improve the knowledge base to achieve specific forest management objectives,

- Implement a results based approach to management,
- Communicate IFPA results to influence forest management, and
- Promote tenure reform.

The M&L IFPA was awarded in 1999 and is a partnership between six regional forest licensees (Babine Forest Products, Canadian Forest Products, Decker Lake Forest Products, Fraser Lake Sawmills, Houston Forest Products, and L&M Lumber) and BC Timber Sales in both the Morice and Lakes Timber Supply Areas. The IFPA program was designed to enable licensees to explore new forest management ideas in an operational setting to enhance timber supplies, community stability and social and environmental values. The M&L IFPA goals are (M&L Strategic Committee):

- Develop socially acceptable plans and practices,
- Enhance basic drivers of timber supply,
- Maintain environmental values, and
- Implement innovative approaches, affect policy and transfer learning.

Developing and implementing SFM Plans for both the Morice & Lakes Timber Supply Areas is the central objective of the M&L IFPA. These SFM Plans are developed using innovative approaches in public involvement, forest productivity and ecosystem-based management, and are the vehicle by which achievement of IFPA goals is enabled.

1.2.2 Linkages to other Processes

Linkages have also been identified with other processes that have since been initiated and are being implemented within the Morice TSA land base (see [Table 1](#)).

Table 1: Linkages to other processes

| Processes to link to SFM Plan: | Objectives: |
|--|---|
| Morice Land and Resource Management Plan | Coordination of objectives and indicator monitoring activities |
| ILMB Sustainable Resource Management Plan | Develop SRMP objectives with M&L IFPA. |
| Forest Certification (e.g. CSA-SFM Z809-2002, SFI) | Derive certification needs from M&L IFPA processes (e.g. PAG) and SFM Plan. |
| Forest Investment SFM Plans | Address needs of the FIA SFM Plan guidelines |
| Forest and Range Practices Act (results-based forest practices code) | Develop SFM Plan to support Forest Stewardship Plans |
| Beetle Management Strategies | Incorporate Beetle Management Strategies into SFM Plan |
| Corporate Forest Policies | Address Corporate Forest Policies |

1.3 Overview of the SFM Plan for the Morice TSA

This SFM Plan outlines the process of adaptive management that will be implemented on the Morice TSA land base and to identify key indicators that will be managed to achieve a sustainable balance of social, economic and ecological values.

Some of the historical context for the SFM Plan has been noted earlier in this section, and [Section 2.0](#) provides a description of the Morice TSA with respect to the physical characteristics, current and anticipated uses, and management regimes. [Section 2.0](#) also contains descriptions of some aspects of traditional forest management, and descriptions (in [subsection 2.5](#)) of the enhancement of forest management under the M&L IFPA SFM framework.

Implementation of the SFM Plan is described in [Section 3.0](#). This section describes the procedures by which the partnership will implement the SFM Plan operationally to support data gathering, monitoring, reporting, management adjustment and continual improvement.

[Section 4.0](#) of the SFM Plan describes the indicators that are used to implement, monitor and evaluate SFM on the Morice TSA. Each indicator is described on a "detailed indicator sheet" in [Appendix C](#) with respect to its rationale, relation to each SFM framework (M&L IFPA and the Canadian Council of Forest Ministers [CCFM]), current condition, indicator forecasting information, target/threshold, data required, and monitoring plans. The development, forecasting and monitoring of indicators is an integral component of the performance management and continual improvement framework for SFM.

2.0 The Defined Forest Area of the Morice TSA

2.1 The Morice TSA land base – Area net down

Table 2: Area net down for Morice TSA (Decision Scenario)

| Classification | Net Area Breakdown by Licensee (ha) | | | | | | | | | | | | | Net Area Breakdown by Licensee (%) | | | | | | | | | | | | |
|--|-------------------------------------|---------------|-----------------------|----------------------------------|--|------------|------------|------------------------|-------------------------------|----------------------|--------------------|-----------------------|-----------|------------------------------------|-----------|-------|--------|------------------------|-------------------------------|----------------------|--------------------|-----------------------|----------|-------------|-------|--|
| | Gross Area (ha) | Net Area (ha) | Percent of Gross Area | Percent of Total Productive Area | Percent of Volume Based Tenure Agreement Lands | BCTS | Canfor | Forest Service Reserve | K2L Community Forest Proposed | New Woodlot Proposed | Parks and Reserves | West Fraser Mills Ltd | Woodlots | Unallocated | Water | BCTS | Canfor | Forest Service Reserve | K2L Community Forest Proposed | New Woodlot Proposed | Parks and Reserves | West Fraser Mills Ltd | Woodlots | Unallocated | Water | |
| Morice TSA: | 1,501,709.75 | | 100% | | | 203,174.89 | 492,803.96 | 21,596.72 | 14,200.41 | 1,880.91 | 360,541.30 | 289,100.66 | 19,253.58 | 539.38 | 98,617.95 | 13.5% | 32.8% | 1.4% | 0.9% | 0.1% | 24.0% | 19.3% | 1.3% | 0.0% | 6.6% | |
| Reductions to Total Land Base: | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Unclassified Lands | 1,099.2 | 1,099.2 | 0% | | | 19.79 | 12.68 | 0.90 | 0.00 | 0.00 | 953.67 | 29.80 | 0.00 | 0.00 | 82.37 | 1.8% | 1.2% | 0.1% | 0.0% | 0.0% | 86.8% | 2.7% | 0.0% | 0.0% | 7.5% | |
| Natural Non-Treed Non-Productive | 394,499.8 | 394,499.8 | 26% | | | 18,654.02 | 50,916.16 | 1,765.72 | 942.60 | 35.87 | 196,463.00 | 31,576.69 | 675.35 | 87.66 | 93,382.73 | 4.7% | 12.9% | 0.4% | 0.2% | 0.0% | 49.8% | 8.0% | 0.2% | 0.0% | 23.7% | |
| Total Productive Land Base: | | 1,106,110.7 | 74% | 100% | | 184,501.1 | 441,875.1 | 19,830.1 | 13,257.8 | 1,845.0 | 163,124.6 | 257,494.2 | 18,578.2 | 451.7 | 5,152.9 | 16.7% | 39.9% | 1.8% | 1.2% | 0.2% | 14.7% | 23.3% | 1.7% | 0.0% | 0.5% | |
| Reductions to Total Productive Land Base: | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Deforested Lands for Agriculture and Settlement | 24,741.7 | 24,657.1 | 2% | 2% | | 11,981.4 | 7,189.4 | 533.2 | 320.8 | 82.0 | 162.9 | 2,464.1 | 665.3 | 2.4 | 1,255.7 | 48.6% | 29.2% | 2.2% | 1.3% | 0.3% | 0.7% | 10.0% | 2.7% | 0.0% | 5.1% | |
| Deforested Lands for Timber Harvesting and Forest Management | 18,664.2 | 16,498.1 | 1% | 1% | | 2,549.4 | 8,336.3 | 244.9 | 226.0 | 47.9 | 55.7 | 4,790.6 | 212.9 | 4.0 | 30.3 | 15.5% | 50.5% | 1.5% | 1.4% | 0.3% | 0.3% | 29.0% | 1.3% | 0.0% | 0.2% | |
| Net Productive Land Base: | | 1,064,955.5 | 71% | 96% | | 169,970.3 | 426,348.5 | 19,052.1 | 12,711.0 | 1,715.1 | 162,906.0 | 250,239.5 | 17,700.0 | 445.3 | 3,866.8 | 16.0% | 40.0% | 1.8% | 1.2% | 0.2% | 15.3% | 23.5% | 1.7% | 0.0% | 0.4% | |
| Reductions to Net Productive Land Base: | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Natural Treed Non-Productive | 231,287.1 | 65,030.2 | 4% | 6% | | 3,356.9 | 10,531.2 | 87.5 | 100.1 | 0.0 | 43,794.6 | 7,074.4 | 48.7 | 4.0 | 32.9 | 5.2% | 16.2% | 0.1% | 0.2% | 0.0% | 67.3% | 10.9% | 0.1% | 0.0% | 0.1% | |
| Lands to which Volume Based Tenure Agreements cannot be Granted | 150,083.0 | 74,748.6 | 5% | 7% | | 12,982.3 | 6,823.8 | 234.8 | 2.4 | 6.7 | 35,635.8 | 2,212.5 | 16,393.3 | 0.2 | 456.8 | 17.4% | 9.1% | 0.3% | 0.0% | 0.0% | 47.7% | 3.0% | 21.9% | 0.0% | 0.6% | |
| Forested Area where Volume Based Tenure Agreements Apply: | | 925,176.7 | 62% | 84% | 100% | 153,631.1 | 408,994.4 | 18,729.8 | 12,608.5 | 1,708.4 | 83,475.7 | 240,952.6 | 1,258.0 | 441.1 | 3,377.0 | 16.6% | 44.2% | 2.0% | 1.4% | 0.2% | 9.0% | 26.0% | 0.1% | 0.0% | 0.4% | |
| Reductions to Volume Based Tenure Agreement Lands: | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Non-Commercial Cover | 7,953.8 | 6,159.4 | 0% | 1% | 1% | 954.3 | 3,583.3 | 515.9 | 45.0 | 15.9 | 9.9 | 993.0 | 0.0 | 0.0 | 42.0 | 15.5% | 58.2% | 8.4% | 0.7% | 0.3% | 0.2% | 16.1% | 0.0% | 0.0% | 0.7% | |
| Non-Merchantable Forest Types | 3,187.2 | 1,830.6 | 0% | 0% | 0% | 923.4 | 637.7 | 15.2 | 101.1 | 88.0 | 0.0 | 62.0 | 3.2 | 0.0 | 0.0 | 50.4% | 34.8% | 0.8% | 5.5% | 4.8% | 0.0% | 3.4% | 0.2% | 0.0% | 0.0% | |
| Low Productivity Sites | 139,108.1 | 52,082.1 | 3% | 5% | 6% | 10,915.9 | 21,696.9 | 351.8 | 827.0 | 0.0 | 352.7 | 17,784.2 | 0.1 | 152.9 | 0.6 | 21.0% | 41.7% | 0.7% | 1.6% | 0.0% | 0.7% | 34.1% | 0.0% | 0.3% | 0.0% | |
| Terrain Stability | 58,671.7 | 26,663.0 | 2% | 2% | 3% | 4,676.6 | 13,037.8 | 448.2 | 561.0 | 51.6 | 185.5 | 7,521.8 | 15.6 | 12.0 | 152.8 | 17.5% | 48.9% | 1.7% | 2.1% | 0.2% | 0.7% | 28.2% | 0.1% | 0.0% | 0.6% | |
| Environmentally Sensitive Areas | 70,759.1 | 19,608.6 | 1% | 2% | 2% | 2,869.2 | 8,972.7 | 213.7 | 0.0 | 0.0 | 150.6 | 7,334.4 | 0.3 | 8.8 | 58.9 | 14.6% | 45.8% | 1.1% | 0.0% | 0.0% | 0.8% | 37.4% | 0.0% | 0.0% | 0.3% | |
| Inoperable | 238,124.4 | 11,903.8 | 1% | 1% | 1% | 2,832.5 | 6,686.8 | 0.0 | 700.4 | 0.0 | 8.9 | 1,675.2 | 0.0 | 0.0 | 0.0 | 23.8% | 56.2% | 0.0% | 5.9% | 0.0% | 0.1% | 14.1% | 0.0% | 0.0% | 0.0% | |
| Tourism Areas | 2,322.2 | 903.2 | 0% | 0% | 0% | 153.3 | 451.3 | 8.5 | 17.8 | 0.0 | 1.0 | 260.7 | 0.0 | 0.0 | 10.7 | 17.0% | 50.0% | 0.9% | 2.0% | 0.0% | 0.1% | 28.9% | 0.0% | 0.0% | 1.2% | |
| Riparian Management Areas | 32,738.3 | 15,612.9 | 1% | 1% | 2% | 2,512.1 | 6,693.3 | 363.3 | 189.6 | 26.5 | 46.5 | 5,658.5 | 31.5 | 18.8 | 72.8 | 16.1% | 42.9% | 2.3% | 1.2% | 0.2% | 0.3% | 36.2% | 0.2% | 0.1% | 0.5% | |
| LRMP No Harvesting Areas | 301,275.0 | 83,730.4 | 6% | 8% | 9% | 54.0 | 1,674.5 | 0.0 | 5.0 | 0.0 | 80,640.1 | 95.9 | 0.2 | 2.9 | 1,257.8 | 0.1% | 2.0% | 0.0% | 0.0% | 0.0% | 96.3% | 0.1% | 0.0% | 0.0% | 1.5% | |
| Current Timber Harvesting Land Base: | | 706,682.8 | 47% | 64% | 76% | 127,739.8 | 345,560.0 | 16,813.3 | 10,161.6 | 1,526.4 | 2,080.6 | 199,567.1 | 1,207.0 | 245.6 | 1,781.4 | 18.1% | 48.9% | 2.4% | 1.4% | 0.2% | 0.3% | 28.2% | 0.2% | 0.0% | 0.3% | |
| Future Reductions: | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Deforested Lands for Timber Harvesting and Forest Management | 31,968 | 18,066.8 | 1% | 2% | 2% | 3,410.04 | 8,590.98 | 475.60 | 246.65 | 31.99 | 103.31 | 5,089.99 | 43.65 | 11.56 | 63.07 | 18.9% | 47.6% | 2.6% | 1.4% | 0.2% | 0.6% | 28.2% | 0.2% | 0.1% | 0.3% | |
| Future Timber Harvesting Land Base: | | 688,615.9 | 46% | 62% | 74% | 124,329.8 | 336,969.0 | 16,337.7 | 9,915.0 | 1,494.5 | 1,977.3 | 194,477.1 | 1,163.4 | 234.0 | 1,718.4 | 18.1% | 48.9% | 2.4% | 1.4% | 0.2% | 0.3% | 28.2% | 0.2% | 0.0% | 0.2% | |

* The gross area for WTR includes areas that contribute to WTR but are not within the current THL

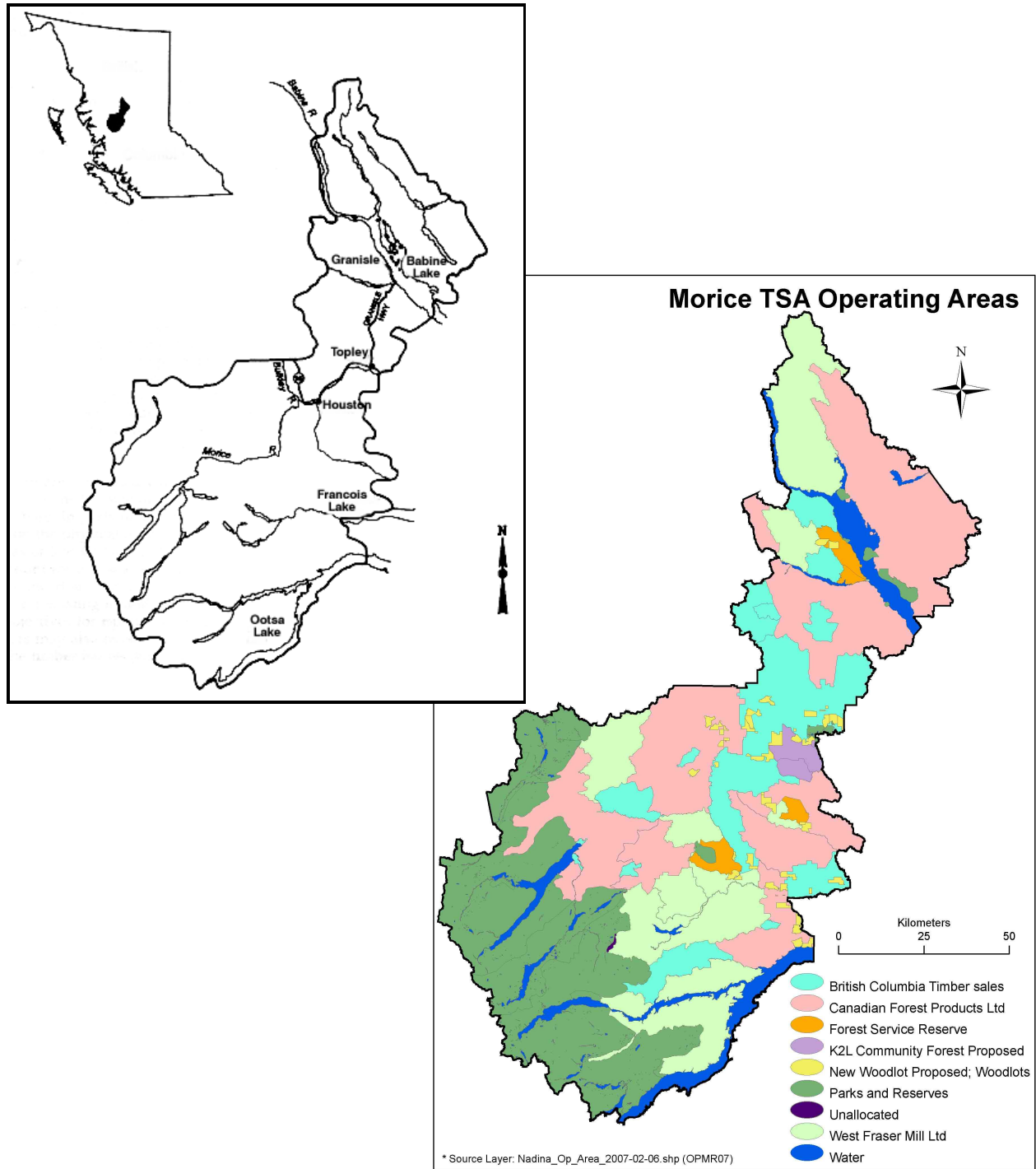


Figure 2: Map of the Morice Timber Supply Area and the Operating Areas within it

2.1.1 Geography and Terrain

Being located in a transitional area between the Coast and the Interior Plateau, the physical location of the Morice TSA contributes significantly to its biophysical characteristics (see [Figure 2](#) and [Table 2](#); also see [Appendix E](#) for a larger, more detailed key map of the Morice TSA). To the north and east, the topography is rolling hills, which contrasts the mountainous terrain of the southwest. The area is also well endowed with several prominent water features. Babine Lake, located in the north of the TSA is the largest freshwater natural lake in BC. Ootsa Lake, which is part of the Nechako Reservoir, is located in the south. Furthermore, several major watercourses occur in the area; of these, the Bulkley, the Morice and Nadina Rivers are the largest.

The terrain features, as well as the relative proximity to the coast give rise to the climatic conditions in the area. As a result, the continental climate of the area is moderated by the coastal marine influence. This results in shorter and warmer winters than locations more easterly on the Interior Plateau (Horn and Tamblyn 2000).

2.1.2 Ecosystems

Owing to its diversity of physical geography and climate, the Morice TSA has a wide variety of ecosystems. As organized by the provincial Biogeoclimatic Ecosystem Classification System (BEC), the Morice TSA has five BEC zones (summarized in [Table 3](#); sources: BCMOF 2002; Meidenger and Pojar 1991).

Table 3: BEC zones and descriptions of the Morice TSA

| | |
|--|--|
| Sub-Boreal Spruce (SBS) (59%) | The Sub-Boreal Spruce is the predominant forested zone in the interior lowland forest in the southern half of the Prince Rupert Forest Region, including the Lakes, Morice and Bulkley forest districts. The SBS occurs in valley bottoms to an elevation of approximately 1350 m, depending on local topography and climate. The climate is characterized by seasonal extremes of temperature, with severe, snowy winters and relatively warm, moist and short summers. The climate is more productive for tree growth than the true boreal forest. This subzone is subject to frequent large-scale fires (the average fire return interval is 100 years), and early seral species such as lodgepole pine and trembling aspen, are common, although the climax tree species are hybrid spruce and subalpine fir. |
| Engelmann Spruce-Subalpine Fir (ESSF) (26%) | The ESSF has a shorter, cooler and moister growing season than adjacent low elevation zones. The zone is comprised of continuous forest at its lower and middle elevations and subalpine parkland at its upper elevations. Subalpine fir is the dominant tree species throughout the zone. Hybrid spruce and lodgepole pine are common in drier portions of the zone that have been influenced by fire (mainly above the SBS). |
| Alpine Tundra (AT) (11%) | Most of the Alpine Tundra in the plan area occurs in the mountainous areas to the southwest of the district, above the ESSF zone. The climate in the AT is severe. It is cold, windy and snowy, with low growing season temperatures and a very short frost-free period. Frost can occur at any time during the year. The AT is characterized by its lack of trees. Tree species do occur at lower alpine elevations in stunted or krummholz form. Shrubs, herbs, mosses, liverworts, and lichens dominate alpine vegetation. |
| Coastal Western Hemlock (CWH) (3%) | There are small pockets of Coastal Western Hemlock wet subarctic subzone (CWHws) in the southwest of the district. The CWHws is an inland subzone of the CWH. The local variant, CWHws2, is found at low to mid- elevations (600 – 1000 m) in a narrow band around Morice, Nanika and Tahtsa Lakes and around the western half of Whitesail Lake. The climate is transitional, being predominantly coastal but with significant influence from continental weather patterns. It is not as subject to winter cold spells and summer droughts as the more interior climates. The flora in this subzone reflects the transitional climate, having both coastal and interior species. Mesic forests are dominated by western hemlock, with amabilis fir, mountain hemlock as well as interior species such as lodgepole pine, trembling aspen and subalpine fir. |
| Mountain Hemlock (MH) (1%) | There is a very small amount (< 1%) of Mountain Hemlock (MHmm) in the southwest of the district. The MHmm is part of the MH moist maritime subzone. Most MHmm occurs at subalpine elevations in maritime to subarctic climates. It lies above the CWH zone and is dominated by western hemlock. |

2.1.3 Forest Types

With regard to dominant forest types, lodgepole pine-leading forests cover more than 50% of the forested land base. Spruce forests and subalpine fir make up most of the remainder with subalpine fir dominating at higher elevations. There are also some hemlock/amabilis fir stands in the more coastal forests to the south. Other forest types include cedar, spruce/fir, spruce/hemlock, white-bark pine, lodgepole pine/fir, larch and deciduous. Alluvial forests of black cottonwood, often with a minor component of spruce, occur to a limited extent on active floodplains of the major streams and rivers (Horn and Tamblin 2000).

Wetlands are common and dot the landscape in poorly drained, postglacial depressions or river ox-bows. Wetland community types include sedge marshes, scrub fens (containing birches and willows), treed fens and swamps (with black and hybrid white spruce, and black spruce) and sphagnum bogs. Acidic, nutrient-poor bogs are less common than the richer wetland types (marshes, fens, and swamps) (Meidinger et al. 1991).

2.1.4 Wildlife and Fish

The ecosystem diversity gives rise to an abundance of wildlife. Within the Morice TSA, the SBS and ESSF BEC zones cover the majority of the TSA. In the SBS, important ecological factors for wildlife are the long snowy winters, the dominance of dense spruce – subalpine fir and pine forests on gently rolling terrain, and the abundant wetlands. Wildlife that inhabits this zone is adapted to either survive or avoid the severe winters. In the ESSF the factors that most influence the assemblage of wildlife species are the wet, cool summers, long cold snowy winters, and steep topography.

Although best known for its moose population, the TSA also supports mule deer and, to a lesser degree, whitetail deer, grizzly and black bear, mountain goat, wolves, coyotes and portions of three caribou herds. Populations of pine marten, beaver and lynx are also common (BCMOF 2002).

Avian species include those resident and migratory birds that can take advantage of the habitat elements afforded by the TSA (e.g. forest birds, geese, ducks, swans, grouse, woodpeckers, owls, and eagles).

The numerous lakes and watercourses within the TSA also give rise to several fish species, including four species of salmon, steelhead, rainbow trout, kokanee, lake trout, Dolly Varden, bull trout, cut-throat trout, and whitefish.

“Identified Wildlife Species” have been identified within the Lakes TSA under the Forest Practices Code of British Columbia Act. “Identified Wildlife Species” are those species and plant communities that have been approved by the Chief Forester and deputy Minister of Environment, Lands, and Parks or designate as requiring special management. Within the Morice TSA, these species include bull trout, northern goshawk, fisher, and grizzly bear. American bittern, Trumpeter swan, wolverine, and mountain goat have also been identified as “Identified Wildlife Species” in certain areas of the Morice TSA (BCMOF 2002).

[The BC Conservation Data Centre](#) has also identified “Red” and “Blue” listed animal species within the Morice TSA. Red listed species are extirpated, endangered, or threatened species, whereas Blue listed species are considered “vulnerable” (i.e. particularly sensitive to human activities or natural events) (BCCDC 2002). The peregrine falcon (anatum subspecies) is classified as a Red listed species. The Blue listed species within the Morice TSA include american bittern, rough-legged hawk, barn swallow, double-crested cormorant, bull trout, caribou (northern mountain population), cutthroat trout (clarki subspecies), dolly varden, fisher, grizzly bear, sharp-tailed grouse (columbianus subspecies), and wolverine (luscus subspecies) (BCCDC 2009).

2.1.5 Geology

In terms of geology, the Morice TSA is underlain by volcanic, sedimentary and intrusive rocks that formed during the evolution of the western margin of North America during the past 250 million years. In recent geologic history, repeated glacial advance and retreat during the past two million years carved rugged peaks and deep U-shaped valleys and produced surficial deposits of gravel, sand and clay deposited in glacial lakes and paleo-streams, and a thick mantle of moraine left behind by the ice itself (Horn and Tamblyn 2000).

2.1.6 Soils

Upland soils within the SBS zone are primarily from the Luvisolic, Podzolic, and Brunisolic soil orders. Podzols and Brunisolic and Orthic Gray Luvisols are the most common soils found on the abundant morainal deposits. Imperfectly to poorly drained sites in the SBS typically have Gleysols or gleyed subgroups of Luvisols, Podzols, or Brunisols. Within the ESSF, the rapid to moderately well-drained parent materials give rise to podzolic soil developments and are classified as Humo-Ferric Podzols (Meidinger et al. 1991; Coupé et al. 1991).

2.2 Socio-economic Description of the Morice TSA

2.2.1 Population

The Morice TSA supports a population of approximately 5,200. Houston is the largest centre (approximately 4,250 residents), followed by Granisle (500 residents) and Topley [and area] (450 residents) (Horn and Tamblyn 2000). Rural settlement occurs across the Morice TSA.

2.2.2 Administration

In administrative terms, the Morice TSA is located in the Bulkley-Nechako Regional District. Municipalities in that Regional District include Houston, Granisle, Burns Lake, Fort St. James, Fraser Lake, Smithers, Telkwa, and Vanderhoof. The Board of Directors for the Regional District includes elected representatives from all municipalities as well as elected representatives from the rural, electoral areas. The Districts of Houston and Granisle each have an elected Mayor and Council (Horn and Tamblyn 2000).

2.2.3 First Nations

There are five First Nations with traditional territory within the Morice TSA – the Cheslatta Carrier First Nation, Office of the Wet'suwet'en, Wet'suwet'en First Nation, Lake Babine Nation and Yekooche First Nation. Each has submitted a Statement of Intent to the Treaty Commission. There are 17 Indian reserves scattered throughout the TSA area but only Fort Babine and Tachet (both are part of the Lake Babine Nation) have established year round communities (Zweck 2002, pers. comm.).

There are two tribal councils affiliated with First Nations in the Morice TSA area. The Office of the Wet'suwet'en Hereditary Chiefs is based in Smithers and operates with a basis on the hereditary system

of governance. The Carrier-Sekani Tribal Council is based out of Prince George and is an over-arching organization of elected First Nation chiefs of the Carrier-Sekani (Robinson 2002 pers. comm.).

2.2.4 Employment

As the Morice TSA represents one of the most strategically important timber supply and forestry areas in the province, most of the local employment and economic wealth of the Morice TSA and surrounding areas is provided by the forest industry. In relative terms, forestry employs approximately 50%, followed by the public sector (22%), tourism (9%), construction (7%), agriculture (6%) and mining (3%) (BCMOF 2002).

Forestry plays a significant role in supporting numerous other jobs in the area by companies and employees purchasing goods and services from local businesses. For every 100 direct forestry jobs, another 25 to 65 indirect and induced jobs are supported. In comparison, every 100 jobs in the public sector or tourism support another 10 to 24 positions (BCMOF 2002).

2.3 Current and Anticipated Uses of the Morice TSA land base

2.3.1 Timber

By maintaining a stable Allowable Annual Cut (AAC), the forest industry will continue to be the primary economic driver of the area and will contribute to the maintenance and creation of employment. [Table 4](#) summarizes the AAC allocations for the Morice TSA (BCMOF 2002c). While certain factors may constrain timber supply (e.g. government policy and regulatory initiatives associated with higher level plans, wildlife management strategies, insect infestations etc.), one of the purposes of the M&L IFPA is to demonstrate how these policies and regulations can be implemented without constraining timber supply, thereby maintaining/expanding harvest volume to stimulate the local economy.

Table 4: AAC Allocations for the Morice TSA

| Tenure | AAC (m3/yr) | % of AAC for Morice TSA |
|--|------------------|-------------------------|
| Replaceable Forest Licensees | | |
| Canadian Forest Products | 940 424 | 43.4% |
| Houston Forest Products | 589 836 | 27.2% |
| Non-Replaceable Forest License | 75 222 | 3.5% |
| Morice BCTS | 339 410 | 15.7% |
| Woodlots* | 12 225 | 0.6% |
| FS Reserves | 4 000 | 0.2% |
| Administrative Adjustment [†] | 203 883 | 9.4% |
| Total | 2 165 000 | 100% |

(Source: BCMOF 2009)

*note: woodlot licenses are not included as part of the Morice TSA Planning Area.

[†]note: the administrative adjustment accounts for inclusion of the endemic dead potential volume and includes a non-pine species partition.

Though the forest industry continues to be the primary economic influence in the area, encouraging the diversity of other values and resource uses on the land base is an important aspect in community stability and sustainable forest management.

2.3.2 Tourism and Recreation

Given the natural endowments of lakes, rivers, forest and variable terrain (ranging from rolling hills to rugged mountain ranges), the Morice TSA affords many recreational opportunities. Among these are fishing, boating, hunting, studying natural history, camping, cross-country skiing, back country skiing, snowmobiling, hiking, and mountaineering.

There are three small provincial parks within the boundaries of the Morice TSA that receive relatively modest use (Andrews Bay, Topley Landing and Red Bluff). Furthermore, the Morice TSA has 25 recreation sites and trails (previously maintained by the BC Ministry of Forests) accessible by Forest Service roads. [North Tweedsmuir Provincial Park](#) borders the Morice TSA to the south. The park offers wilderness camping, boat anchorages, tent sites and an extensive network of trails. Access into the park is by boat. Also within the Morice TSA, "Use, Recreation and Enjoyment of the Public" (UREPs) reserve areas have been designated. Government, to reduce any conflict with recreation values, must review any proposed land use in a UREP.

The tourism industry, which largely caters to a growing number of visitors attracted to seasonal outdoor recreation and fishing opportunities, has shown marked growth by the number of tourism operations. Though these operations tend to be small (i.e. < 5 employees), approximately 9% of the sector related income was generated by tourism related business (Horn and Tamblyn 2000). As tourism is a high priority for the area, local organizations have undertaken work to explore and develop tourism potential and marketing strategies and ILMB completed a Tourism Opportunity Study in March 2002 (Saunders 2002 pers. comm.).

A Recreation Opportunities Spectrum (ROS) has also been conducted for the Morice TSA. The ROS describes recreational opportunities in an area based on criteria of remoteness, size of area and evidence of human use. There is a range of ROS in the TSA from primitive (high degree of remoteness and naturalness, no facilities, > 8 km from a road) to roaded resource (various degrees of naturalness/modification). The roaded resource ROS is most common in the Morice. Numerous lakes and other recreation areas are directly accessible by Forest Service roads, particularly around the main population centres (Horn and Tamblyn 2000).

2.3.3 Mining

The mining industry has long had a presence in the area, and until recently, provided significant economic contributions to the area (prior to the closing of several key mines). At present, the Huckleberry mine in the TSA employs approximately 175 persons and supports approximately 40 indirect jobs being serviced primarily out of Houston. Reclamation work associated with the closure of previous mining operations also contributes to the economic influence of the mining industry in the area. The metallic mineral endowment of the area is rated high within BC and there are many favourable conditions for mineral exploration and development (Horn and Tamblyn 2000).

2.3.4 Agriculture and Range

Agriculture has been a traditional mainstay within the Morice TSA since the area was first settled. Alluvial deposits at lower elevations along the major rivers have the best capability for agriculture. Throughout most of the SBS, present agricultural activity is forage-based to support both cattle and dairy operations. On some of the more favourable sites, field crops and cereal grains are produced. Early seral and open mature forests, especially in the drier subzones, are used for seasonal grazing of livestock. Important range can be provided by seeding clearcuts and landings.

The agriculture industry supported employment for 152 people in 1996, which represented approximately 6% of the sector employment for the Morice TSA. As of 2002, there are 48 range tenures, 14 grazing leases, two hay cutting tenures and approximately 5,000 head of brood cows in the Morice (Riendeau 2002). There is a potential for expansion of the agriculture industry in the Morice TSA as current trends in the industry are expected to lead to further development in the livestock industry. It is also anticipated that vegetable and small commercial horticultural operations will continue to expand. Value added processing facilities and support infrastructure are expected to accompany further development within the agriculture industry (Horn and Tamblyn 2000; Meidinger and Pojar 1991).

2.3.5 Fishing/Hunting

The Morice TSA land base provides ample opportunity for hunting and fishing pursuits. The watersheds that characterize the Morice TSA are world renowned for the combination of variety of species, large size of fish, fly-fishing opportunities, and pristine wilderness situations. In this respect, recreational and First Nations fisheries (rivers and lakes) are highly regarded values in the Morice TSA. The First Nations fishery exists to support First Nations indigenous food, social and ceremonial purposes. The recreational fishery supports both unguided (generally residents) and guided (generally non-residents) and participants. The majority of participants in the recreational fishery are unguided residents of the area; however, there is increasing participation in guided fishing opportunities as the world-class status of the Bulkley and Morice rivers, particularly for steelhead, is attracting more foreign tourists. Hunting is also a popular activity on the Morice TSA. Similar to fishing, a large proportion of the hunters are residents whereas non-resident hunters require a guide. Hunting effort and success is influenced by factors such as game abundance, access, regulations, economic climate, and weather (Horn and Tamblyn 2000).

2.3.6 Guiding-Outfitting/Trapping

The Morice TSA hosts a wide variety of wildlife and some of the most abundant species are of commercial significance for guiding-outfitting and trapping operations.

Nine guide-outfitting territories overlap the Morice TSA. Four of these are contained wholly within the TSA. Various proportions of the remaining five are located within the boundaries. The boundaries also overlap with a small portion of one non-guided territory. Moose and bear are the most common animals sought by guided hunters.

62 trapping territories overlap the Morice TSA. Marten is by far the most heavily trapped species. Approximately ten times as many marten are caught annually compared with the next most trapped species, the beaver. Other commonly trapped species are weasel, squirrel, mink, and muskrat. Coyote, fisher, fox, lynx, river otter, skunk, wolf and wolverine are trapped occasionally. Although the figures vary from year to year, trapping of all species appears to have declined slightly over the past decade (Horn and Tamblyn 2000).

2.3.7 Cultural/Heritage and First Nations Uses

Owing to the history of the area that pre-dates contemporary society, the First Nations of the area have many long standing traditional uses and culturally important areas. As such, the Morice TSA has numerous known sites and areas of cultural significance for First Nations, including large numbers of culturally modified trees (CMTs). Locating cultural sites prior to development has been facilitated by the development of Archaeological Overview Assessments (AOAs). This model uses field confirmed data, input from First Nations and other inventories to provide mapped areas of high, moderate, or low risk of finding an unknown archaeological site. The AOA map is used by major licensees, woodlot licensees and BCTS when proposing harvesting blocks. Cultural sites dated prior to 1846 are protected under the Heritage Conservation Act. The Nadina Forest District has developed a CMT policy for managing pre- and post-1846 CMTs.

Traditional use studies (TUS) have been formally completed to Resource Inventory Committee (RIC) standards for the Wet'suwet'en First Nation. Informal TUS information has been received from the Broman Lake Band, Cheslatta and Lake Babine First Nations. Typically these studies indicate areas of importance for traditional activities such as hunting, fishing and berry-picking as well as indicating important wildlife habitat areas, trails, camping areas and cabins

The Ministry of Forests and Range have been working with the Wet'suwet'en on a project designed to cooperatively gather First Nations' land-based information and guiding principles for consideration in land use and resource management within Landscape Units and Wet'suwet'en traditional territories. The Nadina district has mapped information of cultural/heritage sites and traditional ecological knowledge for a number of traditional house territories and Landscape units.

2.3.8 Non-timber Forest Products

Non-timber forest products (NTFPs) use on the TSA is neither documented nor inventoried; however, this use is known to occur on the TSA in varying capacities ranging from non-commercial personal use of NTFP, to small commercial operations. NTFP uses on the Morice TSA include such activities as wild mushroom harvesting, berry picking and country food harvest.

2.3.9 Biological Diversity

As noted in earlier sections of the SFM Plan, there are many elements, which contribute to the biological diversity and the variety and abundance of wildlife in the Morice TSA. The geographic proximity of coastal and interior climate factors has shaped the natural diversity of the flora and fauna within the various ecosystems.

The largest impact to the existing status of biological diversity is land use activity, of which forestry has the largest spatial influence. Young seral forests are created through the removal of the forest canopy by logging or naturally by forest fires. These changes to the structural habitat change the distribution and abundance of flora and wildlife species. Within the Morice TSA, timber harvesting prevails, so there are abundant young seral forest habitats in various stages of succession.

As the forest progresses through its successional stages the abundance and diversity of flora and fauna species change. Many species can benefit from early successional shrub areas (e.g. ungulates, bears, mice, voles, avian predators and other bird species adapted to open areas). As the natural succession

proceeds to early seral and mature seral other species become more abundant as a result of being able to take advantage of changing habitat elements (e.g. structure, food, microclimate, etc.). Though many species can take advantage of some of the opportunities provided by forest in various stages of seral development, particular attention must be afforded to those species that are rare, threatened or endangered so as not to exert further pressure on already limited populations (Meidinger et al. 1991).

2.3.10 Water

The Morice TSA has abundant supplies of high quality surface water in rivers, streams, wetlands and lakes. Groundwater supplies are also generally of high quality. Freshwater provides important habitat for fish and other aquatic creatures as well as for terrestrial animals and plant communities. Freshwater is also used by humans for drinking, recreation, industry, hydropower generation and irrigation. As land use activities can negatively affect water quality, resource management must consider all opportunities to maintain the quality and quantity of all water resources.

There are 133 water licenses within the Morice TSA area. Many of these licenses have several components, so the actual number of regulated points of diversion is 213. The vast majority of these licenses are on private land. At least 23 are Permits over Crown Land for works or flooding, which extends off private land or tenured Crown land. The water licenses that allow the greatest consumption are for Alcan (reservoir for hydropower generation), Fisheries Canada (fish conservation measures as to mitigate effects of Alcan reservoir), Huckleberry Mine (mining processing) and Community water systems (Houston and Granisle) (Horn and Tamblyn 2000).

2.4 Contemporary Forest Management Planning

Provincial forest planning in BC is based on two streams of decision-making: forest land use and forest land management. Land use plans generally define zones and specific objectives for those zones. In the Forest Range and Practices Act of British Columbia this is referred to as "higher-level planning".

Forest Stewardship Plans, define the practices needed to implement the objectives set by government. The Forest Range and Practices Act of British Columbia refers to Forest Stewardship Plans as "operational plans". Timber supply planning is guided by the Forest Act, runs parallel to both land use and forest management planning, and interacts with both. [Timber Supply Reviews](#) are conducted at least once every five years, and incorporate a variety of economic, social and environmental information, which is used by the Chief Forester of BC to make a determination of Allowable Annual Cut for the TSA. There are several opportunities for public review and input throughout the Timber Supply Review process (22 months duration).

In broad terms, land use objectives are fed into timber supply planning from higher-level plans, while harvesting areas and rates are fed back into forest management planning.

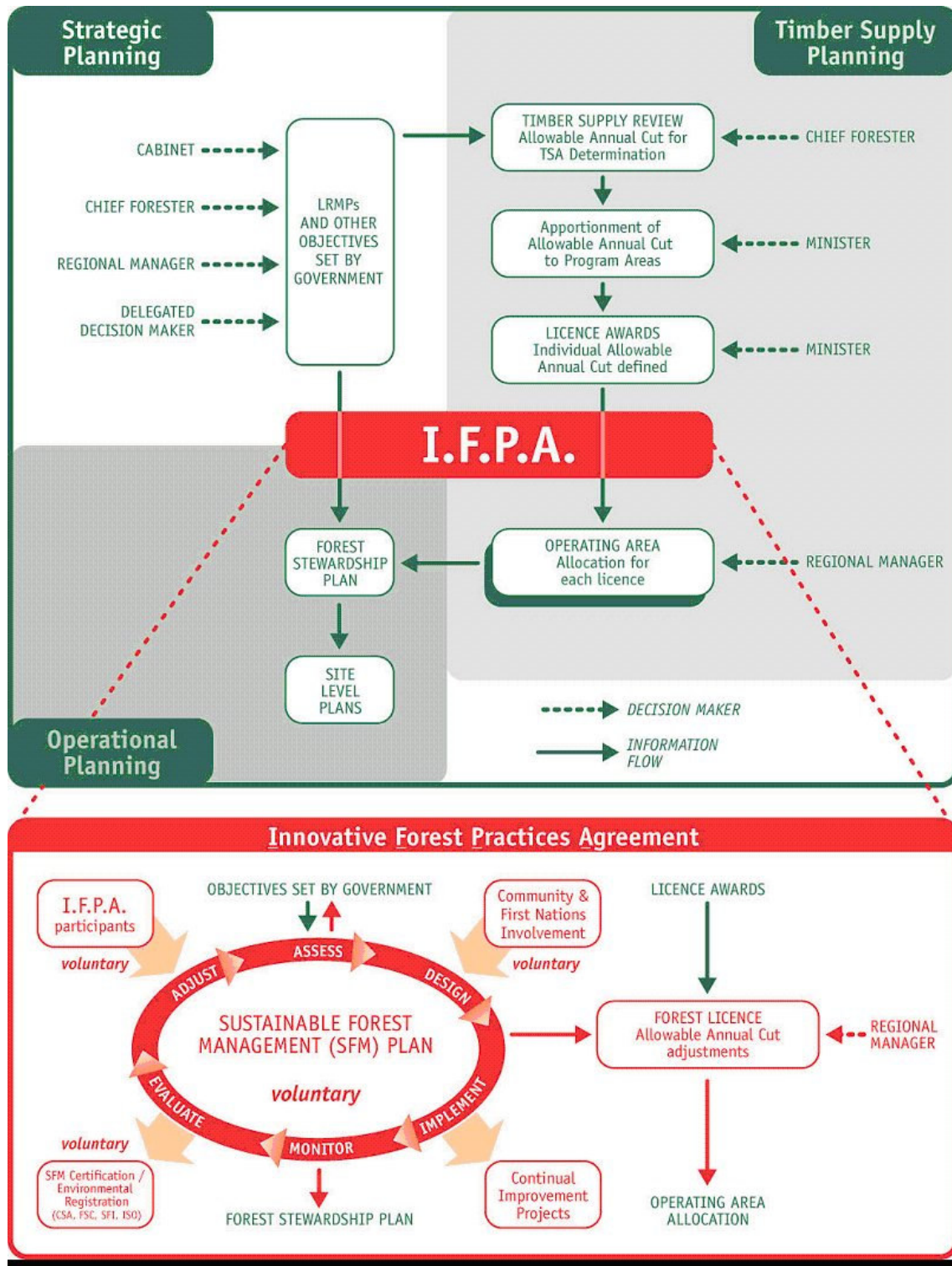


Figure 3: M&L IFPA relationship within current regulated forest planning in BC

2.5 Advanced Forest Management Planning through the M&L IFPA

Innovative Forest Practices Agreements are provincial programs that are intended to encourage new approaches to forest management. They are agreements between major forest companies and the Minister of Forests, and are mandated under the Forest Act (Part 4) through the Innovative Forest Practices Regulation ([section 59.1](#)).

Initially, the IFPA program was a product of the Jobs & Timber Accord. The Accord has now run its course, but the IFPA program remains, in the form of unique forest management programs in each of BC's forest regions. Each IFPA is voluntary, locally based, and industry-led, with its own unique focus and priorities. A core requirement of each IFPA is the development of a Forestry Plan that describes the IFPA's intent, and the activities that it will implement.

The Morice & Lakes IFPA aims to develop and implement Sustainable Forest Management (SFM) Plans for two Timber Supply Areas: the Morice TSA, near Houston, and the Lakes TSA, near Burns Lake. These plans fulfill the requirement for a IFPA Forestry Plans, but they also embrace a wider scope (see [Figure 3](#)). The proponents of the Morice & Lakes IFPA recognize that to be sustainable and implementable, local residents will need to support the plans. The process for gaining this support is one of the innovations of the IFPA.

Local residents work to identify resource management objectives that they considered important by participating in public input meetings. Objectives provided by First Nations, government, and forest companies also shaped the plans. All groups were invited to remain involved in developing the SFM Plan, and in monitoring its implementation. Forest companies and the BC Ministry of Forests' Timber Sales Program are implementing the plans.

2.5.1 M&L IFPA Management Structure

The M&L IFPA partners developed a management structure in the formative stages of the M&L IFPA and will continue to utilize this management structure in the implementation of the IFPA (see [Figure 4](#)).

The M&L IFPA management duties have been split between a Strategic Committee and a Technical Committee. Furthermore, an IFPA Manager coordinates all activities and acts as a liaison with the Strategic and Technical Committees.

Tweedsmuir Forest Limited

Tweedsmuir Forest Ltd. is the subsidiary company of licensees engaged in the M&L IFPA, and is the holder of the IFPA and acts as the funding and delivery mechanism for the M&L IFPA. Tweedsmuir is a limited liability corporation formed under the *Companies Act of BC*, and is directed by a board of directors representing each of the M&L IFPA partner licensees.

M&L IFPA Strategic Committee

The role of the Strategic Committee is to oversee the implementation of the M&L IFPA. One senior member from each licensee is a voting member of this committee. The Chair is chosen by the licensee representatives. Management policies and directions have been developed by committee members. Licensee members on the Strategic Committee are at the woods manager or chief forester level.

Other Strategic Committee members are drawn from the following groups:

- Ministry of Forests – District Manager and Timber Sale Program Manager
- Integrated Land Management Branch – Regional Director
- Ministry of Environment – Regional Director
- Communities – representatives from local governments (council representatives from Houston, Burns Lake & Granisle)
- First Nations representative from each TSA
- M&L IFPA Manager
- Public Advisory Group representatives.

M&L IFPA Technical Committee

The primary role of the Technical Committee is to develop and oversee the implementation of the SFM Plan. This committee proposes management strategies and commitments for approval by the Strategic Committee and addresses technical issues relating to specific activities. Furthermore, this committee determines management targets and monitors results. For the most part, each licensee provides one representative for the committee. The Technical Committee is comprised of members at the divisional forester or operations superintendent level. Technical representatives from the MOF, ILMB and MoE also sit on the Technical Committee. Additional expertise is added as required both from internal and external sources. Also, Technical Advisory Committees for Forest Productivity and Ecosystem Function act as subcommittees to the Technical Committee to provide further domain expertise in focused subject areas.

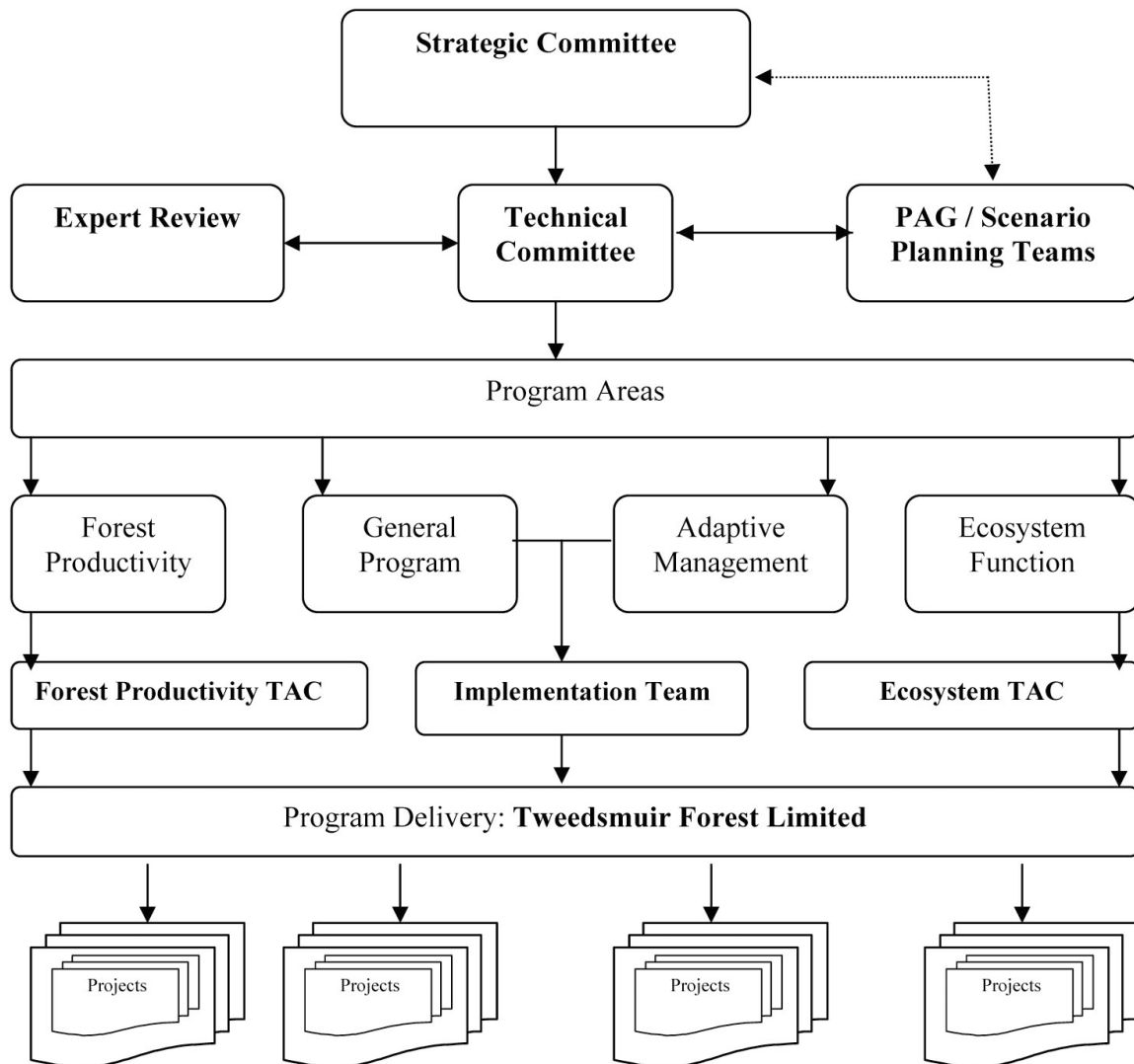


Figure 4: M&L IFPA management structure

2.5.2 The SFM Framework for the M&L IFPA

The SFM framework used for the M&L IFPA is based on the "McGregor Approach to Sustainable Forest Management". This SFM framework, originally developed by the [McGregor Model Forest Association](#) and now implemented by [Tesera Systems Inc.](#), is based on a generic adaptive management cycle (see [Figure 5](#)). Additional features have been added to this adaptive management framework to facilitate the development and implementation of SFM plans and systems.

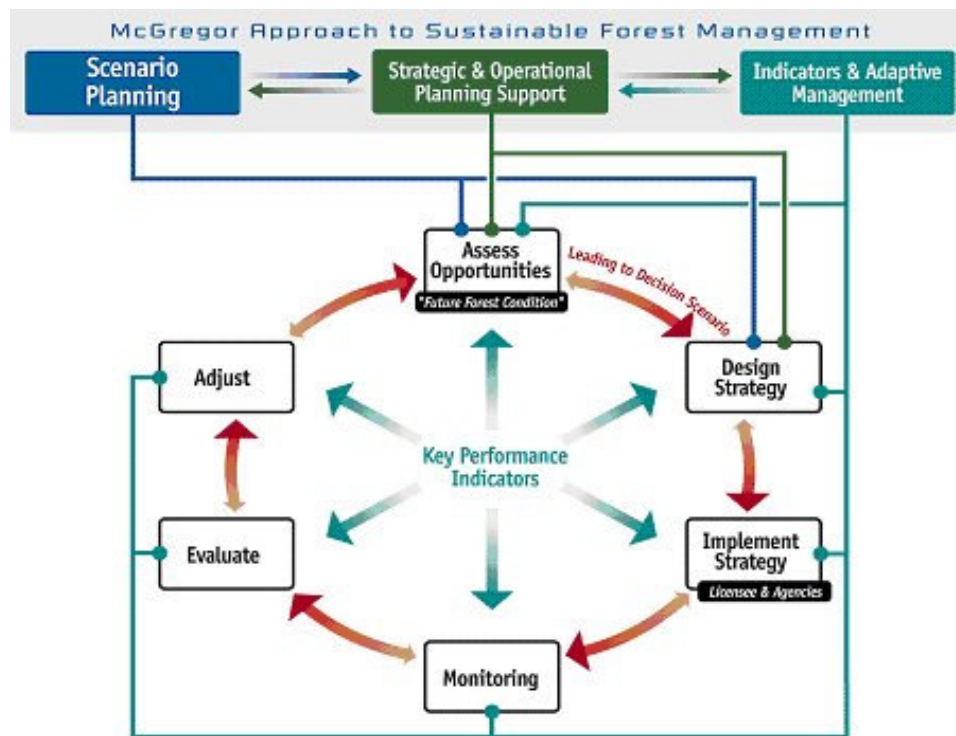


Figure 5: The McGregor Approach to Sustainable Forest Management

A multi-disciplinary planning team is a vital part of the process; it uses scenario planning to develop a series of future forest scenarios (i.e. "learning scenarios") that attempt to achieve a variety of resource management objectives (based on locally expressed values). These learning scenarios represent possible outcomes that stakeholders would like to see expressed on the forest landscape. It is at this level in the M&L IFPA where "resources", and "values/issues" are identified. Objectives are set for the learning scenarios and indicators are developed that enable an evaluation of objectives for a specific scenario.

In the M&L IFPA, the multi-disciplinary planning teams identified the following "resource" categories and rationalized the vast number of identified values/issues under these categories.

- Agriculture
- Community Stability
- Landscape and Stand Biodiversity
- Minerals and Energy
- Recreation
- Timber
- Watershed and Riparian
- Wildlife

Strategic analysis of resource data (spatially and temporally) supports and enables an objective comparison of the learning scenarios and associated values. As part of this process, constraints are imposed for each learning scenario based on particular values that stakeholders wish to be maintained.

The analysis determines if it is possible to maintain these values on the landscape throughout time. Furthermore, during the analysis it is possible to see how certain values interact, and to determine if seemingly disparate values can be compatible on the landscape. As a result of this analysis, the scenario planning team reviews the results from the learning scenario analyses, and works together to develop a "decision scenario", upon which future sustainable forest management will be based. Similar to the learning scenario process, the analysis will project and forecast indicators on the landscape into the future. As a result, indicator targets/thresholds are determined for a decision scenario, which forms the basis of the SFM Plan.

"Implementation of the strategy" requires management and practices to be aligned toward meeting the objectives in the decision scenario. Each licensee and government agency involved in the M&L IFPA is responsible to implement strategies as described in the decision scenario.

In order to determine if the management and practices are "on track" with the objectives and values of the decision scenario, indicator monitoring is conducted. As part of developing the SFM Plan, indicator detail sheets were prepared for each indicator, which form the basis for indicator monitoring. These sheets outline the details of the indicator with respect to associated resource values/objectives, rationale for indicator, current state of the indicator, indicator forecasting, targets/thresholds, and how the indicator will be monitored (data required, analysis procedure, responsibility of tasks, etc.). These detailed indicator sheets and the indicator monitoring provide a framework for future evaluation of the SFM Plan in terms of meeting the values and objectives.

The evaluation of indicator results relative to the targets and thresholds helps to determine if the objectives are being met and whether the values set out in the initial SFM Plan are being maintained. If deemed appropriate (i.e. through the evaluation process), certain management adjustment procedures may be required if indicator targets/thresholds are not being met. The assessment of indicator monitoring results is complex and indicators must be assessed as a whole, rather than individually. Therefore, if certain indicator targets/thresholds are not being met, a careful assessment must be done to determine causal factors and to address whether values are being maintained. Assumptions in the original analysis must be revisited and current conditions must be carefully considered.

The *McGregor Approach to SFM* is an ongoing process based on continual improvement. Therefore, the cycle continues as new understanding is gained from the indicator monitoring, or as new information becomes available, or as values change. It may warrant re-assessing opportunities through scenario planning, refining existing objectives and indicators and/or defining new objectives and indicators, undertaking monitoring, evaluating monitoring results and undertaking any applicable adjustments.

2.5.3 Public Involvement

In order to establish an effective public involvement process, the organizers developed a hierarchy of committees and fully integrated these entities into the design and implementation structure of the M&L IFPA. The two key public involvement committees are the Public Advisory Groups (PAG) and the Scenario Planning Teams (SPT) that operate at the TSA level (see [Figure 5](#)).

The PAG is comprised of members who represent a wide spectrum of values and interests within the TSA community including local business, economic development, small business, contractors, ranching/agriculture, trapping, guiding, recreation, hiking, tourism, woodlots, labour, environment, and local government. The PAG provides a local forum for input and feedback into the SFM planning framework development for the M&L IFPA and the SFM Plan.

The SPT is a working group that develops the resource management objectives, strategies, indicators and future forest scenarios necessary for the delivery of the SFM Plan. Each SPT is comprised of individuals who represent the PAG, the M&L IFPA proponents, and the resource agencies. Functionally, the bulk of the "hands-on" public involvement in the SFM planning process and the development of the SFM Plan rests with the SPT members. The public members of the SPT report out to the PAG on a periodic basis, and—through the PAG—to the community at large.

Since the start of the M&L IFPA in early 2000, well over 200 people have contributed local knowledge and expertise to the identification of resource values, management strategies, indicators. Over 100 meetings have been held within the M&L IFPA planning area to solicit community input to initially develop the SFM plan and also in the continual improvement of the plan. Many more meetings were held to develop a series of learning scenarios and the decision scenario. The decision scenario forms the basis for this version of the SFM Plan.

2.5.4 Integration of the M&L IFPA with other processes

There are other processes initiated in the M&L IFPA planning area with similar requirements to an SFM Plan particularly regarding the monitoring of performance indicators. For example, a single SFM Plan can use objectives from the M&L IFPA, SFM certification, and the LRMP processes, letting planners develop inclusive management strategies and implementation plans. As well, common performance indicators (measures) can be used to track progress in IFPAs, LRMPs, and SFM certification.

2.5.4.1 Land and Resource Management Plan (LRMP)

An LRMP is a provincial initiative that uses public consultation to guide government in making land-use decisions. Typically, an LRMP will specify land use zones for a TSA, along with higher-level social objectives for those zones and monitor their implementation. The M&L IFPA's SFM Plans are both strategic and tactical implementation plans that forge a link between higher-level objectives (i.e. those defined by LRMPs) and the operational plans required by the Forest Practices Code. Elements from the Morice LRMP have been incorporated in the IFPA Decision Scenario (see [Section 2.5.6.4 Decision Scenario - General Assumptions and Alternative Strategies](#))

2.5.4.2 ILMB Sustainable Resource Management Planning

Sustainable Resource Management (SRM) Planning is the consolidated approach of the Integrated Land Management Bureau (ILMB) to planning at the landscape level on provincial Crown lands. The analysis and detail of direction in SRM Planning is at the landscape level and usually focuses on medium sized watersheds (on average 50,000 to 100,000 ha). In addition to landscape-level planning, ILMB will eventually integrate management of strategic land use plans (i.e. LRMPs) into SRM Plans to produce a single framework that will provide a more consistent, streamlined and cost-effective approach to strategic resource planning. The result will be a more comprehensive, single source of information on all approved plans that will expedite development approvals and promote economic development (MSRM 2002).

SRM Planning has the following goals:

- Replace the current confusing array of landscape-level Crown land plans with a new comprehensive, flexible and efficient model for landscape-level planning that supports sustainable economic development, ecosystem management and watershed planning.

- Implement workable, long-term partnerships that provide resources for planning and encourage ownership of the results.
- Provide a single-window access and integrated delivery mechanism for new and existing (e.g., LRMPs) sources of planning, land registry and resource management information to expedite resource development approvals and stimulate sustainable resource-based economic development.

Given the close alignment and mandate of interests between the M&L IFPA and the ILMB in the Morice TSA, it is foreseen that a number of collaborative initiatives can be undertaken to realize time and cost efficiencies and to increase the scope and effectiveness of coordinated resource management efforts within the TSA. A collaborative agreement has been reached between ILMB and the M&L IFPA since there are presently numerous opportunities for collaborative work (e.g. data sharing, public involvement, indicators). Other opportunities which arise throughout time can also be addressed using the relationship outlined in the agreement.

2.5.4.3 SFM Certification

Forest certification is recognition by a qualified, independent third party that forest management meets a predetermined set of standards. These standards are set by groups that generally follow a broad consultative process that is national or international in scope. Forest certification is driven by consumers who insist that the forest products they buy come from responsibly managed forests.

The M&L IFPA has committed to making the SFM Plan "certifiable" by aligning the M&L IFPA resources and values framework and suite of indicators to the [Canadian Council of Forest Ministers \(CCFM\) SFM framework](#). Currently, the [CSA-SFM certification \(CAN/CSA Z809\)](#) is structured according to the CCFM – SFM framework, and the CSA-SFM system is recognized by the US [Sustainable Forest Initiative \(SFI\) certification](#). The CSA – SFM framework has an optional "chain of custody" process and product label provision to track wood from source to consumer, ensuring that the product comes from a forest that follows sustainable forest management standards. [The Forest Stewardship Council \(FSC\)](#) is another certification system available in Canada, and has recently developed draft regional standards for British Columbia. Though the FSC has not adopted the CCFM SFM framework, there may be potential to align the M&L IFPA suite of indicators to the FSC certification framework.

2.5.4.4 Forest Investment SFM Plans

For allocation of BC Ministry of Forests "Land Based Forest Investment Program" (LBIP) funds to individual licensees, each investment schedule is founded upon an SFM Plan developed for the particular timber supply area. Starting in 2003-04, only those licensees that are signatory to an SFM Plan will be entitled to submit an LBIP funding schedule or receive funding for LBIP activities. The SFM Plans will be provided by licensees to illustrate their strategies and priorities for sustainable forest management (BCMOF 2002a).

2.5.4.5 Results-based Forest and Range Practice Act

Under the current framework of the Forest Range and Practices Act of BC, licensees have prepared Forest Stewardship Plans (FSPs). A designated statutory decision maker (normally a District Manager) will then

review the FSP and assess whether it will achieve government objectives to manage and conserve the forest resource.

The proponent licensee will be required to submit sufficient information or an "evidentiary base" to satisfy the District Manager that the FSP will be effective. The standard of proof required to satisfy the District Manager and the evidentiary base required to support the FSP submission will vary with the degree of risk of a negative outcome (e.g. a stronger body of evidence will be required where human safety or critical environmental objectives are at risk (BCMOF 2002b)).

The M&L IFPA process and SFM Plan will provide much of the necessary analysis, information, documentation and public involvement process, to address many of the FSP requirements of the evidentiary package and satisfying the approval requirements.

2.5.4.6 Beetle Management Strategies

Under the current situation of bark beetle outbreaks throughout the Morice and Lakes TSAs, *Beetle Management Strategies* have been developed. These strategies are incorporated into the M&L IFPA analysis (i.e. decision scenario) (see *Section 2.5.6.4 Decision Scenario - General Assumptions and Alternative Strategies*)

2.5.4.7 Licensee Corporate SFM-related Policies

Environmental and other Corporate SFM Policies

All of the licensees in the Morice TSA have developed corporate policies directed toward SFM such as corporate mission statements, forest policies, and environmental policies (see [Appendix A](#)). As a result this SFM Plan will directly contribute toward fulfilling and evaluating some of the objectives outlined in those policies.

International Organization for Standardization (ISO)

The International Organization for Standardization (ISO) is a global federation of national standards bodies. Representatives from participating national bodies may attend technical committees and compile management standards in various subject areas. The [ISO 14001](#) standards are intended to provide organizations with the elements of an effective environmental management system (EMS), which, in combination with other management requirements, can be used to achieve environmental and economic goals. Organizations that successfully demonstrate conformance to the requirements of the ISO 14001 standard through an independent, qualified audit can achieve registration of their EMS to the standard.

Currently all of the licensee partners in the M&L IFPA have ISO 14001 registration.

2.5.5 Projects guided by the M&L IFPA SFM Plan

The projects guided by the M&L IFPA are integral to the continual improvement of the Morice TSA SFM Plan. These projects are described in *The Morice and Lakes IFPA Forestry Plan*. Project description sheets have been completed for each M&L IFPA continual improvement project. These contain linkages to indicators and other processes, partners, schedule of activities, funding requirements, etc. *The Morice*

and Lakes IFPA Forestry Plan also includes rationale statements for undertaking continual improvement projects.

2.5.6 Analysis for the Morice TSA SFM Plan

2.5.6.1 Data acquisition and preparation

A substantial effort has been made to compile, prepare and standardize data for analysis of the learning and decision scenarios for the M&L IFPA. Of nearly 800 data coverages reviewed from strategic and operational plans, approximately 100 have been selected and compiled for use in the analysis. Of the layers selected for processing about half are static while the others are derived data layers. Static data layers are existing data inventories for different resource values and are supplied by M&L IFPA partners. Derived data layers are "value added" data layers and usually involve buffering, classifying or extracting data from static layers. Information regarding the data was also compiled for each layer (i.e. scope, source of date, custodian, vintage, scale, original format, and metadata).

The Scenario Planning Team and the Technical Committee have been involved in the review and approval of each data layer. Reviewing the data with the SPT provided the members with opportunities to understand the complexity and completeness of the M&L IFPA information base.

Data files associated with timber growth and yield, ecosystems and activities have also been collected. Even though Timber Supply Review 3 (TSR3) data are used in the analysis, these data are tracked outside of the "Scenario Planning Team" database.

Benefits of a collective data set for the M&L IFPA

There are many benefits to offset the costs and efforts extended to assemble a collective data set for TSA-wide analysis. One of the advantages is that efficiencies may be realized which may reduce costs and time while providing intrinsic benefits. The following outlines some of the benefits of a centralized data approach, in relation to some of the cost issues described above.

- Current (updated) data sets will be accessible by all IFPA partners and government agencies in a timely fashion. All data will be centrally located on a server and accessible through the Internet.
- Duplicate information will be minimized since there will be a complete inventory of the most current data.
- Data will be standardized therefore increasing accuracy and maintaining a high level of data integrity. A standardized data format will also greatly minimize data preparation time for anyone involved in analysis work.
- Data exchange paths no longer need to be tracked as data will be located in one central depository and can be downloaded when needed.
- Each IFPA partner will continue to maintain their data custodian role. This would mean data update / maintenance costs will be distributed.
- Strategic planning data needs such as the LRMP process, forest certification, higher level plans, operational plans and the M&L IFPA will be met through this one process.

2.5.6.2 Timber Supply Analysis

Timber Supply Analysis addresses many complex management objectives in the Morice TSA, such as extensive riparian areas, diverse wildlife and wildlife habitat requirements and visual quality objectives. Timber supply analysis first examines what exists on the landscape under the current management regime and constraints. Subsequent to examining current conditions, Timber Supply Analysis then looks forward to see what is possible given certain assumptions in management as specified in defined scenarios. The application of the advanced technology of spatial timber supply analysis modelling is particularly appropriate for the M&L IFPA since both the Morice and Lakes TSAs are at a relatively early stage of development. As such, there are opportunities to achieve spatially related targets for age class, patch size, biodiversity and other planning objectives. Spatial analyses have been completed for individual landscape units using Tesera Systems' spatial analysis tools, and this technology is being applied to the entire M&L IFPA planning area (i.e. the Morice and Lakes TSAs).

The first use of the assembled database and the Tesera Systems' spatial analysis tools is in the preparation of the information package for SFM under the "current policy framework" for each TSA. Each information package details the extent of the timber harvesting land base, describes the management strategies that will be forecast, and provides a current status of each indicator.

The information package is reviewed and approved by the Technical Committee prior to being employed to forecast SFM under the "current policy" framework. The current version of the SFM plan has also been augmented with information and strategies derived from the Decision Scenario ([see Section 2.5.6.4 – Decision Scenario – General Assumptions and Alternative Strategies](#)).

2.5.6.3 Multiple Resource Analysis

Multiple resource analysis refers to the analysis of values and objectives outside the scope of timber supply analysis. Scenario planning is used to collect the wide variety of timber and non-timber values and objectives, and subsequently analytical parameters can be identified and these values and associated objectives can be modeled and tracked using indicators. Parallel to scenario planning, multiple resource analysis is used to understand the implications of various learning scenarios as well as the decision scenario. Forecasted indicator results have been used to evaluate the learning scenarios, and a decision scenario has been selected for management implementation based on this analysis.

2.5.6.4 Decision Scenario - General Assumptions and Alternative Strategies

Subsequent to the analysis conducted for the learning scenarios, the intent of the decision scenario was to review and incorporate best management practices based on knowledge gained from each of the learning scenarios. The decision scenario also enabled the investigation of alternative management strategies that were associated with other associated planning/strategic processes such as the Morice LRMP and the Morice Bark Beetle Management Strategy.

The following summarizes the general strategic assumptions of the decision scenario as well as some of the alternative strategies that were incorporated.

2.5.6.4.1 Timber Harvesting Land Base (THLB)

Primary Assumptions: The THLB used for the decision scenario was increased to allow for the inclusion of stands that were considered non-merchantable in the Revised Base Case Scenario.

Alternative Strategies: The Morice LRMP provided guidance and specific objectives and areas where harvesting was to be precluded.

2.5.6.4.2 Growth and Yield

Primary Assumptions: For the THLB areas, the growth curves from the Forest Productivity Scenario were used. For forested non-THLB areas, the growth curves from the Ecosystem Scenario were used. It's worth noting that the intensive silvicultural treatments that were modeled in the forest productivity scenario were not modeled at this stage of formulating the decision scenario, however silviculture treatments may be integrated for additional sensitivities.

Alternative Strategies:

- Adjusted curves to account for the mountain pine beetle (MPB) epidemic as projected in the [BCMPB](#) project.
- Stand status was redefined so that stands established prior to 1987 or did not have a pre-existing silviculture treatment were natural stands.
- Included site index adjustments for Site Index Estimates by Site Series (SIBEC), and Old Growth Site Index (OGSI).
- Incorporated genetic worth due to planting genetically improved (GI) stock
- Operational Adjustment Factors (OAF1) were modified from the base case
- Regeneration assumptions were modified from the base case
- Utilization levels were lowered

2.5.6.4.3 Landbase Constraints/Targets

The constraints acting on the land base were considerably more in the decision scenario than the previous learning scenarios, which is in part why the harvest levels realized during the learning scenarios were not realized in the decision scenario. The constraints in the scenario included:

Primary Assumptions (i.e. Constraints)

- Patch size target requirements
- Timber denudation requirements within visually sensitive areas based on slope and “plan to perspective ratios”. This information was provided by Canfor – Houston Operations.
- Wildlife Tree Retention targets
- Biodiversity targets – Wintering Range Restrictions, etc.

Alternative Strategies:

- General Forested Areas/High Biodiversity Emphasis Areas (GFA/HBEA) seral stage targets from the Morice LRMP
- Morice LRMP “No Harvest” Zones
- Conversion of approximately 20,000 hectares from a forested land base to agriculture and range usage.

2.5.6.4.4 Harvest Flow

Primary Assumptions: for the first 40 years target the relative oldest stands first and stands having the highest percentage of pine volume. After 40 years switch to targeting stands in the higher hazard categories (Extreme/High) for spruce bark beetle; mountain pine beetle and western bark beetle attack.

The Decision scenario harvest forecast when compared against the IFPA Revised Base Case harvest forecast shows an increase in harvested timber in the short-term, with a general decrease in harvest during the long-term (Figure 6). These decreases in available volume are due to:

- Lack of available growing stock above Minimum Harvest Age (MHA) and Minimum Harvest Volume (MHV) levels in the mid-term due to the pre-emptive harvest of pine within the periods 2 and 3 to mitigate further MPB spread;
- Seral constraints as identified in the Morice LRMP are also a factor in the reduction of mid and long-term harvest levels; and
- Visual Sensitivity constraints in the short-term lock up 306 individual visually sensitive areas, ~153,000 hectares of productive forest.

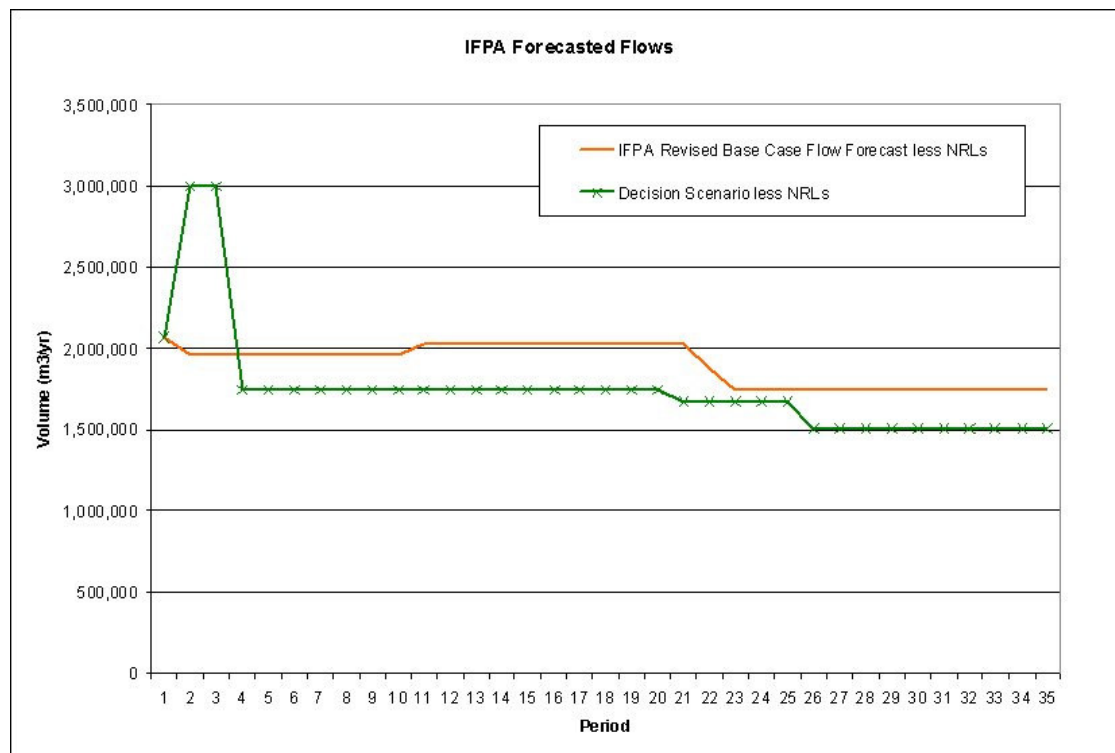


Figure 6: IFPA Harvest Flow Comparisons

Alternative Strategies:

Several harvest levels were tested to mitigate the impending MPB epidemic in the Morice TSA; however, it was felt by the Technical Committee that an annual harvest of 3.0 million cubic metres for periods 2

and 3 would be the best solution to mitigate the effects of the MPB epidemic while at the same time conserving other resource values.

In response to the MPB epidemic, stands other than pine leading stands were retained on the land base for as long as possible while the pine was targeted. Figure 7 illustrates the dead and green pine harvested in relation to the total harvest volume (other species) during the pine targeting in Periods 1 -4 (years 0-20). Other species were harvested due to:

- incidental volume, where not all pine stands targeted were pure pine stands;
- harvesting of approved cutblocks; and
- agriculture conversion activities.

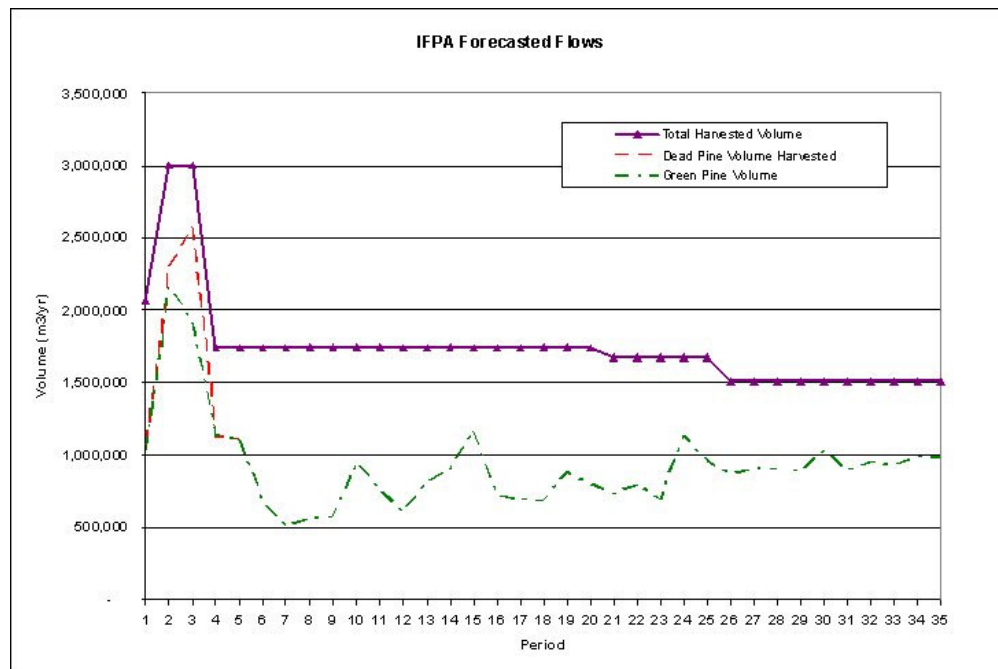


Figure 7: Pine (Dead and Green) in relation to Total Volume Harvested

3.0 Implementation of the SFM Plan

This SFM Plan will be implemented through the M&L IFPA proponents as a collaborative effort which aligns management and practices toward the strategies identified for the various M&L IFPA and CCFM parameters identified through the public involvement process (i.e. Public Advisory Groups and Scenario Planning Teams).

The M&L IFPA proponents are collectively responsible for the implementation of the SFM Plan. Each proponent of the partnership will be responsible for ensuring that their management and practices contribute to meeting targets and/or thresholds for the various performance indicators, which relate back to the framework of values/issues and resources for the M&L IFPA.

The Technical Committee is composed of representatives of the M&L IFPA proponents and ensures that strategies will be incorporated into operational plans for implementation within their respective organizations. Tweedsmuir Forest is responsible for ensuring that indicator monitoring is conducted and results from monitoring are compiled to evaluate performance toward achieving targets. If non-conformance is found, the Technical Committee will be responsible for evaluating the non-conformance and determining remedial action within organizations or for the M&L IFPA as a whole through Tweedsmuir Forest Ltd. Through this continual improvement process, information gaps will be filled from ongoing research and any future data gaps may have to be addressed through implementing other research projects. These elements of implementation and continual improvement are described in greater detail below.

3.1 Operational Planning Links

Operational plans must be consistent with strategic objectives established in higher level plans and government objectives as defined in the Forest and Range Practices Act. The M&L IFPA transcends the boundary of legislated minimums, since it involves defining additional objectives that are provided by local communities, First Nations, agencies, and forest companies. Strategies to meet these objectives are generally incorporated into Operational Plans so activities will meet targets. (Refer to [Figure 3 – M&L IFPA relationship within Current Regulated Forest Planning in BC](#)).

3.2 Monitoring (Standard Operating Procedures)

Monitoring of indicators is initiated according to the monitoring plans developed by the Technical Committee. The specifics of the monitoring activities and responsibilities for accomplishing various tasks are outlined in the "detailed indicator sheets" (see [Appendix C](#)). The unique nature of each indicator requires a distinct protocol for data collection.

In order for monitoring to occur in a consistent manner and for results to be comparable, Standard Operating Procedures documents have been developed for the monitoring and reporting of operational and analytical indicators.

3.3 SFM Reporting

Tweedsmuir Forest Ltd. will report to the public and stakeholders on the state of the forest in a clear, and unambiguous manner. Action plans will outline procedures that will be implemented where outcomes are inconsistent with expectations (see [Section 3.5 – Continual Improvement and Adjustment](#)). Above all, reporting must achieve credibility and encourage confidence in resource management.

SFM reporting will serve a variety of purposes ranging from operational feedback through to general public reporting. Each of these reports will differ in intent, purpose and audience.

3.3.1 Indicator Monitoring Technical Report

The "Indicator Monitoring Technical Report" provides a management summary of the "State of the Forest". Specifically, this report will show (by virtue of the indicator monitoring results) whether

management practices are achieving the targets to meet resource management intent/objectives. This report will be based on systematic analyses to determine the SFM indicator values.

The format of the Technical Indicator Monitoring Report will closely resemble the "detailed indicator sheets" (presented in a later section of this SFM Plan). Where targets have not been met, or where recommendations have been made to improve the effectiveness of the indicator or objective, references will be made to any "management adjustment action plans" which have been reviewed and approved within performance management meetings (see *Section 3.5 – Continual Improvement and Adjustment*). The technical report will also include a brief interpretation of the indicator monitoring results, particularly as they apply to the SFM frameworks and their associated parameters.

3.3.2 Public SFM Report

The Public SFM Report utilizes the same information as in the Indicator Monitoring Technical Report, however, the information in the Public Report is summarized to demonstrate the progress toward SFM. The interpretation of the indicator monitoring results will be reviewed and approved by the M&L IFPA Technical Committee to ensure consistency of information. The preparation of the Public Report is to be done in a clear and understandable fashion. The report will utilize effective communication aids (charts, graphs, maps, etc) and will be available in various media (e.g. hardcopy, Internet-based document). Feedback mechanisms will also be incorporated into these public reports (i.e. hardcopy and Internet-based feedback forms).

3.3.3 Other Corporate/Managing Agency Reports

The requirements for corporate reports (i.e. public annual reports, SFM certification, shareholders reports) and agency reports, will utilize the information from the Technical Indicator Monitoring Report, and/or the Public SFM Report. Specific queries not addressed in the Technical Indicator Monitoring Report or the Public SFM Report can be accommodated through access to the results of the original indicator monitoring information.

3.3.4 Annual Reporting Schedule

The annual reporting schedule for the IFPA is as follows:

April 1 to March 31 – IFPA Reporting Period

June 30 – August 31 – Annual Technical Indicator Reporting Documents

September 15 – Annual Public SFM Report

3.4 Evaluation

Evaluation of management performance is based on the analysis of indicator monitoring data and consideration of their effectiveness in meeting resource objectives (i.e. indicator targets). Interpretation of indicator monitoring results provides the following:

- allows for subsequent decisions to be made regarding resource management strategies and practices;

- recognizes any interdependencies between indicators that can lead to improvement of indicator sets; and,
- implications that may result if management adjustment is implemented.

Figure 8 presents the sequence of steps in evaluation, review and adjustment.

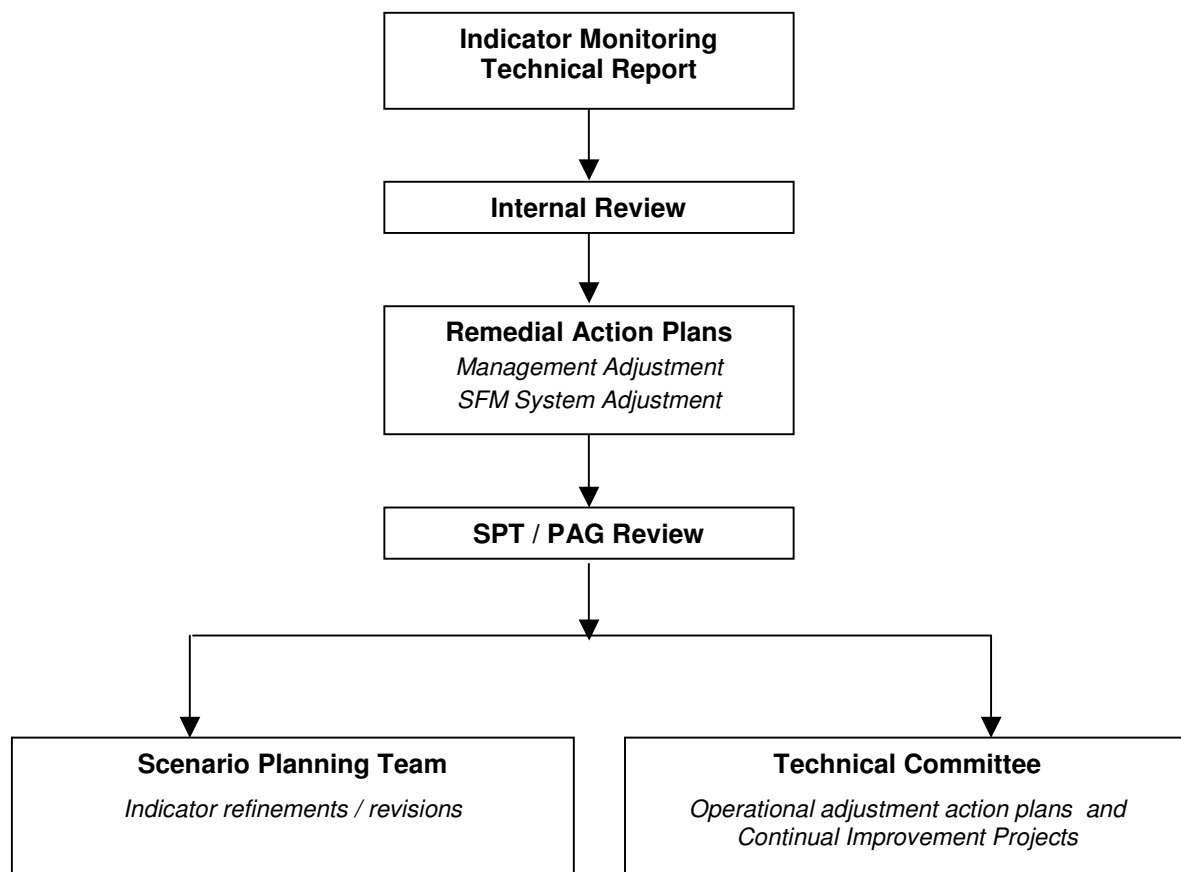


Figure 8: Process of evaluation, review, adjustment and continual improvement

3.4.1 Performance Management

Performance management will utilize the Indicator Monitoring Technical Report (as described in [Section 3.5](#)) to assess the effectiveness of the indicator and the achievement of indicator targets by the IFPA proponents. If individual targets are not being met, or where recommendations have been made to improve the effectiveness of the indicator or objective, the Indicator Monitoring Technical Report will reference the deficiencies and document plans for remedial action. Information from performance management forms the basis for determining "Management Adjustments"

Performance Management information for each indicator will contain the following elements within the Indicator Monitoring Technical Report:

- Name of indicator
- Indicator linkages (M&L-IFPA, CSA-SFM)
- Target met?
- Licensee/Operating Area
- Implications of not meeting target
 - Effectiveness of this indicator/target as a measure towards achievement of the objective
 - Effectiveness of objective as a means of describing the desired future state of the applicable value
 - Remedial action proposed or recommendations for improvement
 - Time to meet target

3.4.2 Internal and Public Review

Performance management measures will be completed by the Technical Committee and documented in the Indicator Monitoring Technical Report. This report will be reviewed with the Public Advisory Group during scheduled M&L IFPA performance review meetings. These meetings would normally be scheduled annually or more frequently if required and will be conducted by Tweedsmuir Forest Ltd. Indicator monitoring results will demonstrate if individual M&L IFPA partners are meeting targets. If targets are not being met due to management and/or practices, the proponents will be expected to propose remedial actions within a "Management Adjustment Action Plan" (described below). If it is determined that the non-conformance issues are related to the SFM system as a whole, continual improvement measures may have to be initiated (see [Section 3.5](#)).

The Public SFM Report and Management Adjustment Action Plans will also be presented and reviewed at Public Advisory Group meetings. These meetings would normally be scheduled annually or more frequently if required.

3.5 Continual Improvement and Adjustment

In keeping with the principles of SFM, opportunities for learning and improvement will be created. Continual improvement includes the incorporation of new information and knowledge, the identification of other information gaps, and undertaking research to address such gaps. The incorporation of new knowledge and understanding allows for better management approaches to evolve.

Continual improvement activities also include modifications to the adaptive management system as a result of what is learned from indicator monitoring. Indicator results provide a means to evaluate the achievement of objectives and to determine whether values are being maintained. This process may also reveal issues with the SFM system that requires adjustment to the SFM system in part, or as a whole.

Following the performance management evaluation and review, non-conformance issues related to organizational management and/ or practices will be addressed within a "Management Adjustment Action Plan" which will be implemented by the applicable organization(s). If it is determined that non-conformances are related to issues regarding the SFM system a "SFM System Adjustment Action Plan" will be produced and implemented by the M&L IFPA.

3.5.1 Proponents Management Adjustment Action Plan

In the event that indicator monitoring results demonstrate that management or practices by one or more of the proponents are not achieving forecasted targets, a "Management Adjustment Action Plan" will be prepared by the affected proponent which will demonstrate how management and practices will be adjusted to achieve the targets.

The "Management Adjustment Action Plan" will contain such elements as:

- A description of the indicator (i.e. the detailed indicator sheet)
- The licensee/agency specific target for the indicator that has not been met
- Reasons for not achieving target
- Schedule of actions to adjust management/practices to achieve targets (may include interim indicator monitoring)
- Management Adjustment Action Plan monitoring.

3.5.2 SFM System Adjustment Action Plan

The results from monitoring SFM performance indicators will also be used to evaluate if management assumptions are correct. In the event that indicator targets are not met due to assumptions being unrealistic, then it will be necessary to review the SFM system to evaluate if modifications are needed for strategy assumptions, indicators, indicator targets, management intent, etc.

The SFM System Adjustment Action Plans will require information such as:

1. A description of the indicator (i.e. detailed indicator sheet)
2. The target that has not been met
3. Implication of non-conformance for other values
4. The issue for non-conformance (e.g. assumptions being incorrect)
5. Schedule of remedial actions necessary to address non-conformance (e.g. SPT sessions to review/revise assumptions, re-analysis, etc.)

3.5.3 Refinement

Based on the evaluation of performance indicators and the improvement in knowledge and understanding, the application of another cycle of the "McGregor Approach to SFM" may be initiated to incorporate this new information and to determine if the existing structure of resources and values is still valid or also requires adjustment. Through this process, values may be redefined, assumptions may be changed, new information gaps revealed (and research initiated to fill the gaps), and new strategies implemented with a revised set of indicators to monitor performance.

This concept of structured learning and continual improvement is the essence of adaptive management, and is well suited to addressing the complex issues associated with managing ecosystems with multiple values and objectives.

4.0 M&L IFPA Indicators and Monitoring

Indicators form the basis by which sustainable forest management will be monitored, evaluated, and adjusted for continual improvement. For clarity of understanding (i.e. public, operational needs, corporate, managing agencies, etc.), it is important to describe each indicator carefully with respect to the linkage of the indicator to SFM system(s) (i.e. M&L IFPA & CSA/CCFM SFM frameworks), the indicator rationale, the current status, forecasted targets, the schedule to achieve targets, how the indicator will be analyzed, the data necessary for analysis and monitoring, the schedule of implementation for indicator monitoring and reporting, and, how the results of indicator monitoring will be presented. In this context, “detailed indicator sheets” have been prepared for each indicator that has been identified in the M&L IFPA scenario planning process. The complete set of detailed indicator sheets for the Morice TSA is contained in [Appendix C](#).

4.1 End use Frameworks for Indicators

The following summary tables have been prepared to clarify the relationship of the indicators to the M&L IFPA SFM framework (see [Table 5](#)) and the CSA/CCFM SFM framework (see [Table 6](#)). In each table, the indicator number is referenced which corresponds to the numbered “detailed indicator sheet” contained in [Appendix C](#). Specific information (e.g. targets) was placed in the table where possible; however, for information that required more detailed explanation, the reader is referred to the specific detailed indicator sheet.

Table 5: Linkage of indicators to M&L IFPA SFM Framework

| M&L IFPA Resource | Indicator number ¹ | Indicator | M&L IFPA Value/Issue | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|-------------------|-------------------------------|---|--|------------------------------|---------------------------------|--------------------|---|------------------------------|------------------------------|
| Agriculture | 13 (5.1) | Percent area in suitable forage opportunity class by LU by licensee | Range tenure enhancement and expansion | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 36 | Percent area in Aspen Leading Stands within Existing and Potential Range by LU by licensee | Aspen Management | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 42 (5.1) | Area of arable land (Ha/5yr.) within contributing and non-contributing forest converted to agricultural lease by agricultural unit in licensee operating area | Agricultural lease land expansion | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

¹ **Bold characters** – indicator applies to more than one M&L-IFPA resource and/or CSA-SFM element
Italic characters– Applies to [M&L IFPA resources] and/or (CSA-SFM elements)

| M&L IFPA Resource | Indicator number ¹ | Indicator | M&L IFPA Value/Issue | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|-------------------|--|---|--|------------------------------|---------------------------------|--------------------|---|------------------------------|------------------------------|
| Biodiversity | 15 (2.2) | Percent area retained in WTR by licensee annually | Wildlife Trees and Wildlife Tree Patches -Habitat Element – snags -Habitat Element – large live trees -Habitat Element - CWD | See detailed indicator sheet | Operational | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 17 (1.1, 1.3, 2.1, 2.2) | Percent forest in each patch type by patch size class by BEC Variant by licensee | Patch size targets | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 31 <i>[wildlife]</i> (1.4) | % seral stage distribution by Ecosystem and Wildlife Value Class by licensee | -Rare Ecosystems | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 32 (1.1, 1.3, 2.1, 2.2, 4.1, 5.1) | % Seral Stage Distribution by LRMP Biodiversity Emphasis Area / BEC Combination by Licensee | -biodiversity emphasis options -natural stands -OGMAs -PAS study area -Patch size targets -Habitat element – seral stage distribution | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| M&L IFPA Resource | Indicator number ¹ | Indicator | M&L IFPA Value/Issue | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|-------------------|--|--|--|------------------------------|--|--------------------|---|------------------------------|------------------------------|
| | 33 <i>[timber, wildlife] (1.2, 2.1)</i> | % species composition by BEC by licensee | -biodiversity emphasis options -Natural stands -Natural tree species -habitat element – trees species composition | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 46 <i>[Wildlife] (1.4)</i> | Road Density by Ecosystem and Wildlife Value Class by licensee | Rare Ecosystem | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 53 <i>(1.2, 4.1)</i> | Percent of Harvesting by Licencee Where Recommended Operational Guidelines Have Been Applied to Retain Structural Habitat Elements | Habitat Element - CWD - Snags - Large live trees | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| Recreation | 10 <i>[Water] (3.2)</i> | Percent of cut blocks harvested that are consistent with riparian management area commitments by licensee | Classified angling waters | See detailed indicator sheet | Operational/Public Advisory Group decision | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| M&L IFPA Resource | Indicator number ¹ | Indicator | M&L IFPA Value/Issue | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|-------------------|-------------------------------|--|---|------------------------------|---------------------------------|--------------------|---|------------------------------|------------------------------|
| | 11 (5.1) | Percent area less than VEG by recreation class by licensee | <ul style="list-style-type: none"> -Non-commercial recreation – motorized camping -Recreation areas -Trails (well used, existing) -Trails (high value, existing) -Provincial parks -Recreation features -Backcountry Lakes recruitment | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| M&L IFPA Resource | Indicator number ¹ | Indicator | M&L IFPA Value/Issue | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|-------------------|-------------------------------|---|---|------------------------------|---------------------------------|--------------------|---|------------------------------|------------------------------|
| | 47 (5.1) | Road Density by recreation class by licensee | -Trails (high value, existing) -Non-commercial recreation – cross country skiing -Non-commercial recreation – snowmobiling -Non-commercial recreation – Touring / skiing -Fly in fishing lakes -Recreation areas -trails (well used, existing) | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| Timber | 14 (2.1) | Percent area of the THLB and non-contributing forest by beetle hazard type (extreme and high) by licensee | Bark Beetles | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 20 (5.2) | Percentage of AAC harvested by Licensee | Harvest Flow Policy | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| M&L IFPA Resource | Indicator number ¹ | Indicator | M&L IFPA Value/Issue | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|-------------------|---|---|--|------------------------------|---------------------------------|--------------------|---|------------------------------|------------------------------|
| | 25 (3.1,4.2) | Percent of Gross Forest Area converted to permanent access by licensee | Roads, Trails and Landings | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 33 [Biodiv., Wildlife] (1.2, 2.1) | % species composition by BEC by licensee | Harvest Profile | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 35 (5.3) | Percent species composition of harvest volume by licensee | Harvest Profile | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 41 | Area (ha) treated by treatment type by licensee | -Vegetation management -Fertilization -Density management -Contributing land base conversion -Wood quality | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 49 (2.2, 5.1) | Weighted Average Minimum Harvest Age Mean annual increment (m ³ /ha/year) by BEC by licensee | -Harvest Flow Policy -Dry wood utilization -Site productivity | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 57 (4.1) | Ecosystem Carbon Storage by tonnes/ha. by Licensee | -Harvest Flow Policy -Dry wood utilization | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| M&L IFPA Resource | Indicator number ¹ | Indicator | M&L IFPA Value/Issue | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|-------------------|-------------------------------|---|--|------------------------------|--|--------------------|---|------------------------------|------------------------------|
| Visual | 12 (5.1) | Percentage of Blocks and Roads Harvested Annually by Licensee that are Consistent with the Visual Quality Objective (VQO) | -Babine Lake -Commercial Recreation - Fishing Lakes With Cabins -Commercial recreation – fishing lakes with lodges -Currently Unclassified Visual Quality Objective Areas -Gordeau Lake -Morice Lake -Morice River VQO "PR" -Owen Lake -Parrott Lakes -Visual Quality Objective "M" & "MM" -Visual Quality Objective "P" & "R" -Visual Quality Objective "PR" | See detailed indicator sheet | Operational/Public Advisory Group decision | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| M&L IFPA Resource | Indicator number ¹ | Indicator | M&L IFPA Value/Issue | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|-------------------|---|---|--|------------------------------|--|--------------------|---|------------------------------|------------------------------|
| Water | 10 [Recreation] (3.2) | Percent of cut blocks harvested that are consistent with riparian management area commitments by licensee | -Fish habitat – riparian management rivers and streams -Fish habitat – riparian management lakes -Fish habitat – riparian management wetlands -Hydrology – Fulton and Morrison watersheds -Hydrology – Nadina watershed -Zone A Morice River LRUP -Trophy Rainbow trout and Lake trout lakes | See detailed indicator sheet | Operational/Public Advisory Group decision | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 45 (3.2) | Equivalent clear cut area (ECA) by Sensitive watershed by licensee | -Hydrology -Hydrology – Fulton and Morrison watersheds -Hydrology – Nadina watershed | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| M&L IFPA Resource | Indicator number ¹ | Indicator | M&L IFPA Value/Issue | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|-------------------|--|--|--|------------------------------|---------------------------------|--------------------|---|------------------------------|------------------------------|
| | 52 <i>[Wildlife]</i> (3.2) | Road density index (RDI) by sensitive watershed by licensee | -Hydrology -Hydrology – Fulton and Morrison watersheds -Hydrology – Nadina watershed | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| Wildlife | 31 <i>[Biodiv.]</i> (1.4) | % seral stage distribution by Ecosystem and Wildlife Value Class by licensee | -Mountain goat -Telkwa Caribou Recovery Program Area | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| M&L IFPA Resource | Indicator number ¹ | Indicator | M&L IFPA Value/Issue | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|-------------------|--|--|---|------------------------------|---------------------------------|--------------------|---|------------------------------|------------------------------|
| | 33 <i>[Biodiv., Timber]</i> (1.2, 2.1) | % species composition by BEC by licensee | -Tweedsmuir Caribou Herd (Whitesail and Troitsa LUs) -Mule deer winter habitat -Fisher habitat -Northern goshawk nesting habitat -Moose summer habitat -Moose winter habitat -Sydney Williams Caribou Herd habitat -Telkwa Caribou Recovery Program Area | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| M&L IFPA Resource | Indicator number ¹ | Indicator | M&L IFPA Value/Issue | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|-------------------|--|--|---|------------------------------|---------------------------------|--------------------|---|------------------------------|------------------------------|
| | 37 (1.2, 1.4) | Total area by Ecosystem and Wildlife Value Class by licensee | -Fisher habitat -Grizzly bear habitat -Sydney Williams (Takla) Caribou Herd Habitat -Telkwa Caribou Herd Habitat -Tweedsmuir Caribou Herd Habitat | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 46 <i>[Biodiversity]</i> (1.4) | Road density by Ecosystem & Wildlife Value Class by licensee | -Mountain goat habitat | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 52 <i>[Water]</i> (3.2) | Road density index (RDI) by sensitive watershed by licensee | -Tweedsmuir Caribou Herd - Whitesail & Troitsa Landscape Units -Grizzly – Salmon zones -Grizzly habitat zones | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

Table 6: Linkage of indicators to CSA/CCFM SFM Framework

| CCFM Criterion | CSA SFM Elements | Value | Objective | Indicator number ² | Indicator | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|--|-------------------------|---|---|---|---|------------------------------|---------------------------------|--------------------|---|------------------------------|------------------------------|
| 1 Conservation of Biological Diversity | 1.1 Ecosystem Diversity | 1.1.1 The range of functions, interactions and processes that occur naturally within and between ecosystems on the DFA | 1.1.1.1 Functions, interactions and processes that occur naturally within and between ecosystems on the DFA will fluctuate within a (naturally, socially) acceptable range of variation over time. | 17 <i>(1.3, 2.1, 2.2)</i> | Percent forest in each patch type by patch size class by BEC variant by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 32 <i>(1.3, 2.1, 2.2, 4.1, 5.1)</i> | Percent Seral Stage Distribution by LRMP Biodiversity Emphasis Area / BEC Combination by Licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

² **Bold** – indicator applies to more than one SFM element (*Italic* – other SFM elements that indicator applies to)

| CCFM Criterion | CSA SFM Elements | Value | Objective | Indicator number ² | Indicator | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|----------------|--------------------------|--|---|---------------------------------------|--|------------------------------|---|------------------------------|---|------------------------------|------------------------------|
| | 1.2 Species Diversity | 1.2.1 Abundance and distribution of common and rare habitats within a range of variability over time to conserve species on the DFA | 1.2.1.1 A constant supply of habitats and/or attributes sufficient to conserve species that occur naturally on the DFA through time. | 53 (4.1) | Percent of harvesting by licensee where recommended operational guidelines have been applied to retain structural habitat elements | 100% | Operational /Public Advisory Group decision | See detailed indicator sheet | 0 | See detailed indicator sheet | 0 |
| | | | | 37 (1.4) | Total area by ecosystem and wildlife value class by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 33 (2.1) | % Species composition by BEC by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 1.3 Genetic Diversity | 1.3.1 The opportunity for individuals within sub-species and species to move and interact within their natural range in and across the DFA. | 1.3.1.1 Habitats for species present on the DFA that are functionally connected over a range of spatial and temporal scales. | 17 (1.1, 2.1, 2.2) | Percent forest in each patch type by patch size class by BEC variant by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| CCFM Criterion | CSA SFM Elements | Value | Objective | Indicator number ² | Indicator | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|----------------|--|---|--|--|--|--|---|--------------------|---|------------------------------|--|
| | | | | 32 (1.1, 2.1, 2.2, 4.1, 5.1)) | Percent Seral Stage Distribution by LRMP Biodiversity Emphasis Area / BEC Combination by Licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 1.4 Protected Areas and Sites of Special Significance | 1.4.1 Protected areas and sites of biological significance are identified and appropriately managed. | 1.4.1.1 Protected Areas identified through government processes are respected and accommodated. Biologically significant areas are identified and management strategies appropriate to their long term maintenance are implemented. | 37 (1.2) | Total area by ecosystem and wildlife class by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 27 (5.1, 5.2, 6.2) | Percentage of forest management commitments completed on time resulting from consultations regarding non-timber features and interests by licensee | 100% (all applicable licensees) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | -10% (all applicable licensees) |

| CCFM Criterion | CSA SFM Elements | Value | Objective | Indicator number ² | Indicator | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|---|--------------------------------------|--|--|--|---|------------------------------|---------------------------------|--------------------|---|------------------------------|------------------------------|
| | | | | 31 | Percent Seral Stage Distribution by Ecosystem and Wildlife Value Class by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 46 | Road density by Ecosystem & Wildlife Value Class by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| 2 Maintenance and Enhancement of Forest Ecosystem Condition and Productivity | 2.1 Forest Disturbance and Stress | 2.1.1 Healthy, productive forests that support ecosystem conditions and processes | 2.1.1.1 Forest ecosystems resilient to disturbances and stresses. | 14 | Percent area of the THLB and non-contributing forest by beetle hazard type (extreme and high) by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 17 (1.1, 1.3, 2.2) | Percent forest in each patch type by patch size class by BEC variant by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 32 (1.1, 1.3, 2.2, 4.1, 5.1)) | Percent Seral Stage Distribution by LRMP Biodiversity Emphasis Area / BEC Combination by Licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| CCFM Criterion | CSA SFM Elements | Value | Objective | Indicator number ² | Indicator | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|----------------|--------------------------------------|--|---|--|--|------------------------------------|---|--------------------|---|------------------------------|------------------------------|
| | | | | 33 (1.2) | % Species composition by BEC by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 58 (2.2, 5.1) | Percent of harvest area in Mountain Pine Bark Beetle attacked stands by licensee | 100% (all applicable licensees) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | |
| | 2.2 Forest Ecosystem Productivity | 2.2.1 Ecosystem and biological productivity is conserved on the DFA | 2.2.1.1 Sustainable rates of ecosystem and biological productivity | 17 (1.1, 1.3, 2.1)) | Percent forest in each patch type by patch size class by BEC variant by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 15 | Percent area retained in WTR by Licensee Annually | See detailed indicator sheet | Operational | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 49 (5.1) | Area weighted average minimum harvest age Mean Annual Increment (m ³ /ha/yr) by BEC by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| CCFM Criterion | CSA SFM Elements | Value | Objective | Indicator number ² | Indicator | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|---|-----------------------------------|---|---|--|---|------------------------------------|---|---|---|------------------------------|----------------------------------|
| | | | | 32 (1.1, 1.3, 2.1, 4.1, 5.1)) | Percent Seral Stage Distribution by LRMP Biodiversity Emphasis Area / BEC Combination by Licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 58 (2.2, 5.1) | Percent of harvest area in Mountain Pine Bark Beetle attacked stands by licensee | 100% (all applicable licensees) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | |
| 3 Conservation of soil and water resources | 3.1 Soil Quality and Quantity | 3.1.1 Productive capacity of soil resources are conserved | 3.1.1.1 Soil quantity and quality are sustained through their characteristic range of variation on the DFA through time | 25 (4.2) | % of gross forest area converted to permanent access by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 23 | % of blocks meeting NAR disturbance objectives by LU by licensee | 100% (all applicable licensees) | Operational /Public Advisory Group decision | BCMOF – Forest Practices Code Act of BC | Licensees to manage toward target | See detailed indicator sheet | 0% (all applicable licensees) |
| | 3.2 Water Quality and Quantity | 3.2.1 Productive Capacity of water resources are conserved | 3.2.1.1 Water quantity and quality are sustained through their characteristic range of variation on the DFA through time | 45 | Equivalent clear cut area (ECA) by Sensitive watershed by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| CCFM Criterion | CSA SFM Elements | Value | Objective | Indicator number ² | Indicator | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|---|----------------------------------|--|--|--|---|------------------------------------|---|---|---|------------------------------|-----------------------------------|
| | | | | 52 | Road density index (RDI) by sensitive watershed by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 10 | Percent of cut blocks harvested that are consistent with riparian management area commitments by licensee | See detailed indicator sheet | Operational /Public Advisory Group decision | None (voluntary) | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 7 | Percentage of identified high hazard structures with action plans implemented by licensee | 100% (all applicable licensees) | Operational /Public Advisory Group decision | BCMOF – Forest Practices Code Act of BC | Licenseses to manage toward target | See detailed indicator sheet | -5% (all applicable licensees) |
| 4 Forest ecosystem Contributions to the Global Ecological Cycles | 4.1 Carbon Uptake and Storage | 4.1.1 Storage of carbon in forest ecosystems and products | 4.1.1.1 Forest ecosystems are net carbon sinks over time on the DFA | 32 <i>(1.1, 1.3, 2.1, 2.2, 5.1)</i> | Percent Seral Stage Distribution by LRMP Biodiversity Emphasis Area / BEC Combination by Licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| CCFM Criterion | CSA SFM Elements | Value | Objective | Indicator number ² | Indicator | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|-----------------------------------|---------------------------------------|--|---|---|--|------------------------------|---|------------------------------|---|------------------------------|------------------------------|
| | | | | 53 (1.2) | Percent of harvesting by licensee where recommended operational guidelines have been applied to retain structural habitat elements | 100% | Operational /Public Advisory Group decision | See detailed indicator sheet | 0 | See detailed indicator sheet | 0 |
| | | | | 57 | Ecosystem Carbon Storage by tonnes/ha. by Licensee | See detailed indicator sheet | Spatial forest scheduling model | None | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | 4.2 Forest Land Conversion | 4.2.1 Gross Forest Area on the DFA | 4.2.1.1 Minimal loss of the gross forest area on the DFA over time | 25 (3.1) | % of gross forest area converted to permanent access by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| 5 Multiple Benefits to Society | 5.1 Timber and Non-Timber Benefits | 5.1.1 A balanced supply and variety of timber and non-timber products, services and benefits on the DFA | 5.1.1.1 A sustainable harvest and use of timber products services and benefits | 32 (1.1, 1.3, 2.1, 2.2, 4.1) | Percent Seral Stage Distribution by LRMP Biodiversity Emphasis Area / BEC Combination by Licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| CCFM Criterion | CSA SFM Elements | Value | Objective | Indicator number ² | Indicator | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|----------------|------------------|-------|--|--|--|------------------------------------|---|--------------------|---|------------------------------|------------------------------------|
| | | | | 49 (2.2) | Area weighted average minimum harvest age Mean Annual Increment (m ³ /ha/yr) BEC by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | 5.1.1.2 A sustainable harvest and use of non-timber forest products services and benefits | 27 (1.4, 5.1, 5.2, 6.2) | Percentage of forest management commitments completed on time resulting from consultations regarding non-timber features and interests by licensee | 100% (all applicable licensees) | Operational /Public Advisory Group decision | None (voluntary) | Licenseses to manage toward target | See detailed indicator sheet | -10% (all applicable licensees) |
| | | | 5.1.1.3 A variety of agricultural products are provided from the DFA | 13 | Percent area in suitable forage opportunity class by LU by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licenseses to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| CCFM Criterion | CSA SFM Elements | Value | Objective | Indicator number ² | Indicator | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|----------------|------------------|-------|---|-------------------------------|---|------------------------------|---|--------------------|---|------------------------------|------------------------------|
| | | | | 42 | Area of arable land (Ha/5yr.) within contributing and non-contributing forest converted to agricultural lease by agricultural unit in licensee operating area | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | 5.1.1.4 A full range of recreation opportunities are provided on the DFA | 11 | Percent area less than VEG by recreation class by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 12 | Percentage of Blocks and Roads Harvested Annually by Licensee that are Consistent with the Visual Quality Objective (VQO) | See detailed indicator sheet | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 47 | Road density by recreation class by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| CCFM Criterion | CSA SFM Elements | Value | Objective | Indicator number ² | Indicator | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|----------------|---------------------------------------|--|--|---------------------------------------|--|--|---|--------------------|---|------------------------------|--|
| | | | | 27 (1.4, 5.2, 6.2) | Percentage of forest management commitments completed on time resulting from consultations regarding non-timber features and interests by licensee | 100% (all applicable licensees) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | -10% (all applicable licensees) |
| | | | | 58 (2.2, 5.1) | Percent of harvest area in Mountain Pine Bark Beetle attacked stands by licensee | 100% (all applicable licensees) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | |
| | 5.2 Communities and Sustainability | 5.2.1 Healthy and sustainable communities | 5.2.1.1 A diverse local economy and local participation in the use of forests benefits on the DFA | 4 | Number of Participation Opportunities by Opportunity Type | See detailed indicator sheet | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 27 (1.4, 5.1, 6.2) | Percentage of forest management commitments completed on time resulting from consultations regarding non-timber features and interests by licensee | 100% (all applicable licensees) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | -10% (all applicable licensees) |

| CCFM Criterion | CSA SFM Elements | Value | Objective | Indicator number ² | Indicator | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|----------------|------------------|-------|-----------|-------------------------------|---|---|---|--------------------------------|---|------------------------------|--|
| | | | | 24 | Percentage of total goods and services provided by local vendors by licensee | Maintain current status (all applicable licensees) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | -10% (all applicable licensees) |
| | | | | 21 | Ratio of annual mill consumption to AAC apportionment harvested by licensee | ≥ 1.0 (for licensees with milling facilities on the Morice TSA) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | None (for licensees with milling facilities on the Morice TSA) |
| | | | | 20 | Percentage of AAC harvested by Licensee | 100% of the AAC apportionment (all applicable licensees) | Operational /Public Advisory Group decision | BCMOF – Cut control regulation | Licensees to manage toward target | See detailed indicator sheet | AAC apportionment ± 50% (annually) (all applicable licensees) |
| | | | | 28 | Ratio of Capital Expenditures to Depreciation by licensee | ≥ 1.0 (for licensees with milling facilities on the Morice TSA) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | None (for licensees with milling facilities on the Morice TSA) |
| | | | | 56 | Percent of Fires Burning During Poor or Fair Air Quality Conditions by Licensee | See detailed indicator sheet | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| CCFM Criterion | CSA SFM Elements | Value | Objective | Indicator number ² | Indicator | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|---|--|---|--|-------------------------------|--|---|---|--------------------|---|------------------------------|---------------------------------|
| | 5.3 Fair Distribution of Benefits and Costs | 5.3.1 Fair distribution of timber and non-timber benefits and costs over time | 5.3.1.1 Timber and non timber benefits are fairly and equitably distributed at a range of scales for current and future generations | 19 | Percent Seral Stage Distribution by non-timber tenure license by forest licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 43 | Benefits directed into local communities by licensee | Maintain current status (all applicable licensees) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | -10% (all applicable licensees) |
| | | | | 35 | Percent species composition of harvest volume by licensee | See detailed indicator sheet | Spatial forest scheduling model | | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 6 (6.4) | Number of Continual Improvement–related projects in the DFA by Licensee | ≥ 1 (all applicable licensees) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | none (all applicable licensees) |
| 6 Accepting Society's Responsibility for Sustainable Development | 6.1 Aboriginal and Treaty Rights | 6.1.1 First Nations' Aboriginal and Treaty rights | 6.1.1.1 Recognition and respect for Aboriginal and treaty rights | 2 (6.3) | Number of Communications by Licensee | Minimum of one written communication annually regarding each resource value | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | none |
| | | | | 5 (6.2) | Number of Aboriginal Participation Opportunities by Licensee | See detailed indicator sheet | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |

| CCFM Criterion | CSA SFM Elements | Value | Objective | Indicator number ² | Indicator | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|----------------|---|---|---|---------------------------------------|--|--|---|--------------------|---|------------------------------|--|
| | | | | 54 (6.3, 6.4) | Percentage of comments receiving response by type by licensee | 100% (for all applicable licensees) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | none |
| | 6.2 Respect for Aboriginal Forest Values, Knowledge and Uses | 6.2.1 Indigenous Knowledge of Forest values and uses | 6.2.1.1 Forest management incorporates Indigenous Knowledge of forest values and uses | 5 (6.1) | Number of Aboriginal Participation Opportunities by Licensee | See detailed indicator sheet | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | See detailed indicator sheet |
| | | | | 27 (1.4, 5.1, 5.2) | Percentage of forest management commitments completed on time resulting from consultations regarding non-timber features and interests by licensee | 100% (for all applicable licensees) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | -10% (for all applicable licensees) |
| | 6.3 Public Participation | 6.3.1 Fair, equitable and effective public participation | 6.3.1.1 A public involvement process designed, implemented and functioning to the satisfaction of the participants | 50 | Public Advisory Group established and maintained according to approved Terms of Reference | TOR on file | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | none |

| CCFM Criterion | CSA SFM Elements | Value | Objective | Indicator number ² | Indicator | Target | Means to identify target | Legal requirements | Means of Achieving Objective and Target | Monitoring and Measurement | Acceptable Variance |
|----------------|--|---|--|----------------------------------|---|---|---|--------------------|---|------------------------------|---------------------|
| | | | | 2 (6.1) | Number of Communications by Licensee | Minimum of one written communication annually regarding each resource value | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | none |
| | | | | 54 (6.1,6.4) | Percentage of comments receiving response by type by licensee | 100% (for all applicable licensees) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | none |
| | 6.4 Information for Decision-Making | 6.4.1 Informed decision-making and increased knowledge | 6.4.1.1 Relevant information is exchanged between interested parties to support decision-making and increased knowledge of ecosystem processes and human interactions with forest ecosystems. | 6 (5.3) | Number of Continual Improvement-related projects in the DFA by Licensee | ≥ 1 (all applicable licensees) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | none |
| | | | | 54 (6.1, 6.3) | Percentage of comments receiving response by type by licensee | 100% (for all applicable licensees) | Operational /Public Advisory Group decision | None (voluntary) | Licensees to manage toward target | See detailed indicator sheet | none |

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APPENDIX A – Corporate Policies related to SFM



Figure 9: Canfor's Environment Policy

Canfor's Forestry Principles

Ecosystem Management

We will use the best available science to develop an understanding of ecological responses to natural and human-caused disturbances. We will incorporate this knowledge into higher level and operational plans by applying ecosystem management principles to achieve desired future forest conditions.

Scale

We will define objectives over a variety of time intervals (temporal scales), and at spatial scales of stand, landscape and forest.

Adaptive Management

We will use adaptive management to continually improve forest ecosystem management. This will require the development and implementation of collaborative research and monitoring programs.

Old Growth

We will include old growth and old growth attributes as part of our management strategies and philosophy in the forests where we operate.

Timber Resource

Canfor will ensure a continuous supply of affordable timber in order to carry out its business of harvesting, manufacturing and marketing forest products. Canfor will strive to maximize the net value of the fibre extracted for sustained economic benefits for employees, communities and shareholders.

Forest Land Base

We advocate the maintenance of the forestland base as an asset for the future.

Health and Safety

We will operate in a manner that protects human health and safety.

Aboriginal Peoples

We will pursue business partnerships and cooperative working arrangements with aboriginal people to provide mutual social, cultural and economic benefits and address mutual interests.

Communities

We will engage members of the public, communities and other stakeholders in the delivery of the Forestry Principles. The process will be open, transparent and accountable.

Accountability

We will be accountable to the public for managing the forest to achieve present and future values. We will use credible, internationally recognized, third party verification of our forestry operations as one way of demonstrating our performance.

Figure 10: Overview of Canfor's Forestry Principles



West Fraser Timber Co. Ltd. is committed to responsible stewardship of the environment. A philosophy of continual improvement of our forest practices and manufacturing procedures has been adopted to optimize the use of resources and minimize or eliminate the impact of our operations on the environment.

West Fraser recognizes that environmental excellence is an integral aspect of long-term business success. Our Company and its employees are committed to the following:

- Complying with all applicable environmental laws and regulations, and with other requirements to which the organization subscribes.
- Preventing pollution and continuing to improve our environmental performance by setting and reviewing environmental objectives and targets.
- Conducting periodic environmental audits.
- Providing training for employees and contractors to ensure environmentally responsible work practices.
- Communicating our environmental performance to employees, customers, shareholders, local communities and other stakeholders.
- Reviewing, on a regular basis, this policy to ensure that it reflects the Company's ongoing commitment to environmental stewardship.

Figure 11: West Fraser Environment Policy (Fraser Lakes Sawmills and Houston Forest Products)



B C Timber Sales, Babine Business Area

SUSTAINABLE FOREST MANAGEMENT (SFM) POLICY

The British Columbia Ministry of Forests B C Timber Sales Program (BCTS) manages and administers timber harvesting and related forest management activities on BCTS timber sale licences and related tenures sold on Crown forestland throughout British Columbia.

It is the policy of the BCTS, Babine Business Area to:

- Comply with all relevant environmental legislation and regulations.
- Achieve and maintain SFM.
- Respect Aboriginal and treaty rights.
- Provide participation opportunities for Aboriginal peoples with respect to their rights and interests in SFM.
- Provide for public participation.
- Provide conditions and safeguards for the health and safety of workers and the public on lands we manage.
- Improve knowledge about the forest and SFM, and to monitor advances in SFM science and technology and incorporate them where applicable.
- Strive for excellence in forest management by continually improving the performance of resource management activities and practices. Maintain a framework for setting and reviewing environmental objectives and targets. Monitor and evaluate key BCTS forestry operations.
- Endeavour to prevent or mitigate undesired environmental impacts and pollution associated with BCTS forestry operations.
- Communicate BCTS business activities and policies to all staff and make them available to the public.

June 8, 2005

Updated: June 8, 2005

Original Signed by

**Timber Sales Manager
Babine Business Area**

Figure 12: BC Timber Sales (Province of BC) SFM Policy

APPENDIX B – M&L IFPA Glossary of Terms

Abiotic – pertaining to the non-living component of the environment (e.g., climate, ice, soil and water). (Canadian Council of Forest Ministers)

Aboriginal – “aboriginal peoples of Canada” [which] include Indian, Inuit, and Métis peoples of Canada (Constitution Act 1992, Subsection 35(2)). (CSA Z808-96)

Abundance – the number of organisms in a population, combining density within inhabited areas with number and size of inhabited areas. (Canadian Council of Forest Ministers)

Access management – management of all access road construction, deconstruction, maintenance and deactivation. (BC MoF Website Glossary)

Activities – energetic action or movement; liveliness. (The American Heritage Dictionary of the English Language, Third Edition)

Adaptive Management (AM) – a systematic, rigorous approach to improving management and accommodating change by learning from the outcomes of management interventions. (BC Ministry of Forests - Forest Practices Management Branch)

Age Class – any interval of time into which the age range of trees, forests, stands or forest types is decided for classification and use. (BC Ministry of Forests)

Agriculture Land (High Value) – parcels of land, which, based on soil and climate capability hearings, are deemed necessary to be maintained for agricultural use. (Common Usage)

Allowable Annual Cut (AAC) – the allowable rate of timber harvest from a specified area of land. British Columbia’s Chief Forester sets AACs for timber supply areas (TSAs) and tree farm licenses (TFLs) in accordance with the BC Forest Act. (BC Ministry of Forests)

Analysis Units – the basic building blocks around which inventory data and other information are organized for use in forest planning models. Typically, these involve specific tree species or type groups that are further defined by site class, geographic location or similarity of management regimes. (BC MoF Website Glossary)

Anthropogenic – relating to or influenced by the impact of man on nature (e.g., ecosystems) (Webster’s Collegiate Dictionary)

Aquatic – consisting of, relating to, or being in water. (The American Heritage Dictionary of the English Language, Third Edition)

Apportionment – the distribution of the AAC for a TSA among timber tenures by the Minister in accordance with Section 10 of the *Forest Act*. (BC MoF Website Glossary)

Backlog – a Ministry of Forests term applied to forest land areas where silviculture treatments such as planting and site preparation are overdue. Planting is considered backlog if more than 5 years have elapsed since a site was cleared (by harvesting or fire) in the interior and more than 3 years on the coast of British Columbia. (BC MoF Website Glossary)

Basic silviculture – harvesting methods and silviculture operations including seed collecting, site preparation, artificial and natural regeneration, brushing, spacing and stand tending, and other operations that are for the purpose of establishing a free growing crop of trees of a commercially valuable species and are required in a regulation, pre-harvest silviculture prescription or silviculture prescription. (BC MoF Website Glossary)

Best Management Practices – a practice or combination of practices that are determined to be the most technologically or economically feasible means of preventing or managing potential impacts. (Best Management Practices Handbook: Hillslope Restoration in British Columbia; Watershed Restoration Technical Circular No.3 (revised); May 2000; Watershed Restoration Program, BC MoF)

Biodiversity (or biological diversity) – the variability among living organisms from all sources including *inter alia* terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (Canadian Biodiversity Strategy 1995) (CSA Z808-96)

Biogeoclimatic ecosystem classification – a hierarchical classification system scheme having three levels of integration: regional, local and chronological; and combining climatic, vegetation and site factors. (BC Ministry of Forests)

Biogeoclimatic zone – a large geographic area with a broadly homogenous macroclimate. Each zone is named after one or more of the dominant climax species of the ecosystems in the zone, and a geographic or climatic modifier. British Columbia has 14 biogeoclimatic zones. (BC Ministry of Forests)

Biota – all of the living organisms in given ecosystem, including microorganisms, plants and animals. (Canadian Council of Forest Ministers)

Biotic – pertaining to any living aspect of the environment, especially population or community characteristics. (Canadian Council of Forest Ministers)

Blowdown (windthrow) – uprooting by the wind. Also refers to a tree or trees so uprooted. (BC MoF Website Glossary)

Catastrophic Event – a cataclysmic, disastrous incident, a violent usually destructive natural occurrence. (Merriam-Webster Dictionary online.)

Common Trails – a widely used, unrestricted right of way. (Common usage)

Community – a group of people with collective, common goals. (Common Usage)

Community Forest Tenures – the control and use of land and resources contained within an area influenced by the urban population. (Dictionary of Natural Resource Management-J. & K. Dunster)

Communities of Interest – sectors of society which share common goals and interests e.g. First Nations, Recreation Associations. (Common usage)

Connectivity – a qualitative term describing the degree to which late-succession ecosystems are linked to one another to form an interconnected network. The degree of interconnectedness and the characteristics of the linkages vary in natural landscapes based on topography and natural disturbance regime. (BC Ministry of Forests)

Considered – mentally contemplate. (Canadian Oxford Dictionary)

Country-food harvest – the gathering and removal of crops or produce specific to an area. (Dictionary.com)

Critical – being in or verging on a state of crisis or emergency. (The American Heritage Dictionary of the English Language, Fourth Edition)

Crown Land – land that is owned by the Crown; referred to as federal land when it is owned by Canada, and as provincial Crown land when it is owned by a province. Land refers to the land itself and the resources or values on or under it. (BC Ministry of Forests)

Cut Control – a set of rules and actions specified in the *Forest Act* that describes the allowable variation in the annual harvest rate either above or below the allowable annual cut (AAC) approved by the chief forester. (BC MoF Website Glossary)

Defined Forest Area (DFA) – a specified area of forest, land, and water delineated for the purposes of registration of a Sustainable Forest Management System. (CSA Z808-96)

Degradation – potentially detrimental disturbance. (Morice CSA SPT 10/10/01)

Disturbed areas – localities which have been impacted by natural events (fire, wind, flood, insects and also by human activities such as forest harvesting or construction of roads (Dictionary of Natural resource management + common usage)

Diverse – made up of distinct characteristics, qualities, or elements. (The American Heritage Dictionary of the English Language, Fourth Edition)

Duly Established Aboriginal and Treaty Rights – existing Aboriginal and Treaty Rights are recognized and affirmed in the Canadian Constitution. When discussed in relation to renewable resources, such Aboriginal and Treaty Rights generally relate to hunting, fishing, and trapping, and in some cases, gathering. (CSA Z808-96 Page 31 Section 2.6.1)

Ecological Reserves – areas of Crown land which have the potential to satisfy one or more of the following criteria:

- areas suitable for scientific research and educational purposes associated with studies in productivity and other aspects of the natural environment;
- areas which are representative of natural ecosystems;
- areas in which rare or endangered native plants or animals may be preserved in their natural habitat; and
- areas that contain unique geological phenomena. (BC MoF Website Glossary)

Ecosystem – a functional unit consisting of all the living organisms (plants, animals, and microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size—a log, pond, field, forest, or the earth's biosphere—but it always functions as a whole unit. Ecosystems are commonly described according to the major type of vegetation, for example, forest ecosystem, old-growth ecosystem, or range ecosystem. (BC MoF Website Glossary)

Educational – of or relating to education. (The American Heritage Dictionary of the English Language, Fourth Edition)

Enhance – to make greater (as in value, desirability, or attractiveness). (Webster's Collegiate Dictionary)

Environment – the surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation. (CSA Z808-96)

Extraction – the act of extracting, or drawing out; as, the extraction of a tooth, of a bone or an arrow from the body, of a stump from earth, of a passage from a book, of an essence or tincture. (Webster's Revised Unabridged Dictionary)

Fauna – the animal community found in one or more regions. (Canadian Council of Forest Ministers)

Flora – the plant species found in one or more regions. (Canadian Council of Forest Ministers)

Forest – a plant community of predominantly trees and other woody vegetation growing more or less closely together, its related flora and fauna, and the values attributed to it. (CSA Z808-96)

Forest Area – see Defined Forest Area.

Forest Ecosystem – includes both terrestrial and aquatic ecosystems. (Morice TSA CSA Scenario Planning Team 11/14/01)

Forest Land – land supporting forest growth or capable of so doing, or, if totally lacking forest growth, bearing evidence of former forest growth and not now in other use. (CSA Z808-96)

Forest Product – an item that is manufactured from trees. Forest products can be classified as primary (originating from harvested timber, i.e., lumber, pulp, etc.), or secondary (a by-product of the lumber or pulp process, i.e. furniture, wood-based chemicals, etc.). (Common Usage)

Forest Resources – resources and values associated with forests and range including, without limitation, timber, water, wildlife, recreation, botanical forest products, forage and biological diversity. (Forest Practices Code of British Columbia Act)

Forest Worker – any contractors and or their employees working on a licensee’s DFA (Morice TSA CSA Scenario Planning Team 09/12/01)

Fragmentation – the process of transforming large continuous forest patches into one or more smaller patches surrounded by disturbed areas. This occurs naturally through such agents as fire, landslides, windthrow and insect attack. In managed forests timber harvesting and related activities have been the dominant disturbance agents. (BC MoF Website Glossary)

General Forested Area (GFA) – the forested land base outside of high biodiversity emphasis areas (see high biodiversity emphasis areas) that is managed for a range of resource interests inclusive of, but not exclusive to, biodiversity. (MSRM 2004 - Morice Land and Resource Management Plan Final Land Use Recommendation)

Genetic diversity – variation among and within species that is attributable to differences in hereditary material. (BC MoF Website Glossary)

Genetically improved stock – seed or propagule that originate from a tree breeding program and that have been specifically designed to improve some attribute of seeds, seedlings, or vegetative propagules selection. (BC MoF Website Glossary)

Goal – a broad, general statement that describes a desired state or condition related to one or more forest values. (CSA Z808-96)

Grazing Tenure – the use and control of range land for cattle grazing purposes (common usage)

Habitat - the place where an organism lives and/or the conditions of that environment including the soil, vegetation, water, and food. (BC MoF Website Glossary)

Habitat Networks – physical features within landscapes that contribute to, or are integral parts of, habitats for a range of species and/or provide spatially fixed locations for movement. (Morice CSA SPT 11/13/01)

Healthy – having or indicating good health in body or mind; free from infirmity or disease. (Dictionary.com)

Healthy Community – a community evidencing growth, interdependence, and cooperation in a variety of areas. (Common usage)

High Biodiversity Emphasis Area (HBEA) – a spatially explicit portion of the forested landscape managed for high biodiversity values, particularly structural integrity. HBEAs are distributed throughout the plan area and are related to, but not limited by, landscape unit boundaries. (MSRM 2004 - Morice Land and Resource Management Plan Final Land Use Recommendation)

High Value Trails – a widely used, unrestricted right of way acknowledged as having local social or cultural significance. (Common usage)

Hydrologic Flows – the movement of groundwater near the surface. (Common Usage)

Hydrogeology – the branch of geology that deals with the occurrence, distribution, and effect of ground water. (The American Heritage Dictionary of the English Language, Fourth Edition)

Hydrology – the science that describes and analyzes the occurrence of water in nature, and its circulation near the surface of the earth. (BC MoF Website Glossary)

Incremental silviculture – a Ministry of Forests term that refers to the treatments carried out to maintain or increase the yield and value of forest stands. Includes treatments such as site rehabilitation, conifer release, spacing, pruning, and fertilization. Also known as intensive silviculture. See Basic silviculture. (BC MoF Website Glossary)

Indicator – a measurable variable used to report progress toward the achievement of a goal. (CSA Z808-96)

Indicator species – species of plants used to predict site quality and characteristics. (BC MoF website glossary)

Indigenous – a species of plant, animal, or abiotic material that is nature to a particular area (i.e., occurs naturally in an area and is not introduced). (Dictionary of Natural Resource Management, Julian and Katherine Dunster, 1996)

Infringe – refer to provincial documentation related to infringement. (Morice CSA SPT 10/10/01)

Independent – autonomous, self regulating. (Common Usage)

Inoperable lands – lands that are unsuited for timber production now and in the foreseeable future by virtue of their: elevation; topography; inaccessible location; low value of timber; small size of timber stands; steep or unstable soils that cannot be harvested without serious and irreversible damage to the soil or water resources; or designation as parks, wilderness areas, or other uses incompatible with timber production. (BC MoF website glossary)

Keystone Species – a species that plays an important ecological role in determining the overall structure and dynamic relationships within a biotic community. A keystone species presence is essential to the integrity and stability of a particular ecosystem. (BC MoF website glossary)

Known – to be able to distinguish; recognize as distinct. (The American Heritage Dictionary of the English Language, Fourth Edition)

Landscape – a spatial mosaic of several ecosystems, landforms and plant communities intermediate between an organism's normal home-range, size and its regional distribution. (Canadian Council of Forest Ministers). A watershed or series of similar and interacting watersheds, usually between 10,000 and 100,000 hectares in size. (BC Ministry of Forests Biodiversity Guidebook pp76.)

Linkage – a physical, biological, cultural, psychological, or policy connection or influence between two or more objects, processes, or policies. (Dictionary of Natural Resource Management, Julian and Katherine Dunster, 1996)

Local – of, relating to, or characteristic of a particular place (i.e. the Lakes TSA). (The American Heritage Dictionary of the English Language, Fourth Edition)

Mean Annual Increment – the total volume increment for a given area to a given age in years, divided by that age (m³/ha/year). (BC MoF website glossary)

Minimum Harvest Age - The age at which the minimum harvest volume of a stand of trees is reached on the corresponding yield curve.

Minimum Harvest Volume – The minimum amount of merchantable volume (m³/hectare) by leading tree species required before a stand of trees is considered economically suitable for harvest.

Natural – being in accordance with or determined by nature or having a form or appearance found in nature. (Webster' Collegiate Dictionary)

Natural Disturbance Type – an area that is characterized by a natural disturbance regime. (BC Ministry of Forests Biodiversity Guidebook pp76.)

Natural disturbance pattern – the historic patterns (frequency and extent) of fire, insects, wind, landslides and other natural processes in an area. (BC MoF Website Glossary)

Natural range of variability – the variation in extent or occurrence through time of ecosystems, and species resulting from naturally occurring biotic or abiotic disturbances. (Common Usage)

Net Area to be Reforested (NAR) – (a) the portion of the area under a silviculture prescription or Site Plan that does not include:

- (i) an area occupied by permanent access structures,
- (ii) an area of rock, wetland or other area that in its natural state is incapable of growing a stand of trees that meets the stocking requirements specified in the prescription,
- (iii) an area of non-commercial forest cover of 4 ha or less that is indicated in the silviculture prescription as an area where the establishment of a free growing stand is not required,
- (iv) a contiguous area of more than 4 ha that the district manager determines is composed of non-commercial forest cover, or
- (v) an area indicated in the silviculture prescription as a reserve area where the establishment of a free growing stand is not required, and

(b) if there is no silviculture prescription for a cutblock in a woodlot license area or community forest agreement area, the portion of the cutblock that does not include:

- (i) an area occupied by permanent access structures,
- (ii) an area of rock, wetland or other area that in its natural state is not capable of supporting a stand of trees that meets the stocking requirements specified in the regulations,
- (iii) an area of non-commercial forest cover of 4 ha or less that is indicated in an operational plan as an area where the establishment of a free growing stand is not required,
- (iv) a contiguous area of more than 4 ha that the district manager determines is composed of non-commercial forest cover, or
- (v) an area indicated in an operational plan as a reserve area where the establishment of a free growing stand is not required. (Forest Practices Code of BC Act; Part 1 – Definitions)

Non-contributing – having no involvement or effect (Common Usage)

Objective – a clear, specific statement of expected quantifiable results to be achieved within a defined period of time related to one or more goals. An objective is commonly stated as a desired level of an indicator. (CSA Z808-96)

Opportunities – potential or possibilities of action and change (Common Usage)

Patch – a stand of similar-aged forest that differs in age from adjacent patches by more than 20 years. When used in the design of landscape patterns, the term refers to the size of either a natural disturbance opening that led to an even-aged forest of an opening created by cutblocks. (BC Ministry of Forests Biodiversity Guidebook pp76.)

Period – an interval of time, typically expressed in hours, days, months or years.

Permanent Access Structures – the area of land within the Designated Forest Area that has been converted through land-use policy (permanently removed from the productive forest landbase) to provide access for resources development and protection. To facilitate forest management, part of the forest land base is occupied permanently by roads and other structures that provide access to the forest. Permanent access structures include those main haul roads, spur roads, landings, gravel pits, borrow pits and permanent logging trails required to meet present and future management needs. Permanent access structures are to be identified on operational plans and prescriptions. These structures may be treated to prevent erosion or to reduce slope stability hazard (e.g., decompacting the running surface, pulling sidecast fill slope soil up onto the running surface, or revegetating exposed mineral soil surfaces). This does not alter their status as permanent access structures, if these treatments are not adequate to enable reforestation or to ensure that the prescribed stocking and performance requirements will be met within the free growing time limits. (BC Forest Practices Code Soil Conservation Guidebook)

Permanent Site Disturbance – roads, landings, gravel pits, and permanent skid trails

Plan to Perspective Ratios – an enhanced procedure for modelling of visual management of clearcuts in timber supply analysis. Forest cover requirements used in timber supply modelling apply to plan (map) area, while visual impact assessments and operational approvals use perspective area. Therefore, a plan to perspective (P2P) ratio must be assumed when developing visual management constraints for timber supply analysis. (Ministry of Forests, Forest Practices Branch (*Bulletin — Modelling Visuals in TSRIII*)).

Productive forest land – forest land that is capable of producing a merchantable stand within a defined period of time. (BC MoF Website Glossary)

Productive Land base – see Defined Forest Area

Profitable – yielding profit; advantageous or lucrative. (The American Heritage Dictionary of the English Language, Fourth Edition)

Protect – the action of safe guarding and caring for the welfare of a person, area or thing. (Common Usage)

Public Advisory Group – an assembly that provides local people, community groups and general public that are interested in, or affected by, the Sustainable Forest Management (SFM) certification for HFP's Defined Forest Area with a focused process for shared decision-making. (Common Usage)

Rare Ecosystems – infrequently occurring; uncommon functional unit consisting of all the living organisms (plants, animals, and microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. (Common Usage)

Rare Flora and Fauna – infrequently occurring; uncommon plants and animals in a given area. (Common Usage)

Recreation Feature – a biological, physical, cultural or historic feature that has recreational significance or value. (BC MoF Website Glossary)

Recreation Opportunity Spectrum (ROS) – a mix of outdoor settings based on remoteness, area size, and evidence of humans, which allows for a variety of recreation activities and experiences. The descriptions used to classify the settings are on a continuum and are described as: rural, roaded resource, semi-primitive motorized, semi-primitive non-motorized, and primitive. (BC MoF Website Glossary)

Recruitment – the action of enrolling or enlisting people and resources (Common Usage)

Regeneration – the renewal of a tree crop through either natural means (seeded on-site from adjacent stands or deposited by wind, birds, or animals) or artificial means (by planting seedlings or direct seeding). (BC MoF Website Glossary)

Regeneration Assumptions – hypotheses regarding the renewal of a tree crop through either natural means (seeded on-site from adjacent stands or deposited by wind, birds, or animals) or artificial means (by planting seedlings or direct seeding). (Common Usage)

Regeneration Delay – the maximum time allowed in a prescription, between the start of harvesting in the area to which the prescription applies, and the earliest date by which the prescription requires a minimum number of acceptable well-spaced trees per hectare to be growing in that area. (BC MoF Website Glossary)

Relative Oldest Stands First – A timber supply modeling harvest rule. The timber supply model will pick from stands available for harvest by comparing the difference between minimum harvest age and current stand age. The stands with the biggest difference will be harvested first. (Common Usage)

Resource Value – values on Crown land which include but are not limited to biological diversity, fisheries, wildlife, minerals, oil and gas, energy, water quality and quantity, recreation and tourism, natural and cultural heritage resource, timber, forage, wilderness and aesthetic values. (BC Ministry of Forests)

Return on Capital Employed – a key financial statistic reflecting the rate of return that the company's management has obtained, on the shareholders' behalf, by their management of the company's assets. ROCE is determined by dividing net income before income taxes for the past 12 months by Common Shareholder's Equity and Long-term Liability. The result is shown as a percentage. (Common Usage)

Riparian – an area of land adjacent to a stream, river, lake or wetland that contains vegetation that, due to the presence of water, is distinctly different from the vegetation of adjacent upland areas. (BC MoF Website Glossary)

Road Density Index – a ratio describing the extent of road development within a given watershed. (Common Usage)

Scenic area – any visually sensitive area or scenic landscape identified through a visual landscape inventory or planning process carried out or approved by the district manager. (BC MoF Website Glossary)

Seral Stages – the stages of ecological succession of a plant community, e.g., from young stage to old stage. The characteristic sequence of biotic communities that successively occupy and replace each other by which some components of the physical environment becomes altered over time. The age and structure of seral stages varies significantly from one biogeoclimatic zone to another. (BC Ministry of Forests Biodiversity Guidebook).

Social – of or relating to human society and its modes of organization. (The American Heritage Dictionary of the English Language, Fourth Edition).

Soil – the naturally occurring, unconsolidated mineral or organic material at the surface of the earth that is capable of supporting plant growth. It extends from the surface to 15 cm below the depth at which properties produced by soil-forming processes can be detected. The soil-forming processes are an interaction between climate, living organisms, and relief acting on soil and soil parent material. Unconsolidated material includes material cemented or

compacted by soil-forming processes. Soil may have water covering its surface to a depth of 60 cm or less in the driest part of the year. (BC MoF Website Glossary).

Special and Unique Aboriginal needs – site-specific archeological, cultural, and spiritual values related to traditional aboriginal use. (Morice CSA SPT 10/10/01)

Species Sensitive to Disturbance – plants or animals susceptible to disturbance by natural events (fire, wind, flood, insects) and also by human activities such as forest harvesting or construction of roads. (Common Usage).

Stability – the state or quality of being stable, especially: (a) Resistance to change, deterioration, or displacement; (b) Constancy of character or purpose; steadfastness; (c) Reliability; dependability. (The American Heritage Dictionary of the English Language, Fourth Edition)

Stand – a community of trees sufficiently uniform in species composition, age, arrangement, and condition to be distinguishable as a group from the forest or other growth on the adjoining area, and thus forming a silviculture or management entity. (BC MoF Website Glossary)

Standard Operating Procedure – established procedure to be followed in carrying out a given operation or in a given situation. (The American Heritage Dictionary of the English Language, Fourth Edition).

Structural stage – the existing dominant stand appearance and structure for an ecosystem unit. (Common Usage)

Sustainability – the concept of producing a biological resource under management practices that ensure replacement of the part harvested, by regrowth or reproduction, before another harvest occurs. (BC MoF Website Glossary)

Temporary Access Structures – the area of land within the Designated Forest Area that has been converted through land-use policy (temporarily removed from the productive forest landbase to be rehabilitated after use) to provide access for resources development and protection. Temporary access structures include those haul roads, landings and excavated or bladed trails that will be restored to a productive state upon completion of harvesting. Temporary access structures are identified on operational plans and prescriptions. All areas occupied by temporary access structures must be rehabilitated so that all silvicultural obligations are achieved on the whole of the net area to be reforested. (BC Forest Practices Code Soil Conservation Guidebook)

Tourism – the business of providing tours and services for tourists. (The American Heritage Dictionary of the English Language, Fourth Edition).

Tree species profile – a description of the tree species composition of a DFA. (Common Usage)

Trekking – a hike or journey, perceived to be long and possibly arduous. (Common Usage)

Understory – any plants growing under the canopy formed by other plants, particularly herbaceous and shrub vegetation under a tree canopy. (BC MoF Website Glossary)

Value – a principle, standard, or quality considered worthwhile or desirable. (CSA Z808-96)

Viable – an action or proposed action which has a feasible, realistic outcome (Common Usage)

Visually Effective Greenup – the stage at which regeneration is seen by the public as newly established forest. When VEG is achieved the forest cover generally blocks views of tree stumps, logging debris and bare ground. Distinctions in height, colour, and texture may remain between a cutblock and adjacent forest but the cutblock will no longer be seen as recently cut-over. (BC MoF Visual Landscape Design, Training Manual)

Visual Quality Objective – a resource management objective established by the district manager or contained in a higher level plan that reflects the desired level of visual quality based on the physical characteristics and social concern for the area. Five categories of VQO are commonly used: preservation; retention; partial retention; modification; and, maximum modification. (BC MoF Website Glossary)

Water Flow Regime – the passage of water under the influence of gravity through soils, rocks, and other substrates. (Dictionary of Natural Resource Management, Julian and Katherine Dunster, 1996)

Watershed – an area of land, which may or may not be under forest cover, draining water, organic matter, dissolved nutrients, and sediments into a lake or stream. The topographic boundary, usually a height of land that marks the dividing line from which surface streams flow in two different directions. (Dictionary of Natural Resource Management, Julian and Katherine Dunster, 1996)

Well-used Trails – a widely used, unrestricted right of way acknowledged as receiving a significant amount of public use. (Common usage)

Windthrow – see Blowdown.

Winter Range – a range, usually at lower elevation, used by migratory deer, elk, caribou, moose, etc., during the winter months and typically better defined and smaller than summer range. (BC MoF Website Glossary)

GLOSSARY OF ACRONYMS

AF: Alpine Forest
 AT: Alpine Tundra
 AAC: Allowable Annual Cut
 BCFS: BC Forest Service
 BEC: Biogeoclimatic Classification
 BEO: Biodiversity Emphasis Option
 BMP: Best Management Practice
 CWD: Coarse Woody Debris
 DFA: Defined Forest Area
 DFO: Federal Department of Fisheries and Oceans
 ESA: Environmentally Sensitive Area
 ESSF: Engelmann Spruce-Subalpine Fir
 FEN: Forest Ecological Network
 FPC: Forest Practices Code
 GIS: Geographic Information System
 ICH: Interior Cedar-Hemlock
 IRMA: Integrated Resource Management Area
 IWAP: Interior Watershed Assessment Program
 LRMP: Land and Resource Management Plan
 LRUP: Local Resource Use Plan
 MAI: Mean Annual Increment
 MELP: BC Ministry of Environment, Lands and Parks
 MHA: Minimum Harvest Age
 MHV: Minimum Harvest Volume
 MOF: BC Ministry of Forests
 MSYT: Managed Stand Yield Table
 NAR: Net Area to be Reforested
 NcBr: Non-Commercial Brush
 NDT: Natural Disturbance Type
 NDT1: ecosystems with rare stand-initiating events
 NDT2: ecosystems with infrequent stand-initiating events
 NDT3: ecosystems with frequent stand-initiating events
 NDT4: ecosystems with frequent stand-maintaining fires
 NDT5: alpine tundra and subalpine parkland
 NSR: Not Satisfactorily Restocked
 NSYT: Natural Stand Yield Table
 OAF: Operational Adjustment Factor
 OGMA: Old Growth Management Area
 OPR: Operational Planning Regulation
 OGSi: Old Growth Site Index
 PAS: Protected Area Strategy
 RDI: Road Density Index
 RFA: Regenerating Forest Area
 RMA: Riparian Management Area
 RMZ: Riparian Management Zone
 ROCE: Return On Capital Employed
 RPM: Roads Performance Model (Houston Forest Products)
 SBS: Sub-Boreal Spruce
 SIBEC: Site Index Estimates by Site Series
 SOP: Standard Operating Procedure
 SP: Silviculture Prescription
 TFL: Tree Farm License
 THLB: Timber Harvesting Land Base
 TSA: Timber Supply Area
 TSR: Timber Supply Review
 WTP: Wildlife Tree Patch
 WTR: Wildlife Tree Retention

APPENDIX C – Detailed Indicator Description Sheets

Structure of the Detailed Indicator Description Sheets

For each SFM indicator selected for the Morice TSA, a detailed indicator description sheet has been prepared which contains the following information:

Indicator: Name of the indicator

Indicator Linkages: The linkages of the indicator to the M&L IFPA and CSA/CCFM framework parameters.

Indicator Rationale: An explanation of the terms used to describe the indicator and how the indicator relates to the M&L IFPA and CSA/CCFM parameters.

Current Status and Forecasted Targets/Thresholds of Indicator: Reflects the current status and forecasted targets/thresholds of the indicator as derived by resource analysis or other means. Also reflected is the timeframe to meet targets.

Indicator Analysis Information: States the strategy practices that were used in the resource analysis to model the indicator (if applicable) and which will need to be followed to realize targets. Furthermore, the methods, assumptions and criteria used for the indicator are stated.

Calculation of Indicator: A formula is presented which indicates how the indicator is calculated. The variables in the formula are also defined.

Analysis comments/discussion: A summary of the discussion/comments for the "current condition" and "forecasted conditions" analyses.

Indicator Monitoring Plans:

Inventories Needed to Monitor and Analyze Indicator: Listing of the data, the source, and update requirements (if applicable) for inventories needed to monitor and analyze data.

Indicator Monitoring Implementation Schedule: A list of activities and associated tasks to implement indicator monitoring. This includes assigning responsibility for completing tasks according to a defined schedule.

Output for indicator reporting: Specifies the format to report results from indicator monitoring.

References: Sources of information referenced throughout indicator sheets.

Notes regarding Detailed Indicator Description sheets:

- The numbering of indicators is consistent with the Morice SPT indicator list (*circa*. Aug 13, 2002). As such, there are some numbers missing from the numerical sequence. In general, those indicator numbers missing from the numerical sequence of the original list have been reconsidered by the Technical Committee and, in most cases, have been covered with existing indicators. This numbering is consistent with the “End Use Framework” summary tables contained in the main text of the SFM plan (i.e. [Table 5](#) and [Table 6](#)).
- “Licensees” include the BC Timber Sales Program (BCTS)
- The Morice District BCMOF is responsible for Non-replaceable forest licenses (NRFLs). Reporting requirements for these tenures is unknown at this time.
- Where “Period” is referenced in a detail sheet Periods 1 – 20 inclusive are in 5 –year increments. Periods 21 to 35 are in 10 – year increments. This covers a 250 year planning horizon.
- Where applicable, a map-based spatial forecast of selected indicators is available for viewing online at the Morice & Lakes IFPA Data Review Site (<http://tao.tesera.com:81/website/>).
- For those licensees who are not currently pursuing certification, the indicators that apply only to the CSA framework (and not specifically to M&L IFPA framework), may have *current status*, *targets*, and *variances* labeled as “N/A” (i.e. Not Applicable).

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Indicator 2: Number of Communications by Licensee

Indicator Linkages

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|--|
| Applies to the M&L IFPA process as a whole | <p>Criterion: 6. Accepting Society’s Responsibility for Sustainable Development</p> <p>SFM Element: 1. Aboriginal and Treaty Rights</p> <p>Value: 1. First Nations’ Aboriginal and Treaty rights</p> <p>Objective: 1. Duly- established First Nations’ Aboriginal and Treaty rights are recognized and respected</p> <p>SFM Element: 3. Public Participation</p> <p>Value: 1. Fair, equitable and effective public participation</p> <p>Objective: 1. A public involvement process designed and implemented to the satisfaction of participants</p> |

Indicators 2, 4, 27 & 54 are closely related

Indicator Rationale

What does this indicator mean?

Communications are an important tool for the IFPA and its proponents to make the public aware of issues regarding resource management toward local values. This indicator describes the level of outreach to the community. The number of communications refers to written and verbal communications which are documented by resource value for the IFPA and each of the IFPA proponents.

How does this indicator relate to the M&L IFPA and to SFM?

The M&L IFPA encourages open and effective communication regarding various aspects of the process in working towards SFM. Effective communication by the IFPA and its proponents ensures opportunities exist for community awareness regarding resource management. Proactive communication which encourages public input/participation in SFM is an important tool by which to incorporate public values in long-term SFM planning. Maintaining effective communication is not only important for developing the SFM plan, but will also be important in the monitoring, evaluation and continual improvement part of the M&L IFPA SFM process. By maintaining effective communication between the public, licensees, managing agencies and other stakeholders, there is a much greater ability to work together to develop mutually compatible objectives on the land base.

Current Status and Forecasted Targets/Thresholds of Indicator

| Number of Communications by Type by licensee | | | | | | |
|--|-------------------------------------|--------|-------|--|----------|----------------|
| Licensee | Current Status (2006 Calendar year) | | | Target | Variance | Achieve Target |
| | Communication Type | | | | | |
| | Written | Verbal | Media | | | |
| Canfor | 116 | 0 | 1 | Minimum of one written communication annually to each contact on the licensee's contact list | none | Annually |
| BCTS | 821 | 3 | 3 | Minimum of one written communication annually to each contact on the licensee's contact list | none | Annually |
| IFPA | 4200 | 0 | 1 | Minimum of one written communication annually to each contact on the IFPA contact list | none | Annually |

Rationale for variance: It is expected that the licensees, the Babine BCTS and the M&L IFPA maintain communications with each contact on their contact list, therefore, no variance is indicated.

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria |
|--|
| IFPA – specific communication to be identified and reported See Analysis Comments/Discussion below. |
| Licensees review communication records to determine Current Status See Analysis Comments/Discussion below. |
| Develop and implement licensee - specific communications strategies with interested parties (e.g. <ul style="list-style-type: none"> ○ Send a map of proposed blocks when they are planned within a certain area ○ Send a map of list of roads to be deactivated ○ Send a map or list of blocks planned for harvest on a seasonal basis ○ Develop another agreed to method of communication if applicable. |

Calculation of Indicator**Formula:**

$$\#C_{\text{Resource value}}$$

Variables:

C_{Resource value}: Number of Communications by licensee

Analysis Comments/Discussion

- Reporting period is the calendar year.
- Each licensee will maintain a list of all interested parties who may be impacted or others who want to be kept informed of the licensee's activities (Trappers, Guides, Stakeholders, etc).
- This list could come from existing tenure holders, from those that the licensee is already in contact with or from newspaper invitations, etc.
- For each interested party, and or member of the public, a record of communications will be maintained. Licensees and the IFPA Manager will describe the type of media communication in their annual reporting (eg. one newsletter sent to 500 households).
- The plan proponents will report annually on the types of resource values addressed by their communication strategies. The following examples or resource values types have been described in the resource list for the Morice Scenario Planning database,
 - Agriculture
 - Community Stability
 - Cultural Heritage
 - Minerals and Energy
 - Landscape and Stand Level Biodiversity
 - Recreation
 - Timber
 - Visuals
 - Watershed and Riparian
 - Wildlife
 - Other examples as required

Communication Type (examples):

- Written (Letter, Fax, Email)
- Verbal (Conversation) - must be a recorded
- Media (Newsletter, Newspaper Article, Meeting Notices)

Indicator Monitoring Plans**Inventories Needed to Monitor and Analyze Indicator**

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|-------------------------------------|------------------------|---|-------------------------------|
| Communication records database | Each licensee | Yes | As communications are sent |
| IFPA communication records database | Tweedsmuir Forest Ltd. | Yes | As communications are sent |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--|---|---|------------------------------------|
| Set up system to document communications | Ensure a system is organized to document communications within the M&L IFPA and licensee-specific DFA's | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager • IFPA Manager | December, 2004 |
| Monitor and update data | Ensure data is continually updated | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager • IFPA Manager | Annually starting in 2005 |
| Analysis | Not applicable | Not applicable | Not applicable |
| Report | Indicator Performance Management Report for Management Adjustment Purposes (review updated data only) | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager | Annually starting January 31, 2006 |
| | M&L IFPA SFM Report | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager • IFPA Manager | Annually starting January 31, 2006 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Indicator 4: Number of Participation Opportunities by Opportunity Type

Indicator Linkages

| M&L IFPA Framework | CSA/CCFM SFM Framework |
|--|---|
| Applies to the M&L IFPA process as a whole | Criterion: 5. Multiple Benefit to Society SFM Element: 2. Communities and Sustainability Value: 1. Healthy and sustainable communities Objective: 1. A diverse local economy and local participation in the use of forests benefits on the DFA |

Indicators [2](#), [4](#), [5](#), [27](#) & [54](#) are closely related

Indicator Rationale

What does this indicator mean?

Maintaining and enhancing the ability for the public to participate in SFM (i.e. development, planning, implementation and monitoring, etc.), is fundamental to ensuring public values are expressed in SFM. The type of opportunities that have commonly been available for public participation in the M&L IFPA SFM process have been workshops, open houses, public exhibits, public advisory group meetings, scenario planning team meetings and knowledge transfer sessions. It is anticipated that the diversity of participation opportunities will increase as the M&L IFPA SFM process matures.

How does this indicator relate to the M&L IFPA and to SFM?

The opportunity for the public to participate in the development of SFM, contributes to the ability of the public to ensure local values are considered and incorporated within SFM planning. In this regard, values pertaining to the economic, ecological and social well being of the local communities can be expressed and incorporated into long-term SFM strategies and practices. Furthermore, as values change throughout time, maintaining and increasing the opportunities for ongoing public participation in the M&L IFPA SFM process ensures that local values will continue to be incorporated.

Current Status and Forecasted Targets/Thresholds of Indicator

| Number of Participation Opportunities by Opportunity Type | | | | |
|---|---------------------------------------|--------------|----------|----------------|
| Opportunity Type | Current Status (2004 M&L IFPA fiscal) | Target | Variance | Achieve Target |
| Meetings | 11 | >=2 | None | Annually |
| Workshops | 1 | ≥ 1 per year | None | Annually |

Rationale for variance: The frequency of meetings may fluctuate as the M&L IFPA process matures.

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria |
|---|
| IFPA – specific opportunities to be provided and reported See “Analysis Comments/Discussion” |

Calculation of Indicator

Formula:

$$\# P_{\text{opportunity type}}$$

Variables:

P_{opportunity type} : Number of Participation Opportunities by Opportunity Type by licensee

Analysis Comments/Discussion

Participation Opportunities include:

- Public Participation Meetings (strategic committee, public advisory group meetings, scenario planning team meetings, value/issue focus meetings)
- Workshops (technical workshops, knowledge transfer sessions)

Reporting period for this indicator will be the IFPA fiscal year (April 1 - March 31)

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|-------------------------------------|------------------------|--|---|
| IFPA participation records database | Tweedsmuir Forest Ltd. | Yes | Update monthly, as participation opportunities occur. Compile results annually. |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|---|--|----------------|--------------------------------|
| Set up system to document participation opportunities | Ensure a system is organized to document participation opportunities within the M&L IFPA. | IFPA Manager | December 31, 2002 |
| Monitor and update data | Ensure data is reviewed and updated | IFPA Manager | Annually starting May 31, 2003 |
| Analysis | Compile results | IFPA Manager | Annually starting May 31, 2003 |
| Report | Indicator Performance Management for Management Adjustment Purposes (review updated data only) | IFPA Manager | Annually starting May 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Annually starting May 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Indicator 5: Number of Aboriginal Participation Opportunities by Licensee

Indicator Linkages

| M&L IFPA Framework | CSA/CCFM SFM Framework |
|--|--|
| Applies to the M&L IFPA process as a whole | <p>Criterion: 6. Accepting Society's Responsibility for Sustainable Development</p> <p>SFM Element: 1. Aboriginal and Treaty Rights</p> <p>Value: 1. First Nations' Aboriginal and Treaty Rights</p> <p>Objective: 1. Duly-established First Nations' Aboriginal and Treaty Rights are recognized and respected.</p> <p>SFM Element: 2. Respect for Aboriginal Forest Values, Knowledge and Uses</p> <p>Value: 1. Indigenous Knowledge of forest values and uses</p> <p>Objective: 1. Forest management incorporates Indigenous Knowledge of forest values and uses</p> |

Indicators [2](#), [4](#), [5](#), [27](#) & [54](#) are closely related

Indicator Rationale

What does this indicator mean?

Maintaining and enhancing the ability for First Nations to participate in SFM (i.e. development, planning, implementation and monitoring, etc.), is fundamental to ensuring aboriginal values are expressed in SFM. The types of opportunities that have commonly been available for aboriginal participation include consultation and information sharing with licensees and involvement in the M&L IFPA SFM process.

Aboriginal rights and Aboriginal title are recognized and affirmed in Section 35 of the Constitution Act, 1982. The SFM requirements do not in any way intend to define, interpret, or prejudice ongoing or future discussions and negotiations regarding these legal rights and do not stipulate how to deal with treaty rights. The appropriate bodies to make decisions related to Aboriginal and treaty rights are the governments. Organizations are required to be in compliance with government regulations and policies and should be able to demonstrate that they are operating in accordance with the requirements applicable to their jurisdictions. Organizations are also required to make special efforts to secure Aboriginal participation.

How does this indicator relate to the M&L IFPA and to SFM?

The opportunity for First Nations to participate in the development of SFM contributes to the ability of the First Nations to ensure traditional and local values are considered and incorporated within SFM planning and forest management. In this regard, values pertaining to the economic, ecological and social well being of the local First Nations communities can be expressed and incorporated into long-term SFM strategies and practices. Furthermore, as values change throughout time, maintaining and increasing the opportunities for ongoing First Nations participation in the M&L IFPA SFM process ensures that these values will continue to be incorporated.

Current Status and Forecasted Targets/Thresholds of Indicator

| # of Aboriginal participation opportunities | | | | | | |
|--|--------------------------------|------------------------------|----------------------|----------------------|-----------------------|----------|
| Licensee | First Nations | Current Status (2004) | Target | Variance | Achieve Target | |
| Canfor | Lake Babine Nation | LBN | 10 | 2 per group per year | none | Annually |
| | | Old Fort | | | | |
| | | Tachet | | | | |
| | | Fort Babine | | | | |
| | Wet'suwet'en First Nation | 2 | | | | |
| | Cheslatta Carrier First Nation | 2 | | | | |
| | Nee-tahi-buhn Band | 2 | | | | |
| | Skin Tyee Band | 2 | | | | |
| | Office of Wet'suwet'en | 4 | | | | |
| Yekooche First Nation | 0 | | | | | |
| Moricetown Band | | | | | | |
| BCTS | Lake Babine Nation | 5 | 2 per group per year | none | Annually | |
| | Wet'suwet'en First Nation | 5 | | | | |
| | Cheslatta Carrier First Nation | | | | | |
| | Nee-tahi-buhn Band | 5 | | | | |
| | Skin Tyee Band | 6 | | | | |
| | Office of Wet'suwet'en | 8 | | | | |
| | Yekooche First Nation | 0 | | | | |
| | Morricetown Band | 3 | | | | |
| | Cheslatta Carrier Nation | 2 | | | | |

Rationale for variance: The frequency of meetings may fluctuate as the M&L IFPA process matures.

Indicator Analysis Information

Strategy Practices Methods, Assumptions and Criteria

Licensee – specific opportunities to be identified and reported. Licensees with targets will ensure identified First Nations Groups are provided the opportunity to participate in consultation sessions regarding forest management and to participate in the SFM process. Canfor will achieve the targets through the implementation of its *Aboriginal Strategy*.

See “Analysis Comments/Discussion”

Calculation of Indicator**Formula:**

$$\# AP_{\text{licensee}}$$

Variables:

AP_{licensee} : Number of Aboriginal Participation Opportunities by licensee

Analysis Comments/Discussion

Aboriginal Participation Opportunities include:

- Invitations to consult or share information with licensees;

The following list of recognized Aboriginal Groups in the Morice TSA is based on digital map data provided by Nadina Forest District in March 2005:

- Lake Babine Nation
 - Lake Babine Nation
 - Old Fort
 - Tachet
 - Fort Babine
- Wet'suwet'en
- Cheslatta First Nation
- Nee-tahi-buhn Band
- Skin Tyee Band
- Wet'suwet'en First Nation
- Yekooche Nation
- Moricetown Band

Targets will apply to the Traditional Territories of all the Aboriginal Groups listed above. Licensee-specific targets will apply to only those Traditional Territories intersecting the licensee operating areas.

As described in the section "What does this indicator mean?", organizations are required to make special efforts to secure Aboriginal participation in SFM planning. Furthermore, Sections 5.2 (c)&(d) of the CSA Z809-02 standard require the organization to: "demonstrate through documentation that efforts were made to contact Aboriginal forest users and communities affected by or interested in forest management on the DFA; demonstrate through documentation that efforts were made to work with Aboriginal forest users and communities to become involved in identifying and addressing SFM values." The licensees have expended considerable recruitment effort in an attempt to gain aboriginal participation. A record of those efforts is tracked by the licensees.

Reporting period for this indicator will be the fiscal year (April 1 - March 31)

Indicator Monitoring Plans**Inventories Needed to Monitor and Analyze Indicator**

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|--|---------------|---|---|
| Licensee-specific participation records database | Each Licensee | Yes | Update monthly, as participation opportunities occur. Compile results annually. |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|---|--|---|---------------------------------|
| Set up system to document participation opportunities | Ensure a system is organized to document aboriginal participation opportunities. | <ul style="list-style-type: none"> • Woods Managers for each Licensee • Babine BCTS Manager | December 31, 2002 |
| Monitor and update data | Ensure data is reviewed and updated | <ul style="list-style-type: none"> • Woods Managers for each Licensee • Babine BCTS Manager | Annually starting 2003 |
| Analysis | Compile results | <ul style="list-style-type: none"> • Woods Managers for each Licensee • Babine BCTS Manager | Annually starting 2003 |
| Report | Indicator Performance Management for Management Adjustment Purposes (review updated data only) | <ul style="list-style-type: none"> • Woods Managers for each Licensee • Babine BCTS Manager • IFPA Manager | Annually starting May 31, 2004 |
| | M&L IFPA SFM Report | <ul style="list-style-type: none"> • IFPA Manager | Annually starting May 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Indicator 6: Number of Continual Improvement–related projects in the DFA by licensee

Indicator Linkages

| M&L IFPA Framework | CSA/CCFM SFM Framework |
|--|--|
| Applies to the M&L IFPA process as a whole | <p>Criterion: 5. Multiple Benefits to Society</p> <p>SFM Element: 3. Fair Distribution of Benefits and Costs</p> <p>Value: 1. Fair distribution of timber and non-timber benefits and costs over time</p> <p>Objective: 1. Timber and non timber benefits are fairly and equitably distributed at a range of scales for current and future generations</p> <p>Criterion: 6. Accepting Society’s Responsibility for Sustainable Development</p> <p>SFM Element: 4. Information for Decision-Making</p> <p>Value: 1. Informed decision-making and increased knowledge</p> <p>Objective: 1. Relevant information is exchanged between interested parties to support decision-making and increased knowledge of ecosystem processes and interactions with forest ecosystems.</p> |

Indicator Rationale

What does this indicator mean?

Continual improvement-related projects are those projects where the licensee provides financial support, in-kind support, or a study area within the DFA for the purposes of improving resource management or resource management planning. With regard to the M&L IFPA, continual improvements are periodically identified by the IFPA technical committee and projects are coordinated among the various proponents to address these needs. Commitments to undertake continual improvement-related projects are highly dependent on available resources within each of the proponent organizations; however, as a result of this SFM Plan, commitments have been made to maintain a certain level of continual improvement projects on an annual basis.

How does this indicator relate to the M&L IFPA and to SFM?

Investing in continual improvement projects is a primary means to ensure the continual improvement of SFM within the Morice TSA. Adaptive management principles are employed in the selection of continual improvement projects. In this regard, advances can be made in areas such as filling knowledge gaps and improving data inventories, as well as looking toward advanced techniques and technology to better

facilitate our understanding of complex systems. Continually improving the SFM system by virtue of continual improvement related projects, allows for a greater degree of understanding when making decisions regarding the impacts of current and future uses of, and management practices on, the forest land base as they relate to timber and non-timber values.

Current Status and Targets/Thresholds of Indicator

| # of Continual Improvement – related Projects in the DFA | | | | |
|---|------------------------------|------------------------------------|-----------------|-----------------------|
| Licensee | Current Status (2004) | Target | Variance | Achieve Target |
| Canfor | 4 | Maintain 2002 current status ≥9 | None | Annually |
| BCTS | 7 | ≥ 1 | None | Annually |
| M&L IFPA* | 14 | ≥ 1 | None | Annually |

*M&L IFPA projects are those, which licensees jointly participate through a subsidiary company, Tweedsmuir Forest Ltd. These projects are not included in the individual licensee count (as above).

At least one of the continual improvement projects must be directed towards developing and implementing a long term effectiveness monitoring program.

Rationale for variance: It is expected that the licensees, the Babine BCTS and the M&L IFPA maintain a specified level of continual improvement projects on the Morice TSA, therefore, no variance is indicated.

Indicator Analysis Information

Strategy Practices, Methods, Assumptions and Criteria

Licensee - specific projects to be identified and reported.

IFPA – specific projects to be identified and reported

See “Analysis Comments/Discussion” below

Calculation of Indicator

Formula:

$$\#CIP_{DFA, licensee}$$

Variables:

$\#CIP_{DFA, licensee}$: # of Continual Improvement-related projects in the DFA by Licensee

Analysis Comments/Discussion

Continual Improvement projects are defined as projects where the licensee independently, or through the M&L IFPA, provides financial support, in-kind support, or a study area within the DFA in the areas of:

- Research (experiments designed to test a hypothesis)
- Inventories (updated, or enhanced)
- Adaptive Management Projects
- Extension work related to continual improvement projects

Effectiveness monitoring projects are a subset of the continual improvement projects and are aimed at testing the effectiveness of the indicators in achieving, or moving towards achieving, the objective(s) of the indicators.

Annual review and update of the continual improvement requirements is required by each licensee independently, and by the IFPA through the M&L IFPA technical committee.

Each licensee and the M&L IFPA needs to review and update the current number of continual improvement projects they are sponsoring.

Reporting period for this indicator will be the fiscal year of each proponent organization.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|---|------------------------|---|-------------------------------|
| Continual Improvement project database | Each licensee | Yes | As projects are started |
| IFPA Continual Improvement project database | Tweedsmuir Forest Ltd. | Yes | As projects are started |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|---|--|---|---------------------------------|
| Document number of active continual improvement projects in the DFA by licensee | Set up system within individual organizations to document continual improvement projects in the DFA. | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager • M&L IFPA Manager | December 2002 |
| Monitor and update data | Ensure data is updated | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager | Starting in 2003 |

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|----------|---|---|------------------------------------|
| | | <ul style="list-style-type: none"> M&L IFPA Manager | |
| Analysis | Compile updated data (as described above in “analysis comments/discussion”) | <ul style="list-style-type: none"> Woods Managers for each licensee Babine BCTS Manager M&L IFPA Manager | Annually starting 2003 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes (review updated data only) | <ul style="list-style-type: none"> Woods Managers for each licensee Babine BCTS Manager M&L IFPA Manager | Annually starting January 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Indicator 7: Percentage of Identified High Hazard Structures with Actions Plans Implemented by Licensee

Indicator Linkages

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|--|
| Applies to the M&L IFPA process as a whole | <p>Criterion: 3. Conservation of Soil and Water Resources</p> <p>SFM Element: 2. Water Quality and Quantity</p> <p>Value: 1. Productive capacity of water resources is conserved</p> <p>Objective: 1. Water quantity and quality are sustained through their characteristic range of variation, on the DFA through time.</p> |

Indicators 7, [10](#), [45](#), and [52](#) are closely related

Indicator Rationale

What does this indicator mean?

Sediment delivery to streams at road crossings may have a major impact to water quality in a watershed. This indicator will use an inspection procedure to evaluate the size and characteristics of road-related sediment sources at crossings and the potential for the eroded sediment to reach the stream environment. A high score infers that there is potentially a significant erosion problem, which may in turn cause sediment related water quality problems.

How does this indicator relate to the M&L IFPA and to SFM?

The indicator will ensure that the productive capacity of water is conserved by identifying through inspections, high hazard structures in sensitive watersheds with high road densities (see indicator M52). It also evaluates the effectiveness of management practices for drainage structure installation in reducing the risk of sediment delivery to streams. In order to minimize the risk of stream sedimentation impacts upon water quality, where potential sedimentation occurrences are identified, corrective action plans must be developed and implemented. By committing to identifying and addressing potential stream sediment sources, this indicator demonstrates the commitment of the IFPA partners to respond appropriately to potential environmental issues relating to water quality.

Current Status and Forecasted Targets/Thresholds of Indicator

| % of Identified High Hazard Structures with Action Plans Implemented by Licensee | | | | |
|---|------------------------------|---|-----------------|-----------------------|
| Licensee | Current Status (2004) | Target | Variance | Achieve Target |
| Canfor | No data | 100% of high hazard structures identified during inspections with action plans implemented. | - 50% | Annually |
| BCTS | No data | 100% of high hazard structures identified during inspe implemented. | - 50% | Annually |

Rationale for variance: The variance is meant to account for completing corrective action plans outside of reporting period.

Indicator Analysis Information

Strategy Practices, Methods, Assumptions and Criteria

Sensitive watersheds with the highest road densities as identified by indicator M52 will be a priority for a survey and hazard rating score.

Corrective Action Plans will be developed for drainage structures with a high hazard rating that have been identified in the survey.

Road construction practices and standards will use methods for minimizing sediment delivery to streams.

New roads and their associated drainage structures are inspected within 1 year after construction is complete to ensure that sedimentation control methods are effective. If the results of the initial inspection result in a downgrading of the hazard, the inspection frequency may change.

Drainage structures identified during the inspections with a perceived high hazard for sediment delivery to streams will have action plans developed to reduce the hazard.

Calculation of Indicator
Formula:

$$\%SORC_{licensee} = (SHPI_{licensee} / SHS_{licensee}) \times 100$$

Variables:

%SHPI_{licensee}: % of identified high hazard structures with actions plans implemented by licensee

SHPI_{licensee}: Number of Structures with a High hazard rating with action Plans Developed within the calendar year

SHS_{licensee} : Number Structures with a High hazard rating Surveyed within the calendar year

Analysis Comments/Discussion

Only drainage structures surveyed in identified watersheds from indicator M52 will be used to calculate this indicator.

Minimizing the effects of sediment delivery on new roads is managed by licensee standard operating and inspection procedures.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|---|---------------|---|-------------------------------|
| Sediment survey inspection reports | Each Licensee | Yes | Annual |
| Records of status of corrective action plans. | Each Licensee | Yes | Annual |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--|--|--|------------------------------------|
| Document percentage of corrective action plans completed for high hazard structures to mitigate sediment occurrences | Review road sediment survey inspection reports for high hazard watersheds. | <ul style="list-style-type: none"> Woods Managers for each applicable licensee Babine BCTS Manager | Annually starting 2005 |
| | Set up system to track development of action plans. | <ul style="list-style-type: none"> Woods Managers for each applicable licensee Babine BCTS Manager | Annually starting 2005 |
| Monitor and update data | Ensure inventories (as above) are updated | <ul style="list-style-type: none"> Woods Managers for each applicable licensee Babine BCTS Manager | Starting in 2005 |
| Analysis | Obtain necessary data and conduct analysis for indicator | <ul style="list-style-type: none"> Woods Managers for each applicable licensee Babine BCTS Manager | Annually starting 2005 |
| Report | Indicator Performance Management for Management Adjustment Purposes (review updated data only) | <ul style="list-style-type: none"> Woods Managers for each applicable licensee Babine BCTS Manager | ANNUALLY STARTING JANUARY 31, 2006 |

| | | | |
|--|---------------------|--|------------------------------------|
| | M&L IFPA SFM Report | <ul style="list-style-type: none"> • Woods Managers for each applicable licensee • Babine BCTS Manager • IFPA Manager | Annually starting January 31, 2006 |
|--|---------------------|--|------------------------------------|

Output for indicator reporting

This indicator will be reported in tabular format.

Indicator reporting will:

- make a notation as to general location (e.g. road name, section, etc.) of the structures assessed and their hazard rating.. This will allow analysis to identify effectiveness of best management practices.

References

Indicator 10: Percent of cut blocks harvested that are consistent with riparian management area commitments by licensee

Indicator Linkages:

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|--|
| <p>Resource: Recreation</p> <p>Value / Issue: Classified Angling Waters</p> <p>Resource: Watershed and Riparian</p> <p>Value / Issue: Fish Habitat - Riparian Management Rivers and Streams</p> <p>Value / Issue: Hydrology: Fulton and Morrison Watershed</p> <p>Value / Issue: Fish Habitat - Riparian Management Lakes</p> <p>Value / Issue: Trophy Rainbow Trout and Lake Trout Lakes</p> <p>Value / Issue: Zone A Morice River LRUP</p> <p>Value / Issue: Fish Habitat - Riparian Management Wetlands</p> <p>Value / Issue: Hydrology: Nadina Watershed</p> | <p>Criterion: 3 Water Quality and Quantity</p> <p>SFM Element: 2 Conserve water resources by maintaining water quality and quantity</p> <p>Value: 1 Productive capacity of water resources is conserved. (<i>conserve, quantity, quality, erosion, nutrient cycling, hydrologic changes.</i>)</p> <p>Objective: 1 Water quantity and quality are sustained through their characteristic range of variation, on the DFA through time.</p> |

Indicators [7](#), [10](#), [45](#), and [52](#) are closely related

Indicator Rationale

What does this indicator mean?

Riparian management areas (RMAs) occur adjacent to streams, rivers, lakes and wetlands and are characterized by high moisture and relatively dense vegetation and structure. They are generally very productive. Riparian management areas often support some of the highest concentrations of non-timber values in the forest. Functioning riparian management areas offer an array of benefits such as, contributing to water quality, regulating water flow, maintaining stream banks, regulating water temperature, and providing a diversity of habitats for fish, birds and animals. This indicator is intended to ensure that the riparian management area commitments made by Licensees are implemented on the ground.

How does this indicator relate to the M&L IFPA and to SFM?

The Morice and Lakes IFPA area contains many riparian management areas that provide a host of non-timber benefits as well as supplies of quality timber products. The ability of RMAs to provide a sustained source of benefits depends on maintaining these areas in a healthy and functioning condition.

Current Status and Forecasted Targets / Thresholds of Indicator

| Percent of cut blocks harvested that are consistent with riparian management area commitments by licensee | | | | |
|--|---------------------------|------------------------------|---------------------|--------------------------|
| Licensee | Current Status (%) | Forecasted Target (%) | Variance (%) | Achieve Target by |
| Canfor | 100% | 100% | 0 | Immediately |
| HFP | | 100% | 0 | Immediately |
| FLSM | | N/A | 0 | Immediately |
| BCTS | | 100% | 0 | Immediately |

Indicator Analysis Information**Strategy Practices, Methods, Assumptions and Criteria**

The Target will be achieved in the short term by using the current management practices for riparian management areas as specified in the Forest and Range Practices Act, Forest Planning and Practices Regulation and outlined in the each licensee's specific Forest Stewardship Plans. Alternative Riparian Management Practices that are consistent with the FSP Riparian results and strategies may be applied to individual riparian features in the site plan on a case-by-case basis.

In order to maintain riparian function for the long term, it is essential that forest harvesting in the RMA proceeds in a manner that maintains the functional integrity of the associated values within the RMA. To evaluate the effectiveness of this, the Fish/Riparian protocols outlined in the Forest and Range Evaluation Program (FREP) will be used where applicable. If deficiencies are noted in the existing riparian practices, the management practices will be modified to address the noted deficiencies. Additionally, the retention requirements specified in the management practices will consider the amount of RMA within each watershed that is less than 3m in height. This will help to ensure that the values associated with riparian management areas are maintained in those watersheds that are more heavily impacted by harvesting.

The following Watersheds currently have greater than 15% of their riparian areas below 3m in height (based on 2008 annual report).

BCTS

- Watershed 150-Morice River Group-3rd Order
- Watershed 70-Bulkley River Group-3rd Order

CANFOR

- Watershed 105-Bulkley River Group-5th Order
- Watershed 147-Francois Lake Group-4th Order
- Watershed 178-Francois Lake Group-5th Order
- Watershed 180-Francois Lake Group-4th Order
- Watershed 213-Upper Nechako Reservoir Group-3rd Order
- Watershed 28-Takla Lake Group-3rd Order
- Watershed 32-Takla Lake Group-3rd Order

- Watershed 36-Takla Lake Group-4th Order
- Watershed 50-Babine Lake Group-3rd Order
- Watershed 78-Bulkley River Group-7th Order
- Watershed 81-Bulkley River Group-3rd Order
- Watershed 8-Takla Lake Group-5th Order

HFP

- Watershed 180-Francois Lake Group-4th Order
- Watershed 188-Francois Lake Group-3rd Order
- Watershed 189-Francois Lake Group-3rd Order
- Watershed 190-Francois Lake Group-3rd Order
- Watershed 194-Francois Lake Group-3rd Order
- Watershed 218-Upper Nechako Reservoir Group-3rd Order

The current status results for watersheds having greater than 15% of their riparian areas below 3m in height will be at a minimum assessed and updated every 5 years.

Calculation of Indicator**Indicator Formula:**

$$\% \text{HARMC licensee} = \text{HARMC licensee} / \text{TAH licensee} * 100$$

Variables:

HARMC licensee: Harvested Area consistent with Riparian Management Commitments

TAH licensee: Total Area Harvested per annum

Analysis Comments / Discussion

Harvested Area consistent with Riparian Management Commitments: Specific strategies referenced for the riparian feature in the site plan.

Indicator Monitoring Plans**Inventories Needed to Monitor and Analyze Indicator**

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|-----------------------------------|---------------|---|---------------------------------|
| Site Plans of past year's harvest | Each Licensee | No | Annual |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--------------|--|----------------|--------------------------------|
| Procure data | Obtain Silviculture Prescription and site plan data | Licensees | Annually starting 2008 |
| Analyze data | Calculate percent of blocks consistent with riparian commitments | Licensees | Annually starting May 31, 2009 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Annually starting May 31, 2009 |
| | M&L IFPA SFM Report | IFPA Manager | Annually starting May 31, 2009 |

Proposed output for indicator reporting

This indicator will be reported in tabular format.

References

Forest and Range Practices Act, SBC 2002, c. 69

Forest Planning and Practices Regulation, B.C. Reg. 14/2004

Indicator 11: Percent area less than VEG by recreation class by licensee

Indicator Linkages:

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|---|--|
| <p>Resource: Recreation</p> <p>Value / Issue: Non - Commercial Recreation - Motorized Camping</p> <p>Value / Issue: Recreation Areas</p> <p>Value / Issue: Trails (High Value, existing)</p> <p>Value / Issue: Trails (Well-used, Existing)</p> <p>Value / Issue: Provincial Parks</p> <p>Value / Issue: Recreation Features</p> <p>Value / Issue: Backcountry lake recruitment</p> | <p>Criterion: 5 Multiple Benefits to Society</p> <p>SFM Element: 1 Timber and Non-Timber Benefits</p> <p>Value: 2 Recreational experiences are provided on the DFA.</p> <p>Objective: 1 A full range of recreational opportunities are provided on the DFA</p> |

Indicator Rationale

What does this indicator mean?

The general public is making greater use of recreation opportunities that are available on crown land. At the same time, public concerns are increasing as recreational opportunities overlap on areas supporting forest management activities. Concerns arise primarily because of visual and physical alterations to the landscape, noise, direct interaction with harvesting activities and removal of some areas from public access. The recreational experience is based on the degree of disturbance by forest management and the recreational expectations of the public. The degree to which areas recover from the impact of harvesting activities influences the quality of the recreation experience. The percentage of area within a recreational class failing to achieve Visually Effective Greenup (VEG) is deemed not to contribute fully to a specific recreational experience because of the visual remnants of harvesting (bare ground, stumps, disturbed soil, skid trails etc). The height of trees to achieve VEG will depend on slope. Generally greater tree height is required with increasing slope class. This indicator provides some measure of the extent to which the quality of the recreational experiences is being influenced.

How does this indicator relate to the M&L IFPA and to SFM?

The implied definition of sustainable forest management embraces the need for forest managers to manage for an array of non timber values that contribute to community well being. This indicator measures the proportion of managed areas that represent recreational value that have yet to attain VEG.

Current Status and Forecasted Targets / Thresholds of Indicator

| Percent area less than VEG by recreation class by licensee | | | | | |
|---|------------------------------|-----------------------|--------------------------|-----------------|--------------------------|
| Licensee | Recreation Class | Current Status | Forecasted Target | Variance | Achieve Target by |
| Canfor | Trails | 2.5 | <= 3.5% | 0 | Immediately |
| | Recreation Features | 2 | <= 4 | 0 | Immediately |
| | Backcountry Lake Recruitment | .8 | <= 3 | 0 | Immediately |
| HFP | Trails | 1.4 | <= 3.5% | 0 | Immediately |
| | Recreation Features | 1.2 | <= 4 | 0 | Immediately |
| | Backcountry Lake Recruitment | .3 | <= 3 | 0 | Immediately |
| BCTS | Trails | 1.6 | <= 3.5% | 0 | Immediately |
| | Recreation Features | 1.6 | <= 4 | 0 | Immediately |
| | Backcountry Lake Recruitment | .2 | <= 3 | 0 | Immediately |

Trails: Targets are based on Decision Scenario Outputs.

Recreation Features: Targets are based on Decision Scenario Outputs. West Fraser and Houston Forest Products will be combining their Defined Forest Areas in later versions of the SFM Plan.

Backcountry Lake Recruitment: Targets are based on Decision Scenario Outputs.

Rationale for variance:

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria |
|---|
| <p>The strategies are based on the Decision Scenario forecast across a 250 yr planning horizon as forecast using the Tesera Scheduling Model (TSM). The block design generated by TSM will be considered when developing future harvest proposals.</p> <p>The Plan Proponents will implement Recreation Management strategies identified in section 2.3.5 & 2.4.7 of the Morice LRMP to achieve the targets for this indicator.</p> |

Calculation of Indicator

Formula:

$$\%ALTVEG_{Rec. Class, licensee} = (ALTVEG_{Rec. Class, licensee} / TA_{Rec. Class, licensee}) \times 100$$

Variables:

%ALTVEG_{Rec. Class, licensee}: Percent area less than VEG by recreation class by licensee

ALTVEG_{Rec. class, licensee}: Area less than VEG by recreation class by licensee

TA_{Rec. class, licensee}: Total area by recreation class by licensee

Analysis Comments / Discussion

Recreation classes for this indicator (as defined by SPT):

- Trails
 - Recreation Features (Based on LRMP Inventory) including:
 - **LRMP summer non-motorized** (Grease Trail, Tsitsutl Mountain, Barrett Hat, Telkwa Mountains Area (Grizzly Plateau area), Telkwa Mountains Area Burnie South - Morice Range, Nanika - Kidprice, Kasalka, Whitesail South areas)**
 - **LRMP Winter non-motorized** (Little Whitesail area)**
 - **LRMP non-motorized** (Crow Bar Ski area, Morice Mtn - Silverthorne Lake, Telkwa Mountains Area, (Core recovery area) Telkwa Mountains Area Owen Lookout, Burnie North, Atna River, Nadina Mountain areas)**
 - **LRMP Motorized** (Sibola, Tahtsa areas)**
- **for the LRMP areas see the Morice LRMP for more information
http://srmwww.gov.bc.ca/ske/lrmp/morice/docs/Morice_LRMP_Consensus_Draft_March_26.pdf
- Backcountry Lake Recruitment

The Morice Scenario Planning Team defined these recreation classes and the assumptions can be found on the Morice and Lakes IFPA Website (<http://www.moricelakes-ifpa.com>).

Recreation features categorized as “A0” (provincially significant recreation features), are excluded from the THLB.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|---|-------------------------------|---|---------------------------------|
| VRI | ILMB | Yes | Use most current version |
| LRMP Recreation Features Inventory | ILMB | Yes | Use most current version |
| Recreation Inventory | ILMB | Yes | Use most current version |
| Silviculture database (harvesting data) | Licensees | Yes | Annual |
| Digital Elevation Model (DEM) | ILMB (augmented by licensees) | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|-----------------|--|------------------------|--|
| Procure data | Generate harvesting overlays and establishment information | Tweedsmuir Forest Ltd. | Annually starting 2003 |
| | Obtain Recreation Features information over DFA. | Tweedsmuir Forest Ltd. | Every 5 years starting 2003 (using 2001 forest cover data) |
| Analysis | Analyze data by licensee | Tweedsmuir Forest Ltd. | Annually starting 2003 using harvest database information |
| | Project VRI for tree heights | Tweedsmuir Forest Ltd. | Every 5 years starting 2003 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Annually starting May 31, 2004 using harvest database information Every 5 years starting May 31, 2004 using VRI (reconciled with harvesting data) |
| | M&L IFPA SFM Report | IFPA Manager | Annually starting May 31, 2004 using harvest database information Every 5 years starting 2004 using VRI (reconciled with harvesting data) |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Indicator 12: Percentage of Blocks and Roads Harvested Annually by Licensee that are Consistent with the Visual Quality Objective (VQO)

Indicator Linkages

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|--|
| <p>Resource: Visual</p> <p>Value / Issue: Babine Lake</p> <p>Value / Issue: Commercial Recreation - Fishing Lakes With Cabins</p> <p>Value / Issue: Commercial Recreation - Fishing Lakes With Lodges</p> <p>Value / Issue: Currently Unclassified Visual Quality Objective Areas</p> <p>Value / Issue: Gordeau Lake</p> <p>Value / Issue: Morice Lake</p> <p>Value / Issue: Morice River VQO "PR"</p> <p>Value / Issue: Owen Lake</p> <p>Value / Issue: Parrott Lakes</p> <p>Value / Issue: Visual Quality Objective "M" & "MM"</p> <p>Value / Issue: Visual Quality Objective "P" & "R"</p> <p>Value / Issue: Visual Quality Objective "PR"</p> | <p>Criterion: 5 Multiple Benefits to Society</p> <p>SFM Element: 1 Timber and Non-Timber Benefits</p> <p>Value: 2 A variety of recreational experiences are provided on the DFA.</p> <p>Objective: 1 A full range of recreation opportunities are provided on the DFA.</p> |

Indicator Rationale

What does this indicator mean?

Public concerns are increasing with regards to visual quality since forest management has the potential to alter the visual landscape. The impact on visual quality resulting from forest management is based on the rate and scale of disturbance. The rate at which areas recover from the impact of disturbance influences the visual quality. Visual Quality Objectives (VQOs) are set in scenic areas with high visual values. These objectives establish a level of acceptable forest landscape alteration based on the characteristics and value of the landscape for visual resources. The five categories of VQOs recognized and managed for in an altered forest landscape in British Columbia are as follows³:

- 1.) **Preservation** - consisting of an altered forest landscape in which the alteration, when assessed from a significant public viewpoint, is very small in scale, and not easily distinguishable from the pre-harvest landscape.

³ Forest Planning and Practices Regulation, B.C. Reg. 14/2004.

- 2.) **Retention** - consisting of an altered forest landscape in which the alteration, when assessed from a significant public viewpoint, is difficult to see, small in scale, and natural in appearance;
- 3.) **Partial Retention** - consisting of an altered forest landscape in which the alteration, when assessed from a significant viewpoint, is easy to see, small to medium in scale, and natural and not rectilinear or geometric in shape
- 4.) **Modification** - consisting of an altered forest landscape in which the alteration, when assessed from a significant public viewpoint, is very easy to see, and is large in scale and natural in its appearance, or small to medium in scale but with some angular characteristics;
- 5.) **Maximum Modification** - consisting of an altered forest landscape in which the alteration, when assessed from a significant public viewpoint, is very easy to see, and is very large in scale, rectilinear and geometric in shape, or both.

When a block or road is proposed within a known scenic area having an established VQO, they are planned, designed and assessed for consistency with the applicable category for an altered forest landscape both prior to and after harvest. Blocks and roads are designed in a manner so that when viewed from a significant public viewpoint they are consistent with the qualitative appearance associated with the applicable category for an altered forest landscape. As such the intent of this indicator is to ensure that blocks and roads are assessed to be consistent with the VQO category using a variety of tools .

Visual analysis techniques could include but are not limited to on the ground assessment from a significant public viewpoint, or sightline analysis and planimetric or perspective visual simulation from a significant public viewpoint. Methods such as those outlined in the Forest Resources Evaluation Program document Procedures for Effectiveness Evaluation of Visual Quality Management will be one tool used to assist in evaluating the consistency of harvested areas in meeting the established visual quality objective. This will also serve as a tool to help assess the effectiveness of visual analysis techniques in providing appropriate block and road design considerations prior to harvest.

How does this indicator relate to the M&L IFPA and to SFM?

Sustainable forest management embraces the need for forest managers to manage for a variety of non timber values that contribute to personal and community well being. This indicator represents the proportion of managed areas within a known scenic area having an established visual quality objective that are consistent with these objectives.

Current Status and Forecasted Targets/Thresholds of Indicator

| Percentage of Blocks and Roads Harvested by Licensee that are Consistent with the Visual Quality Objective (VQO) | | | | |
|--|----------------------------|-----------------------|----------|-------------------|
| Licensee | Current Status (%) 2007 | Forecasted Target (%) | Variance | Achieve Target by |
| BCTS | | 100% | 0% | Immediately |
| Canfor | 5/5 (100%) | 100% | 0% | Immediately |
| HFP | | 100% | 0% | Immediately |

Indicator Analysis Information

Strategy Practices, Methods, Assumptions and Criteria

Timber harvest has been spatially modeled and subsequently scheduled throughout the planning horizon. Scenic areas exist on the Morice TSA. VQOs are currently being managed according to results and strategies in approved Forest Stewardship Plans and associated Forest and Range Practices Act requirements.

Visual design analysis will be conducted from significant public viewpoints when planning roads and cut blocks in Visual Quality Objective (VQO) polygons in established scenic areas. Design concepts and principles such as those outlined in the Visual Landscape Design Training Manual will be used when planning the shape of harvest openings and road construction to ensure that prior to harvest, blocks and roads are consistent with the applicable category for a visually altered landscape within the scenic area where they are located. Effectiveness evaluation will be conducted to determine that harvested units are consistent with the objectives.

Calculation of Indicator

Formula:

%Roads & Blocks Harvested Consistent with VQO by Licensee by VQO =

(# Blocks & Roads Consistent with Category of Altered Forest Landscape for VQO by Licensee by VQO / **Total Number of Blocks & Roads where VQO Applies** by Licensee by VQO) x 100

Variables:

%Blocks & Roads Harvested Consistent with VQO by Licensee by VQO: Percent of blocks and/or roads by licensee by Visual Quality Objective that are consistent with the visual analysis and the applicable visual quality objective category for an altered forest landscape.

Blocks & Roads Consistent with Category of Altered Forest Landscape for VQO by Licensee by VQO: Number of blocks and/or roads by licensee by visual quality objective harvested during the reporting period under the authority of an approved FSP that are consistent with the visual analysis results and the applicable visual quality objective category for an altered forest landscape.

Total Number of Blocks & Roads where VQO Applies by Licensee by VQO: Total number of blocks and/or roads by licensee by visual quality objective harvested during the reporting period under the authority of an approved FSP area.

Analysis Comments / Discussion

Targets were not set for areas:

- Where the scenic area was located in a proposed protected area or no harvest zone from the Morice LRMP Recommendations Report March 2004

Definitions:

- Preservation = P
- Retention = R

- Partial Retention = PR
- Modification = M
- Maximum Modification = MM

Altered Forest Landscape: means forest landscape that is viewable from a significant public viewpoint, contains cutblocks or roads, and is in one of the categories prescribed under section 1.1 of the FPPR.

Visual Quality Objective: means an objective continued, in respect of a scenic area, under section 181 of the Act, an objective established for a scenic area under the Government Actions Regulation, or a visual quality class continued, for a scenic area, under section 17 of the Government Actions Regulation.

Alteration Area: Only applies to bare ground. Exposed tree trunks, areas that have achieved visually effective green-up, and natural non-green areas (such as mountain tops and rock out crops) are excluded from the alteration measurement.

Scenic Area: means a scenic area continued under section 180 (c) (grandparenting specified designations) of the Act, or established under the Government Actions Regulation.

It is intended that all blocks and roads harvested during a given reporting period that are located within a scenic area with a legally established visual quality objective will be assessed for consistency with the visual analysis and ultimately the applicable category of a visually altered landscape. Consistency will be assessed by utilizing visual analysis to determine if the block and/or road when viewed from one or more significant public viewpoints is consistent with the applicable category of a visually altered forest landscape.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|---|-------------------------------|---|---------------------------------|
| Visual Landscape Inventory (VQO) | ILMB | Yes | Use most current version |
| VRI | ILMB | Yes | Use most current version |
| Silviculture database (harvesting data) | Licensees | Yes | Annual |
| Digital Elevation Model (DEM) | ILMB (augmented by licensees) | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|-----------------|---|-----------------------|---------------------------------|
| Procure Data | Generate harvesting overlays and establishment information. Obtain visual analysis information. | Licensees | Annually starting 2008 |
| Analysis | Determine percentage of blocks harvested annually consistent with VQO. | Licensees | Annually starting May 31, 2009 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Annually starting May 31, 2009 |

| | | | |
|--|---------------------|--------------|--------------------------------|
| | M&L IFPA SFM Report | IFPA Manager | Annually starting May 31, 2009 |
|--|---------------------|--------------|--------------------------------|

Output for indicator reporting

Tables will be prepared by licensee that denote VQOs and the percentage of blocks and roads that have been harvested during the reporting period within VQO's that are consistent with the applicable VQO category for an altered forest landscape

References

Anon. 2005. Procedures for Factoring Visual Resources into Timber Supply Analyses Page 9
<http://www.for.gov.bc.ca/hfp/PUBS/Visual/TSR10.pdf>

Anon. 2003. Bulletin – Modelling Visuals in TSR III December 2003

Anon. 1981. Forest Landscape Handbook. Province of British Columbia, Ministry of Forests. Information Services Branch. BC. 97p.

Jacques. 2005. Procedures for Effectiveness Evaluation of Visual Quality Management. Province of British Columbia, Ministry of Forests. Forest Stewardship.

Indicator 13: Percent area in suitable forage opportunity class by LU by licensee

Indicator Linkages

| M&L IFPA Framework | CSA/CCFM SFM Framework |
|--|--|
| Resource: Agriculture Value/Issue: Range Tenure Enhancement and Expansion | Criterion: 5. Multiple Benefits to Society Critical Element: 1. Timber and Non-Timber Benefits Value: 1. A balanced supply and variety of timber and non-timber products, services and benefits on the DFA Objective: 3. A variety of agricultural products are provided from the DFA |

Indicator Rationale

What does this indicator mean?

This indicator tracks the proportion of area that is classified as suitable forage opportunity within Landscape Units (LU) on the Morice TSA.

How does this indicator relate to the M&L IFPA and to SFM?

Range related activities are one of the long standing non-timber values that exist within portions of the TSA. Certain areas within the TSA offer potential range opportunities. Given that a balance must exist between the different timber and non-timber resources, it is important to carefully balance areas which have multiple uses and values associated with them. One of the intentions within the ML-IFPA "Agriculture" Resource Value is to enhance existing range tenure and expand range tenure by examining areas which are classified as areas with "suitable forage opportunity". The enhancement and the potential expansion of range areas through planning and developing range opportunities help to maintain the economic diversity of the area while also preserving a well-established and long standing livelihood on the Morice TSA.

Current Status and Forecasted Targets/Thresholds of Indicator

| % area in suitable forage opportunity class by LU | | | | | | |
|---|--|----------------|----------------|----------|----------|----------------|
| Licensee | | Landscape Unit | Current Status | Target | Variance | Achieve Target |
| Canfor | | Buck | 0.1% | >= 0.1% | 0 | Immediately |
| | | Fulton | 0.4% | >= 0.2% | 0 | Immediately |
| | | Gosnel | 0.3% | >= 0.15% | 0 | Immediately |

| | | | | | | |
|------|--|--------------------|-------|---------------|---|-------------|
| | | Granisle | 0.01% | $\geq 0.01\%$ | 0 | Immediately |
| | | Houston - Tommy | 1.7% | $\geq 2.2\%$ | 0 | Period 5 |
| | | Kidprice | 1.0% | $\geq 0.7\%$ | 0 | Immediately |
| | | Morice Lake | 1.9% | $\geq 0.5\%$ | 0 | Immediately |
| | | Morrison | 0.2% | $\geq 1.9\%$ | 0 | Period 5 |
| | | Nadina | 0.4% | $\geq 0.6\%$ | 0 | Period 5 |
| | | North Babine | 3.7% | $\geq 0.9\%$ | 0 | Immediately |
| | | Parrotts | 3.0% | $\geq 0.68\%$ | 0 | Immediately |
| | | Tahtsa | 1.2% | $\geq 1.3\%$ | 0 | Period 5 |
| | | Thautil | 2.5% | $\geq 2.5\%$ | 0 | Immediately |
| | | Tochcha - Natowite | 0.16% | $\geq 0.15\%$ | 0 | Immediately |
| | | Topley | 0% | $\geq 0.37\%$ | 0 | Period 5 |
| | | Valley | 2.1% | $\geq 1.0\%$ | 0 | Immediately |
| HFP | | Buck | 0.1% | $\geq 0.1\%$ | 0 | Immediately |
| | | Fulton | 1.2% | $\geq 0.3\%$ | 0 | Immediately |
| | | Gosnel | 0.1% | $\geq 0.1\%$ | 0 | Immediately |
| | | Granisle | 0.28% | $\geq 0.02\%$ | 0 | Immediately |
| | | Houston - Tommy | 0.1% | $\geq 0.1\%$ | 0 | Immediately |
| | | Kidprice | 0.1% | $\geq 0.1\%$ | 0 | Immediately |
| | | Morrison | 0.43% | $\geq 0.25\%$ | 0 | Immediately |
| | | Nadina | 0.85% | $\geq 0.59\%$ | 0 | Immediately |
| | | Owen | 0.07% | $\geq 0.02\%$ | 0 | Immediately |
| | | Sibola | 0.1% | $\geq 0.1\%$ | 0 | Immediately |
| | | Tahtsa | 1.4% | $\geq 6.0\%$ | 0 | Period 5 |
| | | Thautil | 0.46% | $\geq 2.5\%$ | 0 | Period 5 |
| | | Troitsa | 0.1% | $\geq 0.1\%$ | 0 | Immediately |
| | | Whitesail | 0.47% | $\geq 0.2\%$ | 0 | Immediately |
| BCTS | | Buck | 0.26% | $\geq 0.26\%$ | 0 | Immediately |
| | | Fulton | 1.0% | $\geq 0.11\%$ | 0 | Immediately |
| | | Houston - Tommy | 1.4% | $\geq 1.0\%$ | 0 | Immediately |
| | | Kidprice | 1.6% | $\geq 0.1\%$ | 0 | Immediately |
| | | Morice Lake | 0.3% | $\geq 0.05\%$ | 0 | Immediately |
| | | Nadina | 1.7% | $\geq 0.1\%$ | 0 | Immediately |

| | | | | | | |
|--|--|----------|-------|----------|---|-------------|
| | | Owen | 0.43% | >= 0.23% | 0 | Immediately |
| | | Parrotts | 0.28% | >= 0.28% | 0 | Immediately |
| | | Valley | 0.8% | >= 1.8% | 0 | Immediately |

Note: Targets are based on Decision Scenario strategies and reflect the accelerated harvest to address the Mountain Pine Beetle situation. Suitable forage opportunity is based on the criteria defined in the analysis assumptions.

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria |
|---|
| The strategies are based on the Decision Scenario forecast across a 250 yr planning horizon as forecast using the Tesera Scheduling Model (TSM). The block design generated by TSM will be considered when developing future harvest proposals. |

Calculation of Indicator

Formula:

$$\%SFO_{LU, Licensee} = (A_{SFO, LU, licensee} / A_{LU, licensee}) \times 100$$

Variables:

%SFO_{licensee} : % area in suitable forage opportunity class by Landscape Unit by licensee.

A_{SFO, Range class/ALR, LU, licensee} : area in suitable forage opportunity class by LU, by licensee.

A_{Range class/ALR, LU, licensee} : area by LU by licensee.

Analysis Comments/Discussion

Forage opportunity criteria was provided by the Agriculture Sector representatives on the Morice Public Advisory Group.

Forage opportunity criteria are defined as:

“Forage Opportunity”: South Aspect (SW&SE), Slope <50%, Crown Closure <40%, SBS dk or SBS mc. Net out the LRMP Protected Areas and all of the Area-specific “No Harvest” Zones in the LRMP except Swan Lake.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|--------------|--------|--|------------------------|
| Forest cover | ILMB | Yes | Annually |
| TRIM | ILMB | No | Annually |
| BEC | ILMB | No | Annually |

| | | | |
|-----------------------|--------------------------|------------------|--------------------|
| Landscape Units | ILMB | If changes occur | When changes occur |
| Silviculture database | Licensee and Babine BCTS | Yes | Annually |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|---|---|------------------------|---------------------------------|
| Obtain necessary information from data custodian (ILMB) | Review data determine if updates have occurred | Tweedsmuir Forest Ltd. | Annually, starting 2003 |
| Analysis | Determine Suitable Forage Class Information by LU by licensee | Tweedsmuir Forest Ltd. | Annually, starting May 31, 2003 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes (review updated data only) | Tweedsmuir Forest Ltd. | Annually, starting May 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Annually, starting May 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Indicator 14: Percent area of the THLB and non-contributing forest by beetle hazard type (extreme and high) by licensee

Indicator Linkages:

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|--|
| <p>Resource: Timber</p> <p>Value / issue: Bark beetles</p> | <p>Criterion: 2. Maintenance and Enhancement of Forest ecosystem Condition and Productivity</p> <p>SFM Element: 1. Forest Disturbance and Stress</p> <p>Value: 1. Bark beetles</p> <p>Objective: 1. Forest ecosystems resilient to disturbances and stresses. (<i>abiotic, stress</i>)</p> |

Indicators 14 and [26](#) are closely related

Indicator Rationale

What does this indicator mean?

This indicator relates to acknowledging the growing threat and dynamics that beetle infestations present to forest management in the Morice TSA (i.e. current and future). Developing a plan of action requires that the hazards and risks of beetle infestations be understood. In addition to the proportion of the timber harvesting land base (THLB) in high and extreme hazard condition, the proportion of non-contributing forest within the DFA in high and extreme hazard condition is of particular importance. Such areas can continue to provide a source for infestation unless they are managed in conjunction with the THLB.

How does this indicator relate to the M&L IFPA and to SFM?

The short to medium term sustainability of the M&L IFPA is to be related to management plans to address the timber losses attributable to the current beetle infestation. This indicator also acts as a long term measure to reduce the impact to susceptible stands. In addition to addressing the loss of timber, it will be important to manage the forests on a landscape level to replace infested and susceptible stands. The rapidity with which renewal occurs will contribute to securing growing stock and other values for the new forest.

Current Status and Forecasted Targets/Thresholds of Indicator

| Percent area of the THLB and non-contributing forest by beetle hazard type (extreme and high) by licensee | | | | | | | | | |
|--|-----------------------|----------------|---------------|----------------|--------------------|-------------|-------------------|-------------|-------------|
| Licensee | Forest Classification | Beetle Species | Beetle Hazard | Current Status | Forecasted Target* | Variance | Achieve Target by | | |
| Canfor | THLB | MPB | Extreme | 13.5% | <= 10 | 0 | Period 4 | | |
| | | | High | 7.4 % | <= 6 | 0 | Period 2 | | |
| | | | | Pine Young | 11.8 | <=16 | 0 | Immediately | |
| | | | | SBB | Extreme | 10.0 % | <= 5 | 0 | Period 9 |
| | | | | High | 7.0 % | <= 5 | 0 | Period 8 | |
| | | | | WBBB | Extreme | 0.8 | <= 1 | 0 | Immediately |
| | | | High | 16.4% | <= 10 | 0 | Period 13 | | |
| | | | NCF | MPB | Extreme | 5% | N/A | | |
| | HFP | THLB | | High | 6% | N/A | | | |
| | | | | Pine Young | 10.7% | N/A | | | |
| | | | | SBB | Extreme | 5% | N/A | | |
| | | | | | High | 6% | N/A | | |
| | | | | WBBB | Extreme | 0% | N/A | | |
| | | | | | High | 44% | N/A | | |
| NCF | | MPB | Extreme | 13 % | <= 10 | 0 | Period 4 | | |
| | | | High | 8 % | <= 6 | 0 | Period 3 | | |
| | | Pine Young | 14.3% | <=17 | 0 | Immediately | | | |
| | | SBB | Extreme | 9.4 % | <= 6 | 0 | Period 8 | | |
| | | High | 6.1 % | <= 4 | 0 | Period 8 | | | |
| | | WBBB | Extreme | 0.8 | <= 1.3 | 0 | Immediately | | |
| | | High | 18.3% | <= 15 | 0 | Period 12 | | | |
| | | NCF | MPB | Extreme | 4% | N/A | | | |
| | | High | 11% | N/A | | | | | |
| | | Pine Young | 10% | N/A | | | | | |
| | | SBB | Extreme | 5% | N/A | | | | |
| | | High | 5.2% | N/A | | | | | |
| | | WBBB | Extreme | 0.3% | N/A | | | | |
| | | High | 46% | N/A | | | | | |

| | | | | | | | |
|------|------|------|------------|--------|---------|------|-------------|
| FLSM | THLB | MPB | Extreme | 19.1 % | <= 10% | 0 | Period 3 |
| | | | High | 6.9 % | <= 6% | 0 | Period 1 |
| | | | Pine Young | 17.6% | <=17.6% | 0 | Immediately |
| | | SBB | Extreme | 1.9 % | <= 1% | 0 | Period 9 |
| | | | High | 6.8 % | <= 4% | 0 | Period 8 |
| | | WBBB | Extreme | 0.1 % | N/A | 0 | |
| | | | High | 14% | <= 10% | 0 | Period 10 |
| | NCF | MPB | Extreme | 11% | N/A | | |
| | | | High | 9.5% | N/A | | |
| | | | Pine Young | 17.6% | N/A | | |
| | | SBB | Extreme | 2.5% | N/A | | |
| | | | High | 11% | N/A | | |
| | | WBBB | Extreme | 0% | N/A | | |
| | | | High | 39% | N/A | | |
| BCTS | THLB | MPB | Extreme | 7.4% | <= 10% | 0 | Period 6 |
| | | | High | 6.5% | <= 7% | + 4% | Immediately |
| | | | Pine Young | 24.4% | <=14 | 0 | Immediately |
| | | SBB | Extreme | 5.3% | <= 8% | | Immediately |
| | | | High | 8.6% | <= 7% | 0 | Period 16 |
| | | WBBB | Extreme | 0.1% | <= 1 % | 0 | Immediately |
| | | | High | 10% | <= 10% | 0 | Immediately |
| | NCF | MPB | Extreme | 5% | N/A | | |
| | | | High | 4% | N/A | | |
| | | | Pine Young | 17.7% | N/A | | |
| | | SBB | Extreme | 4% | N/A | | |
| | | | High | 6.7% | N/A | | |
| | | WBBB | Extreme | 0% | N/A | | |
| | | | High | 12.5% | N/A | | |

Note: A map-based spatial forecast of this indicator is available for viewing online at the Morice & Lakes IFPA Data Review Site (<http://tao.tesera.com:81/website/>).

THLB: timber harvesting land base

NCF: Non-contributing forest

MPB: Mountain Pine Beetle

SBB: Spruce Bark Beetle

WBBB: Western Balsam Bark Beetle

Rationale for variance:

BCTS THLB MPB High – Variance to account for aging of younger stands into the High MPB hazard class.

Indicator Analysis Information**Strategy Practices, Methods, Assumptions and Criteria**

The target will be achieved by implementing the harvest rules contained in TSR2 which state that extreme and high hazard pine and spruce stands will be harvested first. Other land-based constraints may delay the achievement of the targets

The block design generated by Tesera Scheduling Model (TSM) will be considered when developing future harvest proposals. Model outputs are based on Base Case forecast across a 250 yr planning horizon.

The Morice District Bark Beetle Strategy will be utilized to further reduce the amount of susceptible timber. Assumptions are listed in the Morice District Bark Beetle Strategy.

Calculation of Indicator**Formula:**

$$\%A_{\text{species, hazard class, THLB/NCF, licensee}} = (A_{\text{species, hazard class, THLB/NCF, licensee}} / TA_{\text{THLB/NCF, licensee}}) \times 100$$

Variables:

$\%A_{\text{species, hazard class, THLB/NCF}}$: % area = area by beetle species in hazard class (extreme or high) in THLB or NCF by licensee / total area in the THLB or NCF by licensee

$A_{\text{species, hazard class, THLB/NCF, licensee}}$: Area by beetle species in hazard class (high or extreme) in THLB or NCF by licensee

$TA_{\text{THLB/NCF, licensee}}$: Total area in THLB or NCF by licensee

Analysis Comments / Discussion

Morice District Bark Beetle Hazard Rating (for extreme and high hazard ratings)

| Beetle Species | Hazard Rating | Criteria |
|----------------------|---------------|---|
| Mountain Pine Beetle | Extreme | Pine leading species Age class 7,8,9 Site Index \geq 16 |
| | High | Pine leading species |

| | | |
|----------------------------|------------|--|
| | | Age class 7,8,9 Site Index < 16 |
| | Pine Young | Pine leading species Age class 4,5,6 Site Index - All |
| Spruce Bark Beetle | Extreme | Spruce leading species Age class 7,8,9 Site Index ≥ 15 |
| | High | Spruce leading species Age class 7,8,9 Site Index < 15 |
| Western Balsam Bark Beetle | Extreme | Balsam leading species Age class 7,8,9 Site Index ≥ 15 |
| | High | Balsam leading species Age class 7,8,9 Site Index < 15 |

(source: Morice Bark Beetle Strategy, June 2001)

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|--|----------------|---|---------------------------------|
| VRI (forest cover) | ILMB | Yes | use most current version |
| Silviculture data (harvesting data) | Licensees | Yes | annually |
| Morice TSA Bark Beetle Hazard Criteria | MoF, Licensees | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|-----------------|---|------------------------|--|
| Procure data | Obtain and update inventories | Tweedsmuir Forest Ltd. | Every 5 years starting 2003 (using 2001 forest cover data) |
| Data analysis | Inventory projection (VRI) | Tweedsmuir Forest Ltd. | Every 5 years starting 2004 |
| | Re-assess beetle hazard using projected VRI | Tweedsmuir Forest Ltd. | Every 5 years starting 2004 |

| | | | |
|--------|--|--------------|-------------------------------------|
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Every 5 years starting May 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Every 5 years starting May 31, 2004 |

Output for indicator reporting

This indicator will be reported out with a combination of maps illustrating the stands classified according to the rating system and tables denoting the area of the respective ratings and associated stand volumes.

References

Morice Bark Beetle Strategy (June 2001). BC Ministry of Forests.

Indicator 15: Percent area retained in WTR by Licensee Annually

Indicator Linkages:

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|---|
| <p>Resource: Landscape and Stand Level Biodiversity</p> <p>Value / Issue: Wildlife Trees & Wildlife Tree Patches</p> <p>Value / Issue: Habitat Element – Snags</p> <p>Value / Issue: Habitat Element – Large Live Trees</p> <p>Value / Issue: Habitat Element – CWD</p> | <p>Criterion: 2 Maintenance and Enhancement of Forest Ecosystem Condition and Productivity</p> <p>SFM Element: 2 Forest Ecosystem Productivity</p> <p>Value: Ecosystem and biological productivity is conserved on the DFA.</p> <p>Objective: Sustainable rates of ecosystem and biological productivity.</p> |

Indicator Rationale

What does this indicator mean?

This indicator will track the proportion of gross cut block area harvested annually retained as wildlife tree retention (WTR) by forest licensee. WTR provides important stand level biodiversity attributes such as vertical structure, snags, large trees and coarse woody debris (CWD) for future stands. Provincial legislation and policy requires that stand level retention - be included in site level plans. The recently completed Morice Land and Resource Management Plan Final Land use Recommendation (MLRMP) also contain measures for the retention of mature and old forest within harvested patches. Tracking the proportion of WTR in the Morice TSA will provide an indicator that can be used as a surrogate for explicit tracking of the wildlife habitat elements for snags, large live trees and CWD.

How does this indicator relate to the M&L IFPA and to SFM?

Sustainable forest management requires that biological processes of the ecosystems are functioning. While the degree to which they may function is modulated by harvesting, their resiliency is assumed through the presence of their components through time.

This indicator relies on the proposition that WTR is a continuum of residual forest structure that provides a broad range of habitats (i.e. source of food, physical and thermal protection) for a broad range of species. By ensuring representative elements are present across the landscape through time, it can be assumed that ecosystems are being sustained and biological productivity is maintained.

Current Status and Forecasted Targets / Thresholds of Indicator

| Percent area retained in WTR by Licensee Annually | | | | |
|---|-----------------------|--------|----------|-------------------|
| Licensee | Current Status (2006) | Target | Variance | Achieve Target By |
| BCTS | | >= 7% | 0% | Immediately |
| CANFOR | 17.7% | >= 7% | | Immediately |
| HFP | | >= 7% | | Immediately |

Indicator Analysis Information

Strategy Practices, Methods, Assumptions and Criteria

The targets will be achieved by retaining Wildlife Trees (WT's) and Wildlife Tree Patches (WTP's) in harvest areas. This will be accomplished operationally and by retaining patches identified in stand level plans. WTR will have structural attributes consistent with those described in the Biodiversity Guidebook and the Provincial Policy and Management Recommendations Feb. 2000.ⁱ to guide the delineation of WTR's within harvested areas. until best management practices are developed and targets are refined for stand level structural retentionⁱⁱ.

Licensees will properly characterize WTR retention, calculating proportion in Riparian Reserve Zones (RRZ), patches, and single trees. during field audits.

For large patches >250 ha, additional retention over and above the target will be delineated for delayed harvest later in the rotation.ⁱⁱⁱ

For areas with retention above the target plus the variance. lower levels of retention will be prescribed in harvest areas so that retention levels will move toward the target over time.

Blocks < 3.0 will be included in adjacent harvest openings over time and their area will be used in calculating the retention requirements for the aggregate opening.

Calculation of Indicator

Formula: $\%WTR_{Licensee} = (WTR_{Licensee} / TAH_{Licensee}) / 100$

Variables:

%WTR: percent area in wildlife tree retention relative to the total area harvested annually

WTR: area in wildlife tree retention

TAH_{LU, BEC, licensee}: Total Area of cut blocks harvested annually by licensee

Analysis Comments / Discussion

The proportion of WTRs maintained on the landscape will be an important operational and modeling requirement to help maintain stand level attributes such as snags, large live trees and CWD. Within the scheduling model, WTRs will be maintained and tracked as a proportion of a harvested cutblock rather than as a discrete polygon.

Operationally, WTRs will be tracked through silviculture prescriptions, site plans and operational mapping. Periodic review of the model, operational values and development of tools to measure functional attributes will be required.

The Biodiversity Guidebook (Anon. 1995):

Current status is calculated on an annual bases by adding the gross cut block area of all cut blocks that have harvesting completed each year and the total area of WTR associated with those cut blocks. A year is defined as the 12 month period from April 1 to March 31 and corresponds to the government requirements for reporting harvesting activities.. The targets were based on the practice requirement in the Forest Practices and Planning Regulation section 66(1)

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|----------------------|----------|--|--------------------------|
| Results submissions. | Licensee | Yes | Annual |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--------------|--|----------------|--------------------------------|
| Procure data | Copy results submission data. | Licensees | Annually starting 2007 |
| Analyze data | Calculate percent areas in WTR for cut blocks harvested annually. | Licensees | Annually starting 2007 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Annually starting May 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Annually starting May 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

- Anon. 2004. Ministry of Sustainable Resource Management Order Establishing Landscape Units and Old Growth Objectives. June 30th, 2004
- Anon. 2004a. Morice Land and Resource Management Plan (Page 119, Table 18)
- Anon. 1995. Biodiversity Guidebook. Forest Practices Code of British Columbia. Government of British Columbia, Victoria, BC. 99p.

Indicator 17: Percent forest in each patch type by patch size class by BEC Variant by licensee

Indicator Linkages:

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|---|
| <p>Resource: Landscape and Stand Level Biodiversity</p> <p>Value / Issue: Patch size targets</p> | <p>Criterion: 1. Conservation of Biological Diversity</p> <p>SFM Element: 1. Ecosystem Diversity</p> <p>Value: 1. The range of functions, interactions and processes that occur naturally within and between ecosystems on the DFA</p> <p>Objective: 1. Functions, interactions and processes that occur naturally within and between ecosystems on the DFA will fluctuate within a (<i>natural, socially</i>) acceptable range of variation over time.</p> <p>SFM Element: 3. Genetic Diversity</p> <p>Value: 1. The opportunity for individuals within sub-species and species to move and interact within their natural range in and across the DFA.</p> <p>Objective: 1. Habitats for species present on the DFA are functionally connected over a range of spatial and temporal scales.</p> <p>Criterion: 2 Maintenance and Enhancement of Forest Ecosystem Condition and Productivity</p> <p>SFM Element: 1. Forest Ecosystem Resilience</p> <p>Value: 1. Healthy, productive forests that support ecosystem conditions and processes</p> <p>Objective: 1. Forest ecosystems resilient to disturbances and stresses</p> <p>SFM Element: 2. Forest Ecosystem Productivity</p> <p>Value: 1. Ecosystem and biological productivity is conserved on the DFA</p> <p>Objective: 1. Sustainable rates of ecosystem and biological productivity</p> |

Indicators 17 and [32](#) are closely related.

Indicator Rationale

What does this indicator mean?

This indicator will track the percentage of the forest land base in each patch type by patch size class by Biological Ecosystem Classification (BEC) variant by licensee. When used in the design of landscape patterns, a patch is dynamic and consists of an individual stand, or a group of stands that are in close

proximity (i.e. no intervening edge) and are similar in structural/seral stage and elevation (Morice Land and Resource Management Plan –March 31, 2004 Page 240)..It can be either a natural disturbance opening that led to forests of similar age or an opening created by cut blocks (BCMOF 2002). Forest patches will be grouped into patch size classes, which are differentiated by seral stage and area class .(see “Analysis Comments/Discussion” below). Thresholds for each patch size class vary according to BEC variant and are defined in the Morice LRMP draft Recommendations Report (Table 17) The desired representation of each patch size class on the landscape is defined by BEC variant units, which are delineated on the basis of topographic, climatic, and ecosystem features.

How does this indicator relate to the M&L IFPA and to SFM?

The distribution of patches across the BEC variant can be used as an indicator of ecosystem health at the BEC variant level. Natural disturbance regimes create different size patches based on variables such as disturbance agents (e.g. wind, fire, insects, disease), frequency, intensity and size of disturbance. Patches can range in size from very small (stand gaps caused by windfall or root rot) to very large (tens of thousands of hectares caused by fire or insect epidemic). The *Biodiversity Guidebook* and other analyses have suggested patch size distributions that follow natural disturbance patterns based on Natural Disturbance Types (NDTs). The Morice LRMP has proposed objectives, measures and targets for patch sizes for the plan area by BEC variant, based on an analysis of historic disturbance regime and fire return intervals (Steventon 2002).

By maintaining patch sizes, that are close to their natural distribution it is expected that landscape level ecological processes such as habitat connectivity and genetic diversity will be maintained within an acceptable proportion of the range of natural variability. This indicator in conjunction with other landscape level indicators such as seral stage distribution and species composition indices will provide important information on BEC variant level ecosystem health.

Current Status and Forecasted Targets / Thresholds of Indicator

| Percent forest in each patch type by patch size class by BEC variant by licensee | | | | | | | |
|--|-------------|------------|-----------------------|--------------------|-------------------|----------|-------------------|
| Licensee | Bec Variant | Patch Type | Patch Size Class (ha) | Current Status (%) | Forecasted Target | Variance | Achieve Target by |
| BCTS | ESSF mc | Early | <= 40 ha. | 45.7% | 15% - 25% | | Period 2 |
| | | Mature/Old | <= 40 ha. | 5.4% | <= 14% | | Immediately |
| | | Early | >250 | 0 | 50% - 60% | | Period 2 |
| | | Mature/Old | >250 | 94.3% | >=70% | | Immediately |
| | SBS dk | Early | <= 40 ha. | 25% | 20% - 30% | | Immediately |
| | | Mature/Old | < =40 ha. | 23.2% | 20% - 30% | | Immediately |

| Percent forest in each patch type by patch size class by BEC variant by licensee | | | | | | | |
|--|--------------------|------------|-----------------------|--------------------|-------------------|----------|-------------------|
| Licensee | Bec Variant | Patch Type | Patch Size Class (ha) | Current Status (%) | Forecasted Target | Variance | Achieve Target by |
| | | Early | >250 | 36% | 50% - 60% | | Period 2 |
| | | Mature/Old | >250 | 56.7% | 50% - 60% | | Immediately |
| | SBS mc2 | Early | <=40 ha. | 25.6% | 20% - 30% | | Immediately |
| | | Mature/Old | <= 40 ha. | 8.2% | <=16% | | Immediately |
| | | Early | >250 | 41.4% | 50% - 60% | | Period 2 |
| | | Mature/Old | >250 | 90% | >65% | | Immediately |
| Canfor | ESSF mc & ESSF wv3 | Early | <= 40 ha. | 27.1% | 15% - 25% | | Period 2 |
| | | Mature/Old | <= 40 ha. | 3.4% | <=9% | | Immediately |
| | | Early | >250 | 57.2% | 50% - 60% | | Immediately |
| | | Mature/Old | >250 | 96.1% | >= 76% | | Immediately |
| | SBS dk | Early | <= 40 ha. | 30.5% | 20% - 30% | | Period 1 |
| | | Mature/Old | < =40 ha. | 17.3% | <=30% | | Immediately |
| | | Early | >250 | 53.3% | 50% - 60% | | Immediately |
| | | Mature/Old | >250 | 68.5% | >=40% | | Immediately |
| | SBS mc2 & SBSwk3 | Early | <= 40 ha. | 14% | 20% - 30% | | Period 2 |
| | | Mature/Old | <= 40 ha. | 4.2% | <=16% | | Immediately |
| | | Early | >250 | 38.3% | 50% - 60% | | Period 2 |
| | | Mature/Old | >250 | 92.6% | >=60% | | Immediately |
| HFP | ESSF mc & ESSF wv3 | Early | < =40 ha. | 13.7% | 15% - 25% | | Period 1 |
| | | Mature/Old | <= 40 ha. | 1.6% | <=11% | | Immediately |
| | | Early | >250 | 20% | 50% - 60% | | Period 2 |
| | | Mature/Old | >250 | 95.8% | >=75% | | Immediately |

| Percent forest in each patch type by patch size class by BEC variant by licensee | | | | | | | |
|--|-------------|------------|-----------------------|--------------------|-------------------|----------|-------------------|
| Licensee | Bec Variant | Patch Type | Patch Size Class (ha) | Current Status (%) | Forecasted Target | Variance | Achieve Target by |
| | SBS dk | Early | <= 40 ha. | 9.2% | 20% - 30% | | Period 2 |
| | | Mature/Old | <= 40 ha. | 9.1% | <=25% | | Immediately |
| | | Early | >250 | 42.1% | 50% - 60% | | Period 2 |
| | | Mature/Old | >250 | 86% | >=40% | | Immediately |
| | SBS mc2 | Early | <= 40 ha. | 18.2% | 20% - 30% | | Period 2 |
| | | Mature/Old | <= 40 ha. | 3.2% | <=20% | | Immediately |
| | | Early | >250 | 26.6% | 50% - 60% | | Period 2 |
| | | Mature/Old | >250 | 93.4% | >=50% | | Immediately |

Rationale for variance:

Targets not set for ESSFmk. Large portion of this BEC variant is in the Morice LRMP protected areas or no harvest zones, and non contributing Forest.

ESSFmc and ESSFmv3 were combined.

SBSmc2 and SBSwk3 were combined.

Targets were not set for CWHws2 because of the small area.

Indicator Analysis Information

Strategy Practices, Methods, Assumptions and Criteria

The targets will be achieved by continuing to gradually plan harvesting so that the patch size distribution for the Bec Variant will be moving toward the targets outlined in *Morice LRMP draft recommendations report Table 17 page 118*.

Calculation of Indicator

Formula: $\%A_{PSC, Bec, Licensee} = (A_{PSC, BEc, Licensee} / A_{Bec, Licensee}) / 100$

Variables:

%A_{PSC, BEC, licensee}: percent Forested in each patch size class by patch type Bec Variant by licensee

A_{PSC, BEC, licensee}: Forested area in each patch size class by patch type by Bec variant by licensee

A_{PSC, BEC, licensee}: Forested Area Bec Variant by licensee

Analysis Comments / Discussion

For this analysis, non-forested polygons such as roads, wetlands, lakes etc. are not included in the patch calculations.

Age criteria for patches type are as follows:

- Early ≤ 20 year old forest.
- Mature/old ≥ 100 year old forest

Patch size Classes area as follows:

- LT_1Ha ≤ 1 HA. No targets set
- Small >1 and ≤ 40
- Medium >40 and ≤ 250 No targets set.
- Large >250

Modeling input assumptions for early age patches are:

- All SBS
 - ≤ 40 ha. Range 20% to 30% of the forested area.
 - >250 ha. Range 50% to 60% of the forested area.
- All ESSF, CWH, and MH
 - ≤ 40 ha. Range 15% to 25% of the forested area.
 - >250 ha. Range 50% to 60% of the forested area.

There were no modeling input assumptions for mature/old patch type. Targets were based on model outputs.

Patch size statistics will be compiled by BEC variant, Landscape unit, and licensee combinations for monitoring reports for this indicator.

Indicator Monitoring Plans**Inventories Needed to Monitor and Analyze Indicator**

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|---|-------------------------------|---|---------------------------------|
| Silviculture Records Harvesting Coverage | Licensees | Yes | annual |
| VRI (forest cover) | ILMB (augmented by licensees) | Yes | Use most current |

| | | | |
|----------------------------------|------|-----|--------------------------|
| | | | version |
| Natural Disturbance Type mapping | ILMB | Yes | Use most current version |
| Landscape Units and BEC Variants | ILMB | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--------------|--|------------------------|--------------------------------|
| Procure data | Obtain Silviculture Prescription mapping | Licensees | Annually starting 2003 |
| Analyze data | Define forest patches using ecologically meaningful seral stage criteria from Silviculture coverage/harvesting mapping and VRI. Calculate percent areas in each forest patch size class by LU by Bec Variant | Tweedsmuir Forest Ltd. | Annually starting May 31, 2004 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Annually starting May 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Annually starting May 31, 2004 |

Proposed output for indicator reporting

This indicator will be reported in tabular format.

References

Anon. 1995. Biodiversity Guidebook. Forest Practices Code of British Columbia. Government of British Columbia, Victoria, BC. 99p.

Anon. 1999. Landscape unit planning guide. Min. of For. and Min. Env., Lands and Parks, Victoria, BC. 101pp.

BCMOF 2002. BC Ministry of Forests – Glossary of Forestry Terms website
<http://www.for.gov.bc.ca/PAB/PUBLCTNS/GLOSSARY/GLOSSARY.HTM> (accessed 10/11/2002)

Indicator 19: Percent Seral Stage Distribution by non-timber tenure license by forest licensee

Indicator Linkages:

| M&L IFPA Framework | CSA/CCFM SFM Framework |
|---|---|
| This indicator applies to the M&L IFPA as a whole | <p>Criterion: 5. Multiple Benefits to Society</p> <p>SFM Element: 3. Fair Distribution of Benefits and Costs</p> <p>Value: 1. Fair distribution of timber and non-timber benefits and costs over time</p> <p>Objective: 1. Timber and non-timber benefits and costs are fairly and equitably distributed at a range of scales for current and future generations.</p> |

Indicator Rationale

What does this indicator mean?

This indicator will track seral stage distribution in non-timber tenure areas to determine if forests attributes continue to support the values associated with non-timber tenures. Seral stage is a descriptive term to refer to broad age classes of forests (early, mid-seral, mature, and old). In addressing non-timber values using seral stage, it is important to measure the rate of forest management development within non-timber tenures. As some areas of the landscape are capable of supporting other non-timber tenured activities such as trapping, guide outfitting, and grazing, it is important that forest conditions are consistent with the intended purposes of individual non-timber tenures.

How does this indicator relate to the M&L IFPA and to SFM?

By maintaining a range of seral stages within non-timber tenures, the productive capacity of these tenures may be supported. The primary purpose of non-timber tenures is to provide opportunities for non-timber products and services.

Current Status and Forecasted Targets / Thresholds of Indicator

| Percent Seral Stage Distribution by non-timber tenure license by forest licensee | | | | | | |
|---|---------------------------------------|--------------------|-----------------------|---------------------------|-----------------|--------------------------|
| Forest Licensee | Non-timber tenure type license | Seral Stage | Current Status | Forecasted Target* | Variance | Achieve Target by |
| All | All Guide Territories | early | N/A | N/A | N/A | N/A |
| | | mid-seral | N/A | N/A | N/A | N/A |

| | | | | | | |
|--|-----------------------------|--------------|-----------------------------------|--|-------------------------------------|-------------|
| | | Mature + old | >50% | >19% Overall 27% | None. See explanation below. | Immediately |
| | | | HFP>49% | HFP>23% | | Immediately |
| | | | BCTS>37% | BCTS>33% | | Immediately |
| | | old | N/A | N/A | N/A | N/A |
| | All Trapline Territories | early | N/A | N/A | N/A | N/A |
| | | mid-seral | N/A | N/A | N/A | N/A |
| | | Mature + old | Canfor>19% HFP>19% BCTS>25% | Canfor>11% HFP>16% BCTS>13% Overall 20% | -4% overall. See explanation below. | Immediately |
| | | old | N/A | N/A | N/A | N/A |
| | All Range Licenses Combined | early | Canfor>20% HFP>14% BCTS>15% | Canfor>27% by Period 2 HFP>27% by Period 3 BCTS>17% by Period 2. | See Explanation. | Immediately |
| | | mid-seral | N/A | N/A | N/A | N/A |
| | | Mature + old | N/A | N/A | N/A | N/A |
| | | old | N/A | N/A | N/A | N/A |

Rationale for variance:

On average, across all Forest Licensees, guide territories remain above 27% Mature + Old throughout the planning horizon.

Trapper Territories:

608T025 drops below 20% Mature + Old in periods 13 thru 17 over its entire area. Lowest level is 16% overall.

608T020 drops below 20% Mature + Old in periods 12, 13, 16, and 17 over its entire area. Lowest level is 19% overall.

609T008 drops to 19% Mature + Old in period 16 over its entire area.

609T019 drops to 18% Mature + Old in period 14 over its entire area.

Range Licenses:

In order to achieve targets for other seral stage indicators, early seral forest can only be created consistent with the rate of harvest.

Indicator Analysis Information

| |
|--|
| Strategy Practices, Methods, Assumptions and Criteria |
|--|

| |
|---|
| Based on Base Case forecast across a 250 yr planning horizon as forecast using the Tesera Scheduling Model (TSM). |
|---|

Calculation of Indicator**Formula:**

$$\%SSD_{NTT, licensee} = (A_{Seral\ stage, NTT, licensee} / A_{NTT, licensee}) \times 100$$

Variables:

$\%SSD_{NTT, licensee}$: % Seral Stage Distribution (early, mid-seral, mature, old) by individual non-timber tenure license by forest licensee

$A_{SeralStage, NTT, licensee}$: Area of seral stage (early, mature, old) by individual non-timber tenure license by forest licensee

$A_{NTT, licensee}$: Area of individual non-timber tenure license by forest licensee

Analysis Comments / Discussion

The Morice LRMP (2004) provides the definitions and targets for seral stages for the Biogeoclimatic Subzones found in the Morice TSA.

Non-timber tenures are defined as trapping, guide outfitting, and grazing licenses.

Areas <1000ha are not part of the target setting.

Indicator Monitoring Plans**Inventories Needed to Monitor and Analyze Indicator**

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|------------------------------------|----------|--|--------------------------|
| Silviculture database (harvesting) | Licensee | Yes | Annually |
| VRI | ILMB | Yes | Use most current version |
| Maps to define non-timber tenures | ILMB | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--------------|---------------------------------|------------------------|--------------------------|
| Procure data | Ensure inventories are current. | Tweedsmuir Forest Ltd. | Annually starting 2003 |

| | | | |
|----------|---|------------------------|--------------------------------|
| | Update digital coverage. Add information to annual reporting resultant file. | | |
| Analysis | Query resultant file and determine percent seral stage distribution by non-timber tenure license by forest licensee | Tweedsmuir Forest Ltd. | Annually starting 2004 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Annually starting May 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Annually starting May 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format and may be supplemented by maps delineating the distribution of the seral stages, non timber tenures, and licensees.

References

Anon. 2004. Morice LRMP.

Indicator 20: Percentage of AAC harvested by licensee

Indicator Linkages

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|--|
| Resource: Timber Value/Issue: Harvest Flow Policy | Criterion: 5. Multiple Benefits to Society SFM Element: 2. Communities and Sustainability Value: 1. Healthy and sustainable communities Objective: 1. A diverse local economy and local participation in the use and management of forest benefits on the DFA |

Indicator Rationale

What does this indicator mean?

The allowable annual cut (AAC) is the allowable rate of timber harvest from a specified area of land. The chief forester makes a determination of AACs for timber supply areas (TSAs) in accordance with Section 8 of the Forest Act. Within each TSA, the AAC is apportioned among timber tenures by the Minister in accordance with Section 10 of the Forest Act (BCMOF 2002).

This indicator, therefore, reports on the percentage of the timber actually harvested by the licensee relative to the licensee's AAC apportionment.

How does this indicator relate to the M&L IFPA and to SFM?

In order to provide multiple timber and non-timber benefits for current and future generations, the determination of the harvest rate on the forest land base must consider how these values will be affected now and in future generations. In the determination of the AAC by the Chief Forester of the Province there are various considerations which are factored into the AAC determination in order to balance the various timber and non-timber values associated with the forest land base over the long term. Among these considerations are the long-term sustainable harvest of the timber resource, community stability, employment benefits, wildlife use, recreational use, productivity of the defined forest area, etc. The Chief Forester makes an independent determination of AAC which is considered to be sustainable over the long term with consideration of all the other values on the forest land base. In order to address new circumstances and incorporate new information, the AAC is determined every 5 years.

In order to maintain the values considered in the AAC determination, the licensees are required to harvest their AAC apportionment according to legislated rules (i.e. cut control regulation). Maintaining harvest levels according to these regulations helps to ensure that current benefits exist in local communities (i.e. employment, community stability, recreation uses, wildlife uses, etc.) and also that the forest land base will be able to provide similar benefits for future generations.

Current Status and Forecasted Targets/Thresholds of Indicator

| Percentage of AAC Harvested | | | | |
|-----------------------------|-----------------------|-------------------------------|-------------------------|----------------|
| Licensee | Current Status (2004) | Forecasted Target | Variance** | Achieve Target |
| Canfor | 103.5% | 100% of the AAC apportionment | AAC apportionment -50% | Annually |
| HFP | 98% | 100% of the AAC apportionment | AAC apportionment -50% | Annually |
| BCTS | 21.4% | 100% of the AAC apportionment | AAC apportionment - 50% | Annually |

*FLSM AAC (2002) transferred to Lakes TSA in order to deal with beetle attack.

** Where a periodic cut applies (i.e. small licences) a target of 100% with a 10% variance over the period.

Rationale for variance: BC Ministry of Forests cut control regulations (BCMOF 2001)

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria |
|---|
|---|

| |
|---|
| Licensees will provide information as per monitoring schedule |
|---|

Calculation of Indicator
Formula:

$$H\%_{\text{licensee}} = H_{\text{licensee}} / AAC_{\text{licensee}}$$

Variables:

$H\%_{\text{licensee}}$: % of AAC apportionment harvested by Licensee

H_{licensee} : Volume harvest by Licensee (includes quota wood within the Morice TSA)

AAC_{licensee} : Licensee AAC apportionment

Analysis Comments/Discussion

Licensees will provide AAC information for this indicator on an annual basis (as per outlined in the monitoring schedule). For BCTS, "AAC apportionment harvested by Licensee" is deemed to be the volume advertised for sale.

Current status of member licensees AAC from license documents (licensee allocation may increase in future if portion of any future cut uplift in Morice TSA is allocated to the licensees)

Reporting period for this indicator will be the calendar year (January 1-December 31)

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|--------------------------------------|---------------|--|------------------------|
| Harvest records/cut control database | Each licensee | Yes | Annual |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|---|--|---|---------------------------------|
| Document cut control in the DFA by licensee | Obtain necessary information from harvest records/cut control database | <ul style="list-style-type: none"> Woods Managers for each licensee Babine BCTS Manager | December, 2002 |
| Monitor and update data | Ensure data is updated | <ul style="list-style-type: none"> Woods Managers for each licensee Babine BCTS Manager | Annually starting 2003 |
| Analysis | Obtain necessary data and conduct analysis | <ul style="list-style-type: none"> Woods Managers for each licensee Babine BCTS Manager | Annually starting 2003 |
| Report | Indicator Performance Management for Management Adjustment Purposes (review updated data only) | <ul style="list-style-type: none"> Woods Managers for each licensee Babine BCTS Manager | Annually starting June 30, 2004 |
| | M&L IFPA SFM Report | <ul style="list-style-type: none"> Woods Managers for each licensee Babine BCTS Manager IFPA manager | Annually starting June 30, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

- BCMOF 2002. BCMOF Glossary of Forestry Terms. BCMOF website (<http://www.for.gov.bc.ca/PAB/PUBLCTNS/GLOSSARY/A.htm#AAC>) accessed August 29, 2002.
- BCMOF 2001. BC Ministry of Forests Cut Control Regulation (Dec. 10, 2001). BCMOF website (<http://www.for.gov.bc.ca/tasb/legsregs/forest/faregs/cutcontr/ccr.htm>) accessed Sept. 30, 2002.

Indicator 21: Ratio of annual mill consumption to AAC apportionment harvested by licensee

Indicator Linkages

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|--|
| Applies to the M&L IFPA process as a whole | <p>Criterion: 5. Multiple Benefits to Society</p> <p>SFM Element: 2. Communities and Sustainability</p> <p>Value: 1. Healthy and Sustainable Communities</p> <p>Objective: 1. A diverse local economy and local participation in the use and management of forest benefits on the DFA.</p> |

Note: indicators 21 and [28](#) are closely related

Indicator Rationale

What does this indicator mean?

Within the TSA, mills have been established with the purpose of processing harvested timber from the surrounding forest land base. The companies which operate these facilities have timber tenure and associated allowable annual cut (AAC) apportionments within the Morice TSA as a means of providing raw materials to these facilities for processing. This indicator shows if the licensees with mills and AAC apportionment on the Morice TSA process a volume equal to their entire AAC apportionment within the DFA (i.e. ratio = 1), or if part of the apportioned AAC for these licensees is milled outside the TSA (i.e. ratio < 1).

How does this indicator relate to the M&L IFPA and to SFM?

In the determination of the AAC by the Chief Forester of the Province, there are various factors which are considered in order to balance the various timber and non-timber values associated with the forest land base over the long term. Among these considerations is the long-term sustainable harvest of the timber resource, community stability, wildlife use, recreational use, productivity of the defined forest area, etc. The Chief Forester makes an independent determination of AAC which is considered to be sustainable over the long term with consideration of all the other values on the forest land base.

With the AAC determination recognizing aspect of multiple use and intergenerational equity regarding forest benefits (timber and non-timber related), this indicator also offers a means to evaluate that the maximum economic benefit from the AAC apportionment of licensees with milling facilities is directed into the local communities and the local economy. The long term viability of the milling facilities within the Morice TSA helps to provide long term economic stability to forestry dependent communities. By ensuring that the licensees with mills on the Morice TSA process a volume equal to their AAC apportionment within the TSA ensures that the timber harvested from the TSA goes to provide economic stability for the local communities.

Current Status and Targets/Thresholds of Indicator

| Ratio of Annual Mill Consumption to AAC apportionment harvested | | | | |
|---|-----------------------|--------|----------|----------------|
| Licensee | Current Status (2004) | Target | Variance | Achieve Target |
| Canfor | 1.65 | ≥ 1.0 | none | Annually |
| BCTS* | N/A | N/A | N/A | N/A |

*No milling facility associated with Babine BCTS

Rationale for variance: It is expected that the licensees with milling facilities located in the Morice TSA will mill at least a volume equal to their AAC apportionment harvested, therefore, no variance is indicated.

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria |
|---|
| Licensees will provide figures as per monitoring schedule |

Calculation of Indicator

Formula:

$$MC:ACC_{DFA, licensee} = MC_{licensee} / AAC_{DFA, licensee}$$

Variables:

MC:AAC_{DFA, licensee}: Ratio of annual mill consumption to AAC apportionment harvested in the DFA by Licensee

MC_{licensee} : Annual mill consumption by licensee (if applicable)

AAC_{DFA, licensee}: AAC apportionment harvested by Licensee (for licensees with milling facilities within the DFA)

Analysis Comments/Discussion

Licensees will provide Mill Consumption and AAC harvest information for this indicator on an annual basis (as per outlined in the monitoring schedule).

Annual information to be provided December 31 (i.e. calendar year)

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|--------------------------------------|---------------|--|------------------------|
| Harvest records/cut control database | Each licensee | Yes | Annual |
| Mill consumption records | Each licensee | Yes | Annual |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--|--|---|------------------------------------|
| Document "mill consumption :AAC harvested" ratio by licensee | Set up system within individual organizations to report mill consumption: AAC harvested ratio. | <ul style="list-style-type: none"> Woods Managers for each applicable licensee | December 2002 |
| Monitor and update data | Ensure data is updated | <ul style="list-style-type: none"> Woods Managers for each applicable licensee | Annually starting 2003 |
| Analysis | Obtain necessary data for analysis | <ul style="list-style-type: none"> Woods Managers for each applicable licensee | Annually starting 2003 |
| Report | Indicator Performance Management for Management Adjustment Purposes (review updated data only) | <ul style="list-style-type: none"> Woods Managers for each applicable licensee | Annually starting January 31, 2004 |
| | M&L IFPA SFM Report | <ul style="list-style-type: none"> Woods Managers for each applicable licensee IFPA manager | Annually starting January 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Indicator 23: Percentage of Blocks meeting NAR disturbance objectives by licensee

Indicator Linkages

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|---|
| Applies to the M&L IFPA process as a whole | <p>Criterion: 3. Conservation of Soil and Water Resources</p> <p>SFM Element: 1. Soil Quality and Quantity</p> <p>Value: 1. Productive capacity of soil resources are conserved</p> <p>Objective: 1. Soil quantity and quality are sustained through their characteristic range of variation on the DFA through time.</p> |

Indicator Rationale

What does this indicator mean?

An objective of placing limits on the amount of soil disturbance allowed within the “Net Area to be Reforested” (NAR) is to ensure that site productivity is maintained and that impacts to other resource values are prevented or mitigated. NAR is defined as the area which the licensees are legally obligated to regenerate to free growing status (i.e. gross harvest area minus deletions for roads, landing, gravel pit, wildlife tree patches, etc.) Harvesting and silviculture activities must be carried out such that the total amount of soil disturbance at any time during operations does not exceed the specified maximum (BCMOF 2001). Soil disturbance objectives are outlined in the Soil Conservation Guidebook (BCMOF 2001) and also the Bark Beetle Regulation (BCMOF 2001a)

Soil disturbance objectives are on the silviculture prescription for each block that is harvested and subsequently reforested. If applicable, the Bark Beetle Regulation for soil disturbance objectives may also apply. Subsequent to harvesting and reforestation, soil conservation compliance surveys and reports are completed and are used to determine the compliance to the soil disturbance objectives. This indicator reports how many of these blocks have conformed to the soil disturbance objectives, thereby contributing to the maintenance of site productivity.

How does this indicator relate to the M&L IFPA and to SFM?

Maintaining soil productivity is one of the most important elements to ensure forests can be re-established on harvested areas. Several soil disturbance risks occur during the harvesting and associated activities. These risks are assessed and recognized as soil disturbance objectives when preparing the Silviculture Prescription for a block, and following harvest and re-forestation, the blocks are assessed as to whether these objectives have been met. Maintaining site productivity by meeting soil disturbance objectives on harvested and reforested blocks aims to ensure that subsequent forests can be re-established with as little damage to soil productivity as possible. The maintenance of soil productivity on each block harvested also provides opportunity for natural succession of local species (i.e. flora and fauna) to proceed on harvested block, which contributes the maintenance of biological diversity within the individual stand and collectively across the landscape.

Current Status and Forecasted Targets/Thresholds of Indicator

| Percentage of Blocks meeting Net Area Reforested (NAR) soil disturbance objectives | | | | |
|--|-----------------------|--------|----------|----------------|
| Licensee | Current Status (2004) | Target | Variance | Achieve Target |
| Canfor | 100% | 100% | 0% | Annually |
| BCTS | 100% | 100% | 0% | Annually |

Rationale for variance: It is expected that the licensees and the Babine BCTS will meet all NAR soil disturbance objectives on the Morice TSA (as per the Soil Conservation Guidebook (BCMOF 2001)), therefore no variance is indicated.

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria |
|--|
| # of blocks where harvesting activity occurred in the calendar year - Licensees will provide figures as per monitoring schedule. |
| # of blocks where site disturbance objectives were not achieved - Licensees will provide figures as per monitoring schedule. |
| Stand level protection measures will be developed on a site by site basis. |
| See “Analysis Comments/Discussion” for description of NAR Soil Description Objectives. |

Calculation of Indicator**Formula:**

$$\%SDO_{\text{licensee}} = SDO_{\text{licensee}} / H_{\text{licensee}} \times 100$$

Variables:

$\%SDO_{\text{licensee}}$: % of Blocks meeting Net Area Reforested (NAR) soil disturbance objectives by licensee

SDO_{licensee} : Blocks meeting Net Area Reforested (NAR) soil disturbance objectives by licensee

H_{licensee} : Total number of blocks harvested by licensee

Analysis Comments/Discussion

With regard to NAR soil disturbance objectives, under the current requirements, silviculture prescriptions must specify:

- the maximum percentage of the NAR that may be occupied by detrimental soil disturbance; and
- the extent to which the maximum percentage of soil disturbance in the NAR can be temporarily exceeded to construct temporary access structures (BCMOF 2001b).

Business Rules:

- Reported by calendar year

Indicator Monitoring Plans**Inventories Needed to Monitor and Analyze Indicator**

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|--|---------------|--|------------------------|
| Harvest records | Each licensee | Yes | Annual |
| MOF Soil Conservation Compliance Reports | Each licensee | Yes | Annual |
| Internal inspection reports | Each licensee | Yes | Annual |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--|---|---|------------------------------------|
| Document # of blocks harvested annually by licensee | Review and obtain necessary information from harvest records | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager | Annually starting 2003 |
| Determine the number of blocks where detrimental soil disturbance objectives have not been achieved. | Review and obtain necessary information from Soil Conservation Compliance Reports and internal inspection reports | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager | Annually starting 2003 |
| Analysis | Compile information to calculate indicator | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager | Annually starting 2003 |
| Report | Indicator Performance Management for Management Adjustment Purposes (review updated data only) | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager | Annually starting January 31, 2004 |
| | M&L IFPA SFM Report | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager • M&L IFPA Manager | Annually starting January 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format.

For blocks not meeting the NAR soil disturbance objective, the indicator report must make a notation as to the location of blocks and area affected.

References

BCMOF 2001. Soil Conservation Guidebook (2nd Edition). BC Ministry of Forests: Victoria, BC (May 2001).

BCMOF 2001a. Bark Beetle Regulation – Forest Practices Code of BC Act. BC Ministry of Forests: Victoria, BC (December 2001).

BCMOF 2001b. Soil Conservation Surveys Guidebook (2nd Edition). BC Ministry of Forests: Victoria, BC (May 2001).

Indicator 24: Percentage of Total Goods and Services Provided by Local Vendors by Licensee

Indicator Linkages

| M&L IFPA Framework | CSA/CCFM SFM Framework |
|--|---|
| Applies to the M&L IFPA process as a whole | Criterion: 5. Multiple Benefits to Society SFM Element: 2. Communities and Sustainability Value: 1. Healthy and sustainable communities Objective: 1. A diverse local economy and local participation in the use and management of forest benefits on the DFA. |

Note: Indicator [28](#) is closely related

Indicator Rationale

What does this indicator mean?

This indicator tracks the proportion that each licensee spends on total goods and services in the local community. The amount spent on goods and services can be tracked to local vendors through accounting records and postal codes. Within the Morice TSA, local vendors are those with Granisle, Topley, and Houston postal codes.

How does this indicator relate to the M&L IFPA and to SFM?

SFM strives for a balance between ecological, social and economic values. Ensuring communities within the surrounding forest area remain healthy and sustainable is an important social and economic aspect. As forestry is the primary industry in the Morice TSA, forest licensees play a substantial role in the local economy. Ensuring revenue that is associated with licensee forest management activities is distributed through the local economy is a means that licensees can contribute to the health and sustainability of the local communities.

Current Status and Forecasted Targets/Thresholds of Indicator

| Percentage of total goods and services provided by local vendors | | | | |
|--|-----------------------|--------|----------|----------------|
| Licensee | Current Status (2004) | Target | Variance | Achieve Target |
| Canfor | 34.27 | 45% | -10% | Annually |

Rationale for variance: The variance is meant to account for fluctuations (i.e. potential declines) in supply of local vendors and being able to respond accordingly (i.e. finding suitable local alternatives within an appropriate timeframe).

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria |
|--|
| <p>Local goods & services vendors to be identified and reported.</p> <p>In order to achieve target, each licensee will target an appropriate amount of spending locally.</p> <p>Each licensee and Babine BCTS to provide information.</p> <ul style="list-style-type: none"> • Goods and services only • Locally is defined by Granisle, Topley and Houston postal codes |

Calculation of Indicator

Formula:

$$\%GSS_{\text{local,licensee}} = \frac{GS\$_{\text{local,licensee}}}{TGS\$_{\text{licensee}}}$$

Variables:

$\%GSS_{\text{local,licensee}}$: Percentage of total goods and services provided by local vendors by licensee

$GS\$_{\text{local,licensee}}$: Value of goods and services provided by local vendors by licensee

$TGS\$_{\text{licensee}}$: Total value of goods and services purchased by licensee

Analysis Comments/Discussion

The intention of this indicator is to reflect the spending of local dollars in the community.

Business Rules:

Stumpage, salaries/hourly employee wages and capital expenditures are excluded from the calculation of this indicator.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|------------------|-----------|--|------------------------|
| Accounts payable | Licensees | Yes | As contracts are paid. |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|---|--|---|--------------------------|
| Document local accounts payable for consumable goods and services by licensee | Set up system within individual organizations to document local accounts payable for consumable goods and services by licensee | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager • IFPA manager | December, 2002 |

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|-------------------------|---|---|------------------------------------|
| Monitor and update data | Ensure data is updated | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager • IFPA manager | Annual starting 2003 |
| Analysis | Obtain necessary data for analysis | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager • IFPA manager | Annual starting 2003 |
| | Conduct analysis for indicator | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager • IFPA manager | Annually starting 2004 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes (review updated data only) | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager | Annually starting January 31, 2004 |
| | M&L IFPA SFM Report | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager • IFPA manager | Annually starting January 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format.

Vendor type (to be determined) will be an output in the reporting of this indicator.

References

Indicator 25: Percent of Gross Forest Area converted to permanent access by licensee

Indicator Linkages:

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|---|
| <p>Resource: Timber</p> <p>Value / Issue: Roads, Trails and Landings</p> | <p>Criterion: 3. Conservation of Soil and Water Resources</p> <p>SFM Element: 1. Soil Quality and Quantity</p> <p>Value: 1. Productive capacity of soil resources are conserved</p> <p>Objective: 1. Soil quantity and quality are sustained through their characteristic range of variation, on the DFA through time.</p> <p>Criterion: 4. Forest Ecosystem Contributions to Global Ecological Cycles</p> <p>SFM Element: 2. Forest Land Conversion</p> <p>Value: 1. Gross forest area on the DFA</p> <p>Objective: 1. Minimal loss of the gross forest area on the DFA over time.</p> |

Indicator Rationale

What does this indicator mean?

This indicator will track the extent to which the gross forest area is reduced as a result of permanent access structures. A permanent access structure is defined as “ a structure, including a road, bridge, landing, gravel pit or other similar structure, that provides access for timber harvesting. (BCMOF 2002). The areas occupied by permanent access structures will not be able to grow trees since these structures are required to continually access the land base to conduct forest management activities.

How does this indicator relate to the M&L IFPA and to SFM?

As withdrawals are made from the gross forest land base there is a commensurate decline in the capacity of this land base to provide expected benefits. In order to provide sufficient overall productive capacity of the landbase (to maintain the array of desirable values water, ecosystem function and productivity values), any permanent removal of productive forest from the gross forest area must be minimized.

Forest productivity is also linked to the productive capacity of soil. In this context, the productive capacity of the soil is a measure of the ability of the forest land base to provide a flow of benefits to society. It applies to both timber and non-timber resources and is a key factor in assessing progress toward sustainable forest management. Furthermore, soil resources are functional components of the ecosystem and provide other benefits important in maintaining desirable characteristics for ecological function (e.g. carbon and nutrient cycling, hydrologic cycle, etc.).

Current Status and Forecasted Targets / Thresholds of Indicator

| Percent of Gross Forest Area converted to permanent access by licensee | | | | |
|--|--------------------|-----------------------|----------|-------------------|
| Licensee | Current Status (%) | Forecasted Target (%) | Variance | Achieve Target by |
| Canfor | 2.1% | <2.6% | 0 | Immediately |
| HFP | 1.9% | <2.4% | 0 | Immediately |
| BCTS | 2.9% | <3.4% | 0 | Immediately |

Rationale for variance:

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria |
|---|
| <p>In order to achieve the target, the following practices will be followed:</p> <ul style="list-style-type: none"> • Site plans will be designed in such a manner to minimize the amount of permanent access structures required for timber harvesting to achieve the landscape level targets. • Area in permanent access structures will be prescribed in cut block site plans based on the degraded width by road class. • Degraded width will be specified in road site plans for each class of road outside of cut blocks. • As built road inspections will document the average actual degraded width to ensure that the constructed roads are within the targets identified in site plans. • Road inspection data will be used to periodically adjust the degraded width assumptions to be used in modeling and site plans. • Road construction techniques will be employed such as low impact winter roads, snow roads, reducing ditch depths, and rehabilitating roads where appropriate, to reduce the amount of degraded area for the length of road |

Calculation of Indicator

Formula:

$$\%PA_{\text{licensee}} = (PA_{\text{licensee}} / GFA_{\text{licensee}}) \times 100$$

Variables:

%PA_{licensee}: Percent of Gross Forest Area converted to permanent access by licensee

PA_{licensee}: Area of permanent access by licensee

GFA_{licensee}: Gross Forest Area by licensee

Analysis Comments / Discussion

The area of road is based on the degraded width which includes the subgrade width plus the ditch width and debris and stripping area.

Gross Forest Area: The landbase that is capable of growing trees within the defined forest area. The area of unclassified lands, non-productive area without trees, and highways have been subtracted from the gross forest area.

Permanent access structures include roads, gravel pits, borrow pits and landings within cut blocks and roads constructed between cut blocks.

Standard IFPA degraded road widths by road class for calculating area in permanent access structures used in the modeling assumptions.

- Mainline = 30m
- Operational = 18m
- Spur = 10m

Targets were derived by forecasting cumulative amount of area in permanent access structures from model outputs as harvesting proceeds through the first two periods (2002 – 2012) of the planning horizon.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|--------------------|---------------|---|---------------------------------|
| Site Plans | Licensee | Yes | Annually |
| Road Inventory | Licensee | Yes | Annually |
| VRI (forest cover) | ILMB | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--|---|-------------------------|---------------------------------|
| Procure and prepare inventory information for analysis | Licensee to provide road information from site plans. | Licensee | Annually starting 2003 |
| | Licensee to track | Licensee and Tweedsmuir | Annually starting 2003 |

| | | | |
|----------|--|------------------------|------------------------------------|
| | <p>degraded road width for roads outside of block (i.e. road inventory).</p> <p>Update digital coverage (road inventory) from licensee data and enter it into the reporting database.</p> <p>Add information to annual reporting resultant file.</p> | Forest Ltd. | |
| Analysis | Query resultant file and determine percent of gross forest area converted to permanent access by licensee. | Tweedsmuir Forest Ltd. | Annually starting January 31, 2004 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Annually starting January 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Annually starting January 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Anon. 2001. Soil Conservation Guidebook. Second Edition. Forest Practices Code Act of BC.

Web reference: <http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/soil/soil-toc.htm> (accessed 09/29/02)

Morice and Lakes IFPA Road Network Standard Definitions August 9, 2001

Indicator 27: Percentage of forest management commitments completed on time resulting from consultations regarding non-timber features and interests by licensee

Indicator Linkages

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|---|--|
| <p>Applies to the M&L IFPA process as a whole</p> | <p>Criterion: 1. Conservation of Biological Diversity</p> <p>SFM Element: 4. Protected Areas and Sites of Biological Significance</p> <p>Value: 1. Protected areas and sites of biological significance are identified and managed appropriately</p> <p>Objective: 1. A sustainable harvest and use of non-timber forest products, services and benefits</p> <p>Criterion: 5. Multiple Benefits to Society</p> <p>SFM Element: 1. Timber and Non-Timber Benefits</p> <p>Value: 1. A balanced supply and variety of timber and non-timber products services and benefits on the DFA</p> <p>Objective: 2. A sustainable harvest and use of non-timber forest products, services and benefits</p> <p>Value: 2. Recreational experiences are provided on the DFA</p> <p>Objective: 1. A full range of recreation opportunities are provided on the DFA.</p> <p>SFM Element: 2. Communities and Sustainability</p> <p>Value: 1. Healthy and sustainable communities</p> <p>Objective: 1. A diverse local economy and local participation in the use and management of forest benefits on the DFA.</p> <p>Criterion: 6. Accepting Society’s Responsibility for Sustainable Development</p> <p>SFM Element: 2. Respect for Aboriginal Forest Values, Knowledge and Uses</p> <p>Value: 1. Indigenous Knowledge of forest values and uses</p> <p>Objective: 1. Forest management incorporates Indigenous Knowledge of forest values and uses</p> |

Note: indicators [2](#), [4](#), [27](#) & [54](#) are closely related

Indicator Rationale

What does this indicator mean?

Many timber and non-timber forest values are represented on the Morice TSA landscape. Where non-timber values are impacted by forest management activities, forest companies may be made aware of these impacts through consultations with individuals or interest groups. Licensees can proactively solicit consultation regarding specific values/interests through advertisement (i.e. newspaper, radio, etc.) or, if values and interests are captured on spatial databases and contact information exists, the licensee can make efforts to contact the representatives of affected values/interests for consultation. This indicator, therefore, tracks the percentage of the commitments completed on time which result from these consultations.

How does this indicator relate to the M&L IFPA and to SFM?

Striving for a balance between timber and non-timber values on the DFA requires the incorporation of non-timber related values into forest management planning and activities. As forest management activities can have varying degrees of impact on non-timber forest values, it is important to consult with parties that represent the values/interests affected. The IFPA has made substantial progress regarding the collection of data regarding areas of special interest (i.e. traditional use), protected areas and areas of biological significance, recreational areas, and areas which support non-timber forest products. As greater awareness evolves regarding the IFPA process, and SFM in general, greater amounts of information will be collected for non-timber values. Having knowledge of these areas is the first step in the process of consultation and, subsequently, licensees can make commitments around forest management activities that encourages balanced use of forest resources on the Morice TSA.

Current Status and Forecasted Targets/Thresholds of Indicator

| Percentage of forest management commitments completed on time resulting from consultations regarding non-timber features and interests | | | | |
|--|-------------------------------------|--------|----------|----------------|
| Licensee | Current Status (2004 calendar year) | Target | Variance | Achieve Target |
| Canfor | 92% | 100% | -10% | Annually |
| HFP | 100% | 100% | -10% | Annually |
| BCTS | 100% | 100% | -10% | Annually |

Rationale for variance:

The variance is meant to take into account timing delays when indicator is calculated (i.e. completed commitments falling just outside the reporting period of the indicator).

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria |
|---|
|---|

| |
|--|
| Report on percent of forest management commitments completed on time resulting from consultation regarding non-timber features and interests |
|--|

| |
|---|
| Each licensee will document and analyze/compile information related to this indicator and provide results |
|---|

Calculation of Indicator**Formula:**

$$\%FMC_{\text{on time, licensee}} = (FMC_{\text{on time, licensee}} / FMC_{\text{total, licensee}}) \times 100$$

Variables:

%FMC_{on time, licensee} : Percentage of forest management commitments completed on time resulting from consultation regarding non-timber features and interests by licensee

FMC_{on time, licensee}: Forest management commitments completed on time resulting from consultation regarding non-timber features and interests by licensee

FMC_{total, licensee}: Total forest management commitments resulting from consultation regarding non-timber features and interests by licensee

Analysis Comments/Discussion

Business rules:

- Forest management commitments must result from recorded consultations.
- Commitments must be documented such that context and timelines agreed to by all parties.
- Timelines to complete commitment can be modified if mutually agreed to by all parties.
- Reporting period is calendar year (January 1 – December 31).

Indicator Monitoring Plans**Inventories Needed to Monitor and Analyze Indicator**

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|--|--------------------------|--|------------------------|
| Database to track forest management commitments and completion | Licensee (as applicable) | Yes | Annually |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--|--|--|------------------------------------|
| Track forest management commitments completed on time resulting from consultations regarding non-timber features and interests | Ensure system exists within individual organizations to document indicator information | <ul style="list-style-type: none"> Woods Manager for each licensee Babine BCTS Manager | December 2002 |
| Monitor and update data | Ensure data is updated | <ul style="list-style-type: none"> Woods Manager for each licensee Babine BCTS Manager | Annually starting January 2003 |
| Analysis | Obtain necessary data for analysis | <ul style="list-style-type: none"> Woods Manager for each licensee Babine BCTS Manager | Annually starting 2003 |
| | Conduct analysis for indicator | <ul style="list-style-type: none"> Woods Manager for each licensee Babine BCTS Manager | Annually starting January 31, 2004 |
| Report | Indicator Performance Management for Management Adjustment Purposes (review updated data only) | <ul style="list-style-type: none"> Woods Manager for each licensee Babine BCTS Manager | Annually starting January 31, 2004 |
| | M&L IFPA SFM Report | <ul style="list-style-type: none"> Woods Manager for each licensee Babine BCTS Manager IFPA Manager | Annually starting January 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format. Any non-conformances are detailed in reporting.

References

Indicator 28: Ratio of Capital Expenditures to Depreciation by licensee

Indicator Linkages

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|---|
| Applies to the M&L IFPA process as a whole | <p>Criterion: 5. Multiple Benefits to Society</p> <p>Critical Element: 2. Communities and Sustainability</p> <p>Value: 1. Healthy and sustainable communities</p> <p>Objective: 1. A healthy and diverse local economy and local participation in the use and management of forest benefits on the DFA.</p> |

Note: indicators [21](#), [24](#) and 28 are closely related

Indicator Rationale

What does this indicator mean?

For licensees with processing facilities located within the Morice TSA, this indicator tracks the ratio of capital expenditures (on assets) to depreciation (on those assets) on those processing facilities on a 10 year rolling average. A ratio value which is greater than one shows capital expenditures are greater than depreciation. Capital Expenditures are expenditures which benefit future periods and, subject to certain dollar limits, are capitalized on the balance sheet. They include the costs of acquiring additional assets, major replacements and alterations to existing capital assets.

How does this indicator relate to the M&L IFPA and to SFM?

Investing in capital assets provides licensees the ability to remain competitive in the forest industry through increasing capacity and efficiency, extending an asset's original planned depreciated life, and improving the quality of production and profit beyond the original design or present capacity. As forestry is the primary industry in the Morice TSA, the effect of licensees investing in their capital assets increases the likelihood that forestry will continue to contribute to the economic stability of communities within the Morice TSA.

Current Status and Forecasted Targets/Thresholds of Indicator

| Ratio of Capital Expenditures to Depreciation | | | | |
|---|------------------------|-------------------|----------|----------------|
| Licensee | Current Status (2004)* | Forecasted Target | Variance | Achieve Target |
| Canfor | 1.67 | ≥ 1.0 | None | Annually |
| HFP | 2.08 | ≥ 1.0 | None | Annually |
| BCTS** | N/A | N/A | N/A | N/A |

*10 year rolling average reported annually

**This is an indicator that BCTS cannot report on due to it being a government ministry.

Rationale for variance: It is expected that the licensees with milling facilities in the Morice TSA will undertake capital expenditures greater than the rate of depreciation (on a 10 year rolling average), therefore, no variance is indicated.

Indicator Analysis Information

Strategy Practices, Methods, Assumptions and Criteria

Report on ratio of capital expenditures to depreciation

Each licensee with processing facilities within the Morice TSA will provide data regarding this indicator (see “Analysis comments/discussion”)

Calculation of Indicator

Formula:

$$RCED_{\text{licensee}} = CE_{\text{licensee}} / D_{\text{licensee}}$$

Variables:

$RCED_{\text{licensee}}$ = Ratio of Capital Expenditures to Depreciation by licensee (10 year rolling average)

CE_{licensee} : Capital Expenditures by licensee (10 year rolling average)

D_{licensee} : Depreciation by licensee (10 year rolling average)

Analysis Comments/Discussion

- Ratio will be calculated using a 10 year rolling average (i.e. average of the 10 years prior to current year) reported annually.

- Due to issues regarding proprietary information, raw data will not be provided. Licensees will provide data in its final form (i.e. ratio of capital expenditures to depreciation using a 10 year rolling average).
- Any change in calculating depreciation must be reported.
- Reporting of this indicator will be by calendar year (January 1 – December 31)
- Calculation does not include improvements to roads, bridges, etc.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|--|--------------------------|--|------------------------|
| Licensee Financial Records (Capital Expenditures and Depreciation) | Licensee (as applicable) | Yes | Annually |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|---|--|--|------------------------------------|
| Track Capital Expenditures and Depreciation | Ensure system exists within individual organizations to document capital expenditures and depreciation | <ul style="list-style-type: none"> • Woods Manager for applicable licensees | December 2002 |
| Monitor and update data | Ensure data is updated | <ul style="list-style-type: none"> • Woods Manager for applicable licensees | Annually starting January 2003 |
| Analysis | Obtain necessary data for analysis | <ul style="list-style-type: none"> • Woods Manager for applicable licensees | Annually starting 2003 |
| | Conduct analysis for indicator | <ul style="list-style-type: none"> • Woods Manager for applicable licensees | Annually starting January 31, 2004 |
| Report | Indicator Performance Management for Management Adjustment Purposes (review updated data only) | <ul style="list-style-type: none"> • Woods Manager for applicable licensees | Annually starting January 31, 2004 |
| | M&L IFPA SFM Report | <ul style="list-style-type: none"> • Woods Manager for applicable licensees • IFPA Manager | Annually starting January 31, 2004 |

Proposed output for indicator reporting

This indicator will be reported in tabular format.
 Any change in calculating depreciation must be reported.

References

Indicator 31: Percent Seral Stage Distribution by Ecosystem & Wildlife Value Class by licensee

Indicator Linkages

| M&L IFPA Framework | CSA/CCFM SFM Framework |
|---|---|
| <p>Resource: Landscape and Stand Level Biodiversity</p> <p>Value/Issue: Rare Ecosystems</p> <p>Resource: Wildlife</p> <p>Value/Issue: Mountain Goat</p> <p>Value/Issue: Telkwa Caribou Recovery Program Area</p> | <p>Criterion: 1. Conservation of Biological Diversity</p> <p>SFM Element: 4. Protected Areas and Sites of Special Biological Significance</p> <p>Value: 1. Protected areas and sites of biological significance are identified and appropriately managed</p> <p>Objective: 1. Protected Areas identified through government processes are respected and accommodated. Biologically significant areas are identified and management strategies appropriate to their long-term maintenance are implemented.</p> |

Indicators 31, [37](#) and [46](#) are closely related

Indicator Rationale

What does this indicator mean?

This indicator tracks the proportion of area within various seral stages (i.e. similarly aged forest) for “Ecosystem and Wildlife value classes” in the Morice TSA. Seral stage is a descriptive term to refer to broad age classes of forests (early, mid-seral, mature, and old). As forest stands age, the composition of plant and animal communities change. Three values of interest for this indicator are mountain goat key habitat, the Telkwa, Takla, and Tweedsmuir Caribou herds, and rare ecosystems. Rare ecosystems are ecosystems that are uncommon on the landscape or are considered threatened at certain seral stages on the landscape. This indicator will provide information on the level of disturbance that occurs within the identified areas as early seral stages, as well as tracking the maintenance and recovery of the areas as proportions of later seral stages.

How does this indicator relate to the M&L IFPA and to SFM?

Mountain goats, the Telkwa, Takla, and Tweedsmuir Caribou herds, are species that need a proportion of forested habitats to be maintained in an older seral stage to provide important feeding, calving, snow interception and thermal cover requirements. Rare ecosystems should be maintained in an undisturbed state to ensure that the potential rare plants and/or communities found within them are not lost due to disturbance.

Current Status and Forecasted Targets/Thresholds of Indicator

| % Seral Stage Distribution by Ecosystem and Wildlife Value Class by licensee | | | | | | | |
|---|---|------------------------------|--------------------|----------------------------|-----------------------------|---------------------|--------------------------|
| Licensee | Species / Ecosystem of interest | Wildlife Value Class | Seral Stage | Current Status (%)* | Forecasted Target %* | Variance | Achieve Target by |
| Canfor | Mountain Goat Key Habitats | N/A | Early | Canfor 4.5% | <16 | 0 | Immediately |
| HFP | | N/A | Early | <1% | <16 | 0 | Immediately |
| BCTS | | N/A | Early | 0% | <16 | 0 | Immediately |
| Canfor | Telkwa Caribou Herd Recovery Program Area | Key Forested Caribou Habitat | Mature + Old | Canfor 74.9% | Canfor >63% | 0 | Immediately |
| HFP | | | | 88.2% | >72% | 0 | Immediately |
| BCTS | | | | 52.2% | >52% | 0 | Immediately |
| Canfor | | ESSF General | Mature + Old | 96.9% 89% | >53% | 0 | Immediately |
| HFP | | | | 89% | >36% | 0 | Immediately |
| | | SBS General | Mature + Old | Canfor 56.6% HFP 76.1% | Canfor >45% HFP >26% | 0 | Immediately |
| Canfor | Takla Caribou | Winter High | Mature + Old | N/A | N/A | N/A | N/A |
| | | Winter Medium | Early | 0% | <15%* | 0 | Immediately |
| Canfor | Rare Ecosystems | N/A | Early | 107.2 (hectares*) | 0 | Previous harvesting | Immediately |
| HFP | | N/A | Early | Unknown | 0 | 0 | Immediately |
| BCTS | | N/A | Early | 33.1 (hectares*) | 0 | Previous harvesting | Immediately |

Note: Current status and targets for Rare Ecosystems have been presented as total hectares.

Rationale for Variance/ Exception:

Rare Ecosystems – Target to be achieved on future planned blocks. Existing harvesting had occurred prior to ecosystems being identified as rare or prior to implementation of this SFM plan.

Takla Caribou Winter High – is identified as a “No Harvest Zone”.

Indicator Analysis Information

Strategy Practices, Methods, Assumptions and Criteria

Rare Ecosystems: Targets will be achieved by avoiding road construction and harvesting activities in Rare Ecosystems when developing new stand level plans.

Caribou:

- Telkwa Caribou Herd – Habitat targets will be achieved by following the interim guidelines in the Telkwa Caribou Herd Recovery Plan;
- Takla Herd - The Northern Caribou Ungulate Winter Range Proposal – Takla Herd as referenced in the Morice LRMP Appendix 8 and 9
- Tweedsmuir Herd – Targets for calving habitat and post calving habitat will be set for the Tweedsmuir herd when the recovery action plan has been completed.

Mountain Goat Key Habitat: Targets will be achieved in the key habitat areas by:

- Checking for the presence of mountain goats, trails, hair, or in key habitat areas (e.g. consult with local resource users and/or Guide Outfitters) prior to development.
- Where feasible incorporate Old Growth Areas in and/or around occupied goat habitat areas.
- Maintaining a minimum of 70% of the forested area in goat habitat areas in suitable thermal cover where the habitat use has been confirmed.

Calculation of Indicator

Formula:

$$\%SSD_{\text{Ecosystem, WVC, licensee}} = (SS_{\text{Ecosystem, WVC, licensee}} / SS_{\text{licensee}}) \times 100$$

Variables:

$\%SSD_{\text{Ecosystem, WVC, licensee}}$: % Seral Stage Distribution by Ecosystem & Wildlife Value Class by licensee

$SS_{\text{Ecosystem, WVC, licensee}}$: Area of Seral Stage by Ecosystem & Wildlife Value Class by licensee

SS_{licensee} : Area of Seral Stage by licensee

Analysis Comments/Discussion

The inventory data layers are considered static on the landscape.

The following list of Site Series represent Rare Ecosystems in the Morice TSA (as of *November 2004*) (Anon. 2004)

| Site Series | English_Name | BC Status |
|--------------|--|-----------|
| CW Hws2/04 | amabilis fir - western redcedar / oak fern | Blue |
| CWHws2/07 | Sitka spruce / salmonberry Wet Submaritime 2 | Blue |
| CWHws2/02 | lodgepole pine / kinnikinnick | Red |
| CWHws2/08 | black cottonwood / red-osier dogwood | Blue |
| Essfmk/02/03 | whitebark pine / clad lichens - curly heron's-bill moss | Blue |
| MHmmp/00 | purple reedgrass Herbaceous Vegetation | Red |
| SBSdk/81 | saskatoon / slender wheatgrass | Red |
| SBSdk/02 | lodgepole pine / common juniper / rough-leaved ricegrass | Blue |
| SBSdk/82 | Sandberg's bluegrass - slender wheatgrass | Red |
| SBSdk/08 | black cottonwood / red-osier dogwood - prickly rose | Red |
| SBSdk/04 | Douglas-fir / red-stemmed feathermoss - step moss | Blue |
| SBSdk/Wf05 | slender sedge / common hook-moss | Blue |
| SBSmc2/Wf05 | slender sedge / common hook-moss | Blue |
| SBSwk3/02 | lodgepole pine / black huckleberry / reindeer lichens | Blue |
| SBSwk3/03 | Douglas-fir - hybrid white spruce / thimbleberry | Blue |
| SBSwk3/Ws06 | Sitka willow / Sitka sedge | Blue |
| SBSwk3/Ws11 | Spruces - subalpine fir / skunk cabbage | Blue |

Mountain Goat Zones: Targets in the model will use the thermal cover requirements identified in the Morice LRMP (Anon. 2004a). Generally, adequate thermal cover in forests has been defined as crown closure greater than 30% and tree heights over 7m. The LRMP management direction states that 70% of the forest area in these key habitats should provide adequate thermal cover. This will be a model input, however, the targets in the indicator will be expressed as amount of early seral for consistency. The amount of early seral in key goat habitat will be reported as a model output based on the thermal cover requirements.

Telkwa Caribou Herd: Manage to the seral target assumptions for the Telkwa Caribou Recovery Program Area.

Telkwa Caribou Herd Recovery Program Area (Key Forested Caribou Habitat): The Decision Scenario forecast modeled the TSR 2 assumption that a maximum 50% of the THLB in the ESSF and SBS should be less than 90 years of age. This serves as the basis for the targets being applied in the SFM Plan.

Tweedsmuir Caribou Herd: In order to meet the requirements contained in the wildlife notice for the Tweedsmuir Caribou Herd, the islands in the Whitesail reservoir will not be scheduled for harvesting.

Takla Herd Winter Medium: The Takla Herd seral stage target was derived from the Morice LRMP (Anon. 2004b). It indicates that there should be < 30% volume removal on a cut block area every 80 years. For

the purposes of this indicator it was expressed as the amount of area in early seral by using the following calculation:

$80 \text{ years} \div (30/100) = 266 \text{ years}$ indicated rotation. Early seral is forest less than 40 years.

$40 \div 266 = 15\%$

Rare Ecosystems: Performance toward targets for Rare Ecosystems will be tracked as an operational indicator.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|---|----------|--|--------------------------|
| Silviculture data (harvesting data) | Licensee | Yes | Annually |
| Rare Ecosystems Inventory | ILMB | Yes | Use August 2002 version |
| VRI (forest cover) | ILMB | Yes | Use most current version |
| Telkwa Caribou Herd Recovery Program Area | ILMB | Yes | Use most current version |
| Mountain Goat Key Habitat Areas | ILMB | Yes | Use most current version |
| Tweedsmuir Caribou Herd | ILMB | Yes | Use most current version |
| Takla Herd Winter Medium | ILMB | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--------------|---|------------------------|--------------------------|
| Procure data | Ensure inventories are current (e.g. VRI). Add information to annual reporting resultant file. | Tweedsmuir Forest Ltd. | Annually starting 2003 |
| Analysis | Query resultant file and determine percent seral stage distribution by "ecosystem and wildlife | Tweedsmuir Forest Ltd. | Annually starting 2004 |

| | | | |
|--------|--|--|--------------------------------|
| | value class” | | |
| | Query Operational Data to determine area of rare ecosystems included in newly developed site plans | <ul style="list-style-type: none"> • Woods Managers for each licensee • BCTS Manager | Annually starting 2004 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Annually starting May 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Annually starting May 31, 2004 |

Output for indicator reporting

This indicator will be output in tabular format.

References

Anon. 2004. Forest District lists of BC CDC Natural Plant Communities: November, 2004 Nadina Forest District. NPC_ForestDistrictLists_Nov2004.xls.

Anon. 2004a. Morice Land and Resource Management Plan Final Land Use Recommendation March 31, 2004 Page 156 measure 11.2

Anon. 2004b. Morice Land and Resource Management Plan Final Land Use Recommendation March 31, 2004 Appendix IX Page 262.

Anon. 1995. Biodiversity Guidebook. Forest Practices Code of British Columbia. Government of British Columbia, Victoria, BC. 99p.

Interim Harvesting Guidelines for the Telkwa Caribou Herd Recovery Program Area, March 1999.

Morice Timber Supply Area Analysis Report – February 2002. Ministry of Forests

Indicator 32: Percent Seral Stage Distribution by LRMP Biodiversity Emphasis Area / BEC Combination by Licensee

Indicator Linkages:

| M&L IFPA Framework | CSA/CCFM SFM Framework |
|---|---|
| <p>Resource: Landscape and Stand Level Biodiversity</p> <p>Value / Issue: Biodiversity Emphasis Options</p> <p>Value / Issue: Natural Stands</p> <p>Value / Issue: Old Growth Management Areas (OGMAs)</p> <p>Value / Issue: PAS Study Areas</p> <p>Value / Issue: Patch Size Targets</p> <p>Value / Issue: Habitat Element - Seral Stage Distribution</p> | <p>Criterion: 1. Conservation of Biological Diversity</p> <p>SFM Element: 1. Ecosystem Diversity</p> <p>Value: 1. The range of functions, interactions and processes that occur naturally within and between ecosystems on the DFA</p> <p>Objective: 1. Functions, interactions and processes that occur naturally within and between ecosystems on the DFA will fluctuate within a (<i>natural, socially</i>) acceptable range of variation over time.</p> <p>SFM Element: 3. Genetic Diversity</p> <p>Value: 1. The opportunity for individuals within sub-species and species to move and interact within their natural range in and across the DFA.</p> <p>Objective: 1. Habitats for species present on the DFA are functionally connected over a range of spatial and temporal scales.</p> <p>Criterion: 2 Maintenance and Enhancement of Forest Ecosystem Condition and Productivity</p> <p>SFM Element: 1. Forest Ecosystem Resilience</p> <p>Value: 1. Healthy, productive forests that support ecosystem conditions and processes</p> <p>Objective: 1. Forest ecosystems resilient to disturbances and stresses</p> <p>SFM Element: 2. Forest Ecosystem Productivity</p> <p>Value: 1. Ecosystem and biological productivity is conserved on the DFA</p> <p>Objective: 1. Sustainable rates of ecosystem and biological productivity</p> <p>Criterion: 4 Forest Ecosystem Contributions to Global Ecological Cycles</p> <p>SFM Element: 1. Carbon Uptake and Storage</p> <p>Value: 1. Storage of carbon in forest ecosystems and products</p> <p>Objective: 1. Forest ecosystems are net carbon sinks over time on the DFA</p> <p>Criterion: 5 Multiple Benefits to Society</p> <p>SFM Element: 1 Timber and Non-Timber Benefits</p> <p>Value: 1. A balanced supply and variety of timber and non-timber products, services and benefits on the DFA</p> <p>Objective: 1. A sustainable harvest and use of timber products, services and benefits</p> |

Indicator Rationale

What does this indicator mean?

This indicator tracks the proportion of area within various seral stages (i.e. similarly aged forest) at a landscape level. Seral stage is a descriptive term to refer to broad age classes of forests (early, mid-seral, mature, and old). As forest stands age, the composition of plant and animal communities change and can be classified into different seral stages. In addressing objectives associated with biodiversity, it is considered impractical to manage for individual species. Rather, taking a coarse filter approach directs management to implement practices that ensures a range of forest conditions (including seral stages) exist somewhere on the landscape at all times. This indicator will allow for the tracking of natural diversity through the inferred relationship with seral stages and their distribution across the landscape. Specific targets for percent seral stage distribution will be set with respect to Natural Disturbance Types (NDTs), which are broad groupings of BEC zones and subzones based on the predominant form and frequency of disturbance.

How does this indicator relate to the M&L IFPA and to SFM?

As forest stands age, the composition of plant and animal communities change and can be classified into different seral stages. The species that use the various seral stages can be quite different, with most specialist species associated with early shrub/herb or mature/old stages. In forests disturbed by natural agents such as windfall, insects and fire, the distribution of seral stages is dependant on the severity, frequency and spatial pattern of the disturbance. By maintaining the natural range of variability of seral stages within NDTs conditions, under which natural species, gene pools, communities, and ecosystems evolved should be retained, thereby managing the risk to biodiversity. The range of the conditions provided allows for the management of varied ecosystems and their natural processes and in turn providing the broad range of habitats that are necessary to maintain natural diversity of species. This will allow ecosystem resiliency and productivity to be maintained for important forest values.

Current Status and Forecasted Targets / Thresholds of Indicator

| Percent Seral Stage Distribution by LRMP Biodiversity Emphasis Area / BEC Combination by Licensee | | | | | | | |
|---|---------------------------------|--------------------|--------------|----------------|--------------------|----------|-------------------|
| Licensee | LRMP Area-specific Management | BEC | Seral Stage | Current Status | Forecasted Target* | Variance | Achieve Target by |
| Canfor | High Biodiversity Emphasis Area | ESSF mc & ESSF mv3 | Early | 5.3% | <= 28% | 0 | Immediately |
| | | | Mature + Old | 76.1% | >= 48% | 0 | Immediately |
| | | | Old | 68% | >= 42% | 0 | Immediately |
| | | ESSF mk | Early | 0.6% | <= 7% | 0 | Immediately |
| | | | Mature + Old | 86.4% | >= 86% | 0 | Immediately |
| | | | Old | 80.6% | >= 84% | -6% | Immediately |
| | | SBS dk | Early | 21.2% | <= 50% | 0 | Immediately |

| | | | | | | | |
|-----|--|---------------------------|--------------|-------|--------|-----|-------------|
| | | | Mature + Old | 42.1% | >= 21% | 0 | Immediately |
| | | | Old | 12.3% | >= 16% | 0 | Period 3 |
| | | SBS mc2 and SBS wk3 | Early | 12% | <= 37% | +2% | Immediately |
| | | | Mature + Old | 68.1% | >= 33% | 0 | Immediately |
| | | | Old | 42.4% | >= 26% | 0 | Immediately |
| | General Forested Area | ESSF mc & ESSF mv3 | Early | 10.2% | <= 38% | 0 | Immediately |
| | | | Mature + Old | 81.8% | >= 37% | 0 | Immediately |
| | | | Old | 74% | >= 34% | 0 | Immediately |
| | | ESSF mk | Early | 4.1% | <= 9% | 0 | Immediately |
| | | | Mature + Old | 95.9 | >= 83% | 0 | Immediately |
| | | | Old | 84% | >= 82% | 0 | Immediately |
| | | SBS dk | Early | 24.4% | <= 64% | 0 | Immediately |
| | | | Mature + Old | 44.9% | >= 10% | 0 | Immediately |
| | | | Old | 23.2% | >= 8% | 0 | Immediately |
| | | SBS mc2 and SBS wk3 | Early | 26.8% | <= 48% | 0 | Immediately |
| | | | Mature + Old | 57.1% | >= 20% | 0 | Immediately |
| | | | Old | 40.7% | >= 17% | 0 | Immediately |
| HFP | High Biodiversity Emphasis Area | ESSF mc & ESSF mv3 | Early | 1.7% | <= 28% | 0 | Immediately |
| | | | Mature + Old | 80.4% | >= 48% | 0 | Immediately |
| | | | Old | 53.8% | >= 42% | 0 | Immediately |
| | | ESSF mk | Early | 0% | <= 7% | 0 | Immediately |
| | | | Mature + Old | 100% | >= 86% | 0 | Immediately |
| | | | Old | 95% | >= 84% | 0 | Immediately |
| | | SBS dk | Early | 14.6% | <= 50% | 0 | Immediately |
| | | | Mature + Old | 61.6% | >= 21% | 0 | Immediately |
| | | | Old | 48.6% | >= 16% | 0 | Immediately |

| | | | | | | | |
|------|---------------------------------|---------------------|--------------|-------|--------|-----|-------------|
| | | SBS mc2 and SBS wk3 | Early | 15.2% | <= 37% | +3% | Immediately |
| | | | Mature + Old | 66.2% | >= 33% | 0 | Immediately |
| | | | Old | 36.8% | >= 26% | 0 | Immediately |
| | General Forested Area | ESSF mc & ESSF mv3 | Early | 4.8% | <= 38% | 0 | Immediately |
| | | | Mature + Old | 84.4% | >= 37% | 0 | Immediately |
| | | | Old | 69.8% | >= 34% | 0 | Immediately |
| | | ESSF mk | Early | 0% | <= 9% | 0 | Immediately |
| | | | Mature + Old | 99.8% | >= 83% | 0 | Immediately |
| | | | Old | 95.1% | >= 82% | 0 | Immediately |
| | | SBS dk | Early | 33.5% | <= 64% | 0 | Immediately |
| | | | Mature + Old | 44.8% | >= 10% | 0 | Immediately |
| | | | Old | 39% | >= 8% | 0 | Immediately |
| | | SBS mc2 and SBS wk3 | Early | 19% | <= 48% | 0 | Immediately |
| | | | Mature + Old | 66.1% | >= 20% | 0 | Immediately |
| | | | Old | 43.2% | >= 17% | 0 | Immediately |
| BCTS | High Biodiversity Emphasis Area | ESSF mc & ESSF mv3 | Early | 2.6% | <= 28% | 0 | Immediately |
| | | | Mature + Old | 72% | >= 48% | 0 | Immediately |
| | | | Old | 48.9% | >= 42% | 0 | Immediately |
| | | SBS dk | Early | 21.5% | <= 50% | 0 | Immediately |
| | | | Mature + Old | 44.8% | >= 21% | 0 | Immediately |
| | | | Old | 21.5% | >= 16% | 0 | Immediately |
| | | SBS mc2 and SBS wk3 | Early | 13.6% | <= 37% | 0 | Immediately |
| | | | Mature + Old | 76.6% | >= 33% | 0 | Immediately |
| | | | Old | 56.9% | >= 26% | 0 | Immediately |
| | General Forested Area | ESSF mc & ESSF mv3 | Early | 4.5% | <= 38% | 0 | Immediately |

| | | | | | | | |
|--|--|---------------------------|--------------|-------|--------|---|-------------|
| | | | Mature + Old | 73.3% | >= 37% | 0 | Immediately |
| | | | Old | 51.9% | >= 34% | 0 | Immediately |
| | | SBS dk | Early | 18.8% | <= 64% | 0 | Immediately |
| | | | Mature + Old | 37.2% | >= 10% | 0 | Immediately |
| | | | Old | 14.9% | >= 8% | 0 | Immediately |
| | | SBS mc2 and SBS wk3 | Early | 18% | <= 48% | 0 | Immediately |
| | | | Mature + Old | 52% | >= 20% | 0 | Immediately |
| | | | Old | 28% | >= 17% | 0 | Immediately |

Rationale for variance / exceptions:

Canfor / HBEA / ESSF mk / Old: Targets were set by licensee Defined Forest Area. The overall target meets or exceeds the LRMP targets.

Canfor / HBEA / SBS mc2 and SBS wk3 / Early:

Mitigating measures can be investigated and applied well in advance of these areas violating targets due to the timing of the periods where the issues appear.

Canfor / GFA / ESSF mk / Early:

Targets were set by licensee Defined Forest Area. The overall target meets or exceeds the LRMP targets.

Canfor / GFA / ESSF mk / Mature + Old:

Targets were set by licensee Defined Forest Area. The overall target meets or exceeds the LRMP targets.

Canfor / GFA / ESSF mk / Old:

Targets were set by licensee Defined Forest Area. The overall target meets or exceeds the LRMP targets.

HFP / HBEA / SBS mc2 and SBS wk3 / Early:

Mitigating measures can be investigated and applied well in advance of these areas violating targets due to the timing of the periods where the issues appear.

Indicator Analysis Information

Strategy Practices, Methods, Assumptions and Criteria

Based on Decision Scenario forecasts across a 250 yr planning horizon as forecast using the Tesera Scheduling Model (TSM), the target will be achieved by following the management direction in section 2.5.1 (Biodiversity), Table 15 (Seral Stage Distribution for High Biodiversity Emphasis Areas) and Table 16 (Seral Stage Distribution for the General Forested Area) in the Morice LRMP.

Calculation of Indicator

Formula:

$$\%SSD_{LU, NDT, BEC, licensee} = (AS_{LU, NDT, BEC, licensee} / A_{LU, NDT, BEC, licensee}) \times 100$$

Variables:

$\%SSD_{LU, NDT, BEC, licensee}$: Seral Stage Distribution by Landscape Unit by NDT by BEC by licensee

$AS_{LU, NDT, BEC, licensee}$: Area of seral stage (early, mid-seral, mature, old) by Landscape Unit by NDT by BEC by licensee

$A_{LU, NDT, BEC, licensee}$: Area by Landscape by Unit NDT by BEC by licensee

Analysis Comments / Discussion

Seral Stage Definitions (for all BEC zones):

Early <40 yrs; Mature + Old => 100 yrs; Old => 140 yrs.

As described in section 2.5.1 of the Morice LRMP, targets will be measured by BEC variant.

Future monitoring reports will report by BEC variant and Landscape Unit.

For reporting purposes, the Biodiversity Guidebook (BGB) defines landscape units as generally greater than 10,000 hectares in size. For the purpose of managing landscape level biodiversity indicators it is practical to determine a minimum area for managing performance toward achievement of the target. Areas less than 1000 ha within Operating Area/LU/BEC combinations will not be considered for reporting current status since they are well below the suggested area of a landscape. (Reference: Definition of Landscapes on Page 75 of the BGB).

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|-------------------|---------------|---|---------------------------------|
| Silviculture data | Licensee | Yes | Annually |

| | | | |
|-----------------|------|-----|--------------------------|
| BEC | ILMB | Yes | Use most current version |
| VRI | ILMB | Yes | Use most current version |
| Landscape Units | ILMB | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--------------|--|------------------------|-----------------------------------|
| Procure data | Ensure inventories are current and that all natural disturbances are accounted for. Update digital coverage. Add information to annual reporting resultant file. | Tweedsmuir Forest Ltd. | Annually starting 2003 |
| Analysis | Query resultant file and determine percent seral stage distribution by LU by NDT by BEC by licensee | Tweedsmuir Forest Ltd. | Annually starting 2004 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Annually starting on May 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Annually starting on May 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Anon. 1995. Biodiversity Guidebook. Forest Practices Code of British Columbia. Government of British Columbia, Victoria, BC. 99p.

Indicator 33: Percent Species Composition by BEC by licensee

Indicator Linkages:

| M&L IFPA Framework | CSA/CCFM SFM Framework |
|---|--|
| <p>Resource: Landscape and Stand Level Biodiversity</p> <p>Value / Issue: Biodiversity Emphasis Options</p> <p>Value / Issue: Natural Stands</p> <p>Value / Issue: Natural Tree Species</p> <p>Value / Issue: Habitat Element – Tree Species Composition</p> <p>Resource: Timber</p> <p>Value / Issue: Harvest Profile</p> <p>Resource: Wildlife</p> <p>Value / Issue: Tweedsmuir Caribou Herd - Whitesail & Troitsa Landscape Units</p> <p>Value / Issue: Mule Deer Winter Habitat</p> <p>Value / Issue: Fisher Habitat</p> <p>Value / Issue: Northern Goshawk Nesting Habitat</p> <p>Value / Issue: Moose Summer Habitat</p> <p>Value / Issue: Moose Winter Habitat</p> <p>Value / Issue: Sydney Williams Caribou Herd Habitat</p> <p>Value / Issue: Telkwa Caribou Recovery Program Area</p> | <p>Criterion: 1 Conservation of Biological Diversity</p> <p>SFM Element: 2 Species Diversity</p> <p>Value: 1. Abundance and distribution of common and rare habitats within a range of variability over time to conserve species in the DFA</p> <p>Objective: 1. A constant supply of habitats and/or attributes sufficient to conserve species that occur naturally on the DFA through time.</p> <p>Criterion: 2. Maintenance and Enhancement of Forest Ecosystem Condition and Productivity</p> <p>SFM Element: 1. Forest Ecosystem Resilience</p> <p>Value: 1. Healthy, productive forests that support ecosystem conditions and processes</p> <p>Objective: 1. Forest ecosystems resilient to disturbances and stresses</p> |

Indicator Rationale

What does this indicator mean?

This indicator will track the proportion of tree species on the Morice TSA. Species composition (the relative abundance of a species expressed as a percentage) is variable across the landscape and is influenced over time by the interactions of soil, water availability, climate, species’ silvics, influence of disturbance and forest management activities. In British Columbia, the Biogeoclimatic Ecosystem Classification (BEC) describes the landscape based on these and other characteristics.

How does this indicator relate to the M&L IFPA and to SFM?

Maintaining species composition within the range of natural variability is an important aspect to conserve biodiversity. For example, maintaining species composition at the landscape level influences the dynamic creation of habitats that provide the necessary requirements for resident wildlife to be maintained. Furthermore, maintaining species composition typical of the range of natural variation enables the ecosystem to respond and recover from disturbance. In fire dominated ecosystems, resiliency is an important functional characteristic that ensures a vibrant ecosystem. A productive and resilient ecosystem is sustainable and is capable of providing the many products and services desired by the public. Therefore, the maintenance of the natural range of species composition is crucial in achieving biodiversity objectives.

Current Status and Forecasted Targets / Thresholds of Indicator

| Percent Species Composition by BEC by licensee | | | | | | |
|--|------------------|----------------|--------------------|-----------------------|----------|-------------------|
| Licensee | BEC | Species | Current Status (%) | Forecasted Target (%) | Variance | Achieve Target by |
| HFP | CWH ws 2 | B (BA, BG, BL) | 74% | >=40 | 0 | Immediately |
| | | H (HM, HW) | 22% | >=20 | 0 | Immediately |
| | | PL | 3.5% | >= 3 | 0 | Immediately |
| Canfor | ESSFmc & ESSFmv3 | B (BA, BG, BL) | 59% | >= 45 | 0 | Immediately |
| | | PL | 20% | > = 20 | 0 | Immediately |
| | | S (SE SW) | 20% | > = 20 | 0 | Immediately |
| HFP | ESSFmc & ESSFmv3 | B (BA, BG, BL) | 65% | >= 50 | 0 | Immediately |
| | | PL | 21% | > = 21 | 0 | Immediately |
| | | S (SE SW) | 12% | > = 11 | 0 | Immediately |
| BCTS | ESSFmc & ESSFmv3 | B (BA, BG, BL) | 40% | >= 36 | 0 | Immediately |
| | | PL | 32% | > = 32 | 0 | Immediately |
| | | S (SE SW) | 26% | > = 26 | 0 | Immediately |
| Canfor | ESSFmk | B (BA, BG, BL) | 79% | >= 72 | 0 | Immediately |
| | | H (HM, HW) | 4% | >= 4 | 0 | Immediately |
| | | PL | 10% | > = 5 | 0 | Immediately |
| | | S (SE SW) | 2% | > = 2 | 0 | Immediately |
| HFP | ESSFmk | B (BA, BG, BL) | 87% | >= 76 | 0 | Immediately |
| | | H (HM, HW) | | >= 1 | 0 | Immediately |
| | | PA | 5% | > = 1 | 0 | Immediately |
| | | PL | 5% | > = 1 | 0 | Immediately |
| | | S (SE SW) | 1% | > = 1 | 0 | Immediately |
| Canfor | SBS dk | AC | 4% | >= 1 | 0 | Immediately |

| Percent Species Composition by BEC by licensee | | | | | | |
|--|-------------------|----------------|--------------------|-----------------------|----------|-------------------|
| Licensee | BEC | Species | Current Status (%) | Forecasted Target (%) | Variance | Achieve Target by |
| | | AT | 16% | >= 10 | 0 | Immediately |
| | | PL | 55% | > = 47 | 0 | Immediately |
| | | S (SE SW) | 23% | > = 23 | 0 | Immediately |
| HFP | SBS dk | AT | 4% | >= 4 | 0 | Immediately |
| | | PL | 61% | > = 55 | 0 | Immediately |
| | | S (SE SW) | 30% | > = 23 | 0 | Immediately |
| BCTS | SBS dk | AC | 4% | >= 1 | 0 | Immediately |
| | | AT | 22% | >= 10 | 0 | Immediately |
| | | PL | 43% | > = 37 | 0 | Immediately |
| | | S (SE SW) | 28% | > = 28 | 0 | Immediately |
| Canfor | SBS mc 2 & SBSwk3 | AT | 4% | >= 4 | 0 | Immediately |
| | | B (BA, BG, BL) | 16% | >= 6 | 0 | Immediately |
| | | PL | 46% | > = 46 | 0 | Immediately |
| | | S (SE SW) | 30% | > = 23 | 0 | Immediately |
| HFP | SBS mc 2 & SBSwk3 | AT | 4% | >= 4 | 0 | Immediately |
| | | B (BA, BG, BL) | 20% | >= 7 | 0 | Immediately |
| | | PL | 46% | > = 44 | 0 | Immediately |
| | | S (SE SW) | 28% | > = 23 | 0 | Immediately |
| BCTS | SBS mc 2 & SBSwk3 | AT | 4% | >= 4 | 0 | Immediately |
| | | B (BA, BG, BL) | 18% | >= 10 | 0 | Immediately |
| | | PL | 45% | > = 42 | 0 | Immediately |
| | | S (SE SW) | 30% | > = 24 | 0 | Immediately |

Rationale for Variance

The tree species percentages from the inventory are estimated to the nearest 10% (see indicator analysis information).

*Where the inventory has estimated species content below this level of precision the variance was set to ensure that the minimum amount for these species was maintained on the defined forest area through the planning horizon.

Indicator Analysis Information

A target of >= 1 indicates a trend toward trace amounts or a trend towards a lack of representation of a species in a particular BEC/Licensee area due to existing inventory information and the regeneration assumptions that were modeled.

Forest inventory tree species percentage is estimated to the nearest 10%. For any given forest inventory polygon (Anon. 1998). The species estimates from the model will have a precision of +/- 10%.

Strategy Practices, Methods, Assumptions and Criteria

The target will be achieved by using the following strategies:

- regenerate harvested stands with ecologically appropriate species as reflected in stand level plans.
- tree species that are encountered that are not currently in the forest cover inventory or rare will be included in WTP's or other reserve zones at the stand level (e.g. cedar).
- Deciduous species will be targeted for retention in WTP's, riparian reserve zones, and single tree retention.
- Follow the regeneration assumptions used to model species composition for the decision scenario.

This in turn will maintain species composition within the range of natural variability.

Model outputs are based on Base Case forecast across a 250 yr planning horizon, using the Tesera Scheduling Model (TSM).

Calculation of Indicator

Formula: $\%SC_{BEC, licensee} = (A_{sp, BEC, licensee} / A_{BEC, licensee}) \times 100$

Variables: $\%SC_{BEC, licensee}$: Percent species composition by BEC by licensee

$A_{sp, BEC, licensee}$: Area of species within BEC by licensee

$A_{BEC, licensee}$: Area of BEC by licensee

Analysis Comments / Discussion

The following tree species are common to the Morice TSA:

- AC - Black Cottonwood
- AT - Trembling Aspen
- B (BA, BG, BL) - Balsam Fir
- H (HM, HW) - Hemlock
- EP - Paper Birch
- PA – White Bark Pine
- PL – Lodgepole Pine
- S (SE SW) - Spruce
- SB – Black Spruce

If the species is not present in the Current Status/Forecast Table within a BEC subzone, this means that the species is not found in the inventory or does not occur in that particular subzone variant. In some BEC/licensee areas, certain tree species percentages decrease over time due to the regeneration assumptions being applied and a lack of current knowledge regarding ingress of natural regeneration in plantations.

Tree species composition at the stand (polygon) level will be tracked using the forest cover tree species available from the forest cover database. In the analysis and forecasting of this indicator (using the scheduling model) trees will be replanted based on ecosystem parameters and existing restocking standards after the model harvests a stand.

Areas that have been harvested but not re-planted will not be included in the calculation:

- The following BEC zones have been combined for reporting purposes due to their relatively small area in the Morice T.S.A. and similarity in tree species distribution. These BEC zones were combined for other biodiversity indicators identified in the Morice LRMP document (Anon. 2004)
- SBS mc 2 and SBSwk3
- ESSFmc and ESSFmv 3

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|--------------------|------------------------------|--|--------------------------|
| Silviculture data | Licensee | Yes | Every five years |
| VRI (Forest cover) | ILMB (augmented by licensee) | Yes | Use most current version |
| BEC | ILMB | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--------------|---|------------------------|--|
| Procure data | Ensure licensee inventories are current. Update digital coverage. Add information to annual reporting resultant file. | Tweedsmuir Forest Ltd. | Five years starting 2003 |
| Analysis | Query resultant file and determine percent species composition by BEC by licensee | Tweedsmuir Forest Ltd. | Five years starting May 31, 2004 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | May 31, 2004 Next Report May 31, 2009 |
| | M&L IFPA SFM Report | IFPA Manager | May 31, 2004 Next Report May 31, 2009 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Anon. 2004. Morice Land and Resource Management Plan Final Land Use Recommendation March 31, 2004 pp. 117-119 Tables 15, 16, and 19.

Anon. 1998. Vegetation Resources Inventory Photo Interpretation Standards Prepared by Ministry of Forests Resources Inventory Branch for the Resources Inventory Committee March 31, 1998 Version 1.0 http://srmwww.gov.bc.ca/risc/pubs/teveg/photostandards/stds-pub-03.htm#p596_10733

Anon. 1995. Biodiversity Guidebook. Forest Practices Code of British Columbia. Government of British Columbia, Victoria, BC. 99p.

Indicator 35: Percent species composition of harvest volume by licensee

Indicator Linkages:

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|---|
| Resource: Timber Value / Issue: Harvest Profile | Criterion: 5. Multiple Benefits to Society SFM Element: 3. Fair Distribution of Benefits and Costs Value: 1. Fair distribution of timber and non-timber benefits and costs over time. Objective: 1. Timber and non-timber benefits and costs are fairly and equitably distributed at a range of scales for current and future generations. |

Indicator Rationale

What does this indicator mean?

Forest harvesting must be carefully planned in order to harvest the existing species profile. Harvesting the existing species profile ensures that the values (i.e. timber and non-timber) of the forest is not deteriorated for future generations. This indicator allows for a determination to be made as to the proportion of species that, over time, make up the harvest volume and will be used to monitor the harvest with regards to maintaining the existing species profile.

How does this indicator relate to the M&L IFPA and to SFM?

This indicator is important to long term community well being which in turn is dependent on forest ecosystems to supply the array of products and services necessary for community stability. The strength of a forest ecosystem to supply a myriad of products and services is derived fundamentally from its diversity. Therefore, it is prudent to maintain the natural mix of species over the long run. In cases where a catastrophic natural event has occurred (i.e. Mountain Pine Beetle epidemic) it is prudent to focus attention on the affected tree species. Ignoring the overabundance of affected pine trees, and continuing to harvest the natural species profile can lead to a faster decline in economic prosperity.

Once it has been determined that there are no short-term adverse implications to not meeting the Balsam and Spruce targets, it is important to focus on the Pine in order to capture as much value as possible before the pine volume deteriorates to the point where it becomes unmerchantable.

Current Status and Forecasted Targets / Thresholds of Indicator

| Percent species composition of harvest volume by license | | | | | |
|--|---------|------------------------|--|----------|-------------------|
| Licensee | Species | Current Status (2004)* | Forecasted Target (%)** | Variance | Achieve Target by |
| Canfor | Pine | 53% | 45 – 53 for first period >65 for periods 2-4 30 to 70 percent for the rest of the planning horizon | None | Immediately |
| | Balsam | 20% | N/A | N/A | N/A |
| | Spruce | 26% | N/A | N/A | N/A |
| HFP | Pine | 59% | 53 – 75 for first period >60 for periods 2-4 22 to 67 percent for the rest of the planning horizon | None | Immediately |
| | Balsam | 23% | N/A | N/A | N/A |
| | Spruce | 18% | N/A | N/A | N/A |
| BCTS | Pine | 57% | 51-59 for first period >45 for periods 2-4 29-69 percent for the rest of the planning horizon | None | Immediately |
| | Balsam | 17% | N/A | N/A | N/A |
| | Spruce | 26% | N/A | N/A | N/A |

*based on actual harvest methods

**based on modelling assumptions

Rationale For Variance**Indicator Analysis Information**

| Strategy Practices, Methods, Assumptions and Criteria |
|--|
| The target will be achieved by ensuring annual harvest plans consider species profile forecasts and by considering block design generated by TSM when proposing future harvest Based on Base Case forecast across a 250 yr planning horizon as forecast using the Tesera Scheduling Model (TSM) |

Calculation of Indicator**Formula:**

$$\%SpV_{\text{licensee}} = (SpV_{\text{licensee}} / HV_{\text{licensee}}) \times 100$$

Variables:

%SpV_{licensee}: % Species volume (m³) by licensee

SpV_{licensee}: Species volume (m³) by licensee

HV_{licensee}: Harvest volume (m³) by licensee

Analysis Comments / Discussion

Current condition of % species composition of harvest will be based on scaled volume.

The amount of mature balsam will decline to approx 2% at the end of the planning horizon following an initial stable harvest level as targeted. Although balsam is planted as part of the current management strategies, current modelling assumptions do not account for balsam ingress. The forecasted targets will ensure that balsam is targeted in the short and mid-term.

Conversely, pine and spruce volumes are relatively stable for the first 10 periods then gradually increase over the planning horizon.

Indicator Monitoring Plans**Inventories Needed to Monitor and Analyze Indicator**

| Data Source | Source | Updating required for future analysis? | Date / interval required |
|---|----------|--|--------------------------|
| Scale receipts, payments | Licensee | Yes | Annual |
| VRI | ILMB | Yes | Use most current version |
| Silviculture database (harvest records) | Licensee | Yes | Annual |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|---------------------|--|------------------------|------------------------------------|
| Procure information | Obtain data from scale supervisor | Tweedsmuir Forest Ltd. | Annually starting 2003 |
| Analyze data | Evaluate data by licensee | Tweedsmuir Forest Ltd. | Annually starting January 31, 2004 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Annually starting January 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Annually starting January 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Indicator 36: Percent area in Aspen Leading Stands within Existing and Potential Range by LU by licensee

Indicator Linkages

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|-------------------------------|
| Resource: Agriculture Value/Issue: Aspen Management | Not applicable |

Indicator Rationale

What does this indicator mean?

This indicator tracks the percent of area in aspen leading stands within existing range, “potential” range areas and by Landscape Unit (LU). Existing range areas are those areas that exist under established range tenure, whereas potential range areas derived using a 5 km buffer around existing range*.

* Fulton Range unit is a standalone potential range area.

How does this indicator relate to the M&L IFPA and to SFM?

Range related activity is one of the long standing non-timber values that exist within portions of the Morice TSA. Certain areas within the TSA have established range tenure, and other areas of the TSA offer potential range opportunities. Given that a balance must exist between the different timber and non-timber resources, it is important to carefully balance areas which have multiple uses and values associated with them. One of the intentions within the ML-IFPA “Agriculture” Resource Value is to manage areas in potential range tenures areas which have aspen leading stands for enhanced grazing values. This indicator, therefore, provides the ability to forecast and track these areas throughout time. If these areas are identified, it could be possible to manage these areas to increase the potential grazing values. The potential expansion of range areas through planning and development of range opportunities helps in maintaining the economic diversity of the area while also preserving a well-established and long standing livelihood in the Morice TSA.

Current Status and Forecasted Targets/Thresholds of Indicator

| % area in Aspen leading Stands within Existing and Potential Range by LU by Licensee | | | | | | |
|---|-----------------------|-------------------|-----------------------|---------------|-----------------|-----------------------|
| Licensee | Landscape Unit | Range Type | Current Status | Target | Variance | Achieve Target |
| Canfor | Buck | Existing | 12% | TBD | TBD | Every 5 Years |
| | | Potential | 3.3% | | | |
| | Fulton | Existing | N/A | | | |
| | | Potential | 1.0% | | | |
| | Houston Tommy | Existing | 35% | | | |
| | | Potential | 6.0% | | | |
| | Kidprice | Existing | 8.0 | | | |
| | | Potential | 6.4% | | | |
| | Nadina | Existing | 8.3% | | | |
| | | Potential | 4.9% | | | |
| | Owen | Existing | 17.2% | | | |
| | | Potential | 7.3% | | | |
| | Parrotts | Existing | 17% | | | |
| | | Potential | 13% | | | |
| | Topley | Existing | N/A | | | |
| | | Potential | 12% | | | |
| | Valley | Existing | 18% | | | |
| | | Potential | 11.1% | | | |
| HFP | Buck | Existing | 9% | TBD | TBD | Every 5 Years |
| | | Potential | 0.3% | | | |
| | Nadina | Existing | 6.3% | | | |
| | | Potential | 4.1% | | | |
| | Owen | Existing | 7.6% | | | |
| | | Potential | 3.9% | | | |
| BCTS | Buck | Existing | 11.7% | TBD | TBD | Every 5 Years |

| % area in Aspen leading Stands within Existing and Potential Range by LU by Licensee | | | | | | |
|---|-----------------------|-------------------|-----------------------|---------------|-----------------|-----------------------|
| Licensee | Landscape Unit | Range Type | Current Status | Target | Variance | Achieve Target |
| | | Potential | 12.1% | | | |
| | Fulton | Existing | N/A | | | |
| | | Potential | 6.1% | | | |
| | Houston_Tommy | Existing | 5.0% | | | |
| | | Potential | 10.7% | | | |
| | Kidprice | Existing | 7.2% | | | |
| | | Potential | 7.9% | | | |
| | Owen | Existing | 17.2% | | | |
| | | Potential | 8.5% | | | |
| | Parrotts | Existing | 17% | | | |
| | | Potential | 0.8% | | | |
| | Valley | Existing | 18.3% | | | |
| | | Potential | 10.8% | | | |

Rationale for variance:

Indicator Analysis Information

Strategy Practices, Methods, Assumptions and Criteria

Every 5 years report % species composition by age class within Existing Range, Potential Range Areas by LU by licensee.

Calculation of Indicator

Formula:

$$\%ALS_{\text{range class, LU, licensee}} = (A_{\text{ALS,range class, LU, licensee}} / A_{\text{LU, licensee}}) \times 100$$

Variables:

$\%ALS_{\text{range class, LU, licensee}}$: % area in Aspen Leading Stands within Existing and Potential Range by LU by Licensee

$A_{\text{ALS, range class, LU, licensee}}$: Area in Aspen Leading Stands within Existing and Potential Range by LU by Licensee

$A_{\text{range class, LU, licensee}}$: Area by Existing Range/Potential Range/ALR, by LU, by licensee.

Analysis Comments/Discussion

- Targets were not set for licensee Landscape unit combinations less than 500 ha.
- Current status results will be reported out on every 5 years commencing in the 2007 reporting period

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|-----------------|--------|--|--------------------------|
| Forest cover | ILMB | Yes | Use most current version |
| Landscape Units | ILMB | If changes occur | Use most current version |
| TRIM | ILMB | No | Use most current version |
| BEC | ILMB | No | Use most current version |
| ALR | ILMB | Yes | Use most current version |
| Range tenure | ILMB | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|------------------------|---|------------------------|--------------------------------------|
| Procure necessary data | Review data determine if updates have occurred | Tweedsmuir Forest Ltd. | Every 5 years, starting 2007 |
| Analysis | Determine Existing Range Tenure area | Tweedsmuir Forest Ltd. | Every 5 years, starting 2007 |
| | Derive Potential Range Tenure area | Tweedsmuir Forest Ltd. | Every 5 years, starting 2007 |
| | Determine values for indicator | Tweedsmuir Forest Ltd. | Every 5 years, starting 2007 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes (review updated data only) | Tweedsmuir Forest Ltd. | Every 5 years, starting May 31, 2007 |
| | M&L IFPA SFM Report | IFPA Manager | Every 5 years, starting May 31, 2007 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Indicator 37: Total area by Ecosystem & Wildlife Value Class by licensee

Indicator Linkages:

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|--|
| <p>Resource: Wildlife</p> <p>Value / Issue: Fisher Habitat</p> <p>Value / Issue: Grizzly Bear Habitat</p> <p>Value / Issue: Sydney Williams (Takla) Caribou Herd Habitat</p> <p>Value / Issue: Telkwa Caribou Herd Habitat</p> <p>Value / Issue: Tweedsmuir Caribou Herd Habitat</p> | <p>Criterion: 1. Conservation of Biological Diversity</p> <p>SFM Element: 2 Species Diversity</p> <p>Value: Abundance and distribution of common and rare habitats within a range of variability over time to conserve species in the DFA</p> <p>Objective: A constant supply of habitats and/or attributes sufficient to conserve species that occur naturally on the DFA through time</p> <p>SFM Element: 4. Protected Areas and Sites of Special Biological Significance</p> <p>Value: 1. Protected areas and sites of biological significance are identified and appropriately managed</p> <p>Objective: 1. Protected Areas identified through government processes are respected and accommodated. Biologically significant areas are identified and management strategies appropriate to their long-term maintenance are implemented.</p> |

Indicators [31](#), [37](#) and [46](#) are closely related

Indicator Rationale

What does this indicator mean?

This indicator will track the changes in habitat values for selected wildlife species within the Morice TSA. In general, “ecosystem and wildlife value classes” are defined by the level of suitability (high, moderate, low, nil) for selected wildlife species habitat requirements. Detailed habitat suitability models have been completed for selected wildlife species of interest: Grizzly Bear, Caribou, and Moose. Grizzly Bear and Caribou have been identified by the Conservation Data Centre as species of management concern within the Morice TSA. Moose has been identified by members of the Morice Public Advisory Group as a species of interest. Each habitat suitability model evaluates each mapped polygon for variables such as forest structure, site series and assumed habitat attributes to determine habitat suitability values, either high, moderate, low, or nil. By running the models under different time intervals, a time series of habitat suitability is created which can be used for habitat supply. Changes in the percent total area for the habitat values for the selected species over time can be used to monitor the effects of various forest and habitat management strategies on wildlife.

How does this indicator relate to the M&L IFPA and to SFM?

Maintenance of wildlife habitat over the long-term is critical to meeting the environmental requirements of sustainable forest management. The wildlife species selected for habitat supply modeling were chosen to

reflect social, environmental and economic values important to the members of the IFPA scenario planning team and public advisory group. Each of the wildlife species selected for modeling have specific habitat attribute requirements (i.e. snags, closed canopy forests, limited road access, etc.) that need to be maintained for optimal habitat value. Species were also selected based on species at risk, available information, methods for inventory/management, and their roles as potential keystone/indicator species.

Current Status and Forecasted Targets / Thresholds of Indicator

| Total area by Ecosystem & Wildlife Value Class by licensee | | | | | | |
|--|---------------------------|--------------------------------|---------------------|------------------------|----------|-------------------|
| Licensee | Species of interest | Ecosystem Wildlife Value Class | Current Status (ha) | Forecasted Target (ha) | Variance | Achieve Target by |
| Canfor | Grizzly Bear (Spring) | High | 56,766 | > 39,412 | 0 | Immediately |
| HFP | Grizzly Bear (Spring) | High | 48,554 | > 35,480 | 0 | Immediately |
| BCTS | Grizzly Bear (Spring) | High | 15,874 | > 14,659 | 0 | Immediately |
| CanFor | Grizzly Bear (Summer) | High | 150,070 | > 107,403 | 0 | Immediately |
| HFP | Grizzly Bear (Summer) | High | 109,849 | > 80,467 | 0 | Immediately |
| BCTS | Grizzly Bear (Summer) | High | 37,157 | >32,737 | 0 | Immediately |
| CanFor | Grizzly Bear (Fall) | High | 86,608 | > 43,976 | 0 | Immediately |
| HFP | Grizzly Bear (Fall) | High | 65,349 | >33,721 | 0 | Immediately |
| BCTS | Grizzly Bear (Fall) | High | 14,461 | >9,017 | 0 | Immediately |
| CanFor | Telkwa Caribou Winter | Moderate + High | 42,468 | >41,000 | 0 | Immediately |
| HFP | Telkwa Caribou Winter | Moderate + High | 18,400 | > 18,375 | 0 | Immediately |
| BCTS | Telkwa Caribou Winter | Moderate + High | 4,276 | >4,276 | 0 | Immediately |
| CanFor | Takla Caribou Winter | Moderate + High | 7,746 | > 7,746 | 0 | Immediately |
| HFP | Takla Caribou Winter | Moderate + High | 8,791 | > 8,791 | 0 | Immediately |
| CanFor | Tweedsmuir Caribou Winter | Moderate + High | 9,012 | 8,242 | 0 | Immediately |
| HFP | Tweedsmuir Caribou Winter | Moderate + High | 18,129 | 17,504 | 0 | Immediately |
| BCTS | Tweedsmuir Caribou Winter | Moderate + High | 66 | 66 | 0 | Immediately |
| CanFor | Telkwa Caribou Calving | Moderate + High | 33,936 | > 33,123 | 0 | Immediately |
| HFP | Telkwa Caribou Calving | Moderate + High | 13,674 | > 13,069 | 0 | Immediately |
| BCTS | Telkwa Caribou Calving | Moderate + High | 3,298 | >3,164 | 0 | Immediately |
| CanFor | Takla Caribou Calving | Moderate + High | 29,422 | > 29,353 | 0 | Immediately |
| HFP | Takla Caribou Calving | Moderate + High | 14,894 | >14,767 | 0 | Immediately |

| Total area by Ecosystem & Wildlife Value Class by licensee | | | | | | |
|--|----------------------------|--------------------------------|---------------------|------------------------|----------|-------------------|
| Licensee | Species of interest | Ecosystem Wildlife Value Class | Current Status (ha) | Forecasted Target (ha) | Variance | Achieve Target by |
| CanFor | Tweedsmuir Caribou Calving | Moderate + High | 5,182 | >4,664 | 0 | Immediately |
| HFP | Tweedsmuir Caribou Calving | Moderate + High | 9,075 | > 8,709 | 0 | Immediately |
| CanFor | Telkwa Caribou Summer | Moderate + High | 71,229 | > 69,033 | 0 | Immediately |
| HFP | Telkwa Caribou Summer | Moderate + High | 28,742 | > 28,415 | 0 | Immediately |
| BCTS | Telkwa Caribou Summer | Moderate + High | 8,306 | >8,306 | 0 | Immediately |
| CanFor | Takla Caribou Summer | Moderate + High | 66,162 | > 62,885 | 0 | Immediately |
| HFP | Takla Caribou Summer | Moderate + High | 35,374 | > 34,433 | 0 | Immediately |
| CanFor | Tweedsmuir Caribou Summer | Moderate + High | 12,380 | > 11,444 | 0 | Immediately |
| HFP | Tweedsmuir Caribou Summer | Moderate + High | 30,907 | > 28,883 | 0 | Immediately |
| CanFor | Moose Winter | Moderate + High | 142,432 | > 142,432 | 0 | Immediately |
| HFP | Moose Winter | Moderate + High | 75,511 | > 75,511 | 0 | Immediately |
| BCTS | Moose Winter | Moderate + High | 60,098 | > 60,098 | 0 | Immediately |

Note: The decision scenario strategies suggest that the input assumptions and targets for Morice LRMP Seral Stage, area – specific management, visual constraints, and other input assumptions will ensure an adequate supply of habitat for each species modeled for this indicator. Targets we set on the minimum habitat available over the planning horizon.

Rationale for variance:

Indicator Analysis Information

Strategy Practices, Methods, Assumptions and Criteria

Based on Decision Scenario forecasts across a 250 yr planning horizon as forecast using the Tesera Scheduling Model (TSM), the target will be achieved with the following management direction:

Caribou:

- Telkwa Caribou Herd – Habitat targets will be achieved by following the interim guidelines in the Telkwa Caribou Herd Recovery Plan until such time as the Species at Risk Recovery Plan is completed for the Telkwa herd. The targets and strategies will be modified once the Species at Risk Recovery Plan is completed;
- Takla Herd - The strategies described in the Northern Caribou Ungulate Winter Range Proposal – Takla Herd (as referenced in the Morice LRMP Appendix 8 and 9) will be followed.
- Tweedsmuir Herd – Targets for calving habitat and post calving habitat will be set for the Tweedsmuir herd when the recovery action plan has been completed.

Grizzly Bear: Once the LRMP Best Management Practices (Objective 4 - Grizzly Bear) are developed, these practices will be followed.

Moose: The management strategies described in the Morice LRMP Section 2.5.4 (Objective 19) will be followed.

Other Species listed in the Morice LRMP, will be managed according to the direction in Section 2.5.4 (Objectives 16-24) of the Morice LRMP.

Other species of management concern may be identified in the future. Appropriate management strategies for these species will be developed in future versions of the SFM Plan.

Calculation of Indicator

Formula:

$$AWVC_{LU, Licensee}$$

Variables:

$AWVC_{Licensee}$: Total Area within Ecosystem and Wildlife Value Classes by licensee

Analysis Comments / Discussion

Caribou are only modeled in portions of the Morice that were considered as available suitable habitat based on telemetry data, input from MWLAP staff and Debbie Cichowski R.P.F., R.P. Bio. (Consulting Caribou Biologist).

Takla Caribou are modeled in the LUs north of Babine Lake only.

Telkwa Caribou are modeled in the LUs surrounding the Telkwa and Howson Ranges

Tweedsmuir Caribou are modeled in the LUs west of Whitesail Lake (Whitesail and Tahtsa)

Telkwa Caribou Herd: Manage to the seral target assumptions for the Telkwa Caribou Recovery Program Area.

Telkwa Caribou Herd Recovery Program Area (Key Forested Caribou Habitat): The Decision Scenario forecast modeled the TSR 2 assumption that a maximum 50% of the THLB in the ESSF and SBS should be less than 90 years of age. This serves as the basis for the targets being applied in the SFM Plan.

Tweedsmuir Caribou Herd: In order to meet the requirements contained in the wildlife notice for the Tweedsmuir Caribou Herd, the islands in the Whitesail reservoir will not be scheduled for harvesting.

Takla Herd Winter Medium: The Takla Herd seral stage target was derived from the Morice LRMP (Anon. 2004). It indicates that there should be < 30% volume removal on a cut block area every 80 years. For the purposes of this indicator it was expressed as the amount of area in early seral by using the following calculation:

$80 \text{ years} \div (30/100) = 266 \text{ years indicated rotation. Early seral is forest less than 40 years.}$

$40 \div 266 = 15\%$

Grizzly Bear (LRMP): Once the LRMP Best Management Practices (Objective 4 - Grizzly Bear) are developed, these practices will be followed.

The external habitat suitability models provide an opportunity to test and modify the models and their assumptions independently of the scheduling model. Integration of management targets back into the scheduling model for subsequent learning scenarios will be accomplished through analysis of the habitat attributes that contribute to the desired habitat conditions and managing for those targets within the scheduling model.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|-------------------------|------------------------|--|--------------------------|
| Silviculture data | Licensee | Yes | Annual |
| Wildlife habitat models | Tweedsmuir Forest Ltd. | Yes | Use most current version |
| VRI | ILMB | Yes | Use most current version |
| Landscape Units | ILMB | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--------------|--|------------------------|------------------------------|
| Procure data | Obtain data from habitat suitability models Ensure inventories are current (e.g. VRI). Add information to annual reporting resultant file. | Tweedsmuir Forest Ltd. | Every 5 years, starting 2004 |
| Analysis | Query resultant file and | Tweedsmuir Forest Ltd. | Every 5 years, starting |

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|----------|--|----------------|------------------------------|
| | determine percent total area by "ecosystem and wildlife value class" | | 2004 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Every 5 years, starting 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Every 5 years, starting 2004 |

Output for indicator reporting

This indicator will be reported on in tabular format.

References

Anon. 2004. Morice Land and Resource Management Plan Final Land Use Recommendation March 31, 2004 Appendix IX Page 262

Turney, L. and A.M. Roberts. 2003. Species accounts for Fisher (*Martes pennanti*), Grizzly Bear (*Ursus arctos horribilis*), and Woodland Caribou (*Rangifer tarandus caribou*) in the Morice and Lakes IFPA.

Indicator 41: Area (ha) treated by Treatment Type by licensee

Indicator Linkages:

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|---|-------------------------------|
| Resource: Timber Value / issue: Vegetation Management (maintain Base Case) Value / issue: Fertilization Value / issue: Density Management Value / issue: Contributing land base conversion Value/Issue: Wood quality | Not applicable |

Indicators 41 and 49 are closely related

Indicator Rationale

What does this indicator mean?

“Treatments” are prescribed silviculture activities following harvesting. Treatments are prescribed based on site characteristics and stand specific objectives for product type quality and value. Within silviculture and stand management prescriptions, operational details regarding treatments are described with respect to the type of treatment, timing of treatment, and the geographical extent of the treatment (i.e. treatment unit). With regard to the M&L IFPA, the treatments identified above (under the “value/issue” category) are those relating to incremental (i.e. non-mandatory) intensive silviculture treatments, which are intended to enhance long term forest productivity, quality, and value. This indicator will track the area treated by treatment type by licensee.

How does this indicator relate to the M&L IFPA and to SFM?

Ensuring that the forest land base is able to contribute to the long term timber supply (while ensuring high quality fibre and product value) is one of the key factors in progressing toward sustainable forest management. By virtue of varying site characteristics and stand specific objectives across the TSA, various intensive silviculture treatment methods can be applied in order to maintain and improve the productive capacity and value of harvested stands.

Current Status and Forecasted Targets/Thresholds of Indicator

| Area treated by treatment type by licensee | | | | | |
|---|--|--|-------------------------------|-----------------|--------------------------|
| Licensee | Treatment Type (incremental silviculture) | Current Status (2004) (ha) | Forecasted Target (ha) | Variance | Achieve Target by |
| Canfor | Vegetation Management • Backlog brushing | No data | | | |
| | Fertilization • Repeat & Late Rotation | No data | | | |
| | Density Management • Pre-free growing & Incremental Spacing • Problem Forest Type Rehab, - High density • Thinning | No data | | | |
| | Contributing Land base conversion • Problem Forest Type Rehab, - Low volume • Non-commercial cover conversion • Problem Forest Type Rehab, - Non-merchantable forest types | No data | | | |
| | Wood quality • pruning | No data | | | |
| HFP | (repeat) | 0 ha for all incremental treatment types | | | |
| BCTS | (repeat) | No data | | | |

Rationale for variance:

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria |
|--|
| Targets are defined according to model forecasting and assumptions from the M&L IFPA decision scenario. Targets are based on incremental silviculture activities only (i.e. not basic silviculture). Current status of this indicator is reported from operational data. |

Calculation of Indicator

Formula:

$$A_{\text{treatment type, licensee}}$$

Variables:

$A_{\text{treatment type, licensee}}$: Sum Area treated by treatment type by licensee

Analysis Comments / Discussion

- This indicator is for incremental (i.e. non-mandatory) silviculture treatments only
- Effectiveness of treatment will be verified through Growth and Yield Monitoring Program.
- Current status will be reported out on every 5 years with the next reporting period being in 2012.
- Current status will be based on the sum of all incremental silviculture treatments conducted within the 5 year reporting period.

Indicator Monitoring Plans**Inventories Needed to Monitor and Analyze Indicator**

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|-------------------|-----------------|--|--------------------------|
| Silviculture data | Licensees/BCMOF | Yes | Annually |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|---------------|---|------------------------|-----------------------------------|
| Procure data | Ensure data updated in silviculture database Indicator information to be provided by licensee. | Licensees/BCMOF | Every five years starting in 2012 |
| Data analysis | Compile information from licensees. | Tweedsmuir Forest Ltd. | Not applicable |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Every five years starting in 2012 |
| | M&L IFPA SFM Report | IFPA Manager | Every five years starting in 2012 |

Output for indicator reporting

This indicator will be reported out in tabular format.

References

Indicator 42: Area of arable land (Ha/5yr.) within contributing and non-contributing forest converted to agricultural lease by agricultural unit in licensee operating area

Indicator Linkages

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|--|
| Resource: Agriculture Value/Issue: Agriculture Lease Land Expansion | Criterion: 5. Multiple Benefits to Society Critical Element: 1. Timber and Non-Timber Benefits Value: 1. A balanced supply and variety of timber and non-timber products, services and benefits on the DFA Objective: 3. A variety of agricultural products are provided from the DFA |

Indicator Rationale

What does this indicator mean?

This indicator will report on portions of potentially arable land identified on the Pleasant Valley Cattleman's Association arability study map area within the agricultural units that is harvested for conversion to agriculture on a periodic basis.

How does this indicator relate to the M&L IFPA and to SFM?

While one of the premises of SFM is to maintain the productivity of the forest ecosystem, the conversion of forested land to agriculture is also an important factor in contributing to multiple benefits to society with regards to non-timber forest values. Agriculture and grazing is an important socio-economic activity in the Morice TSA, and as such, a balance must exist between the different timber and non-timber resources. One of the intentions within the ML-IFPA "Agriculture" Resource Value is to expand agriculture land use within the agricultural expansion Areas. The maintenance of agriculture and grazing opportunities helps to maintain the economic diversity of the area while preserving a well-established and long standing way of life in the Morice TSA.

Current Status and Forecasted Targets/Thresholds of Indicator

| Area of arable land (Ha/5yr.) within contributing and non-contributing forest converted to agricultural lease by agricultural unit by licensee | | | | | | |
|---|----------------------|--------------|----------------|------------------------|----------|----------------|
| Licensee | Agricultural Unit | THLB/ NCF | Current Status | Forecasted Target (ha) | Variance | Achieve Target |
| Canfor | Fulton Lake | NCF | 569 | 2,050 | | Period 6 |
| | | THLB | 0 | 0 | | Immediately |
| | Bulkley/Lower Morice | NCF | 418 | 2,952 | | Period 11 |
| | | THLB | 26.9 | 0 | | Immediately |
| | Parrott/ Owen | NCF | 996 | 2,750 | | Period 5 |

| Area of arable land (Ha/5yr.) within contributing and non-contributing forest converted to agricultural lease by agricultural unit by licensee | | | | | | |
|---|--------------------------|----------------------|---------------------------|-----------------------------------|-----------------|---------------------------|
| Licensee | Agricultural Unit | THLB/ NCF | Current Status | Forecasted Target (ha) | Variance | Achieve Target |
| | | THLB | 225 | 0 | | Immediately |
| | Morice West | NCF | 191 | 1,200 | | Period 7 |
| | | THLB | 511 | 0 | | Immediately |
| | Ootsa | NCF | 525 | 500 | | Immediately |
| | | THLB | 25 | 0 | | Immediately |
| HFP | Fulton Lake | NCF | 25.0 | 450 | | Period 10 |
| | | THLB | 470 | 0 | | Immediately |
| | Bulkley/Lower Morice | NCF | | | | |
| | | THLB | | | | |
| | Parrott/ Owen | NCF | 137 | 706 | | Period 6 |
| | | THLB | 0 | 0 | | Immediately |
| | Morice West | NCF | 422 | 800 | | Period 3 |
| | | THLB | 0 | 0 | | Immediately |
| | Poplar | NCF | 740 | 1,500 | | Period 4 |
| | | THLB | 0 | 0 | | Immediately |
| BCTS | Bulkley/Lower Morice | NCF | 2,068 | 7,048 | | Period 9 |
| | | THLB | 77.3 | 0 | | Immediately |
| | Parrott/ Owen | NCF | 1,120 | 2,544 | | Period 4 |
| | | THLB | 159 | 0 | | Immediately |

Rationale for variance:

Indicator Analysis Information

| |
|--|
| Strategy Practices, Methods, Assumptions and Criteria |
|--|

Report Area (ha/in five year period) harvested and converted to agricultural lease within each agricultural unit. (AU).

The target will be achieved by regularly converting identified potentially arable (PA) areas within the agricultural units to agricultural leases., thus providing an opportunity for agricultural expansion. The block design generated by TSM will be considered when developing future harvest proposals for agricultural, leases

Based on Decision Scenario forecast across a 250 yr planning horizon as forecast using the Tesera Scheduling Model (TSM).

The target will be achieved by following the management direction in section 2.4.2 (objective 1) in the Morice LRMP.

Calculation of Indicator

Formula:

$$H_{AAL/Au, licensee}$$

Variables:

$H_{AAL/Au, licensee}$: Area of arable land (Ha/5yr.) within contributing and non-contributing forest converted to agricultural lease by agricultural unit by licensee

Analysis Comments/Discussion

See the Morice LRMP consensus document section 2.4.2 Agriculture and Range objective #1 Measures 1.1, 1.2 and 1.3

Maximum potential area for expansion by unit, Fulton Lake 2,500 ha, Bulkley/Lower Morice 10,000 ha, Parrott: 6,000 ha., Morice West: 2,000 ha., Poplar Lake 1,500 ha., Ootsa Lake 500 ha.

Maximum area that can be in agriculture lease at one time by agriculture unit Fulton Lake 250 ha, Bulkley 600 ha, Parrott: 400 ha., Morice West 200 ha., Poplar Lake 200 ha., Ootsa 200 ha. Once agricultural land is fully developed it can be alienated to private land. The intent of the above is to ensure that the rate of development is spaced over time and to discourage acquiring agriculture leases just for the timber resource.

Parcels of land for agriculture expansion should be laid out to capture high value arable land while minimizing inclusion of areas of high value for other resources. Arable land outside the timber harvesting landbase (THLB) are the highest priority for agriculture expansion.

When considering alienating arable land within the THLB for agriculture, ensure that agriculture is the highest and best use of the land. Where silviculture investments have been made on arable land, conversion to agriculture should wait until the timber is harvested.

Fulton Unit: Total NCF is : 3,990 ha. which is above the Morice LRMP target of 2,500 ha. Licensee targets were prorated by HFP and Canfor contribution to Non contributing area.

- Canfor total NCF - 3,276 ha. 82% Target Area - 2050 ha.
- HFP total NCF - 613 Ha. 18% Target Area – 450 ha.

Area for agricultural land conversion will come entirely from non - THLB in this unit.

Bulkley/Lower Morice Unit: Total NCF is 14,511 which is above the Morice LRMP target of 10,000 ha.

- Canfor total NCF - 4,283ha. 29.5% Target Area - 2952 ha.
- BCTS total NCF - 10,228 Ha. 70.5% Target Area – 7,048 ha.

Area for agricultural land conversion will come entirely from non - THLB in this unit.

Parrott Unit: Total NCF is 9,213 ha. which is above the Morice LRMP target of 6,000 ha.

- Canfor total NCF - 4, 223 ha. 45.8% Target Area - 2,750 ha.
- BCTS total NCF - 3,906 Ha. 42.4% Target Area – 2,544 ha.
- HFP total NCF - 1084 Ha. 11.8 % Target Area – 706 ha.

Area for agricultural land conversion will come entirely from non - THLB in this unit.

Morice West Unit: Total NCF is 3,520 ha. which is above the Morice LRMP target of 2,000 ha.

- Canfor total NCF - 2,117 ha. 60% Target Area - 1,200 ha.
- HFP total NCF - 1,403 Ha. 40% Target Area – 800 ha.

Area for agricultural land conversion will come entirely from non - THLB in this unit.

Ootsa Unit: Total NCF is 848 ha. which is above the Morice LRMP target of 500 ha.

- Canfor total NCF - 800ha. 100% Target Area - 500 ha.

Area for agricultural land conversion will come entirely from non - THLB in this unit.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|-------------------------|--------|--|------------------------|
| ALR/GLA and PA coverage | ILMB | Yes | as updates occur |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|---|--|------------------------|--|
| Obtain necessary information from data custodian (ILMB) | Review data determine if updates have occurred | Tweedsmuir Forest Ltd. | Every 5 years, starting 2005 |
| Analysis | Determine values (ha/5 yr) for the indicator | Tweedsmuir Forest Ltd. | Every 5 years, starting 2005 |
| Report | Indicator Performance Management for Management Adjustment Purposes (review updated data only) | Tweedsmuir Forest Ltd. | Every 5 years, starting January 31, 2006 |
| | M&L IFPA SFM Report | IFPA Manager | Periodically, starting January 31, 2006 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Morice Land and Resource Management Plan – March 31, 2004 Section 2.4.2 Agriculture and Range Pages 66 to 71.

http://srmwww.gov.bc.ca/ske/lrmp/morice/docs/Morice_LRMP_Consensus_Draft_March_26.pdf

Indicator 43: Benefits directed into local communities by licensee

Indicator Linkages

| M&L IFPA Framework | CSA/CCFM SFM Framework |
|--|---|
| Applies to the M&L IFPA process as a whole | <p>Criterion: 5. Multiple Benefits to Society</p> <p>Critical Element: 3. Fair Distribution of Benefits and Costs</p> <p>Value: 1. Fair distribution of timber and non-timber benefits and costs over time</p> <p>Objective: 1. Timber and non timber benefits are fairly and equitably distributed at a range of scales for current and future generations</p> |

Indicator Rationale

What does this indicator mean?

This indicator tracks the volunteer contributions (in dollars) made by each IFPA partner toward the local communities in the Morice TSA on an annual basis. Examples of these contributions can be scholarships, donations (cash and in-kind contributions) and sponsorship.

How does this indicator relate to the M&L IFPA and to SFM?

Benefits directed toward local communities by the forest licensees contribute to the distribution of benefits obtained from the surrounding forest resources. With forestry as the primary industry in local communities, licensees can demonstrate good corporate citizenship through various volunteer contribution mechanisms such as providing scholarships, sponsorship, corporate donations, etc. The licensees also demonstrate their commitment to investing in the community for present and future generations by maintaining a certain level of benefits to the local communities over time.

Current Status and Forecasted Targets/Thresholds of Indicator

| Benefits directed into local communities | | | | |
|---|---|------------------------------------|-----------------|-----------------------|
| Licensee | Current Status (5 year rolling average) (2003) | Target | Variance | Achieve Target |
| Canfor | \$37,018.91* | Maintain 2002 level of \$38,000 | - 10% | Annually |
| HFP | \$33,742.63 | Maintain 2002 level of \$29,691.06 | - 10% | Annually |
| BCTS** | N/A | N/A | N/A | N/A |

*2001 data (most current available)

** This is an indicator that BCTS cannot report on due to it being a government ministry.

Rationale for variance: the variance is meant to account for annual fluctuations in the indicator which may be beyond the control of the licensee (e.g. amount of requests, economic limitations, etc.).

Indicator Analysis Information

Strategy Practices, Methods, Assumptions and Criteria

In order to achieve target, benefits will be directed into local communities. Benefits directed into local communities will be identified and reported.

Each licensee and Babine BCTS to provide information.

- Benefits include scholarships, donations, etc.
- Local is defined by Granisle, Topley and Houston postal codes

Calculation of Indicator

Formula:

$$\$B_{\text{local community, licensee}}$$

Variables:

$$\$B_{\text{local community, licensee}} = \text{Benefits directed into local community by Licensee (in dollars)}$$

Analysis Comments/Discussion

Business rules:

- In-kind contributions will be calculated within the value of this indicator
- Employee time is not considered as in-kind contributions

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|------------------|--------------------------|--|------------------------|
| Accounts payable | Licensee and Babine BCTS | Yes | As contracts are paid. |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|---|--|---|--------------------------|
| Set up system within individual organizations to document benefits to the local community | Ensure a system is organized to document the benefits to the local community | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager | December, 2002 |
| Monitor and update data | Ensure data is updated | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager | Annually starting 2003 |

| | | | |
|----------|--|---|------------------------------------|
| Analysis | Obtain necessary data for analysis | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager | Annually starting 2003 |
| | Conduct analysis for indicator | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager | Annually starting 2003 |
| Report | Indicator Performance Management for Management Adjustment Purposes (review updated data only) | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager • IFPA manager | Annually starting January 31, 2004 |
| | M&L IFPA SFM Report | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager • IFPA manager | Annually starting January 31, 2004 |

Proposed output for indicator reporting

This indicator will be reported in tabular format.

References

Indicator 45: Equivalent clear cut area (ECA) by Sensitive watershed by licensee

Indicator Linkages:

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|--|
| <p>Resource: Watershed and Riparian</p> <p>Value / Issue: Hydrology</p> <p>Value / Issue: Hydrology: Fulton and Morrison Watershed</p> <p>Value / Issue: Hydrology: Nadina Watershed</p> | <p>Criterion: 3. Conservation of Soil and Water Resources</p> <p>SFM Element: 2. Conserve water resources by maintaining water quality and quantity</p> <p>Value: 1. Productive capacity of water resources is conserved. (<i>conserve, quantity, quality, erosion, nutrient cycling, hydrologic changes.</i>)</p> <p>Objective: 1. Water quantity and quality are sustained through their characteristic range of variation, on the DFA through time.</p> |

Indicators [7](#), [10](#), [45](#) and [52](#) are closely related

Indicator Rationale

What does this indicator mean?

Forests and associated vegetation are central to maintaining hydrological cycles. In regions of mountainous terrain the integrity of forest ecosystems is critical in safe guarding water quality and quantity. Although it is recognized that many biophysical features of a watershed influence hydrology, forest cover is deemed to be very influential in governing water quality, quantity and flow patterns. Forest cover modulates peak flows and, as forest cover is removed, the amount of snow interception decreases and the timing of snow melt changes with respect to elevation. This can result in extreme episodes of flooding, erosion and mass wasting with loss of water quality and productive capacity of aquatic ecosystems. The potential impact of harvesting on watersheds must be continually evaluated to assist in determining the extent of best management practices.

Equivalent clearcut area (ECA) is a calculated term that reflects the cumulative effect of harvesting within a watershed that is equivalent to the impact of a clearcut⁴. Depending on the characteristics of a watershed, rate of recovery in terms of regrowth of vegetation (development of tree cover and shrub layer) will dictate the continuance of forest operations within a watershed. If it is deemed through the calculation of ECA that a threshold value has been exceeded, further examination may be necessary to determine if forest operations need to be modified (e.g. road deactivation and maintenance practices, alternative silviculture systems or possibly discontinuation of operations) would be discontinued until acceptable recovery has occurred. This indicator provides an approximate measure of disturbance in relation to hydrology impacts on water quality, quantity and flow patterns.

⁴ Anon. 1999. Coastal Watershed Assessment Procedure Guidebook (CWAP) and Interior Watershed Assessment Procedure Guidebook (IWAP) Second Edition Version 2.1 40p.

How does this indicator relate to the M&L IFPA and to SFM?

This indicator provides guidance in forest management planning with respect to the extent to which watersheds can be harvested in a manner that contributes to the maintenance of water quality, quantity and flow patterns. Other factors are also important in this regard such as, road density, presence of other access structures and the occurrence of natural events. The avoidance of erosional events contributes to the maintenance of overall productive capacity of the site and ensures other associated forest products are maintained.

Current Status and Forecasted Targets/Thresholds of Indicator

| Equivalent clearcut area (ECA) by Sensitive watershed by licensee | | | | |
|---|--|-----------------------|----------|-------------------|
| Licensee | Current Status (Sensitive Watershed > Threshold) | Forecasted Target (%) | Variance | Achieve Target by |
| Canfor | Watershed 163-Morice River Watershed 81-Bulkley River | <=30% | 0 | Immediately |
| HFP | N/A | <=25% | 0 | Immediately |
| FLSM | Watershed 218-Upper Nechako Reservoir | <=30% | 0 | Immediately |
| BCTS | Watershed 150-Morice River | <=30% | 0 | Immediately |

Rationale for Variance:

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria | |
|--|--|
| <p>In order to achieve the target, the block design generated by Tesera Scheduling Model (TSM) will be considered when developing future harvest proposals. Model outputs are based on Base Case forecast across a 250 yr planning horizon.</p> <p>Where the target is exceeded and any one of the following conditions apply:</p> <ul style="list-style-type: none"> ○ a significant number of landslides that entered the stream channel are known to have occurred; or ○ stream channel stability problems are evident; or ○ over 25% of the riparian forest along either bank of the main stream channels has been logged over the past 40 years; or ○ landslide problems are anticipated due to recent harvesting on unstable terrain. <p>An evaluation of the watershed will be conducted by a qualified professional.</p> <p>The following watersheds will be considered for an evaluation within the next 5 years:</p> <p>BCTS Watershed 150-Morice River</p> <p>CANFOR Watershed 163-Morice River Watershed 81-Bulkley River</p> <p>FLSM Watershed 218-Upper Nechako Reservoir</p> <p>See "Analysis Comments" section for additional assumptions.</p> | |

Timber harvest will be spatially modeled and subsequently scheduled throughout the planning horizon. ECA calculation will use methodology outlined in the IWAP guidebook (Anon. 1999).

Growth / recovery of vegetation within watershed can be interpreted but yield functions are required. As an alternative, field measurement may be used.

Calculation of Indicator

Formula:

ECA watershed by licensee

Variables:

ECA watershed by licensee: Equivalent clearcut area by watershed by licensee

Analysis Comments / Discussion

The Interior Watershed Assessment Guidebook, second addition page 2, indicates that watershed size suitable for analysis are between 500 and 50,000 ha. The analysis indicates 98% of the area of critical watersheds in the Morice TSA are in watersheds equal to or greater than 1000 ha. (See “Crit Watersheds > 1000 ha” Tab for details). Therefore we have not considered establishing targets for watersheds less than 1000 hectares.

ECA and RDI values of 30% and 1.5 respectively indicate an impact score of 0.5, which is at the bottom end of moderate impact rank. (IWAP Guidebook 1995 edition, page 16).

Targets have only been established for Sensitive Watersheds defined by the Scenario Planning Team. See the “Sensitive Watersheds GE 1000 ha” tab for a description of Sensitive watersheds.

Analysis for watersheds where harvesting activities are occurring and proposed.

The methods to calculate ECA is contained in the *Coastal and Interior Watershed Assessment Procedure Guidebook*⁵. The following table reflects the methods to calculate this indicator.

| Regeneration Height (m) | ECA (%) | % Recovery |
|-------------------------|---------|------------|
| 0-3 | 100 | 0 |
| 3-7 | 50 | 50 |
| 7-9 | 30 | 70 |
| 9+ | 10 | 90 |

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|---------------------|----------------|--|--------------------------|
| Vegetation Resource | Licensees/ILMB | yes | Use most current |

⁵ Anon. 1999. Coastal Watershed Assessment Procedure Guidebook (CWAP) and Interior Watershed Assessment Procedure Guidebook (IWAP) Second Edition Version 2.1 40p. See Appendix 2.

| | | | |
|---|-------------------------------|-----|--------------------------|
| Inventory (VRI) | | | version |
| Harvest history data layer Silviculture Database | Licensees | yes | Annually |
| WA watershed data layer | ILMB (augmented by licensees) | yes | Use most current version |
| Digital Elevation Model (DEM) | ILMB (augmented by licensees) | yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--------------------|---|------------------------|--------------------------------------|
| Data procurement | Obtain all necessary data layers required in order to conduct GIS analysis | Tweedsmuir Forest Ltd. | Every 5 years starting 2003 |
| Update data layers | Update data on a regular basis determined by rate of change within individual watersheds. Update inventories. | Tweedsmuir Forest Ltd. | Every 5 years starting 2003 |
| | Create Resultant (enables querying for ECA) | Tweedsmuir Forest Ltd. | Every 5 years starting 2003 |
| Analysis | Determination of ECA thresholds for watersheds | Tweedsmuir Forest Ltd. | Every 5 years starting 2003 |
| Analysis | Conducts analysis | Tweedsmuir Forest Ltd. | Every 5 years starting 2004 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Every 5 years starting May 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Every 5 years starting May 31, 2004. |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Anon. 1995. Interior Watershed Assessment Procedure Guidebook (IWAP) 82p.

Anon. 1999. Coastal Watershed Assessment Procedure Guidebook (CWAP) and Interior Watershed Assessment Procedure Guidebook (IWAP) Second Edition Version 2.1 40p.

Indicator 46: Road density by Ecosystem & Wildlife Value Class by licensee

Indicator Linkages

| M&L IFPA Framework | CSA/CCFM SFM Framework |
|---|---|
| <p>Resource: Landscape and Stand Level Biodiversity</p> <p>Value/Issue: Rare Ecosystems</p> <p>Resource: Wildlife</p> <p>Value/Issue: Mountain Goat</p> | <p>Criterion: 1. Conservation of Biological Diversity</p> <p>SFM Element: 4. Protected Areas and Sites of Special Biological Significance</p> <p>Value: 1. Protected areas and sites of biological significance are identified and appropriately managed</p> <p>Objective: 1. Protected Areas identified through government processes are respected and accommodated. Biologically significant areas are identified and management strategies appropriate to their long-term maintenance are implemented.</p> |

Indicators [31](#), [37](#) and 46 are closely related

Indicator Rationale

What does this indicator mean?

This indicator tracks density (km/km²) maintained roads in areas for selected “Ecosystem and Wildlife value classes” in the Morice TSA. The values of interest in this indicator are mountain goat key habitat the Telkwa, Takla, and Tweedsmuir Caribou herds, Grizzly Bear habitat and rare ecosystems. These inventory data layers are considered static on the landscape for this analysis. Rare ecosystems are ecosystems that are uncommon on the landscape or are considered threatened at certain seral stages on the landscape. Examples of rare ecosystems include south-facing grassland/scrub ecosystems and mature or old riparian floodplain ecosystems. This indicator will provide information on the level of roads built and their status that occurs within the identified areas.

How does this indicator relate to the M&L IFPA and to SFM?

Mountain goats, Caribou, Grizzly Bears and rare ecosystems have had inventories conducted to determine their locations on the Morice TSA. Mountain goats, Caribou, and Grizzly Bears are impacted by increased access due to roads. Rare ecosystems should be maintained in an undisturbed state to ensure that the potential rare plants and/or communities found within them are not lost due to disturbance. Road building may alter rare ecosystems to such a degree that they are no longer viable communities.

Current Status and Forecasted Targets/Thresholds of Indicator

| Road density by ecosystem and wildlife value class by licensee | | | | | | | | | |
|--|---------------------------------|----------------------|----------------------------|--|---------------------------------|------------------------------------|--|----------|-------------------|
| Licensee | Species / Ecosystem of interest | Wildlife Value Class | Total Area Km ² | | Current status | | Forecasted Target Road Density (km/km ²) | Variance | Achieve Target by |
| | | | | | Km in wildlife value class area | Road Density (km/km ²) | | | |
| Canfor | Mountain Goat Key Habitats | N/A | 20.15 | | 0.15 | 0.01 | <=0.2 | 0 | Immediately |
| | Telkwa Caribou Management Zones | Key Forested | 207.30 | | 49.52 | 0.24 | <=0.6 | 0 | Immediately |
| | | ESSF General | 68.93 | | 0.57 | 0.01 | N/A | N/A | N/A |
| | | SBS General | 65.61 | | 48.84 | 0.74 | N/A | N/A | N/A |
| | Takla Caribou Herd (LRMP) | High | 18.7 | | 0 | 0 | N/A | N/A | N/A |
| | | Medium | 11.7 | | 0 | 0 | N/A | N/A | N/A |
| | Grizzly Bear (LRMP) | N/A | 2486 | | 2065 | 0.83 | <=1.5 | 0 | Immediately |
| HFP | Mountain Goat Key Habitats | N/A | 13.12 | | 0.03 | 0.00 | <=0.2 | 0 | Immediately |
| | Telkwa Caribou Management Zones | Key Forested | 73.69 | | 0 | 0 | <=0.6 | 0 | Immediately |
| | | ESSF General | 74.96 | | 3.57 | 0.05 | N/A | N/A | N/A |
| | | SBS General | 28.64 | | 24.61 | 0.86 | N/A | N/A | N/A |
| | Grizzly Bear (LRMP) | N/A | 1907 | | 998 | 0.52 | <=1.5 | 0 | Immediately |
| BCTS | Telkwa Caribou Management Zones | Key Forested | 95.93 | | 51.30 | 0.53 | <=0.6 | 0.2 | Immediately |
| | | ESSF General | 6.26 | | 0.52 | 0.08 | N/A | N/A | N/A |
| | | SBS General | 0 | | 0 | 0 | N/A | N/A | N/A |
| | Grizzly Bear (LRMP) | N/A | 23 | | 24 | 1.06 | <=1.5 | 0.5 | Immediately |

Telkwa Caribou Management Zones:

- In the Key Forested zone the target is based on the road density after beetle management activities.
- In the ESSF General and SBS General, targets have not been established because the Seral Stage targets for these areas are used to regulate the rate of harvest (see Indicator 31).

Takla Caribou Herd (LRMP):

- High Class – no harvesting allowed

- Medium Class – targets have not been established because the Seral Stage targets for these areas are used to regulate the rate of harvest (see Indicator 31).

Grizzly Bear (LRMP): the target is based on the road density after beetle management activities. Tweedsmuir Herd Calving Areas are located in islands in Ootsa Reservoir and are not part of the timber harvesting land base.

Rationale for Variance

BCTS Telkwa Caribou Management Zones – Key Forested: to account for Beetle Management activities occurring during the first 4 Periods.

BCTS Grizzly Bear (LRMP) - to account for Beetle Management activities occurring during the first 4 Periods.

Indicator Analysis Information

Strategy Practices, Methods, Assumptions and Criteria

Mountain Goat:

Where the presence of mountain goats, trails, hair in key habitat areas is confirmed and future harvesting is planned.

Mountain Goat Key Habitat: Targets will be achieved by:

- Where feasible, incorporate Old Growth Areas in and/or around occupied goat habitat areas.
- Maintaining a minimum of 70% of the forested area in goat habitat areas in suitable thermal cover where the habitat use has been confirmed.
- Increasing yarding distance and modifying road locations to reduce road density
- Use low impact, winter, or temporary roads to minimize access.
- Use deactivation, access control or road rehabilitation to achieve the road density target.

Caribou:

Targets will be achieved by following the interim guidelines in the Telkwa Caribou Herd Recovery Plan until such time as the Species at Risk Recovery Plan is completed for the Telkwa herd. The targets and strategies will be modified once the Species at Risk Recovery Plan is completed.

The strategies described in the Northern Caribou Ungulate Winter Range Proposal – Takla Herd (as referenced in the Morice LRMP Appendix 8 and 9) will be followed.

Grizzly Bear (LRMP): Once the LRMP Best Management Practices (Objective 4 - Grizzly Bear) are developed, these practices will be followed.

Future road networks have been modeled in the decision scenario.

Calculation of Indicator

Formula:

$$RD_{EWVC, licensee} = L_{EWVC, licensee} / A_{EWVC, licensee}$$

Variables:

$$RD_{rec. class, licensee} : \text{road density (km/km}^2\text{) by road phase by Ecosystem \& Wildlife Value Class by licensee}$$

$L_{\text{km, rec. class, licensee}}$: Length of road (km) by road phase by Ecosystem & Wildlife Value Class by licensee

$A_{\text{rec. class, licensee}}$: Total area (km²) of by Ecosystem & Wildlife Value Class by licensee

Analysis Comments/Discussion

The inventory data layers are considered static on the landscape.

For key goat habitat maintained roads are those that the general public can use. Deactivated/access controlled roads are not considered for this indicator. The target was picked to allow for some maintained roads for harvesting purposes but ensuring that access will be limited.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|---------------------------------|-----------|--|--------------------------|
| Roads | Licensees | Yes | Annual |
| Mountain Goat Key Habitat Areas | ILMB | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--------------|---|------------------------|------------------------------------|
| Procure data | Ensure inventories are current | Tweedsmuir Forest Ltd. | Annually starting 2003 |
| Analyze | Compile information - road density by road phase and wildlife and ecosystem value class | Tweedsmuir Forest Ltd. | Annually starting January 31, 2004 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Annually starting January 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Annually starting January 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Indicator 47: Road density by recreation class by licensee

Indicator Linkages:

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|---|---|
| <p>Resource: Recreation</p> <p>Value / Issue: Trails (High Value, Existing)</p> <p>Value / Issue: Non - Commercial Recreation - Cross -country Skiing</p> <p>Value / Issue: Non - Commercial Recreation - Snowmobiling</p> <p>Value / Issue: Non - Commercial Recreation - Touring / Skiing</p> <p>Value / Issue: Fly-in Fishing Lakes (Existing and Proposed)</p> <p>Value / Issue: Recreation Features</p> <p>Value / Issue: Trails (Well-used, Existing)</p> | <p>Criterion: 5. Multiple Benefits to Society</p> <p>SFM Element: 1. Timber and Non-Timber Benefits</p> <p>Value: 2. Recreational experiences are provided on the DFA.</p> <p>Objective: 1. A full range of recreation opportunities are provided on the DFA.</p> |

Indicator Rationale

What does this indicator mean?

There are exceptional opportunities for unique recreational experiences in the Morice and Lakes IFPA. Road development throughout the DFA is an important aspect of ensuring safe, accessible, and enduring recreational experiences. It also provides a measure of back country recreational opportunities where lower road densities are desired. With roads being linked to recreational class this indicator provides a measure of the potential of providing a variety of recreational opportunities.

How does this indicator relate to the M&L IFPA and to SFM?

The varied terrain of BC's forest environments offers a variety of recreational experiences. Access plays an important role allowing the public to derive their desired recreational experience. Roads and the degree of access they provide within the DFA vary depending on the status of forest operations. In this regard, access influences the recreation experience. As forest operations proceed throughout the DFA access will constantly change as will the recreation experience. The licensees are committed to working with the public to provide opportunities for recreation while at the same time, managing access in a manner that is responsible and provides for necessary safeguards for recreational values.

Current Status and Forecasted Targets/Thresholds of Indicator

| Road Density by recreation class by licensee | | | | | | |
|---|---|-------------------|---|--|-----------------|--------------------------|
| Licensee | Recreation Class | Road Phase | Current Status (km/km²) | Forecasted Target (km/km²) | Variance | Achieve Target by |
| Canfor | Trails | Built | 2.66 | <= 3.0 | 0 | Immediately |
| | Fly-in fishing (existing and proposed) | Built | .26 | <= 1.1 | 0 | Immediately |
| | Recreation Features | Built | .59 | <= 1.3 | 0 | Immediately |
| | Trophy Rainbow Trout and Lake Trout Lakes | Built | .84 | <= 1.25 | 0 | Immediately |
| | LRMP summer non-motorized | Built | 0.13 | <=0.82 | 0 | Immediately |
| | LRMP Winter non-motorized | Built | 0 | 0 | 0 | Immediately |
| | LRMP non-motorized | Built | 0.17 | <=1.37 | 0 | Immediately |
| | LRMP Motorized | Built | 0.14 | <=0.87 | 0 | Immediately |
| HFP | Trails | Built | 2.76 | <= 3.4 | 0 | Immediately |
| | Fly-in fishing (existing and proposed) | Built | .59 | <= 1.4 | 0 | Immediately |
| | Recreation Features | Built | .34 | <= 1.1 | 0 | Immediately |
| | Trophy Rainbow Trout and Lake Trout Lakes | Built | .62 | <= 1.2 | 0 | Immediately |
| | LRMP summer non-motorized | Built | 0.08 | <=1.56 | 0 | Immediately |
| | LRMP Winter non-motorized | Built | 0 | 0 | 0 | Immediately |
| | LRMP non-motorized | Built | 0.03 | <=1.08 | 0 | Immediately |
| | LRMP Motorized | Built | 0.21 | <=1.47 | 0 | Immediately |
| BCTS | Trails | Built | 2.62 | <= 3.0 | 0 | Immediately |
| | Fly-in fishing (existing and proposed) | Built | 0.05 | <= 1.3 | 0 | Immediately |
| | Recreation Features | Built | .58 | <= 1.4 | 0 | Immediately |
| | Trophy Rainbow Trout and Lake Trout Lakes | Built | 1.79 | <= 2.3 | 0 | Immediately |
| | LRMP summer non-motorized | Built | 0.52 | <=1.93 | 0 | Immediately |
| | LRMP Winter non-motorized | Built | 0 | 0 | 0 | Immediately |
| | LRMP non-motorized | Built | 0.37 | <=1.63 | 0 | Immediately |
| | LRMP Motorized | Built | 0 | 0 | 0 | Immediately |

Targets are based on Decision Scenario Outputs.

Rationale for variance:

Indicator Analysis Information

Strategy Practices, Methods, Assumptions and Criteria

The strategies are based on the Decision Scenario forecast across a 250 yr planning horizon as forecast using the Tesera Scheduling Model (TSM). The block design generated by TSM will be considered when developing future harvest proposals.

The Plan Proponents will implement Recreation Management strategies identified in section 2.4.1, 2.3.5 & 2.6 of the Morice LRMP to achieve the targets for this indicator.

Calculation of Indicator

Formula:

$$RD_{\text{rec. class, licensee}} = L_{\text{km, rec. class, licensee}} / A_{\text{rec. class, licensee}}$$

Variables:

RD_{rec. class, licensee} : Road density by road phase by recreation class by licensee

L_{km, rec. class, licensee} : Length of road (km) by road phase by recreation class by licensee

A_{rec. class, licensee} : Total area (km²) of recreation class by licensee

Analysis Comments / Discussion

Recreation classes for this indicator (as defined by SPT):

*The locations of these SPT defined recreation classes can be found on the IFPA mapping website <http://tao.tesera.com:81/website/index.html>

- Trails*
- Fly-in fishing (existing and proposed) *
- Recreation Features *
- **LRMP summer non-motorized** (Grease Trail, Tsitsutl Mountain, Barrett Hat, Telkwa Mountains Area (Grizzly Plateau area), Telkwa Mountains Area Burnie South - Morice Range, Nanika - Kidprice, Kasalka, Whitesail South areas)**
- **LRMP Winter non-motorized** (Little Whitesail area)**
- **LRMP non-motorized** (Crow Bar Ski area, Morice Mtn - Silverthorne Lake, Telkwa Mountains Area, (Core recovery area) Telkwa Mountains Area Owen Lookout, Burnie North, Atna River, Nadina Mountain areas)**
- **LRMP Motorized** (Sibola, Tahtsa areas)**

**for the LRMP areas see the Morice LRMP for more information

http://srmwww.gov.bc.ca/ske/lrmp/morice/docs/Morice_LRMP_Consensus_Draft_March_26.pdf

The Scenario Planning Team also defined these additional recreation classes. Models are currently under development and results will be considered in the establishment of targets for future scenarios:

- Non-commercial Rec. – Cross country skiing

- Non-commercial Rec. – snowmobiling
- Non-commercial Rec. - Touring/skiing

Road phases are defined as:

- built

The Morice Scenario Planning Team defined these recreation classes and the assumptions can be found on the Morice and Lakes IFPA Website (<http://www.moricelakes-ifpa.com>).

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|------------------------------------|---------------|---|---------------------------------|
| Roads | Licensees | Yes | Annual |
| IFPA Recreation Features Inventory | ILMB | Yes | Use most current version |
| Recreation Inventory | ILMB | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|-----------------|--|------------------------|------------------------------------|
| Procure data | Ensure inventories are current | Tweedsmuir Forest Ltd. | Annually starting 2003 |
| Analyze | Compile information - road density by road class and recreation class | Tweedsmuir Forest Ltd. | Annually starting January 31, 2004 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Annually starting January 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Annually starting January 31, 2004 |

Output for Indicator Reporting

This indicator will be reported in tabular format.

References

Indicator 49: Area Weighted Average Minimum Harvest Age Mean Annual Increment (m³/ha/year) by BEC by licensee

Indicator Linkages:

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|---|
| <p>Resource: Timber</p> <p>Value / Issue: Harvest Flow Policy</p> <p>Value / Issue: Dry wood Utilization</p> <p>Value / Issue: Site productivity</p> | <p>Criterion: 2. Maintenance and Enhancement of Forest Ecosystem Condition and Productivity</p> <p>SFM Element: 2. Ecosystem Productivity</p> <p>Value: 1. Ecosystem and biological productivity is conserved on the DFA (<i>ecosystem, conserve, productivity, capacity, capability, natural variability, vitality, products</i>)</p> <p>Objective: 1. Sustainable rates of ecosystem and biological productivity.</p> <p>Criterion: 5. Multiple Benefits to Society</p> <p>SFM Element: 1. Timber and Non-Timber Benefits</p> <p>Value: 1. A balanced supply and variety of timber and non-timber products, services and benefits on the DFA</p> <p>Objective: 1. A sustainable harvest and use of timber products, services and benefits</p> |

Indicators [41](#) and 49 are closely related

Indicator Rationale

What does this indicator mean?

Mean Annual Increment (MAI) is a measure of the rate at which a stand of trees accumulates merchantable volume. Merchantable volume is known as the yield of a stand which is different than growth, as trees below merchantability limits grow but do not contribute to merchantable volume until they reach a merchantable size. Minimum harvest age (MHA) is the age at which a stand achieves the volume per hectare considered to be economically viable to harvest. MHA MAI is the average yield of a stand at the age at which it becomes economically viable to harvest expressed as unit volume per unit area per year (i.e. cubic meters/hectare/ year). MAI is a function of site factors such as aspect, slope, soil, nutrient, moisture and climate, and of operational factors such as species selection, genetics, merchantability specifications, regeneration delays and silviculture treatments. . Because sites differ in their productivity across the DFA, in order to report overall productivity the MHA MAI for each stand must be weighted (area weighted average - AWA) by its relative contribution to the productivity of the forest in the DFA. This indicator provides a direct measure of the rate of merchantable timber productivity across the defined forest area, and an indirect measure of the biological site productivity for other values.

How does this indicator relate to the M&L IFPA and to SFM?

This is an important indicator for a number of reasons, as indicated in the indicator linkages section above. From the perspective of the IFPA, maintenance and enhancement of the capacity of forest sites to grow merchantable timber provides the financial incentive for investment in the overall program. At the

time of writing of the IFPA proposal, for example, the Morice and Lakes Timber Supply Areas contributed \$140 million annually to provincial revenue through stumpage payments which equated to 8% of provincial revenue from that source. This has increased in more recent times due to attrition in coastal industry and mill closures in other parts of the province. Government and industry make substantial investments in timber production and related processing facilities and infrastructure to support this revenue flow and its contribution towards economic stability locally, provincially and corporately. These investments also support CSA criterion 5 by providing timber based benefits to society as a whole. This indicator measures the basic driver of that economic activity within the defined forest area that in turn provides for investment and the various economic and social benefits that result from that investment. The AWA MHA MAI at harvest measures the benefit that is captured in the future from the activities that are conducted on the DFA now.

From a CSA perspective, maintenance of forest site productivity addresses a number of SFM elements besides timber production and its related benefits. Sustainable rates of ecosystem and biological productivity provide for a number of related values to be conserved. This productive capacity can be managed for any number of end uses or products, but only when the basic site productivity is maintained can these uses or products be sustainable. The biological capacity of forest sites to produce timber can be viewed as an indicator of capacity of forest sites to produce other biologically based amenities that are valued by society.

Current Status and Forecasted Targets / Thresholds of Indicator

| Area Weighted Average Minimum Harvest Age Mean Annual Increment (m ³ /ha/year) by BEC by licensee | | | | | |
|---|----------|--------------------------|----------------------|----------|----------------------|
| Licensee | BEC | Current Status (2004) | Forecasted Target | Variance | Achieve Target by |
| Canfor | ESSFmc | 1.37 | >=1.37 | 0 | Immediately |
| | ESSFmk | 1.36 | >=1.37 | 0 | Period 5 |
| | ESSFmv 3 | 1.64 | >=1.6 | 0 | Immediately |
| | SBS dk | 2.17 | >=2.26 | 0 | Period 5 |
| | SBS mc 2 | 2.18 | >=2.45 | 0 | Period 5 |
| | SBS wk 3 | 2.11 | >= 2.32 | 0 | Period 5 |
| HFP | ESSFmc | 1.36 | >= 1.2 | 0 | Immediately |
| | ESSFmk | 1.34 | >=1.3 | 0 | Immediately |
| | ESSFmv 3 | 1.3 | >=1.3 | 0 | Immediately |
| | SBS dk | 2.4 | >= 2.6 | 0 | Period 5 |
| | SBS mc 2 | 2.1 | >=2.4 | 0 | Period 5 |
| BCTS | ESSFmc | 1.32 | >= 1.37 | 0 | Period 5 |
| | SBS dk | 1.69 | >= 1.6 | 0 | Immediately |
| | SBS mc 2 | 1.84 | >= 2.14 | 0 | Period 5 |

Rationale for variance:

Indicator Analysis Information

| Strategy Practices ,Methods, Assumptions and Criteria |
|--|
| <p>The target will be achieved by implementing harvest, and regeneration practices, on the ground that were model assumptions contained in the Decision Scenario.</p> <p>The block design generated by Tesera Scheduling Model (TSM) will be considered when developing future harvest proposals. Model outputs are based on Decision Scenario forecast across a 250 yr planning horizon.</p> <p>For calculating current status and targets, Area Weighed Average (AWA) MHAMAI on the timber harvesting landbase was considered since this is the area licensees can influence MHAMAI.</p> <p>The AWA MHA MAI for stands is the projected volume per ha. at the age the stand becomes economically viable for harvest (MHA) divided by the MAI multiplied by it's representative proportion of the THLB. The sum of this is the AWA MHA MAI for the DFA.</p> |

Calculation of Indicator

Formula:

$$\text{AWA MHA MAI}_{\text{BEC, licensee}} = \text{PV}_{\text{stand, BEC, licensee}} / \text{A}_{\text{total, BEC, licensee}}$$

Variables:

AWA MHA MAI_{BEC, licensee}: Area weighted average of Mean Annual Increment at Minimum Harvest Age by BEC by licensee (m³/ha/year)

PV_{stand, BEC, licensee}: Projected Volume of stand at Minimum Harvest Age cubic meters by BEC by licensee

A_{total, BEC, licensee}: Average total stand age at minimum harvest age (years) by BEC by licensee

Analysis Comments / Discussion

BEC Subzones with licensee operable areas less than 100 ha were excluded.

Minimum Volume per ha. for natural existing stands are: 150 m³/Ha. for Spruce and Pine leading stands and 200 m³/Ha. for Balsam leading stands. Minimum Volume per ha. for future managed stands are: 150 m³/Ha. for all species.

Different minimum harvest ages were applied to different locations on the DFA based on constraints.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|---|-----------|--|--------------------------|
| Yield curves | ILMB | Yes | Use most current version |
| VRI (merchantable volume/ha and age from harvest) | ILMB | Yes | Use most current version |
| Silviculture database | Licensees | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--|---|------------------------|-------------------------------------|
| Procure and prepare inventory information for analysis | Obtain most current VRI Obtain silviculture records from licensees Conduct stand disturbance update Update VRI with projections of 5 year stand growth Add updated VRI to reporting resultant file for analysis | Tweedsmuir Forest Ltd. | Every 5 years starting 2003 |
| Analysis | Query resultant file and compile MAI by BEC by licensee | Tweedsmuir Forest Ltd. | Every 5 years starting 2003 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Every 5 years starting May 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Every 5 years starting May 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Indicator 50: Public Advisory Group established and maintained according to approved Terms of Reference

Indicator Linkages

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|--|
| Applies to the M&L IFPA process as a whole | <p>Criterion: 6. Accepting Society's Responsibility for Sustainable Development</p> <p>SFM Element: 3. Public Participation</p> <p>Value: 1. Fair, equitable and effective public participation</p> <p>Objective: 1. A public involvement process designed and implemented to the satisfaction of participants</p> |

Indicator Rationale

What does this indicator mean?

This indicator acts to ensure that there is a properly functioning Public Advisory Group (PAG) which operates in accordance with an accepted Terms of Reference (TOR). The Terms of Reference document contains operating rules containing goals, key timelines, communication methods, provisions for resources, conflict of interest provisions, roles and responsibilities, decision making methods, dispute resolution methods, access to information provisions and TOR review and adjustment mechanisms. This document acts to ensure the Public Advisory Group operates efficiently and effectively toward achieving its goals. Reviewing such a document at specified intervals acts to ensure that it remains relevant.

How does this indicator relate to the M&L IFPA and to SFM?

"Public participation is a vital component of SFM in Canada. Members of the public are widely considered to have the right to be involved in the management of publicly owned forests." (CSA 2002) The Public Advisory Group is a fundamental mechanism to ensure that decisions are made as a result of informed, inclusive and fair consultation with local people who are directly affected by, or have an interest in sustainable forest management. The members of the PAG represent diverse interests on the TSA, and as such, each member of the PAG must be able to have the opportunity for effective and fair communication with one another and with the PAG as a whole. The TOR document is intended to provide the framework and protocol to ensure that all PAG members have the opportunity for effective input. Periodically, the TOR will be reviewed and, if necessary, revised to ensure the TOR remain relevant and effective for future needs of the PAG.

Current Status and Forecasted Targets/Thresholds of Indicator

| | Current Status (2004) | Target | Variance | Achieve Target |
|-------------------------------|---|---|-----------------|-----------------------|
| PAG Terms of Reference | Approved TOR on file (Reviewed June 9, 2004) | Review and update (as required) TOR on file | N/A | Annually |

Rationale for variance: Variance not applicable.

Indicator Analysis Information

Strategy Practices, Methods, Assumptions and Criteria

PAG Terms of Reference to be reviewed on an annual basis and revised if necessary.

Review of TOR will occur on an “as needed” basis with a minimum of 1 review annually in conjunction with the annual indicator performance review.

Calculation of Indicator

Formula:

Not applicable

Variables:

Not applicable

Analysis Comments/Discussion

None

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|--|------------------------|--|------------------------|
| Morice PAG Terms of Reference Document | Tweedsmuir Forest Ltd. | Yes | Annual |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--|--|----------------|------------------------------------|
| Maintain M&L IFPA PAG Terms of Reference | Establish a system to document the maintenance of Morice PAG TOR | IFPA Manager | October 2002 |
| Maintain and update TOR | Ensure TOR is reviewed and updated | IFPA Manager | Annually starting January 31, 2004 |
| Analysis | Not applicable | Not applicable | Not applicable |
| Report | Indicator Performance Management for Management Adjustment Purposes (review updated data only) | IFPA Manager | Annually starting January 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Annually starting January 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format to show when the TOR were reviewed, document the necessary changes and indicate when revisions were made.

References

CAN/CSA- Z809-2002. Sustainable Forest Management: Requirements and Guidance Document February 2002 (Draft). Canadian Standards Association, Etobicoke, Ont.

Indicator 52: Road density index (RDI) by sensitive watershed by licensee

Indicator Linkages:

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|---|--|
| <p>Resource: Watershed and Riparian</p> <p>Value / Issue: Hydrology</p> <p>Value / Issue: Hydrology: Fulton and Morrison Watershed</p> <p>Value / Issue: Hydrology: Nadina Watershed</p> <p>Resource: Wildlife</p> <p>Value / Issue: Tweedsmuir Caribou Herd - Whitesail & Troitsa Landscape Units</p> <p>Value / Issue: Grizzly - Salmon Zones</p> <p>Value / Issue: Grizzly Habitat Zones</p> | <p>Criterion: 3. Conservation of Soil and Water Resources</p> <p>SFM Element: 2. Water Quality and Quantity</p> <p>Value: 1. Productive capacity of water resources is conserved. (<i>conserve, quantity, quality, erosion, nutrient cycling, hydrologic changes.</i>)</p> <p>Objective: 1. Water quantity and quality are sustained through their characteristic range of variation, on the DFA through time.</p> |

Indicators [7](#), [10](#), [45](#) and 52 are closely related

Indicator Rationale

What does this indicator mean?

Road density index (RDI) is defined as the total length of road per unit area. Roads are a necessary component of forest management as they are necessary to access timber. The presence of roads, however, imparts stress on the environment through alteration of hydrological characteristics, the potential for erosion and mass wasting and the effect of roads on wildlife (road kill, predator/prey relationships, hunting pressure, habitat fragmentation and reduction of interior forest conditions).. Roads need to be carefully planned and constructed to minimize the above effects and for economic efficiency. High values of RDI indicate that a given watershed or management unit area is densely roaded and that other features and values may be negatively affected. This indicator provides a measure of the potential effects of roads within a watershed.

How does this indicator relate to the M&L IFPA and to SFM?

A balance must be struck between the value of forest management access, the social cost/benefits and the ecological cost of the road network in terms of impacts to other resource values. If the effects of roads in accessing the timber resource are offset by impacts to other values (e.g. wildlife habitat, water quality) the result can compromise the sustainability of those resources and associated values.

Current Status and Forecasted Targets / Thresholds of Indicator

| Road density index by watershed by licensee | | | | |
|---|--|-----------------|----------|----------------------------|
| Licensee | Current Status Sensitive Watersheds > Threshold | Threshold Value | Variance | Not Exceed Threshold Value |
| Canfor | Watershed 158-Morice River Watershed 162-Morice River | <= 1.5 | 0 | Immediately |

| | | | | |
|------|--|--------|---|-------------|
| | Watershed 163-Morice River Watershed 213-Upper Nechako Reservoir Watershed 29-Takla Lake Watershed 42-Takla Lake Watershed 50-Babine Lake Watershed 89-Morice River | | | |
| HFP | Watershed 180-Francois Lake Watershed 26-Babine Lake | <= 1.5 | 0 | Immediately |
| BCTS | Watershed 147-Francois Lake Watershed 150-Morice River | <= 1.5 | 0 | Immediately |

Other watersheds may be identified for an assessment that does not have the highest density score if there are significant, fisheries values, terrain sensitivity, or temperature sensitivity in the watershed that may be impacted by proposed development.

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria | |
|--|--|
| <p>In order to achieve the target, the block design generated by Tesera Scheduling Model (TSM) will be considered when developing future harvest proposals. Model outputs are based on Base Case forecast across a 250 yr planning horizon.</p> <p>Where the target is exceeded and any one of the following conditions apply:</p> <ul style="list-style-type: none"> o a significant number of landslides that entered the stream channel are known to have occurred; or o stream channel stability problems are evident; or o over 25% of the riparian forest along either bank of the main stream channels has been logged over the past 40 years; or o landslide problems are anticipated due to recent harvesting on unstable terrain. <p>An evaluation of the watershed will be conducted by a qualified professional.</p> <p>The following watersheds will be considered for an evaluation within the next 5 years (based on 2006 Annual Report):</p> <p>BCTS Watershed 145-Morice River Group-3rd Order Watershed 227-Upper Nechako Reservoir Group-5th Order</p> <p>HFP Watershed 101-Morice River Group-7th Order Watershed 111-Morice River Group-3rd Order Watershed 136-Morice River Group-3rd Order Watershed 13-Babine Lake Group-3rd Order Watershed 17-Babine Lake Group-3rd Order Watershed 188-Francois Lake Group-3rd Order Watershed 189-Francois Lake Group-3rd Order</p> | |

Watershed 190-Francois Lake Group-3rd Order

In addition to completing evaluations of watersheds, watersheds that are below the threshold value but have the highest road density index will be selected for sediment source survey annually by each licensee. Other watersheds may be considered for evaluation that do not have the highest density score if there are significant, fisheries values, terrain sensitivity, or temperature sensitivity in the watershed that may be impacted by proposed development.

The survey method to be used is the SQCI procedure (Anon. 2004) or other suitable method provided funding is available.

Future road networks will be modelled spatially and road phase (existing and future roads) will be tracked throughout the planning horizon. RDI calculation will use methodology outlined in the IWAP guidebook (Anon. 1999).

See “Analysis Comments” section for additional assumptions.

Calculation of Indicator

Formula:

$$RDI_{\text{watershed, licensee}} = R_{\text{km, watershed, licensee}} / A_{\text{watershed, licensee}}$$

Variables:

$RDI_{\text{watershed, licensee}}$: Road Density Index by watershed by Licensee (km/km²)

$R_{\text{km, watershed, licensee}}$: Kilometres of roads by watershed by licensee (km)

$A_{\text{watershed, licensee}}$: Area by watershed by licensee (km²)

(source: Anon. 1999)

Analysis Comments / Discussion

The Interior Watershed Assessment Guidebook, second addition page 2, indicates that watershed size suitable for analysis are between 500 and 50,000 ha. The analysis indicates 98% of the area of critical watersheds in the Morice TSA are in watersheds equal to or greater than 1000 ha. (See “Crit Watersheds > 1000 ha” Tab for details). Therefore we have not considered establishing targets for watersheds less than 1000 hectares.

Targets have only been established for Sensitive Watersheds defined by the Scenario Planning Team. See the “Sensitive Watersheds GE 1000 ha” tab for a description of Sensitive watersheds.

ECA and RDI values of 30% and 1.5 respectively indicate an impact score of 0.5, which is at the bottom end of moderate impact rank. (IWAP Guidebook 1995 edition, page 16).

General Access Management Considerations:

For the decision scenario, different levels of road activity by road class will occur across the planning horizon.

- Mainline roads will remain active across the planning horizon.
- Operational and spur roads that do not have hauling for a three year period will be considered inactive.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|-------------------------------|-------------------------------|---|---------------------------------|
| Road inventory | Licensee | Yes | Use most current version |
| Watershed data layer | ILMB (augmented by licensees) | Yes | Use most current version |
| Digital Elevation Model (DEM) | ILMB (augmented by licensees) | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--|--|------------------------|------------------------------------|
| Procure and prepare inventory information for analysis | Update inventories and enter into the reporting database. Add information to annual reporting resultant file. | Tweedsmuir Forest Ltd. | Annually starting 2003 |
| Analysis | Query resultant file and determine RDI | Tweedsmuir Forest Ltd. | Annually starting 2004 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Annually starting January 31, 2004 |
| | M&L IFPA SFM Report | IFPA Manager | Annually starting January 31, 2004 |

Output for indicator reporting

This indicator will be reported in tabular format. If required, maps will also be prepared to supplement the output data. Road locations can be shown and the index for the watershed colour coded. Upon sufficient year-to-year data, graphs can be prepared to demonstrate the change over time of the RDI with respect to the designated threshold value.

References

Anon. 2004. The Stream Crossing Quality Index: A Water Quality Indicator for Sustainable Forest management. P. Beaudry and Associates Ltd. April 2004.

Anon. 1999. Coastal Watershed Assessment Procedure Guidebook (CWAP) and Interior Watershed Assessment Procedure Guidebook (IWAP) Second Edition Version 2.1 40p.

Anon. 1995. Interior Watershed Assessment Procedure Guidebook (IWAP) 82p.

Indicator 53: Percent of Harvesting by Licensee Where Recommended Operational Guidelines Have Been Applied to Retain Structural Habitat Elements

Indicator Linkages:

| M&L IFPA Framework | CSA/CCFM SFM Framework |
|--|--|
| <p>Resource: Landscape and Stand Level Biodiversity Value / Issue: Habitat Element – CWD Value / Issue: Habitat Element – Snags Value / Issue: Habitat Element – Large Live Trees</p> | <p>Criterion: 1. Conservation of Biological Diversity SFM Element: 2. Species Diversity Value: 1. Abundance and distribution of common and rare habitats within a range of variability over time to conserve species in the DFA Objective: 1. A constant supply of habitats and/or attributes sufficient to conserve species that occur naturally on the DFA through time.</p> <p>Criterion: 4. Forest Ecosystem Contributions to Global Ecological Cycles SFM Element: 1. Carbon uptake and storage Value: 1. Storage of Carbon in forest ecosystems and products Objective: 1. Forest ecosystems are net carbon sinks over time on the DFA</p> |

Indicators [15](#) and 53 are closely related

Indicator Rationale

What does this indicator mean?

Coarse woody debris (CWD) is defined as “dead woody material, in various stages of decomposition, located above the soil, larger than 7.5cm diameter and not self-supporting” (MoF and MELP, 1998). CWD is an important component of forest ecosystems, contributing to nutrient, soil and water cycles, soil and slope stability and long term carbon storage, as well as providing habitat for a large number of organisms (Keisker 2000, Lofroth 1998, Stevens 1997, Caza 1993, Maser *et al.* 1988). Recruitment of CWD into a regenerating stand is achieved through the maintenance of standing dead snags and large live trees (wildlife trees), as well as immature trees, within the harvested area. Standing dead wood, recruited from dying large live trees, provides habitat for a broad-range of species until it falls down and contributes to CWD mid-rotation (Byman 2003). Retention of residual immature stems that mature into large live trees ensures recruitment of snags late in the rotation of the managed stand, thereby providing for long-term CWD recruitment. Residual retention also contributes to structural habitat diversity across harvested openings and throughout the life of the regenerating stand.

This indicator will track the frequency, consistency and efficacy of the application of stand level operational guidelines intended to retain CWD and those structural habitat elements related to the recruitment of CWD: snags, large live trees and immature trees (Appendix D). Retention of these habitat elements with the objective of maintaining the dead wood cycle in managed forests will address the biodiversity and habitat needs of a wide range of species. Operational CWD guidelines (Appendix D) are intended to produce volumes of CWD consistent with the range of values found in ecologically similar unmanaged mature and old seral stands (Lloyd 2001a; Lloyd 2004; Lloyd in prep). Volume retained will be morphologically consistent with (diameter class and piece length), and distributed similarly to (horizontal and vertical), unmanaged CWD within site series groups from the prevalent interior

biogeoclimatic (BEC) variants of SBSmc2, SBSdk and ESSFmc (Lloyd 2001b, Lloyd 2001c, Lloyd 2002, Lloyd 2003). Operational guidelines are also intended to enhance retention of residual immature trees and stubs. CWD retention matrices have been developed against which to monitor the performance of operational guidelines in producing the representative CWD volumes and attributes by site series groups by major BEC variant (Lloyd and Todd in prep). Operational management trials have demonstrated that operational guidelines produce CWD retention consistent with matrix values (Lloyd 2004, Lloyd 2004 in prep). Trials have also indicated that operational practices enhance retention of immature trees. CWD within less frequent BEC variants will be managed according to the operational guidelines of the most ecologically similar prevalent variant on the assumption that their CWD attributes and dynamics are comparable and will be maintained. Operational CWD guidelines are intended to retain existing blow down and logging debris on site, associated with the retention of residual immature stems. Standing dead and large live trees are maintained in harvested stands through the retention of Wildlife Trees (WT) and Wildlife Tree Patches (WTP) (refer to Indicator 15).

How does this indicator relate to the M&L IFPA and to SFM?

Coarse woody debris functions at the scale of the stand, site or microsite, and is a consequence of disturbance type and intensity, site productivity (tree species, nutrient and moisture levels), successional processes, and the age of the stand. Management cannot replicate natural dead wood dynamics due to large scale biomass removal by harvesting; however, it can attempt to emulate natural patterns and buffer anticipated troughs in CWD supply. Operational guidelines have been developed to maintain CWD volumes, piece sizes (diameter and length) and distributions within managed stands in the Morice Timber Supply Area (TSA) which are reflective of those found within mature to old unmanaged stands of similar site series. Guidelines for the application of CWD management practices within landscapes are currently under investigation and will allow for both coarse and fine scale natural variability as well as the accommodation of times when CWD retention is operationally impractical (e.g. ground requiring site preparation). Understanding the persistence and recruitment of CWD and its related supply attributes of snags, large live trees and residual, immature trees, is required for the development of growth and yield curves to allow forecasting of CWD levels into the future and monitoring the results of stand level management strategies applied across landscapes. However, our current understanding of CWD dynamics is limited and existing datasets are inadequate to fairly represent the influence of stand initiation conditions and successional processes. The consistent application of stand level operational guidelines across harvested areas in the near future will provide an improved interim supply of CWD as we improve our understanding of the linkage between CWD dynamics and landscape pattern.

Similar to CWD, snags and large live trees function at the scale of the stand or site, but must be supplied at both the stand and landscape scale to account for variability and operational limitations (e.g. wildlife danger tree regulations). Work has not yet been completed to evaluate the abundance, distribution and structural characteristics of these habitat elements relative to site series groups. Such information will allow for the expansion of operational guidelines and monitoring matrices to include snags and large live trees. It will also improve our understanding of stand dynamics, allowing for the refinement of growth and yield curves to improve our ability to forecast and plan at landscape scales. In the interim, retention of these elements is achieved through wildlife tree retention (WTR) as per indicator 15. Future monitoring will be required to assess the performance of WTR in maintaining a supply of snags and large trees to address their dual roles as habitat and CWD supply.

Current Status and Forecasted Targets / Thresholds of Indicator

| Percentage of area harvested each year for which recommended operational practices for structural habitat retention has been applied by licensee | | | | |
|---|-----------------------|----------------------------|-----------------|--------------------------|
| Licencee | Current Status | Forecasted Target % | Variance | Achieve Target By |
| Canfor | 0 | 100 | 0 | Immediately |
| HFP | 0 | 100 | 0 | 2007 |
| BCTS | 0 | 100 | 0 | 2007 |

Implementation of operational CWD guidelines will commence in 2005 or later, dependent on licensee. Guidelines may be implemented in a step-wise fashion, either by logging contractor, operating area, landscape unit, or BEC variant.

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria |
|--|
|--|

1. Implementation of Operational CWD Guidelines

The target is to apply operational CWD guidelines to 100% of new harvesting (Appendix D) and will be expressed as the proportion of area harvested annually on which operational CWD guidelines are applied. Contractor training is an integral part of implementation.

2. Performance Monitoring of Operational CWD Guidelines

Performance: an assessment of whether the guidelines and the means in which they're being applied are producing the expected field results in terms of CWD volumes, piece size and distribution as well as residual immature retention.

Performance monitoring supports the objective of this indicator. The intent is to find that 100% of the post-harvest CWD survey plots within areas for which guidelines were applied do contain volumes and attributes of CWD consistent with the monitoring matrices (Appendix D).

The results of operational trials indicate there is a wide variability in CWD volumes and attributes produced through the application of operational guidelines; however, the trend is for areas treated to consistently produce CWD volumes and attributes which approach or exceed the expected values based on old to mature unmanaged stands (Lloyd 2004). Operational trials produced an insufficient sample size to allow the setting of any meaningful variances around the monitoring matrix values. Therefore, field audits (Appendix D) will be performed for the first 2 years in which practices are applied to create a dataset of sufficient size to determine if setting variances to describe consistency with management targets would be a meaningful exercise given the naturally high variability found in CWD volume, structure and distribution; and what variances, if any, are appropriate. This will also allow for the short-term determination of efficacy of the guidelines. Thereafter, field audits will be performed at 5 year intervals.

Calculation of Indicator

Indicator Formula:

$$\%HAGA_{\text{licensee}} = HAGA_{\text{licensee}} / TAH_{\text{licensee}} * 100$$

Variables:

HAGA_{licensee}: Harvested Area with Guidelines Applied

TAH_{licensee}: Total Area Harvested per annum

Analysis Comments / Discussion

There are three stages of monitoring in the application and assessment of operational CWD guidelines: implementation monitoring, performance monitoring and effectiveness monitoring.

1. Implementation Monitoring:

This indicator tracks implementation of the guidelines and as such, serves a role in implementation monitoring.

A variance is not required as the operational guidelines will be consistently applied during all new harvesting. However, there are several variables that will affect the efficacy of the application of the guidelines; these include forest type, mechanical site preparation or changing pulp markets. Forests with abundant regeneration and blowdown will be better candidates for the full application of retention guidelines, such as residual patch retention and jack-strawing; simpler, less vertically stratified forests may only lend themselves to a limited practices, such as laying logs parallel to skid. Many blocks will have smaller areas within them that require mechanical site prep mixed in amongst larger areas of direct plant. Site preparation guidelines will be developed to ensure that harvesting retention results are not compromised. Not all stands will have the dead wood potential to contribute to pulp and those that do (e.g. ESSFmc sites) have naturally high amounts of CWD and residual understory which will produce a significant level of CWD and immature trees (Lloyd 2004); sufficient to waterbed the effects of short term changes in markets. It is assumed that this type of limited reduction in CWD retention should be absorbed by the larger gains made by retention across all new harvesting throughout landscapes. Future investigations in landscape level managed of this stand level resource should assist us in testing this assumption.

2. Performance Monitoring:

Performance will be monitored periodically by CWD/residual field audits applied to a sub-sample of area harvested in the survey period. A field sampling protocol will be used that is consistent with the original operational trials (Appendix D). CWD results will be analysed and reported as per Lloyd (2004), by grouping all plots by BEC variant and site series groups. Performance will be evaluated by determining the proportion of survey plots, by BEC variant and site series group, that are consistent with the CWD values provided in the monitoring matrices (Appendix D).

Residual retention will also be surveyed. However, the high variability of this attribute pre-harvest is reflected in the high variability observed post-harvest during operational trials. There is currently no baseline on which to establish meaningful stand level targets for residual retention. In the short-term, operational trials have indicated that operational CWD guidelines produce substantially “more” residual retention than control areas. Survey data collected during field audits will assist in the potential development of residual retention targets.

3. Effectiveness Monitoring

An evaluation of the effectiveness of operational CWD guidelines in maintaining ecologically meaningful levels of CWD is required. Current investigations are underway to assess the use of CWD dependent invertebrates as indicators of the effectiveness of CWD management. Other potential species groups include CWD dependent plants and bryophytes.

This operational indicator will develop over time, with modifications to existing monitoring values and sampling protocols, development of new protocols and guidelines, and the ongoing investigation into landscape level management and forecasting. The bias associated with CWD management values based on mature to old seral stand attributes versus those resulting from natural stand initiation events such as fire or blowdown is clearly recognized and will be addressed in continued study. Future landscape evaluation will consider CWD in the non-contributing forest, Wildlife Tree Patches, riparian reserves, other constrained areas and CWD dispersed across harvested areas.

Indicator Monitoring Plans

Inventories Needed to Implement, Monitor and Analyse Indicator

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|--|-----------|--|--------------------------|
| Silviculture data (ecotype) | Licensees | Yes | Annually |
| Post-harvest inspections for CWD (volume, piece size and distribution) | Licensees | Yes | Annually |
| Pre-work Form | Licencees | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|-------------------------------|--|------------------------|--|
| Develop protocol for sampling | Develop post harvest inspection protocol for CWD | Licensees and BCMOF | Complete |
| Procure data | Obtain CWD information from post-harvest inspections. | Licensees and BCMOF | Annually for 2 years, starting one year post implementation. 2006 Every 5 years after that. |
| Analysis | Compile data from licensees and BCMOF and combine with analysis information (to account for areas that haven't been harvested) | Tweedsmuir Forest Ltd. | Annually for 2 years, starting one year post implementation. 2006 Every 5 years after that. |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Annually for 2 years, starting one year post implementation. 2006 Every 5 years after that. |

Output for indicator reporting

This indicator will be presented in tabular format.

Supporting Documentation

Appendix D Operational Strategies for CWD Management, Operational CWD Monitoring Matrices & Field Sampling Protocol for CWD Post-harvest Performance Monitoring

References

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Indicator 54: Percentage of comments receiving response by type by licensee

Indicator Linkages

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|--|--|
| Applies to the M&L IFPA process as a whole | <p>Criterion: 6 Accepting Society's Responsibility for Sustainable Development</p> <p>SFM Element:1 Aboriginal and Treaty Rights Value: 1 First Nations' Aboriginal and Treaty rights Objective: 1 Duly- established First Nations' Aboriginal and Treaty rights are recognized and respected</p> <p>SFM Element:3 Public Participation Value: 1 Fair, equitable and effective public participation Objective: 1 A public involvement process designed and implemented to the satisfaction of participants</p> <p>SFM Element:4 Information for Decision- Making Value: 1 Informed decision- making and increased knowledge Objective: 1 Relevant information is exchanged between interested parties to support decision-making and increased knowledge of ecosystem processes and human interactions with forest ecosystems.</p> |

Indicators [2](#), [4](#), [27](#) & 54 are closely related

Indicator Rationale

What does this indicator mean?

This indicator tracks the level of response to public communications received by the IFPA partners related to forest management activities. It will be the responsibility of the IFPA partners to track comments received through communications, and also track the response to these comments in order to monitor and report on this indicator

How does this indicator relate to the M&L IFPA and to SFM?

Public participation and communication in SFM are important means by which to incorporate public values in long-term SFM planning. The M&L IFPA SFM process encourages open and effective communication of values from a diversity of interests. As such, it is important ensure that communication from individuals and/or groups representing various interests directed towards forest management plans and activities received by the IFPA partners receive appropriate response. By maintaining effective communication between the public, licensees, managing agencies and other stakeholders, there is a

much greater ability to work together to develop mutually compatible objectives on the land base. Maintaining effective communication is not only important for developing the SFM plan, but will also be important in the monitoring, evaluation and continual improvement part of the M&L IFPA SFM process.

Current Status and Forecasted Targets/Thresholds of Indicator

| % of Comments receiving response | | | | | |
|---|----------------------|------------------------------|---------------|-----------------|-----------------------|
| Licensee | Response type | Current Status (2004) | Target | Variance | Achieve Target |
| Canfor | Written | 91% | 100% | None | Annually |
| | Verbal | 90% | 100% | None | Annually |
| BCTS | Written | 100% | 100% | None | Annually |
| | Verbal | 100% | 100% | None | Annually |

Rationale for variance: It is expected that the licensees, and Babine BCTS will respond to all recorded (i.e. written and verbal) comments, therefore, no variance is indicated.

Indicator Analysis Information

Strategy Practices, Methods, Assumptions and Criteria

Licensees review response records to determine Current Status See Analysis Comments/Discussion below

Calculation of Indicator

Formula:

$$\%CR_{\text{type, licensee}} = (R_{\text{type, licensee}} / C_{\text{licensee}}) \times 100$$

Variables:

$\%CR_{\text{type, licensee}}$: % of Comments receiving response by type by licensee

$R_{\text{type, licensee}}$: Number of responses to comments received by type by licensee

C_{licensee} : Number of comments received by licensee

Analysis Comments/Discussion

Response Type (examples)

- Written (Letter, Fax, Email)
- Verbal (Conversation) - must be a recorded conversation

Business Rules:

- Response is defined as sent.
- Reporting period for this indicator will be the calendar year.
- Public communications
 - includes First Nations and other interest groups
 - excludes
 - government communications
 - public meetings

rationale: commitments from meeting proceedings are tracked by “*Percentage of forest management commitments resulting from consultations regarding non-timber features and interests completed on time by licensee*” indicator).

Indicator Monitoring Plans**Inventories Needed to Monitor and Analyze Indicator**

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|--------------------------------|---------------|--|----------------------------|
| Communication records database | Each licensee | Yes | As communications are sent |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|------------------------------------|--|---|------------------------------------|
| Set up system to document response | Ensure a system is organized to document responses within the licensee-specific DFA's. | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager | December, 2002 |
| Monitor and update data | Ensure data is updated | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager | Annually starting 2003 |
| Analysis | Not applicable | Not applicable | Not applicable |
| Report | Indicator Performance Management for Management Adjustment Purposes (review updated data only) | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager | Annually starting January 31, 2004 |
| | M&L IFPA SFM Report | <ul style="list-style-type: none"> • Woods Managers for each licensee • Babine BCTS Manager • IFPA Manager | Annually starting January 31, 2004 |

Proposed output for indicator reporting

This indicator will be reported in tabular format.

References

Indicator 56: Percent of Fires Burning During Poor or Fair Air Quality Conditions by Licensee

Indicator Linkages

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|-------------------------------|---|
| Not Applicable. | <p>Criterion: 5. Multiple Benefits to Society</p> <p>Critical Element: 2. Timber and Non-Timber Benefits</p> <p>Value: 1. Healthy and Sustainable Communities.</p> <p>Objective: Air Quality that supports healthy communities.</p> |

Indicator Rationale

What does this indicator mean?

Poor air quality can affect human health and is not aesthetically pleasing (Bates et al. 2004). Industrial and non industrial smoke and road dust have the largest potential impacts on local air quality. Ambient air quality data for the period of 1999 to 2001 demonstrates that there have been a number of smoke related air quality episodes annually in the Bulkley Valley and Lakes Districts.

How does this indicator relate to the M&L IFPA and to SFM?

A portion of the Bulkley Valley Air shed is within the Morice SFM plan area where a significant proportion of the local population resides. Because of weather patterns and terrain conditions in the Bulkley Valley, it can be particularly susceptible to poor air quality events (Anon. 2004). Other communities in the area may also experience poor air quality. Although fire is a useful tool for achieving several forest management objectives in the Defined Forest Area, forest management activities such as burning logging waste for reforestation or fire hazard abatement can have a significant impact on air quality if conducted during poor venting conditions.

Current Status and Forecasted Targets/Thresholds of Indicator

| Percent of Fires Burning During Poor or Fair Air Quality Conditions by Licensee. | | | | | |
|---|-------------------|------------------------------|---------------|-----------------|-----------------------|
| Licensee | AQI Rating | Current Status (2004) | Target | Variance | Achieve Target |
| Canfor | Poor | 0% | 0% | 0 | Immediately |
| | Fair | 19.1% | <20% | 0 | Immediately |
| BCTS | Poor | N/A | 0% | 0 | Immediately |
| | Fair | N/A | <20% | 0 | Immediately |

Rationale for variance:

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria |
|--|
| <p>Analysis for indicator will be generated from burn records obtained by licensees for burning conducted for site preparation and hazard abatement and the AQI records obtained from WLAP.</p> <p>A fire is considered to be substantially out 24 hours after ignition.</p> <p>The following strategies will be employed to achieve the targets for this indicator:</p> <ul style="list-style-type: none"> • Reducing the amount of debris requiring burning through better utilization and retention of coarse woody debris for biodiversity. • Piling debris to ensure that piles are well seasoned, and piled so wood debris moisture content is minimized. • Igniting piles and slash during good venting conditions. • Igniting Piles and slash in remote areas unlikely to affect air quality in the Bulkley Valley area during periods of fair air quality, when possible. • Prior to each burn day light-up during fair conditions, the current status for this indicator will be calculated. If the current status is less then the target then the burning for that day will continue. <p>Licensees will provide figures as per monitoring schedule. Also, see “Analysis Comments/Discussion” regarding assumptions and criteria</p> |

Calculation of Indicator

Formula:

$$\%FP_{, licensee}$$

Variables:

$\%FP_{, licensee}$: Percent of Fires Burning During Poor or Fair Air Quality Conditions by Licensee.

Analysis Comments/Discussion

This is an operational indicator to be reported annually.

The Ministry of Environment has developed Air Quality Index (AQI) as a way of transforming complex air quality measurements into a single number or descriptive term. It describes both the measured air quality and the publicly perceived air quality at any given time. The British Columbia AQI is directly comparable to AQI's issued in all major Canadian cities and follows the same Federal guidelines⁶ (Anon. 2004a).

The AQI numbers are interpreted as:

- 0 to 25 is GOOD;
- 26 to 50 is FAIR;
- 51 to 100 is POOR;
- 100+ is VERY POOR;

The level of 25 ug/m3 is the level at which there is statistical evidence of health effects (CEPA/FPAC, 1998). Although current health studies have not been able to determine a threshold concentration below

which there are no effects (Schwartz, et al. 1996), 25 ug/m³ is a generally accepted standard among scientists (Anon. 2002)

The AQI is calculated by measuring common air pollutants continuously at state-of-the-art monitoring stations throughout British Columbia. One of these monitoring stations (see Anon. 2004b) is located within the plan area at the fire hall in Houston and will be used as the reference station for this indicator.

Because smoke from open burning chiefly impacts the amount of Inhalable Particulates in the atmosphere, a PM₁₀ (particles with a diameter of < 10 microns) reading of greater than 50 ug/m³ in a 24 hour period will be used to define poor air quality and a PM₁₀ reading of greater than 25 ug/m³ in a 24 hour period will be used for defining fair air quality for the purposes of this indicator. The AQI information for the calendar year can be obtained from the Ministry of Environment. The 24 hour rolling average for the period ending at 7am will be used as the relevant time period to determine AQI for the day.

An assumption has been made that there is a strong correlation between the limited number of air monitoring stations within the DFA and the venting potential that occurs in the DFA. There may be localized impacts found on the DFA that are not being registered at the air monitoring stations.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date/interval required |
|---------------------------|-------------------------|--|------------------------|
| Burning Records | Licensees | Yes | Annually |
| Air Quality Index Records | Ministry of Environment | Yes | Annually |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|--|--|--|--------------------------|
| Document ignition timing for open burning conducted for Forest Management. | Review burn records Review WLAP AQI data. | <ul style="list-style-type: none"> Woods Managers for each applicable licensee Babine BCTS manager | Annually starting 2005 |
| | Set up system to record burn start date s. Set up procedure to archive Air Quality data from MoE annually. | <ul style="list-style-type: none"> Woods Managers for each applicable licensee Babine BCTS manager | Annually starting 2005 |
| Monitor and update data | Ensure burn records are maintained. | <ul style="list-style-type: none"> Woods Managers for each applicable licensee Babine BCTS manager | Starting in 2005 |
| Analysis | Review data and conduct analysis for indicator | <ul style="list-style-type: none"> Woods Managers for each applicable licensee Babine BCTS manager | Annually starting 2006 |

| | | | |
|--------|--|--|------------------------------------|
| Report | Indicator Performance Management for Management Adjustment Purposes (review updated data only) | <ul style="list-style-type: none"> • Woods Managers for each applicable licensee • Babine BCTS manager | ANNUALLY STARTING JANUARY 31, 2006 |
| | M&L IFPA SFM Report | <ul style="list-style-type: none"> • Woods Managers for each applicable licensee • Babine BCTS manager • IFPA Manager | Annually starting January 31, 2006 |

Output for indicator reporting

This indicator will be reported in tabular format.

References

Anon. 2004. Morice Land and Resource Management Plan –March 31, 2004 Section2.3.1. Air Quality page 25

Anon. 2004a. <http://wlapwww.gov.bc.ca:8000/pls/aqiis/air.info>

Anon, 2004b. http://wlapwww.gov.bc.ca:8000/pls/aqiis/air.bulletin?city=Houston&time_zone=PST

Anon. 2002. Environmental Indicator: Air Quality Impacts From Inhalable Particulates and Ozone page 1 para 2. http://wlapwww.gov.bc.ca/soerpt/pdf/992airquality/Airquality_2002.pdf

Bates, DV, Koenig J. and Brauer, M. 2003. Health and Air Quality 2002—Phase I prepared for BC Lung Association, May 2003.

Indicator 57: Ecosystem Carbon Storage by tonnes/ha. by Licensee

Indicator Linkages:

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|---|--|
| <p>Resource: Timber</p> <p>Value / Issue: Harvest Flow Policy</p> <p>Value / Issue: Dry wood Utilization</p> | <p>Criterion: 4 Forest Ecosystem Contributions to Global Ecological Cycles</p> <p>SFM Element: 1 Carbon Uptake and Storage</p> <p>Value: 1 Storage of carbon in forest ecosystems and products. (<i>plant, restock</i>)</p> <p>Objective: 1 Forest ecosystems are net carbon sinks over time on the DFA.</p> |

Indicator Rationale

What does this indicator mean?

Ecosystem carbon storage is the amount of the amount of Carbon stored in several components of forests including tree biomass, plant biomass, coarse woody debris, forest floor litter, and soil. Forest soils are a large but relatively stable reservoir of C with minimal changes over time. In contrast, variation in C storage in tree biomass is the dominant factor regulating temporal patterns in total ecosystem C storage (Seely and Nelson, 2002).

Total volume of standing timber in both the THLB and Non-THLB (m³) is used as a surrogate for storage of Carbon within the Morice Timber supply Area. Harvest levels natural disturbances, fire protection policies and fire suppression success, influence this indicator over time.

How does this indicator relate to the M&L IFPA and to SFM?

As a result of the 1997 Kyoto protocol, international attention has been focused on the problem of global greenhouse gas emissions. This has placed considerable pressure on the public and private sectors to account for the role of forests in storing carbon and reducing global CO₂ emissions. Maintaining productivity of the forests is an important factor in carbon uptake and storage. The process of photosynthesis depends on the absorption of carbon dioxide (CO₂), water and availability of solar energy for the manufacture of carbohydrates that drives the process of tree growth and the production of wood. As stands grow at a positive rate (growth minus mortality) it can be assumed that carbon (the fundamental building block of wood) is accumulating. Fixation of carbon contributes to the lowering of CO₂ in the atmosphere and the reduction of greenhouse gases noted for contributing to global warming. Wood is eventually broken down releasing the carbon as CO₂ and water into the atmosphere. The amount retained per ha per year depends on the diversity of forest landscape, the vigour of trees and other vegetation, the quality of the site, and the amount of disturbance or mortality each year. In a broad sense, maintaining a positive balance of carbon requires that growth (rate of carbon fixation) exceeds the rate of decomposition (the release of carbon) and this is accomplished by ensuring the rate of harvest maintains this positive balance.

The calculation of total ecosystem Carbon storage within the defined forest area allows for a long-term evaluation of effects of management activities and/or natural disturbance on forest Carbon stocks.

Current Status and Forecasted Targets / Thresholds of Indicator

| Ecosystem Carbon Storage by tonnes/ha. by Licensee | | | | |
|--|----------------|-------------------|----------|-------------------|
| Licensee | Current Status | Forecasted Target | Variance | Achieve Target by |
| Canfor | 165 | >=145 | | Immediately |
| HFP | 168 | >=145 | | Immediately |
| FLSM | 170 | >=145 | | Immediately |
| BCTS | 138 | >=130 | | Immediately |

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria |
|---|
| <p>The block design generated by Tesera Scheduling Model (TSM) will be considered when developing future harvest proposals</p> <p>The target will be achieved by implementing harvest, regeneration, and incremental silviculture treatment on the ground that were model assumptions contained in the Decision Scenario Analysis Data package.</p> <p>As better tools become available to measure and manage carbon storage and sequestration this indicator will be modified to use them.</p> |

Calculation of Indicator

Formula:

$$ECS_{\text{tonnes/ha, licensee}}$$

Variables:

$$ECS_{\text{tonnes/ha, licensee}} = \text{Ecosystem Carbon Storage by tonnes/ha. by Licensee}$$

Analysis Comments / Discussion

Carbon stock change is the current method accepted for Carbon accounting under the Kyoto Protocol. It assumes that Carbon stored in harvested materials is returned to the atmosphere immediately following harvesting.

Because carbon accounting must be summarized at the landscape scale Carbon Analysis Units (CAU) were defined based on Timber Supply Review (TSR) analysis units to represent existing natural stands, existing managed stands, and future managed stands based on species composition, site quality, and regeneration assumptions.

The federally and provincially approved forest carbon modeling tool FORECAST was used to generate ecosystem carbon storage curves for each CAU that tracked the amount of carbon stored over time in above and below-ground biomass, dead organic matter, and soil in each CAU as a result of harvesting, succession and natural disturbance.

These in turn were used by TSM to account for the amount of carbon stored over the management unit over the planning horizon.

See the report referenced below *Development of carbon curves for addressing CSA certification requirements in the Morice and Lakes Timber Supply Areas* for details on analysis units and methods for development and modeling of the ecosystem carbon curves.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|---|----------|--|--------------------------|
| Growth & Yield data | ILMB | Yes | |
| VRI (merchantable volume/ha and age from harvest) | ILMB | Yes | Use most current version |
| Silviculture database | Licenses | Yes | Use most current version |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|-------------------------------------|--|------------------------|----------------------------|
| | | | |
| Obtain growth and yield information | Collect growth and yield information | Tweedsmuir Forest Ltd. | Periodically Starting 2005 |
| Analysis | Compile and analyze data | Tweedsmuir Forest Ltd. | Starting 2005 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | 2005 |
| | M&L IFPA SFM Report | IFPA Manager | 2005 |

Proposed output for indicator reporting

The most appropriate for of reporting out on this indicator will be in a table format by licensee.

References

- Hirano, A., Tsuchida, M., Ishibashi, M., and Ogino, K. (no date). Carbon Sink and Storage Capacity of Forest Ecosystems in Oze, Central Japan. <http://www.rite.or.jp/GHGT6/pdf/BUTP1.pdf>
- Martin von Mirbach Carbon Budget Accounting at the forest Management unit Level: An overview of Issues and Methods. <http://dsp-psd.pwgsc.gc.ca/Collection/Fo42-312-2000E.pdf>
- Development of carbon curves for addressing CSA certification requirements in the Morice and Lakes Timber Supply Areas Prepared by: Brad Seely, Ph.D. Feb. 22, 2005.

Indicator 58: Percent of harvest area in Mountain Pine Bark Beetle attacked stands by licensee

Indicator Linkages:

| <u>M&L IFPA Framework</u> | <u>CSA/CCFM SFM Framework</u> |
|---|--|
| Resource: Timber Value / Issue: Bark Beetles | Criterion: 2. Maintenance and Enhancement of Forest ecosystem Condition and Productivity SFM Element: 1. Forest Disturbance and Stress Value: 1. Healthy, productive forests that support ecosystem conditions and processes Objective: 1. Forest ecosystems resilient to disturbances and stresses. SFM Element: 2 Ecosystem Productivity Value: 2. Ecosystem and biological productivity is conserved on the DFA Objective: 1. Sustainable rates of ecosystem and biological productivity Criterion: 5. Multiple Benefits To Society SFM Element: 1. Timber and Non-Timber Benefits Value: 1. A balanced supply and a variety of timber and non-timber products, services and benefits on the DFA. Objective: 1. A sustainable harvest and use of timber products, services and benefits. |

Indicators 58, [14](#) and [35](#) are closely related

Indicator Rationale

What does this indicator mean?

This indicator tracks the percentage of the harvest area (hectares) originating from Mountain Pine Bark Beetle attacked stands. For the purposes of this indicator, stands are considered beetle attacked if it is estimated at least 20% of the pine trees in the stand have been attacked by mountain pine bark beetle.

How does this indicator relate to the M&L IFPA and to SFM?

The current Mountain Pine Bark Beetle epidemic in the central interior has grown to proportions that make it one of the largest natural disturbances in Canadian history. The event is now provincial in scale and threatening to become a national issue with potential expansion into Alberta. Scientists (Eng et al 2005) have estimated the infestation will peak during 2006, estimating up to 90 million cubic meters of merchantable pine on the timber harvesting land base may be killed during the summer of 2006.

When version 2.0 of the Morice SFM plan was completed, Mountain Pine Bark Beetle infestations were still at endemic levels in the Morice TSA and non-recoverable losses were modelled consistent with TSR II. Since that time the infestation has progressed north and westward expanding out of the Lakes into the Morice TSA. Based on data provided by Eng (et al 2004), the infestation is expected to peak in the Morice TSA in 2013. In order to better understand timber supply impacts, responses to SFM indicators and aid in the development of mitigation responses, specific learning scenario yield curves (forest productivity and agriculture) were modified to project losses to Mountain Pine Bark Beetle (Eng at el, 2004).

The Morice Decision Scenario and subsequently version 3.0 of the SFM plan was designed around a series of strategies aimed at balancing social, economic and ecological objectives while minimizing losses to mountain pine bark beetle. In order to mitigate the effect of the beetle infestation on timber supply in the Morice TSA, the decision scenario incorporated a harvest flow strategy targeting the oldest stands containing the highest proportion of pine volume as opposed to targeting high and extreme hazard. In addition, in order to minimize beetle losses, an annual harvest of 3.0 million m³ was prescribed for two periods. By retaining as much non-susceptible mature growing stock as possible, the decision scenario strategy is successful in capturing beetle losses as they occur while demonstrating the ability to achieve non-timber resource targets. This strategy is achieved without realizing a mid-term trough in the timber supply or a significant reduction in the long-term harvest level.

The more closely licensees follow the block design generated from the decision scenario, the more likely all SFM targets will be met and the assumptions contained in the decision scenario realised. This operational indicator has been designed to refine the decision scenario harvest priority, since the decision scenario harvest priority does not take into account whether a stand has been attacked. In addition to targeting pine and pine leading stands (see Indicator 35) as described in the decision scenario harvest priority, this indicator has been designed to demonstrate licensees are operationally prioritising harvest efforts into attacked stands as opposed to “green stands”.

Current Status and Targets/Thresholds of Indicator

| Licensee | Current Status | Target | Variance | Achieve Target by |
|----------|----------------|--------|----------|-------------------|
| Canfor | Unknown | 100% | -10% | Annually |
| HFP | Unknown | 100% | -10% | Annually |
| BCTS | Unknown | 100% | -10% | Annually |

Rationale for variance: to account for variances due to roads to access infested stands, profile requirements, unexpected events (e.g. blowdown salvage), existing policy, landscape constraints, higher level plan constraints.

Indicator Analysis Information

| Strategy Practices, Methods, Assumptions and Criteria |
|---|
| <p>The target will be achieved by:</p> <ol style="list-style-type: none"> 1. Implementing the harvest rules contained in decision scenario; specifically, for the next forty years targeting oldest pine and pine leading stands having the highest percentage of pine. 2. Considering the block design generated by Tesera Scheduling Model (TSM) when developing future harvest proposals. Model outputs are based on Decision Scenario forecasts across a 250 yr planning horizon. 3. Operationally target harvesting into beetle attacked stands where the recommended block design proposes harvesting in pine and pine leading stands in the short term. |

Calculation of Indicator

Formula:

$$\%HA_{\text{beetle attacked stands}} = (HA_{\text{beetle attacked stands}} / HA_{\text{total}}) \times 100$$

Variables:

$\%HA_{\text{beetle attacked stands}}$: Percent Harvest area in mountain pine bark beetle attacked stands by licensee

HA_{beetle attacked stands} : Harvest area in mountain pine bark beetle attacked stands by licensee

HA_{total}: Total Area harvested by licensee

Analysis Comments / Discussion

Business Rules:

- Information will be collected by calendar year.
- Attacked trees are defined as current, Y1, Y2, and grey attacked trees.

Indicator Monitoring Plans

Inventories Needed to Monitor and Analyze Indicator

| Inventory | Source | Updating required for future analysis? | Date / interval required |
|---|-------------------------------|---|---------------------------------|
| VRI (forest cover) | ILMB (augmented by licensees) | Yes | Use most current version |
| Beetle survey (e.g. reconnaissance, probes, aerial, photo) confirming presence of attacked trees. | Licensees | Yes | Annually |

Indicator Monitoring Implementation Schedule

| Activity | Actions required | Responsibility | Schedule (date/interval) |
|-----------------|--|---|---------------------------------|
| Procure data | Update depletion inventory | Woods manager for each licensee BCTS manager | Annually starting 2005 |
| | Obtain data from beetle surveys. | Woods manager for each licensee BCTS manager | Annually starting 2006 |
| Data analysis | Compile information from licensees | Tweedsmuir Forest Ltd. | Annually starting 2007 |
| Report | Indicator Performance Management Report for Management Adjustment Purposes | IFPA Manager | Annually starting 2007 |
| | M&L IFPA SFM Report | IFPA Manager | Annually starting 2007 |

Output for indicator reporting

This indicator will be reported in tabular format

References

Eng, M., A. Fall, J. Hughes, T. Shore, B. Riel, P. Hall and A. Walton. 2005 Provincial-Level Projection of the current Mountain Pine Beetle Outbreak: An Overview of the Model (BCMPB v2) and Results of Year 2 of the Project.

Eng, M., A. Fall, J. Hughes, T. Shore, B. Riel and P. Hall. 2004 Provincial-Level Projection of the current Mountain Pine Beetle Outbreak: An Overview of the Model (BCMPB) and Results of Year 1 of the Project.

APPENDIX D – Supplemental Information for Indicator M53

APPENDIX D

Supplemental Information for Indicator M53

OPERATIONAL GUIDELINES FOR CWD MANAGEMENT

Reference:

Lloyd, Ruth. A. 2004. Results of operational trials to manage coarse woody debris in the northern interior. Interim report. Morice and Lakes IFPA project 442.01. 22 pp.

TRAINING:

Operational guidelines will be presented to contractors through licensee specific training. Training can be achieved through organized annual contractor training, or tailgate training sessions during harvest pre-works.

The following two-page summary handout is provided and crews are instructed to:

- leave logs estimated to be classed as grade 5 (dead and dry lumber reject) or lower intact on the cutblock.
- maintain clumps of immature trees and patches of natural non-merchantable deadfall intact.
- fell or stub dead trees estimated as grade 5 or lower and to place the felled portion in or alongside an existing clump.
- where no such clump exists nearby, place the felled pieces together in a new clump, with stubs or immature trees left as clump markers; preferred locations for new clumps include areas such as ridges and knobs where skidders would not normally travel.
- place felled snags and stub tops in an approximately natural orientation (“jackstrawed”, not bunched together) to simulate natural deadfall, incorporating existing downed logs.
- mark retention clumps, usually by stubs or immature trees, for maximum visibility to the skidder operator, so that the clumps can be maintained intact during skidding

Crews are instructed to place primary emphasis on maintaining intact logs greater than 10m long, and to “do the best you can”, ensuring not to increase the time spent to a degree that would be considered unreasonable during normal operations.

OPERATIONAL GUIDELINES FOR CWD MANAGEMENT

Maintain clumps of CWD and other structural elements



Clumps could be built around:

- existing deadfall
- a group of snags (stubbed, with tops left in clump)
- existing clump of immature trees
- alder patch (or other tall shrubs)
- existing deciduous or cull trees
- a ridge crest or area where the skidder doesn't go

Remember they must be **visible!**

Keep the larger, longer logs intact and on the block



- don't skid unwanted logs
- identify unmerchantable stems at the stump and leave on site
- place unwanted snags
 - in direction of skid
 - to one side of skid route
 - in or adjacent to clump
- applies particularly to snags with branches and bark

Think Jackstraw!! Imitate natural distribution



- try not to disturb natural accumulations of downed logs
- if a tree or snag is felled and left, put it down across other logs (off the ground if possible).
- avoid bunching groups of logs if they are not going to be skidded to the landing

***Maintain immature, deciduous and large
cull trees for habitat and for future CWD***



For immature trees, look for

- pole size or larger preferred
- large, healthy crowns
- in clumps where possible

Large green trees could be

- aspen or cottonwood
- declining or cull trees of little commercial value

Stub snags around the outside of a clump



- the stubs act as “rub trees” to prevent damage to the clump

Place unwanted snags (or stub tops) in or around the clump



- in direction of skid
- at the side to avoid damage to live trees

Even a single stub could be a marker for two or three logs at its base!



Operational CWD Monitoring Matrices

Reference:

Lloyd, Ruth A. and M. A. Todd. In prep. Operational planning matrix for CWD retention: a tool for retaining CWD in managed forests.

Site series groups for CWD management

| Subzone | Site group | Site series |
|------------------------------------|----------------------------------|---------------------------------------|
| SBSdk | Poor | 02 PI – Juniper – Ricegrass |
| | | 03 PI – Feathermoss – Cladina |
| | | 09 Sb – Creeping snowberry – Sphagnum |
| | | 10 Sb – Soft-leaved sedge – Sphagnum |
| | Moderate | 01 Sxw – Spiraea – Purple peavine |
| | | 05 Sxw – Spiraea – Feathermoss |
| | | 06 Sxw – Twinberry – Coltsfoot |
| | Good | 07 Sxw – Horsetail |
| 08 Act – Dogwood – Prickly rose | | |
| SBSmc2 | Very Poor | 02 PI – Huckleberry - Cladonia |
| | | 12 SbSxw – Scrub birch – Sedge |
| | Poor | 03 SbPI – Feathermoss |
| | | 05 Sxw – Twinberry – Coltsfoot |
| | | 07 Sxw – Scrub birch – Feathermoss |
| | Moderate | 01 Sxw – Huckleberry |
| | | 06 Sxw – Oak fern |
| | | 10 Sxw – Horsetail |
| | Good | 09 Sxw – Devil's club |
| | ESSFmc | Poor |
| 04 BI – Huckleberry – Heron's-bill | | |
| 08 BI – Valerian – Sicklemoss | | |
| 09 BI – Horsetail – Glowmoss | | |
| Moderate | | 01 BI – Huckleberry – Leafy liverwort |
| | | 05 BI – Huckleberry – Thimbleberry |
| | | 10 BI – Horsetail – Leafy moss |
| Good | 06 BI – Oak fern – Heron's-bill | |
| | 07 BI – Devil's club – Lady fern | |

DRAFT OPERATIONAL MONITORING MATRIX - SBSdk

| | | Site Group | | |
|--|-------------------|---|---|--|
| | | Poor | Moderate | Good |
| Modification for existing dead wood | High range | Snags + DWB: >60m ³ /ha VOLUME: >50m ³ DIAMETER: 40% of volume >20cm diameter LENGTH: 40% of volume >10m long | Snags + DWB: >60m ³ /ha VOLUME: >80m ³ DIAMETER: 40% of volume >20cm diameter LENGTH: 50% of volume >10m long | Snags + DWB: >60m ³ /ha VOLUME: >150m ³ DIAMETER: 60% of volume >20cm diameter LENGTH: 60% of volume >10m long |
| | | FIELD TARGET: 90 logs/ha >15m long | FIELD TARGET: 60 logs/ha >15m long | FIELD TARGET: 80 logs/ha >15m long |
| | | Snags + DWB: 40-60m ³ /ha VOLUME: DIAMETER: LENGTH: Best management practices | Snags + DWB: 40-60m ³ /ha VOLUME: >50m ³ DIAMETER: 40% of volume >20cm diameter LENGTH: 50% of volume >10m long | Snags + DWB: 40-60m ³ /ha VOLUME: >100m ³ DIAMETER: 60% of volume >20cm diameter LENGTH: 60% of volume >10m long |
| | Mid range | FIELD TARGET: 40 logs/ha >15m long | FIELD TARGET: 50 logs/ha >15m long | |
| | | Snags + DWB: <40m ³ /ha VOLUME: DIAMETER: LENGTH: Best management practices | Snags + DWB: <40m ³ /ha VOLUME: DIAMETER: LENGTH: Best management practices | Snags + DWB: <40m ³ /ha VOLUME: DIAMETER: LENGTH: Best management practices |
| | | | | |

DRAFT OPERATIONAL MONITORING MATRIX – SBSmc2

| | | Site Group | | | |
|-------------------------------------|------------|---|--|--|--|
| | | V. Poor | Poor | Moderate | Good |
| Modification for existing dead wood | High range | Snags + DWB: >50m ³ /ha | Snags + DWB: >80m ³ /ha AND /05 leading | Snags + DWB: >150m ³ /ha | Snags + DWB: >150m ³ /ha |
| | | VOLUME: >50m ³ DIAMETER: 50% of volume >20cm diameter LENGTH: 40% of volume >10m long | VOLUME: >200m ³ DIAMETER: 70% of volume >20cm diameter LENGTH: 50% of volume >10m long | VOLUME: >200m ³ DIAMETER: 70% of volume >20cm diameter LENGTH: 50% of volume >10m long | VOLUME: >300m ³ DIAMETER: 40% of volume >40cm diameter LENGTH: 50% of volume >10m long |
| | | FIELD TARGET: 35 logs >15m long | FIELD TARGET: 100 logs >15m long | FIELD TARGET: 70 logs >20m long | FIELD TARGET: 70 logs >20m long |
| | Mid range | Snags + DWB: <50m ³ /ha | Snags + DWB: 30-80m ³ /ha | Snags + DWB: 75-150m ³ /ha | Snags + DWB: 100-150m ³ /ha |
| | | VOLUME: DIAMETER: LENGTH: Best management practices | VOLUME: >50m ³ DIAMETER: 70% of volume >20cm diameter LENGTH: 50% of volume >10m long | VOLUME: >100m ³ DIAMETER: 70% of volume >20cm diameter LENGTH: 50% of volume >10m long | VOLUME: >200m ³ DIAMETER: 40% of volume >40cm diameter LENGTH: 50% of volume >10m long |
| | | FIELD TARGET: 35 logs >15m long | FIELD TARGET: 35 logs >20m long | FIELD TARGET: 50 logs >20m long | |
| | Low range | Snags + DWB: <50m ³ /ha | Snags + DWB: <30m ³ /ha | Snags + DWB: <75m ³ /ha | Snags + DWB: <100m ³ /ha |
| | | VOLUME: DIAMETER: LENGTH: Best management practices | VOLUME: DIAMETER: LENGTH: Best management practices | VOLUME: DIAMETER: LENGTH: Best management practices | VOLUME: DIAMETER: LENGTH: Best management practices |
| | | | | | |

DRAFT OPERATIONAL MONITORING MATRIX – ESSFmc

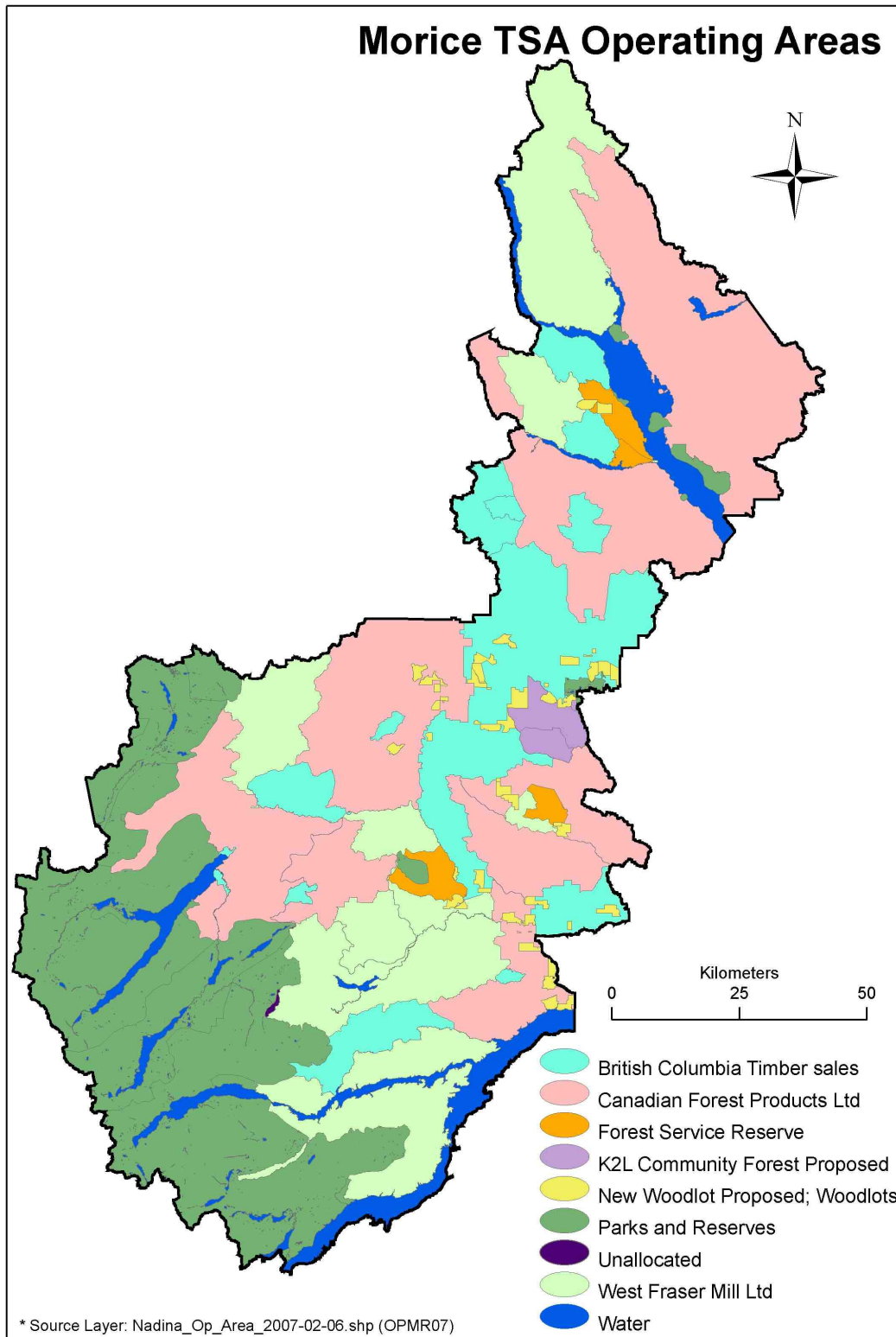
| | | Site Group | | |
|--|-------------------|---|---|--|
| | | Poor | Moderate | Good |
| Modification for existing dead wood | High range | Snags + DWB: >100m ³ /ha VOLUME: >100m ³ DIAMETER: 50% of volume >20cm diameter LENGTH: 20% of volume >10m long | Snags + DWB: >200m ³ /ha VOLUME: >200m ³ DIAMETER: 20% of volume >40cm diameter LENGTH: 40% of volume >10m long | Snags + DWB: >250m ³ /ha VOLUME: >300m ³ DIAMETER: 40% of volume >40cm diameter LENGTH: 50% of volume >10m long |
| | | FIELD TARGET: 40 logs/ha >15m long | FIELD TARGET: 50 logs/ha >15m long | FIELD TARGET: 80 logs/ha >15m long |
| | Mid range | Snags + DWB: <100m ³ /ha VOLUME: DIAMETER: LENGTH: Best management practices | Snags + DWB: >100m ³ /ha VOLUME: >100m ³ DIAMETER: 20% of volume >40cm diameter LENGTH: 40% of volume >10m long | Snags + DWB: 150-250m ³ /ha VOLUME: >200m ³ DIAMETER: 40% of volume >40cm diameter LENGTH: 50% of volume >10m long |
| | | | FIELD TARGET: 25 logs/ha >15m long | FIELD TARGET: 50 logs/ha >15m long |
| | Low range | Snags + DWB: <50m ³ /ha VOLUME: DIAMETER: LENGTH: Best management practices | Snags + DWB: <100m ³ /ha VOLUME: DIAMETER: LENGTH: Best management practices | Snags + DWB: <100m ³ /ha VOLUME: DIAMETER: LENGTH: Best management practices |
| | | | | |

Field Sampling Protocol for CWD Post-harvest Performance Monitoring

Source:

Lloyd, Ruth. A. 2004. Results of operational trials to manage coarse woody debris in the northern interior. Interim report. Morice and Lakes IFPA project 442.01. 22 pp.

APPENDIX E – Key Map for the Morice Timber Supply Area



ⁱhttp://www.for.gov.bc.ca/hfp/pubs/wildlife_trees/WLTpolicyfinalMay15-00.pdf

ⁱⁱ Morice LRMP measure 2.4 page 110 Management Direction.

ⁱⁱⁱ Morice LRMP measure 2.5 page 111.