Fort Saint James
Sustainable Forest Management Plan

VERSION 3.6

Prepared by:

Fort St. James Sustainable Forest Management Public Advisory Group

BCTS BC Timber Sales Stuart-Nechako

Stuart Lake Lumber Co. Ltd.

CARRIER LUMBER LTD

Apollo FOREST PRODUCTS LTD

CANFOR

TTT

TAKLA TRACK & TIMBER LTD.
an affiliate of Takla Forest Management Inc.

Preface

The Sustainable Forest Management Plan for Fort St. James was prepared according to the Canadian Standards Association Sustainable Forest Management Standard CAN/CSA-Z809-02.

Several authors and many reviews contributed in developing key components of this plan. Preparation of this plan was coordinated by,

Forest Company / BCTS	Name & Title	Signature
Canadian Forest Products Ltd. Prince George Operations	Dave Bryden Woodlands Manager	
Canadian Forest Products Ltd. Houston Operations	Kevin Horsnell, RPF Woodlands Manager	
Takla Track and Timber	Gerry Fraser, RPF Operations Manager	
Apollo Forest Products Ltd.	Mike Bell Woodlands Manager *On behalf of Apollo Forest Products Ltd., Winton Global, Lakeland Mills Ltd, L&M Lumber Ltd, and Ta Da Chun Timber Ltd.*	
Stuart Lake Lumber	Andy Little Woodlands Manager	
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We would like to thank the Public Advisory Group members for their continued contributions to SFM.

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Executive Summary

This Sustainable Forest Management Plan (SFMP) is the combined efforts of several major licensees and the Fort St. James portion of the Stuart-Nechako BC Timber Sales to achieve Canadian Standards Association (CSA) certification to the CSA Z809-02 standard. The signatories to the plan are:

- Apollo Forest Products and associated companies
- BC Timber Sales - Stuart Nechako
- Canadian Forest Products Ltd. - Prince George and Houston operations
- Carrier Lumber Ltd.
- Stuart Lake Lumber Ltd.
- Takla Track and Timber Ltd. (managed in this plan by Canfor - Prince George)

The Licensees and BC Timber Sales support business practices that protect and enhance the environment for the use of current and future generations. They are committed to the goals of sustainable forest management and to a process that will continually improve environmental performance. To achieve these objectives the signatories will:

- **Develop** and **maintain** a scientifically credible, structured, yet flexible framework for SFM at the management unit level that incorporates strategic level requirements.
- **Manage** all operations to comply with or exceed all legal requirements.
- **Encourage** local First Nations to become involved in the development of local SFMPs, while respecting their rights and interests.
- **Provide** opportunities for communities, environmental groups and scientists to participate in planning and implementation in ways that reflect their interests and concerns efficiently in both time and cost and in ways that are effective for both stakeholders and resource managers.
- **Identify, evaluate** and **control** potential environmental risks and implement appropriate preventative measures.
- **Communicate, inform**, and **promote** awareness regarding environmental activities with employees, First Nations, and stakeholders.
- **Develop** and **maintain** a monitoring program accompanied by evaluation and reporting of findings and feedback into decision making that is designed to evaluate and report on the measures of sustainability of social, ecological, and economic values.
- **Integrate** an adaptive management system that incorporates improved knowledge, monitoring of results and advances in SFM science and technology so that future plans and practices will continue to move towards sustainability of social, ecological and economic values.
- **Commit** to evolving processes that will ensure work site health and safety standards provide conditions and safeguards for the health and safety of employees and the public.
- **Conduct** timely audits of environmental management systems and SFM parameters, and implement corrective measures as required.

The success of the Fort St. James Sustainable Forest Management Plan is dependent upon the commitment of the Licensees and BC Timber Sales to meet these objectives.

1.0 Introduction

The forests of northern British Columbia have been a source of natural resources for a variety of uses for generations. In the past century, forests have been chiefly valued for their economic potential. However, society is increasingly coming to realize that forests provide a wider set of values that include social and environmental benefits. The forest industry recognizes that the management of a broader range of values from the forest can occur without detriment to its economic potential. This concept is known as **"Sustainable Forest Management" (SFM)** and has been defined as management:

> "*to maintain and enhance the long-term health of forest ecosystems, while providing ecological, economic, social, and cultural opportunities for the benefit of present and future generations*" (The State of Canada's Forests, 2001/2002).

To recognize and achieve this wider set of values, SFM requires that these values be considered in operational decision making and implemented during forest operations. This can only be accomplished through a carefully planned management system that ensures both public participation and forest operations are carried out in a systematic and predictable manner that guarantees continual improvement.

Sustainable forest management has attracted the attention of consumers of forest products who are increasingly demanding that the goods they purchase be derived from forests that are managed on a sustainable basis. This demand has resulted in the emergence of forest certification as a dominant factor in the forest industry to assure the public that the management of forests satisfies standards that are considered critical to sustain forest values. The forest industry of British Columbia (BC) is a part of a much larger global forest product marketplace and has increasingly become aware of the importance of certification to maintain its position in this economy. The Fort St. James Sustainable Forest Management Plan (SFMP) was developed to achieve Canadian Standards Association (CSA) certification to the CSA Z809-02 standard and to provide forest managers with a management system to meet SFM objectives.

The Fort St. James SFMP is a working document and will continue to evolve and expand as forestry practices and socio-economic forest values change over time.

1.1 The Fort St. James SFMP & CSA Certification

The primary purpose of the Fort St. James SFMP is to provide an intensive planning document that will meet CSA SFM certification and provide a framework for the participating Licensees and BC Timber Sales to implement SFM. The Canadian Standards Association is a not-for-profit membership based association serving business, industry, government and consumers in Canada and the global marketplace. The CSA developed a Sustainable Forest Management Standard in 1996 that was revised in 2002. The Standard describes the requirements for SFM on a Defined Forest Area (DFA) that must be met to achieve certification. This Standard was prepared by the Technical Committee on Sustainable Forest Management and has been approved as a National Standard by the Standards Council of Canada.

The general requirements for sustainable forest management as defined in the Standard are:

a) compliance with relevant legislation on the Defined Forest Area (DFA);
b) appropriate values, objectives, indicators, and targets that clearly address the Canadian Council of Forest Ministers (CCFM) SFM criteria and SFM elements in the Standard;
c) ongoing and meaningful public participation;
d) progress towards or achievement of performance targets; and
e) continual improvement in performance.

The Standard provides SFM specifications that include public participation, performance, and system requirements that must be met to achieve certification. These specifications were the framework for the development of the For St. James SFMP.

2.0 The Defined Forest Area

The SFMP, like most forest management plans, is generally prepared for a specified area of forest, including land, water, and range, to which the SFMP is applied. This plan defines the Fort St. James SFMP Area under the Plan (AUTP) as the Crown forest land base contained within the traditional operating areas of the signatory Licensees and BC Timber Sales. A map of the AUTP can be found in Appendix 1.

The Defined Forest Area (DFA) for each Licensee/BC Timber Sales is delineated by their traditional operating areas (see Appendix 1 for a map of Licensee/BC Timber Sales Operating Areas). The following table will serve to define the DFA for each Licensee/BC Timber Sales. The DFA is defined as the Crown forested land base within each operating area excluding woodlots, private land, highways, utilities, mining, protected areas and parks. No harvesting will be proposed in protected areas or parks.

Table 1. Defined Forest Areas for Each Signatory Fort St. James Licensee/BC Timber Sales

Licensee/BC Timber Sales	Fort St. James Licensee DFA Areas (gross ha)	% of Total DFA
Apollo Forest Products Ltd.	330,157	21.7%
Canfor Ltd. – PG	427463	28.1%
Canfor Ltd. - Houston	64,374	4.2%
Carrier Lumber Ltd.	41,611	2.7%
BC Timber Sales	449,972	29.6%
Stuart Lake Lumber Ltd.	72,691	4.8%
Takla Track & Timber	134,292	8.8%
Total Fort St. James AUTP	**1,520560**	100.0%

2.1 Biophysical Description

The PG TSA is located in the north-central interior of BC, cover approximately 7.5 million hectare of area and is subdivided into three Forest Districts: 1) Fort St. James, 2) Vanderhoof, and 3) Prince George.

The Fort St. James AUTP is comprised of a relatively isolated and sparsely populated land area of approximately 3.174 million hectares (LRMP 1999). This land base contains a diversity of landscapes from the rolling northern interior plateau in the southern portion of the AUTP to the extremely mountainous and largely un-roaded landscapes in the north. The Fort St. James AUTP contains many rivers and lakes, several which are highly valued for tourism and recreational purposes. The AUTP also covers portions of three major river systems: the Skeena to the northwest, the Fraser in the south and the Peace in the eastern portion of the AUTP (LRMP 1999).

An abundance of wildlife is present in the Fort. St. James AUTP, including moose, mule and white tailed deer, elk, cougar, sheep, mountain goat, black and grizzly bear, coyote, wolf and the woodland caribou (LRMP 1999). The area also supports a diversity of small furbearers including beaver, otter, mink, muskrat, fisher, wolverine and marten, and is home to over 173 bird species. Along with these important species of wildlife, the AUTP supports a diversity of wildlife habitat crucial for the long-term survival of resident wildlife species.

Forests within the AUTP consist of primarily lodgepole pine and spruce, with balsam fir at higher elevations and scattered patches of aspen. There are some areas of Douglas fir, primarily along the southern portion of the AUTP as this comprises the northern-most range for the species. The Fort St. James AUTP also contains significant mineral values including jade, gold, and copper.

2.1.1 Natural Disturbance / BEC

The AUTP landscape has also been divided into "Natural Disturbance Units" (NDUs) based on a history of frequent wildfires throughout the Fort St. James area. As referenced by Craig DeLong (2002), the underlying assumption of natural disturbance unit classification is that the biota of a forest is adapted to the conditions created by natural disturbances such as fire, wind, and insects. This SFMP uses NDUs for several of its landscape level objectives. The NDUs in the AUTP are:

1) Moist Interior (sub-unit Plateau)
2) Moist Interior (sub-unit Mountain)
3) Omineca (sub-unit Valley)
4) Omineca (sub-unit Mountain)
5) Northern Boreal (sub-unit Mountain)

NDUs are further divided into "biogeoclimatic ecosystem classification" (BEC) zones. BEC considers the vegetation potential on a site (bio), the use of soils and geology (geo), and the overriding climatic factors. There are 14 BEC zones in British Columbia, with each zone divided into subzones and variants. There are 5 BEC zones in the AUTP:

1) Sub-Boreal Spruce (SBS)
2) Engelmann Spruce- Subalpine Fir (ESSF)
3) Interior Cedar- Hemlock (ICH)
4) Alpine Tundra (AT)
5) Boreal White and Black Spruce (BWBS)

See Appendix 1 for maps of the Fort St. James DFA NDUs and BEC zones.

Forest management in the AUTP is based on the concepts of NDUs and BECs. By basing forest management decisions on the ecology of a site, the changes associated with forest operations should be more consistent with the patterns and structures of natural disturbance.

As research and technology advance in the field of forestry, land classifications and divisions continue to evolve. This SFMP will consider these changes through future adaptive management processes.

2.1.2 Mountain Pine Bark Beetle

The southern portion of AUTP is currently experiencing a substantial infestation of the mountain pine bark beetle (*Dendroctonus ponderosae*), and this infestation continues to encroach further north into the AUTP each year. The mountain pine beetle is an insect that is a natural part of forest ecosystems in the central interior. The causes for the current infestation across the central interior of BC are complex. Fire suppression activities, from a natural disturbance perspective, have interrupted natural cycles of large uncontrolled wildfires. Due to the absence of these events a large supply of mature lodgepole pine (the viable host for the beetle) was made available through much of the central interior, including the Fort St. James AUTP. Historically, cold weather in late October and early November kept mountain pine beetle populations relatively controlled. However, in the last decade warmer weather patterns have developed, resulting in a massive explosion in the pine beetle population across most of central BC.

The exponential growth of beetle populations is affecting both current and future timber supply, as well as causing the decline in the aesthetic qualities of some forest landscapes as large areas of forest die. From an economic perspective, the forest industry is particularly concerned with the utilization of infested timber. If beetle killed trees are not harvested soon after their demise, their wood quality will progressively deteriorate until it becomes unsuitable for use in lumber production. As a result, harvest levels have increased in the AUTP in an attempt to capture the economic value of this timber before it is lost. The Fort St. James AUTP is part of the larger Prince George Timber Supply Area (TSA), occupying approximately 42% of the TSA area. The PG TSA annual allowable cut (AAC) was increased by 2.9 million cubic meters in order to salvage the beetle killed timber. However, this increase in harvesting

must be balanced with maintaining other values of SFM. Through the SFMP, management strategies will be developed and implemented to attempt to reduce the impacts of the pine beetle epidemic and restore infested stands to productive forests. The Fort St. James SFMP is one of three SFMPs developed within the Prince George TSA (others include the Vanderhoof SFMP and the Prince George SFMP). In conjunction with these other plans, the Fort St. James Licensees and BC Timber Sales are committed to management regimes that will allow for beetle management that will promote the overall health of the forest land base.

2.2 Socio-Economic Description

The Fort St. James AUTP had a population of 4,015 according to the 1996 Census (LRMP, 1999). This population is entered primarily within the communities of Fort St. James, Tachie, Yekooche Village, Middle River, Takla Landing and Bear Lake. The largest center in the AUTP is the community of Fort St. James, with a 1996 Census population of 2,209. Fort St. James is located on Highway 27 along the southern shores of Stuart Lake, and is the service center for the smaller communities and remote residences scattered throughout the AUTP. First Nations' communities contribute significantly to the economic and community stability of the AUTP (LRMP 1999).

The Fort St. James economy relies heavily on the forest industry. An estimated 40% of the labor forces are directly or indirectly involved in some aspect of forestry, including logging, woodlands, silviculture and milling (LRMP 1999). There are several sawmills and a few value-added operations in the AUTP, with over 50 logging and silviculture contractors also operating within the AUTP. More wood is transported out of the AUTP than remains within its boundaries, with an estimated 55% of wood harvested destined for processing outside the AUTP (LRMP 1999).

Guiding, trapping, outfitting and recreational tourism are also commercial activities taking place within the AUTP. The land base within the AUTP boasts a variety of pristine landscapes and water features, making it a desired vacation destination for many residents of northern BC, southern BC, Canada and even internationally. Visitors to the area are increasing annually by an estimated 15% (LRMP 1999). These include European, American and out-of-Province Canadians.

2.2.1 First Nations

The Fort St. James LRMP area encompasses parts of the traditional territories of four Aboriginal peoples, and is the subject of four land claims. The following are First Nation's communities that have interests in the DFA: McLeod Lake, Nak'azdli, Takla, Tsay Keh Dene band, Tl'azt'en, Yekooche, Gitxsan, Nat'oot'en and Lheidli T'enneh. Two additional First Nations communities have extended interests into the DFA: Halfway River First Nation and the West Moberly First Nations.

As First Nations have historic, cultural, and economic ties to the AUTP, it is important they have an opportunity to provide input into management decisions developed for the AUTP. In appreciation of their association with the AUTP, the participating Licensees and BC Timber Sales prepared this SFMP by providing First Nations with the opportunity to participate in its development. This SFMP and the associated processes “recognize Aboriginal and treaty rights and agree that Aboriginal participation in the public participation process will not prejudice those rights”

Annually, Licensees will provide to First Nations information relating to the SFMP. Coinciding with the completion of the annual report for the SFMP, Licensees will provide the relevant First Nations a copy of the annual report along with the current version of the SFMP. Also at this time, Licensees will make formal invitations to the First Nations to participate in the PAG process. The table below assigns responsibility to individual licensees for ensuring this commitment to First Nations is fulfilled.

Table 2. Licensee Responsibilities for First Nation Information Sharing

First Nation	Licensee Responsible
McLeod Lake First Nation	Carrier Lumber
Nak’azdli First Nation	Apollo Forest Products

Takla First Nation	BC Timber Sales
Tsay Keh Dene Band	Canfor – PG
Tl'azt'en First Nation	BC Timber Sales
Yekooche First Nation	Stuart Lake Lumber
Gitxsan	Canfor - PG
Nat'oot'en First Nation	Canfor - Houston
Lheidli T'enneh	Canfor - PG
Halfway River First Nation	Apollo Forest Products
West Moberly First Nation	Carrier Lumber

3.0 Developing the SFMP

The Fort St. James SFMP was developed to outline how the participating Licensees/ BC Timber Sales will conduct forest management within the AUTP to meet the goals of SFM and to achieve certification under the CSA Z809-02 Standard. This section will provide background information on the Licensees and BC Timber Sales who are part of the SFMP and the public participation process, with emphasis on the Public Advisory Group (PAG). It will also provide an introduction to the values, objectives, indicators, and targets that will address the Canadian Council of Forest Ministers (CCFM) SFM criteria and SFM elements in the Standard.

Document control for the SFMP will be the responsibility of the Licensee Chair. Updates to the plan are usually made to accommodate audit findings, input from PAG, and changes to CSA/SFMP standards. The Licensee Chair will also maintain document control for all communications with the PAG, including meeting minutes, emails, correspondence, and information sharing.

The most current version of the plan will be made available to each company for use on websites, and for internal document control in their operations.

3.1 The Forest Industry

The forestry sector dominates the economy within the Fort St. James Forest District and accounts for 40 percent of basic sector employment. There are 3 major sawmills, as well as smaller primary breakdown facilities and a value-added manufacturing operation.

The Prince George TSA has an Annual Allowable Cut (AAC) of approximately 14,944,000 m3 as of October 1, 2004. Currently, the Fort St. James Forest District has an approximate annual harvest level of 3.6 million cubic meters per year. The combined AAC volumes as percentages of the total AAC apportionment to the AUTP are as follows:

Table 3. Annual Allowable Cut Apportionment – Fort St. James Area Under The Plan

Licensee Apportionment for the PG TSA	Estimated Annual Harvest in the AUTP (m3)	Estimated Percent of AAC in the AUTP (%)
Apollo Forest Products Ltd. & Associated Companies FL.A18156, A18171, A18163, A17842, and NRFL's. A64418, A81516, A82364	416,746	11.1%
Canfor Ltd. FL. A18165, A18167, A40873, and NRFL A33801	750,000	20.0%
Stuart Lake Lumber FL.A18169	201,978	5.4%
BC Timber Sales	1,290,677	34.5%
Carrier Lumber Ltd. FL.A18158	290,000	7.7%
Takla Track & Timber Ltd. NRFL.A27823	200,000	5.3%
Other Non-Signatory Harvesting rights	494583	13.2%
Small Scale Salvage licensees	100,000	2.7%
TOTAL	**3,743,984**	**100.0%**

The estimate of annual harvest in column 4 of Table 2 is taken from a combination of sources. For Licensees whose forest tenure is based within the Fort St. James Forest District, the estimated annual harvest is the TSA apportioned AAC for each license. The remainder of the Licensees/BC Timber Sales has annual harvest rates that are not specific to the Fort St. James Forest District. For this reason, their estimated annual harvest is based on either historic levels of harvest in Fort St. James, or based on an estimate of future harvest levels.

The 494,583 m^3 of non-signatory harvesting rights in the AUTP noted in the table above can be broken down as follows:

- B&T Forest Products – NRFL 250,000 m^3 for 8 years (A77813) – expires 2013
- Brave holdings – SNRFL 25,000 m^3 for 3 years (A75760) – expires 2008-Nov
- Brave holdings – SNRFL 25,000 m^3 for 3 years (A78072) – expires 2009
- Canyon Tree Farms – SNRFL 25,000 m^3 for 3 years (A78073) – expires 2010-March
- KDL Group – SNRFL 25,000 m^3 for 3 years (A78069) – expires 2009-March
- Tugus Timber Ltd. – NRFL 55,000 m^3 for 10 years (A71016) – expires 2009-June
- All Nations – NRFL 60,000 m^3 (A59071) – expires 2014-April
- Yekooche First Nation – NRFL 9,583m3 for 5 years (A75069) – expires 2010 (no further harvest due to over cut)
- Xsu-wii-ax Forest Products Ltd. – NRFL 20,000m3 for 15 years (A70349) from Supply Block “A” with a potential to transfer 60,000m3 to Supply Block “C” – expires 2018

The estimated overlaying volume of non-signatory harvesting rights and small salvage are shown within each licensee DFA.

The Signatories to this SFMP all possess "volume based" timber tenure allocations in the Fort St. James Forest District. "Volume based" tenures, as opposed to "area based" tenures, have no "fixed area" but allow the tenure holder to harvest a specified volume of timber in the larger Timber Supply Area.

Several Licensees operating under volume based tenures within the Fort St. James Forest District and BC Timber Sales combined their efforts to develop a cooperative SFMP for the Fort St. James AUTP. They recognized that SFM certification would help maintain or expand their client base while achieving the positive goals of SFM.

The signatory parties are committed to the development, implementation, and maintenance of the SFMP. The signatories are:

- Apollo Forest Products
- BC Timber Sales - Stuart Nechako
- Canadian Forest Products Ltd. - Prince George and Houston operations
- Carrier Lumber Ltd.
- Stuart Lake Lumber Ltd.
- Takla Track and Timber Ltd. (managed in this plan by Canfor - Prince George)

Participation in the development of the Fort St. James SFMP will require the signatories to work within a public process to jointly develop SFM indicators and targets. The Signatories will use the SFM indicators and targets to monitor progress, publicly report, and promote continuous improvement of the SFMP as agreed to in the signed MOU (see Appendix 5).

As stated in the MOU, the Signatories agree to the following goals:

1. To jointly develop an SFMP covering the geographic area of the Prince George Forest District that meets the requirements of the CSA SFM standard (Z809-02).

2. To work together over the term of the plan to fulfill the PG SFMP commitments including, data collection and monitoring, participating in public processes, producing public reports, and continuous improvement.

The Signatories have established a steering committee structure to ensure the goals listed above are achieved (refer to as the Licensee Steering Committee which includes BC Timber Sales).

Each company and BC Timber Sales has existing initiatives that will contribute to the overall SFM strategy. These may include existing management systems such as ISO 14001 Environmental Management Systems, standard operating procedures, and internal policies. These will have to be re-examined to ensure they are compatible with the procedures outlined in this SFMP.

Sections 3.1.1 to 3.1.7 detail background information for each of the signatories to the plan. Where a signatory makes reference to their operating areas as the DFA, these signatories will be seeking CSA certification by December 31, 2007. Other signatories to the plan will be supplying indicator status data to the other signatories on an annual basis, but they will not be seeking CSA certification in the near future.

3.1.1 Apollo Forest Products Ltd.

The DFA for Apollo Forest Products Ltd. is defined by the operating areas assigned to the following Companies/Forest Licenses in the Fort St. James Forest District:

- Apollo Forest Products Ltd. (FL A18156 A81516, and A82364),
- Winton Global Ltd. (FL A18171),
- Lakeland Mills Ltd. (FL A18163),
- L&M Lumber Ltd. (FL A17842), and
- Ta Da Chun Timber Ltd. (NRFL A64418),

as well as the planning cells allocated to the Sinclar Group in Fort St. James (split between Winton Global, Lakeland Mills Ltd., and L&M Lumber Ltd.) Refer to the map in Appendix 1 depicting the DFA for Apollo Forest Products Ltd. Within the Apollo DFA the following table shows the estimated annual harvest.

Licensee Apportionment	Estimated Annual Harvest in the DFA (m3)	Estimated Percent of Annual harvest in the DFA (%)
Apollo Forest Products Ltd. & Associated CompaniesFL.A18156, A81516, A82364, A18171, A18163, A17842, and NRFL. A64418	416,746	84.8%
Other Non-Signatory Harvesting rights	65,000	13.2%
Small Scale Salvage licensees	10,000	2.0%
TOTAL	**491,746**	**100.0%**

Apollo Forest Products Ltd. (Apollo) is 100% owned by the Anderson and Stewart Families of Prince George (The Sinclair Group of Companies). The Sinclair Group also has controlling shares in both Lakeland Mills and Winton Global located in Prince George, as well as a 50% partnership in L&M Lumber located in Vanderhoof. Through an administration agreement between Apollo and the associated Sinclair companies, Apollo manages each company's forestry activities relating to their operations within the Fort St. James Forest District.

Apollo also has a partnership agreement with the Nak'azdli First Nation in Tl'oh Forest Products Ltd – a joint venture valued added processing facility. The forest licence for Ta Da Chun Timber Ltd. (A64418) is tied to this facility. Apollo manages the forestry activities relating to this forest licence on behalf of the Nak'azdli First Nation.

Apollo Forest Products Ltd., along with the associated companies, are committed to Sustainable Forest Management, responsible stewardship of the environment and forest management certification. Certification initiatives already achieved by Apollo Forest Products Ltd. include development and implementation of an Environmental Management System to meet the ISO 14001 requirements.

WOODLANDS GROUP
SUSTAINABLE FOREST MANAGEMENT (SFM)
and ENVIRONMENTAL POLICY

Apollo Forest Products Ltd. is committed to responsible stewardship of the environment throughout our Woodlands operation.

We will:

- Meet or exceed all applicable legislation, regulations, policies, and other requirements to which Apollo Forest Products subscribes;
- Achieve and maintain SFM;
- Provide safeguards to the health and safety of our employees, contractors, and the public through responsible forest management;
- Provide participation opportunities to Aboriginal peoples with regards to SFM management while respecting their rights and interests;
- Endeavor to prevent pollution;
- Develop and adapt SFM performance measures based on agreed to local forest values with a public advisory group;
- Set and review objectives and targets annually;
- Conduct regular audits and reviews of our SFM performance and Environmental Management System;
- Improve knowledge about the forest and SFM as well as monitoring advances in SFM science and technology, and incorporating them where applicable;
- Implement and maintain a chain of custody system for forest based products and,
- Strive towards continual improvement.

3.1.2 BC Timber Sales (BCTS)

The DFA for BC Timber Sales is defined by its Fort St. James operating areas identified on the map in Appendix 1.
Within the BC Timber Sales DFA the following table shows the estimated annual harvest.

Licensee Apportionment	Estimated Annual Harvest in the DFA (m3)	Estimated Percent of Annual harvest in the DFA (%)
BC Timber Sales	1,290,667	90.2%
Other Non-Signatory Harvesting rights	120,000	8.4%
Small Scale Salvage licensees	20,000	1.4%
TOTAL	**1,430,667**	**100.0%**

The Small Business Forest Enterprise Program (SBFEP) was initially established in 1978 to help diversify and strengthen British Columbia's forest industry. In June 2001, the Ministry of Forests was directed by government to develop a plan to make the Small Business Forest Enterprise Program more effective and put it on a commercial footing. Since then, significant work has been undertaken to achieve these outcomes. A new program and organization – **BC Timber Sales** – has replaced the SBFEP. The transformation of the small business program is part of widespread policy and organizational change across the Ministry of Forests targeted at revitalizing British Columbia's forest industry. BC Timber Sales (BC Timber Sales) was fully implemented on April 1, 2003. BC Timber Sales has been set up as an

independent organization within the Ministry of Forests, with financial independence from regional and district operations. The new organization will sell timber competitively through auction and has been set up to handle an increase in the volume sold.

The transformation of the SBFEP into the BC Timber Sales program also amalgamated a number of forest districts into twelve larger BC Timber Sales business areas each with a main timber sales office. The Stuart-Nechako Business Area of BC Timber Sales geographically encompasses the Fort St. James and Vanderhoof forest districts. The administrative, planning and management center for the business area is the Timber Sales Office (TSO) located in Vanderhoof. In addition to the TSO, field teams are located in Fort St. James and Vanderhoof.

SUSTAINABLE RESOURCE MANAGEMENT POLICY

BC Timber Sales is committed to managing and administering forest management activities on our operations through effective measures that ensure *sustainable resource management.*
It is the policy of BC Timber Sales to:

- **Conduct** our forest management activities to comply with relevant legislation, regulations, policies and other requirements to which the organization subscribes;
- **Develop and maintain** a *Sustainable Forest Management* (SFM) system that is based on sound ecological, social, and economic values;
- **Provide** public participation opportunities to facilitate local input into forest management activities and plans.
- **Provide the opportunity** to First Nations to participate in the SFM process in a manner that respects their aboriginal and treaty rights;
- **Maintain a framewor**k that sets and reviews environmental and SFM objectives and targets, and promotes the prevention of pollution associated with our forest management activities;
- **Monitor, evaluate, and implement** appropriate changes to promote continual improvement of environmental and SFM practices;
- **Seek to advance our knowledge** of SFM science and technology and incorporate relevant measures into our overall planning process;
- **Promote a work environment** that protects the health and safety of staff, clients, and the public;
- **Communicate and make readily available** our Sustainable Resource Management Policy statements to staff, clients, First Nations, and the public.

3.1.3 Canadian Forest Products Ltd (Canfor)

The DFA for Canfor is defined by it's Fort St. James operating areas identified on the map in Appendix 1. Within the Canfor DFA the following table shows the estimated annual harvest.

Licensee Apportionment	Estimated Annual Harvest in the DFA (m3)	Estimated Percent of Annual harvest in the DFA (%)
Canfor Ltd. FL. A18165, A18167, A40873	550,000	69.7%
Canfor Ltd. NRFL. A33801	200,000	25.3%
Other Non-Signatory Harvesting rights	20,000	2.5%
Small Scale Salvage licensees	20,000	2.5%
TOTAL	**790,000**	**100.0%**

Canfor is a leading integrated forest products company based in Vancouver, BC. It is the largest producer of softwood lumber and one of the largest producers of northern softwood kraft pulp in Canada.

The company also produces paper, plywood, remanufactured lumber products, oriented strand board (OSB) and several other wood products.

Since 1999, Canfor has retained an International Organization for Standardization (ISO) 14001 certification of its environmental management system for its forest operations. Canfor also retains certification under the CSA standard for sustainable forest management for its Tree Farm Licenses in Chetwynd, and Prince George, BC, and for its Forest Licenses at Fort St. John, Houston, Mackenzie, Radium, Vavenby, Grande Prairie, Vanderhoof, Fort St. James and Fort Nelson, BC

Environment Policy (*April, 2008*)
Canfor is committed to responsible stewardship of the environment throughout our operations.

We will:

- Comply with or exceed legal requirements
- Comply with other environmental requirements to which the company is committed
- Achieve and maintain sustainable forest management
- Set and review objectives and targets to prevent pollution and to continual improve our sustainable forest management and environmental performance
- Provide opportunities for interested parties to have input to our sustainable forest management planning activities
- Promote environmental awareness throughout our operations
- Conduct regular audits of our forest and environmental management system
- Communicate our sustainable forest management and environmental performance to our Board of Directors, shareholders, employees, customers, and other interested parties

Canfor's Forestry Principles were unveiled in June of 1999 and are a key initiative toward the goal of sustainable forest management. The Forestry Principles provide broad corporate direction to forest management in 10 areas on licensed public lands and is the umbrella document that guides all other planning initiatives within Canfor, including SFM Plans. An overview of the Forestry Principles are provided below:

1. **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.
2. **Scale** - We will define objectives over a variety of time intervals (temporal scales), and at spatial scales of stand, landscape and forest.
3. **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.
4. **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.
5. **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.
6. **Forest Land Base** - We advocate the maintenance of the forestland base as an asset for the future.
7. **Health and Safety** - We will operate in a manner that protects human health and safety.
8. **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.

9. **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.
10. **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.

Through our commitment to SFM and Forestry Principles, we are also committed to respecting Aboriginal and treaty rights and to providing opportunities for interested Aboriginals Peoples to have input to our sustainable forest management planning activities.

3.1.4 Carrier Lumber Ltd. (Carrier)

The DFA for Carrier is defined by it's Fort St. James operating areas identified on the map in Appendix 1. Within the Carrier DFA the following table shows the estimated annual harvest.

Licensee Apportionment	Estimated Annual Harvest in the DFA (m3)	Estimated Percent of Annual harvest in the DFA (%)
Carrier Lumber Ltd. FL.A18158	40,000	80.0%
Other Non-Signatory Harvesting rights	5,000	10.0%
Small Scale Salvage licensees	5,000	10.0%
TOTAL	**50,000**	**100.0%**

Carrier Lumber Ltd. of Prince George is a non-integrated forest company that has considerable experience in forestry operations and manufacturing of forest products in the Prince George area.

Carrier Lumber Ltd.'s experience with milling began in 1951 with small bush mills, specializing in salvage and remote operations in the Prince George area. Carrier Lumber Ltd. quickly established a reputation for innovative technology and the ability to undertake difficult projects. In 1976, Carrier built its Tabor Mill facility located in Prince George's BCR Industrial site. The facility consists of a two-line dimensional sawmill that directly employs over 130 people from the local community. Today, Carrier Lumber Ltd. remains one of the few privately owned, independent operations in the Central Interior.

Carrier Lumber Ltd. is committed to Sustainable Forest Management, responsible stewardship of the environment and forest management certification. Carrier Lumber Ltd. has developed and implemented an Environmental Management System to meet the ISO 14001 requirements.

Sustainable Forest Management & Environmental Policy (December 9, 2005)

CARRIER LUMBER LTD. is committed to Sustainable Forest Management and responsible stewardship of the environment in our Forest Practices. To achieve this objective we are committed to:

- Meeting or exceeding all applicable laws, regulations, policies and other pertinent requirements to which the organization subscribes,
- Meeting or exceeding all applicable laws, regulations, policies and other pertinent requirements as they relate to:
  - Preventing pollution in our forest practices,
  - Respecting Aboriginal and treaty rights,
  - Providing conditions and safeguards to the health and safety of our employees, contractors, and the public in our forest practices,

- Ensuring the Sustainable Forest Management & Environmental Policy is available to the public,
- Providing opportunities for Aboriginal and public participation through a public advisory group,
- Providing the framework for setting and reviewing environmental objectives and targets,
- Documenting, implementing, maintaining and communicating our policy throughout our company,
- Improving knowledge of Forest Management and implementing advances in Sustainable Forest Management through new science and technology,
- Continual improvement in Sustainable Forest Management and environmental management in our forest practices.

3.1.6 Stuart Lake Lumber Company Ltd.

The DFA for Stuart Lake Lumber Company Ltd. is defined by it's Fort St. James operating areas identified on the map in Appendix 1. The Yekooche First Nation Agreement in Principle Land and the Vesko Properties are omitted from Stuart Lake Lumber's DFA. The location of these areas can be seen on Stuart Lake Lumber's Forest Development Plan Maps. Within the Stuart Lake Lumber DFA the following table shows the estimated annual harvest.

Licensee Apportionment	Estimated Annual Harvest in the DFA (m3)	Estimated Percent of Annual Harvest in the DFA (%)
Stuart Lake Lumber FL.A18169	201,978	79%
Other Non-Signatory Harvesting rights	49,583	19%
Small Scale Salvage licensees	5,000	2%
TOTAL	**256,561**	**100.0%**

Non-signatories in the Stuart Lake Lumber DFA include:

- Canyon Tree Farms – SNRFL 25,000m3 for 3 years (A75761) – expires 2007;
- Brave Holdings – SNRL 25,000m3 for 3 years (A78072) – expires 2009;
- Za Marie Economic – NRFL 15,000 m3 for 3 years (A73937) – expires 2007; and,
- Yekooche First Nation – NRFL 9,583 m3 for 5 years (A75069) – expires 2010.

Non-signatories have no responsibility under the SFMP, but licensees involved in the Licensee Landscape Objective Working Group (LLOWG) are collecting non-signatory harvest data. Market conditions and stumpage rates determine if the non-signatory license holder will be actively harvesting or not. The table and list above will be updated as non-signatory harvesting volumes change in the Stuart Lake Lumber DFA.

Stuart Lake Lumber Company Ltd. (SLL) is a family owned and managed company that has been operating in Fort St. James since 1944. Since its early beginnings in Fort St. James, the company has expanded through the same family ownership, from a small operation, to an integrated forest operation, which makes a major contribution to the employment base and economy in Fort St. James. SLL produces dimension lumber and sells it both internationally and locally.

Stuart Lake Lumber's sawmill complex is located 6.5 kilometers north of Fort St. James in the BC Rail Industrial Site. The traditional operating area of the company includes the area south of Cunningham Lake, between Stuart Lake and Grassham Lake, and two areas east of the North Road. Stuart Lake Lumber obtained Canadian Standards Association Certification in February 2007.

Sustainable Forest Management (SFM) Policy

Stuart Lake Lumber Company Ltd. is committed to working towards achieving and maintaining sustainable forest management by following the principles listed below:

- Meet or exceed all relevant legislation, regulations, policies and other requirements;
- Respect Aboriginal and treaty rights;
- Provide for public participation;
- Provide participation opportunities for Aboriginal peoples with respect to their rights and interests in SFM;
- Provide conditions and safeguards for the health and safety of the DFA-related workers and the public;
- Improve knowledge about the forest and SFM and to monitor advances in SFM science and technology and incorporate them where applicable; and,
- Demonstrate continual improvement in SFM.

3.1.7 Takla Track & Timber Ltd.

The licensee operating area for Takla Track & Timber Ltd. is defined by its Fort St. James operating areas identified on the map in Appendix 1. Within the Takla Track & Timber DFA the following table shows the estimated annual harvest.

Licensee Apportionment	Estimated Annual Harvest in the DFA (m3)	Estimated Percent of Annual harvest in the DFA (%)
Takla Track & Timber Ltd. NRFL.A27823	200,000	100.0%
Other Non-Signatory Harvesting rights	0	0%
Small Scale Salvage licensees	0	0%
TOTAL	**211,978**	**100.0%**

Takla Track & Timber (TTT) holds Forest License A27823 (Term 1990-2010) with an Allowable Annual Cut of 200,000 m3. Harvesting was initially restricted to Supply Block A (Sustut River) and a portion of Supply Block B (Takla Lake) in the Prince George Timber Supply Area. On November 6, 2006, the Regional Manager approved an amendment (transfer) of the license area from the initial area to high priority mountain pine beetle (MPB) infested stands in the Carrier/Tezzeron and Sinclair operating areas within Supply Block C of the Prince George Timber Supply Area.

TTT is owned by seven shareholders - Canfor, Dunkley, Lakeland, L&M, Winton Global, Stella Jones, and Sustut Holdings (Necoslie, Tl'azt'en, Takla). Takla Forest Management Inc. (TFMI) is a wholly owned subsidiary of Takla Track & Timber that manages all the activities (planning, logging, hauling, silviculture, rail reload) required to deliver logs from the Forest License area to the shareholder's mills.

3.2 The Non-Signatories

This SFMP was designed as a collaborative effort among the major Licence holders within the Fort St. James Forest District. The primary Licence type within the Area Under the Plan and within each licensee DFA is a volume-based Forest tenure.

In response to the increasing attack of mountain pine beetle in the Prince George TSA, the annual allowable cut (AAC) has been increased by the Ministry of Forests. As a result, it is anticipated that new Non-Replaceable Forest Licenses (NRFL's) will be awarded. The Licensee Steering Committee recognizes that NRFL's and Private Woodlot Owners may have an impact on certain measures of SFM within this plan. At this time, these impacts are still uncertain and it is difficult to address the influences of additional Licenses based on current knowledge gaps. As the AAC increases and new licenses are awarded within the Fort St. James Forest District, this SFMP will also be re-visited and updated

accordingly in order to continually evolve with District and Provincial initiatives. In response to additional Licenses within the AUTP and licensee DFA's, the Licensee Steering Committee may consider revising existing measures, developing additional measures or dropping current measures as required to uphold the principles of SFM.

Efforts will continue to be made by the Licensee Steering Committee to have non-signatory Licence holders become signatory to the SFMP or as a minimum, incorporate non-signatory license data into the SFMP as required. This data is being collected by licensees involved in the Licensee Landscape Objective Working Group (LLOWG). Other license holders are being encouraged to participate in this process in order to meet their landscape objectives as identified in their Forest Stewardship Plans. However, should these private woodlot owners decide not to participate, the Licensees and BCTS recognize the legal right of these private woodlot owners to set their own values, objectives, indictors and targets relating to their properties.

Licensees and BC Timber Sales will respect the legal rights and responsibilities of other non-signatory license holders and other parties in the DFA that are not associated with certification efforts by the companies operating within the AUTP.

Licensee Steering Committee members are committed to working with non-signatory Licence holders in conjunction with this plan in order to ensure SFM is achieved across the AUTP and each licensee DFA.

3.3 Public Advisory Group

One of the general requirements of the CSA SFM Z809-02 Standard is for "ongoing and meaningful public participation". Public participation is a crucial part of SFM in BC as it recognizes the right of members of the public to be involved with the management of publicly owned forests. By participating in the process, citizens can express their views on how public forests are to be managed, and they can enhance their knowledge of SFM.

One of the public participation strategies suggested in the CSA SFM Z809-02 Standard is the formation of a local group of interested and affected parties to provide input on an ongoing basis. This strategy provided the base for the formation of a Public Advisory Group (PAG) whose purpose is to achieve the following CSA SFM Z809-02 Standard's public participation requirements.

Interested parties shall have the opportunities to work with the organization to:

i) identify and select values, objectives, indicators, and targets, based on the CSA SFM elements and any other elements of relevance to the DFA;
ii) develop alternative strategies to be assessed;
iii) assess alternative strategies and select the preferred one;
iv) review the SFM plan;
v) design monitoring programs, evaluate results, and recommend improvements; and
vi) discuss and resolve any issues relevant to SFM in the DFA.

The Licensees/BC Timber Sales established a PAG in the fall of 2004 to assist with developing this SFMP. To promote participation in the PAG, in October 2004 the Licensees/BC Timber Sales sent a letter of invitation to approximately 275 individuals as well as five First Nations in the Fort St. James Forest District, advertised in two local newspapers, and hosted an Open House.

Between November 2004 and October 2005, the PAG met on 10 occasions, with an average of 10 public members at each meeting, to undertake the work necessary to develop the SFMP. By the end of 2004 they had developed a Terms of Reference. The door was, and still is, open to any member of the public and First Nations to participate at the PAG meetings.

After completing the Terms of Reference in December 2004, the PAG began work on the SFMP's Criteria and Elements Performance Matrix. The Licensees/BC Timber Sales also created a Continuous

Improvement Matrix to assist itself and the PAG in tracking issues that could not be addressed at the current time. After completing the SFMP's Criteria and Elements Performance Matrix in May 2005, the PAG met in October 2005 to review the Forecasting Analysis and decide on an option, and to provide comments on the SFMP to the Licensees/BC Timber Sales.

The PAG continues to meet on a regular basis to review licensee/BC Timber Sales performance, to refine the indicators, targets, and variances, and to discuss SFM related information.

See Appendix 2 for a list of the Fort St. James PAG participants, Appendix 2 for the approved PAG Terms of Reference.

3.4 Supporting Information

3.4.1 Legislation, Policies, Strategic Plans

SFM initiatives will utilize and incorporate many of the existing strategies and policies previously developed for the DFA. The following table outlines the intent of this SFMP within the realm of some of the most important existing legislation, plans and policies with regards to SFM.

Table 4. SFMP Linkages to Existing Legislation, Polices, or Strategies

Document	Linkage to SFMP
Forest and Range Practices Act (FRPA)	FRPA provides forest managers with a "results-based" structure upon which to develop and deliver forest management. The SFMP is also "results-based" in nature, providing the participants a context to develop, implement and report on achievement of objectives. The plan must meet or exceed the requirements set forth in FRPA.
Land and Resource Management Plan (LRMP)	The FSJ LRMP (1999) was a community-based process used to develop land use strategies where decisions were made through consensus from members of the public, forest licensees and government resource agencies. Certain objectives developed in the LRMP were also integrated into the measures of SFM plan.
Timber Supply Review (TSR)	The main objectives of a TSR are: • to identify economic, environmental and social information that reflects current forest management practices including their effects on the short and long-term timber supply; • to identify where improved information is required for future timber supply forecasts; and • to provide the Chief Forester with information to make any necessary adjustments to the AAC for the next five years.
ISO 14001 Environmental Management System (EMS)	The ISO 14001 standard governs the implementation of an EMS, which is a series of performance requirements and measures developed and implemented on the land base. The CSA Z809-02 standard is consistent with the ISO 14001 standard. Each requires a detailed management system that will fulfill the requirements of the standard. The primary linkage between the EMS and the SFMP will be in the areas of responsibility matrix, tracking and recording of SFM training needs, communication requirements, documentation and document control, operational procedures and control, corrective actions, internal/external audits, reporting of performance and finally, emergency preparedness and response The CSA Z809-02 Standard indicates that it is consistent with the internationally recognized ISO 14001 Environmental Management System Standard. Each

	Standard requires the development of a management system and these systems operate in a similar fashion. For both the SFMP and the EMS a plan is implemented along with checking and corrective action and it is followed up with a management review. As these systems contain such similarities, one can work in conjunction with the other. Certain aspects of SFM can be appended to an existing EMS system, thereby eliminating the need to develop another set of management system components.
Emergency Preparedness and Response	Each Licensee Team member's Environmental Management System (EMS) or Standard Operating Procedures (SOPs) contain various emergency preparedness and response plans including fire preparedness plans, and safety procedures and plans. As part of the updates taking place within EMSs and SOPs to ensure SFM requirements are met, emergency preparedness and response plans will also be updated as required to ensure SFM elements are realized through these existing plans. Current emergency preparedness and response plans establish and maintain procedures for responding to accidents and emergency situations within the DFA. These plans also identify potential for emergency situations and help to establish pro-active strategies to prevent emergency situations from occurring.
SAFE Company Certification Program	Forest companies have the legal obligation to maintain a safe workplace through a safety program that protects workers. Each Licencee Team Member's SAFE Certification Program is a major Council Initiative to improve forest industry safety. Safe Companies provides clear, practical and achievable standards so they can establish and maintain successful health and safety programs.
Forest Investment Account (FIA) and Land Base Investment Rationale (LIBR)	The purpose of the Forest Investment Account (FIA) is to assist government to develop a globally recognized, sustainably managed forest industry. Administered by government or government agents, Forest Investment Account programs provide funding to forest sector associations, researchers, tenure holders, manufacturers, and government agencies to: • support sustainable forest management practices; • improve the public forest asset base; and • promote greater returns from the utilization of public timber. Tenure holders (forest licensees) can apply for funding under FIA's Land Base Investment Program (LBIP). The LIBP is one of the programs administered under the FIA involving investments in land base activities planned and delivered by licensees according to government standards. This funding is made available to management units (TSAs and TFLs) and licensees within the management units based on AAC. Licensees within a management unit jointly produce a Land Base Investment Rationale (LBIR), a document that outlines the linkages to strategic forest planning and management objectives for each management unit. The LBIR also provides a priority ranking of FIA funded activities proposed within a management unit to help meet SFM objectives.
Forest Stewardship Plan (FSP)	The FSP is a landscape level plan that is submitted to government for approval and it will be the driver of site-specific operational plans. The FSP is the primary operational plan that contains the various management strategies to help achieve the SFM goals of the DFA. Each Licensee Team member will be responsible to ensure that SFM principles are upheld through their approved FSPs and other operational plans.
Site Plan (SP)	The SP is a legislatively required site level plan that identifies the approximate locations of cutblocks and roads, and identifies how the intended results or strategies described in the Forest Stewardship Plan will be implemented. SPs must be made publicly available on request but are otherwise an internal planning document. In the context of this SFMP, the SP is one of the tools that will outline specific

	management strategies in place to achieve SFM. The SP is where strategies will be prescribed to a particular site based on its overall characteristics. Site level activities will be inspected once complete and compared to the SP to ensure adequate management toward SFM.
Operational Plans (harvesting methods, silviculture systems and basic silviculture)	Operational plans reflect ground level applications of all management policy and planning. The SFMP is implemented via these plans through a combination of Best Management Practices that are prescribed for a particular management area or individual harvest site. Operational plans essentially translate strategies and initiatives to forest management activities such as harvesting, silviculture and road building. Harvesting throughout the DFA is accomplished using conventional ground-based harvesting techniques involving feller bunchers, crawler tractors and rubber tired skidders. Sites that require equipment other than ground based systems are generally not scheduled for harvest unless management of the area would provide significant ecological, economic and social benefits. Harvesting activity occurs during summer and winter seasons depending on site conditions and beetle management priority. Areas with more sensitive soils or areas with higher compaction hazards are logged in the winter when the ground is frozen to mitigate impacts. Summer harvest generally occurs on dry sites where the impacts to soil conditions are low. Roadside harvesting is utilized across the DFA. This harvesting system uses the constructed road area as the location to process timber. Felled trees are skidded to the roadside where a processor de-limbs and cuts the log to utilization standards. Processed logs are then decked along the roadside where they are eventually loaded onto trucks and hauled to the mill. Waste wood such as branches and trimmings are piled into debris piles along the roadside where they are eventually disposed of through burning. Roadside processing distributes soil disturbance more evenly across the site and helps to minimize compaction through repeated machine traffic on designated trails within a harvest area. The majority of the DFA is harvested using a clear cut with reserves silviculture system. Partial cutting systems may be used in scenic and riparian sensitive areas. Initially, the harvest of beetle infested timber was conducted through small patch or individual tree harvesting. Current beetle infestation levels have resulted in amalgamation of small patches into larger clear cuts, often exceeding 1000 hectares in size. Overall, natural disturbance patterns within the DFA indicate that management techniques should trend toward development of larger clear cuts with reserves in order to emulate historical natural disturbance patterns. As resource objectives continue to become increasingly complex, so will the design of silviculture systems. As per legislative and most Forest Licence requirements, licence holders within the DFA are required to reforest and produce free growing stands on all areas harvested after October 1987. To ensure a minimum regeneration delay period and complete stocking of harvested areas, generally all areas are planted with nursery grown tree seedlings. The species planted on harvested sites depends on ecological characteristics of the site and also what species were logged from the area. Based on the forest cover of the DFA, pine and spruce seedlings are the most common stock used, with some Douglas-fir being planted on certain sites. Mechanical site preparation, and to a lesser extent chemical site preparation, are used to promote artificial regeneration of harvested sites. Site preparation treatments are completed on areas where straight planting will not yield a healthy crop tree. Examples of these areas include sites with heavy slash or vegetation, or wet areas that require a raised micro site for planting.

	After a harvested site is planted, it must be monitored in order to ensure the crop of trees is growing naturally and uninhibited. Mechanical brushing and weeding treatments are applied to plantations where competition from vegetation will inhibit tree growth. Chemical brushing and weeding treatments are not often used, but may occasionally be applied depending on the characteristics of the site. Surveys are conducted on all sites to determine regeneration performance, brushing and weeding requirements and to assess free growing status. Once free growing status is achieved the requirement of basic silviculture is complete and the forest stand is reverted back to Crown land.

4.0 SFM Performance Requirements

The CSA SFM Z809-02 Standard provides a clear set of requirements a SFMP must meet in order to achieve certification. The Standard recognizes that successful implementation of SFM requires both a strong process and comprehensive content. To achieve this, the CSA SFM Z809-02 Standard requires that "values, objectives, indicators, and targets" in the plan clearly address the Canadian Council of Forest Ministers (CCFM) SFM "criteria" and CSA SFM "elements" in the Standard. This section will explain these concepts and how they are related to one another.

4.1 Criteria and Elements

The most broadly accepted forest values created to this point in time are found in the Canadian Council of Forest Ministers (CCFM) criteria and elements. The CSA SFM Z809-02 Standard uses these criteria and elements as a framework for identifying values and to provide consistency in determining local forest values across Canada. The CSA SFM Z809-02 Standard defines criterion and element as follows:

Criterion: A category of conditions or processes by which sustainable forest management may be assessed; characterized by a set of related indicators which are monitored periodically to assess change (Montreal Process 1995). Criteria are meant to be broad management objectives that are proven through the repeated, long-term measurement of associated indicators.

Element: A concept used to define the scope of each CCFM criterion. Each CCFM criterion contains several elements that serve to elaborate and specify the extent of their associated criterion.

The CCFM Criteria and CSA SFM Elements are outlined in the table below.

Table 5. CCFM Criteria and CSA SFM Elements

CCFM Criterion	CSA SFM Element
1 - Conservation of Biological Diversity	• 1.1 - Ecosystem Diversity • 1.2 - Species Diversity • 1.3 - Genetic Diversity • 1.4 - Protected Areas and Sites of Special Biological Significance
2 - Maintenance and Enhancement of Forest Ecosystem Condition and Productivity	• 2.1 - Forest Ecosystem Resilience • 2.2 - Forest Ecosystem Productivity
3 - Conservation of Soil and Water Resources	• 3.1 - Soil Quality and Quantity • 3.2 - Water Quality and Quantity
4 - Forest Ecosystem Contributions to Global Ecological Cycles	• 4.1 - Carbon Uptake and Storage • 4.2 - Forest Land Conversion
5 - Multiple Benefits to Society	• 5.1 - Timber and Non-timber Benefits • 5.2 - Communities and Sustainability • 5.3 - Fair Distribution of Benefits and Costs

6 - Accepting Society's Responsibility for Sustainable Development	• 6.1 - Aboriginal and Treaty Rights • 6.2 - Respect for Aboriginal Forest Values, Knowledge and Uses • 6.3 - Public Participation • 6.4 - Information for Decision-making

4.2 Values, Objectives, Indicators, and Targets

Using the above Criteria, the Fort St. James PAG needed to identify one or more specific *values* for each element. For each value at least one *objective* had to be defined that described the future condition of that value. Also, each value required one or more *indicator(s)* identified for it. Once an indicator was identified, it in turn needed a *target*. These terms, as defined by the CSA SFM Z809-02 Standard, are as follows:

Value: a characteristic, component, or quality considered by an interested party to be important in relation to a CSA SFM Element or other locally identified element. Example: When considering the CSA Element "*Species Diversity*", a AUTP related value could be "*Sustainable populations of flora and fauna native to the AUTP (natural abundance and distribution of species within their natural range*".

Objective: a broad statement describing a desired future state or condition of a value. Example: One objective for the value "*Sustainable populations of flora and fauna native to the AUTP (natural abundance and distribution of species within their natural range*" could be to "*Maintain a range of temporal and spatial distribution of all natural habitats necessary to support native self sustaining populations*".

Indicator: a variable that measures or describes the state or condition of a value. Indicators should be quantitative where possible. Example: Using the previous value and objective, an indicator could be "*The percent of wildlife trees and/or wildlife tree patches associated with areas harvested annually by licensee as measured across the AUTP*".

Target: a specific statement describing a desired future state or condition of an indicator. Targets should be clearly defined, time-limited, and quantified, if possible. Example: For the above wildlife tree retention indicator, the target could be "*>7% by licensee*".

One of the Fort St. James PAG's major roles was to help select the indicators to be included in the SFMP. This involved defining what is to be measured and why it is important. During this process the PAG applied a set of quality criteria when assessing proposed indicators. This set included:

a) Measurability - targets can only be set for indicators that can be measured;
b) Predictability - indicators whose future levels can be predicted with reasonable accuracy are needed;
c) Relevance - indicators should be clearly applicable to their associated values;
d) Understandability - indicators should be simple, clear, and easy to understand;
e) Validity - indicators should be consistent with the scientific understanding of the value they measure and should be technically valid (objectively obtained, documented, comparable and reproducible); and
f) Feasible- the process of monitoring indicators should be practical, cost-effective and efficient.

The Licensees, BC Timber Sales, and the PAG have established an extensive set of indicators and targets that will be further analyzed in Section 5.0 (refer to Appendix 7 for the Fort St. James SFMP Matrix). The next step is to design and evaluate strategies to achieve all identified targets. The process of evaluating a strategy includes and analysis of current management practices and a forecast of the indicator's success in achieving the target in the future.

4.3 Current Management Practices and Forecasts

4.3.1 Current Management Practices

An assessment of the current management practices associated with each indicator will help determine how these practices contribute to SFM. For each indicator in this SFMP if the indicator and it's associated target involve activities that are occurring in the forest today, the current management practice is briefly described. Continuing on with the wildlife tree retention example from the previous section, a description of current management practices may be the following:

"Stand level retention, including wildlife trees and wildlife tree patches, is managed by each Licensee and BC Timber Sales in the DFA on a site-specific basis. During the development of a cut block, retention areas are delineated based on a variety of factors. Stand level retention generally occurs along riparian features and will include non-harvestable and sensitive sites if they are present in the planning area. Stand level retention also aims to capture a representative portion of the existing stand type to contribute to ecological cycles on the land base. Retention level in each block is documented in the associated Site Plan, recorded in the Licensee's/ BC Timber Sales' database systems and reported out in RESULTS on an annual basis."

This information may include tables detailing the historic trends in meeting the indicator target if applicable. Extrapolating past management practices into the present may not always be a reliable method of predicting the future success of that practice in meeting an indicator's target. However, it is useful in providing a base for developing forecasts where specific modeling information is unavailable or insufficient.

Numerical data defining the current status of each indicator is not included in the annual report for the plan, as this data will not remain static. Data pertaining to the performance of the CSA SFM indicators developed for the Fort St. James SFMP will also be collated in an annual report separate from this document.

4.3.2 Forecasting and Scenario Analysis

The CSA SFM Standard requires explicit forecasts for all indicators. Forecasting indicators requires approaches suited to each indicator. These may include mathematical models, GIS models for quantitative indicators, or scenario-building techniques for qualitative indicators.

Some indicators were forecasting using a GIS modeling technique as follows: An SFM indicator-forecasting project covering the area of the plan was initiated in June 2005. The purpose of the project was to forecast the effects of chosen forest management scenarios on the long-term sustainability of the chosen indicators/measures based on the established targets and thresholds developed in the Public Advisory Group process. A digital dataset was developed that included various base forest inventory GIS data coverage's, timber data GIS coverage's, non-timber GIS coverage's and licensees cutblocks and roads.

A base case was developed and modeled into the future for about 250 years and is the basis for comparing all other management scenarios. The base case used the best available knowledge about current forestry management practices and the growth of the forest. The beetle epidemic is modeled using the provincial-level projection of mountain pine beetle epidemic, current to April 2005. Several other scenarios were modeled and results presented to the Public Advisory Group. The scenario chosen for moving forward in this plan is the Scenario 2 – SFM Base Case with increased biodiversity. This scenario simulates raising biodiversity targets to the minimum natural range of variability. A summary report outlining assumptions and results of the base case and scenarios are included in Appendix 7.

However many of the indicators in this SFMP were forecasted by the scenario-building technique, using a logical "what if scenario" analysis on how the ecological, environmental, and social values of SFM would be affected if the target for each indicator were not achieved.

Using the wildlife tree retention indicator and target used in previous examples, a forecast using the "what if" scenario analysis could be as follows:

"Stand level retention is not easy to quantifiably forecast. However, forecasting of this indicator can be completed with the use of a "what if scenario" to help assess anticipated future trends for stand level retention. This could include two potential scenarios:

a) What if no stand level retention was prescribed in managed stands?
b) What if three times the stand level retention was prescribed in managed stands?

The ecological benefit from stand level retention is assumed to increase with the number of retention areas present in managed stands. Benefits increase up to a saturation point where overall value then begins to level off. At this point in time it is not possible to identify this saturation point as each stand has different ecological attributes. Future research and analysis of historical planning may help to identify this point of maximum benefit. If no stand level retention was prescribed, it is expected that biodiversity values would diminish. Wildlife productivity may decline, ecosystem and genetic diversity could decrease and natural patterns across the landscape may not be represented. Conversely, If three times the stand level retention was prescribed in managed stands one could anticipate economic values from the timber resource might not be fully achieved. Silviculture activities such as reforestation could potentially become less efficient and more costly due to smaller harvesting units. Higher levels of retention would also increase fragmentation of the landscape, making patch size distribution objectives more difficult to achieve.

The comparison of the above scenarios implies that a balance of values can be achieved through an identified level of stand retention that lies somewhere in between the two situations. Although this level has not yet been identified through past experience or through scientific findings, the Licensees and BC Timber Sales are committed to achieving the indicator target and will strive to continually improve practices, as new information becomes available. Within the Fort St. James DFA, future trends suggest that stand level retention will remain constant or potentially decrease due to the current mountain pine beetle epidemic."

This method is somewhat subjective in predicting the "what if" scenario, but it can highlight how important the individual indicator can be to overall SFM in a manner mathematical models cannot achieve. As the SFMP evolves and trends in data begin to appear, indicator forecasts will be re-assessed.

4.4 Adaptive Management

The concept of "sustainability" is based on the idea that a value is maintained over time. If the management of the AUTP forests is to be sustainable, forest managers must be able to adapt plans and practices to respond to the inevitable changes to the forest resource. The CSA SFM Z809-02 Standard recognizes this and requires SFM systems to be based on the principle of "adaptive management, which enables and encourages the improvement of management actions and practices based on knowledge gained from experience" (CSA, 2002). Adaptive management is used to achieve continual improvement. This is accomplished by regularly monitoring, recording, and assessing the indicators and then modifying forecasts, activities, and plans based on this information.

4.4.1 Monitoring

Monitoring of indicators involves the collection of data to verify the achievement of targets. For each indicator in the SFMP a monitoring strategy will be identified. In many cases, established Licensee/ BC Timber Sales EMS frameworks, standard operating procedures, and tracking systems will fill this role.

Collecting the data is the first step. The second is to record the information in such a manner that it can be retrieved for analysis and evaluation. All Licensees and BC Timber Sales maintain databases of some form, from traditional paper filing systems to electronic GIS databases such as GENUS RMT. For

continual improvement to occur, the recording of monitoring information must be timely, complete, and accurate. Failure to do so will reduce the quality of analysis, evaluation, and adjustment that is required for SFM to succeed.

4.4.2 Analysis, Evaluation and Continual Improvement

Analysis of data collected during the monitoring phase is important to relate indicator performance to the particular management strategy applied to achieve the target. Without this analysis, it is impossible to learn what changes (if any) are necessary to meet targets or how to implement them.

The analysis, evaluation and continuous improvement phase of SFM is one of the most difficult aspects of the process. The personnel responsible for analyzing data must be objective when determining if changes are required to either the indicators or the strategies used to achieve targets. Cooperation between the PAG and the Licensees/ BC Timber Sales is important for continuous improvement of sustainable forest management performance.

4.4.3 Annual Reporting

Communicating the results of the monitoring and analysis stages is important for the process of adaptive management. Without knowledge of the results of indicator performance, the Licensees/ BC Timber Sales and the PAG will be unable to recognize problems or take steps to improve them in a timely manner.

The annual report will describe the success in meeting the indicator targets over the AUTP. The report will be available to the public and will allow for full disclosure of forest management activities, successes and failures. It will include the identification of management practices that are not meeting targets and proposed actions to improve and adaptively manage forestry in the AUTP. By creating an annual report, sustainable forest management can be viewed by the public as an open, evolving process that is taking steps to meet the challenge of managing the forests of the Fort St. James AUTP for the benefit of present and future generations.

5.0 SFMP Indicators, Targets and Strategies

In the following sections, each indicator and target developed by the PAG for the Fort St. James DFA is discussed in detail. For each indicator the CSA SFM parameters that it addresses are identified (the CCFM criterion, the CSA SFM element, the value, and the objective). These are followed by descriptions of the indicator, current practices, and a discussion of how the targets were established and how they are to be met. For each indicator a forecast is made of how the target will impact SFM, particularly its ecological, economic, and social values. Finally, a brief discussion of the monitoring and reporting procedures is made, including a description of who is responsible for these activities.

Indicator 1 - Relative Abundance of Ecosystems

Indicator Statement	***Target and Variance***
Relative abundance of ecosystems (Number / types of habitats).	Target: Implement Interim Targets: •Common Ecosystem Groups ≥15% in NHLB •Ecosystems with High Stewardship Resp. ≥30% in NHLB •Uncommon Ecosystem Groups ≥50% in the NHLB •Rare Ecosystem Groups 100% retention Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 1: **Conservation of Biological Diversity -** Sustainable populations of all flora and

fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element 1.1: **Ecosystem Diversity**
Value: Diversity of natural ecosystems that will support function of natural processes for future generations.
Objective: Maintain natural diversity/distribution.

CCFM Criterion 1: **Conservation of Biological Diversity -** Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element 1.2: **Species Diversity**
Value: Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
Objective: Ensure habitat for species where ecologically appropriate and maintain a range of temporal and spatial distribution of natural habitats necessary to support native self-sustaining populations.

CCFM Criterion 2: **Maintenance and Enhancement of Forest Ecosystem Condition and Productivity**.
CSA SFM Element 2.1: **Forest Ecosystem Resilience**
Value: Conserve ecosystem resilience by maintaining both ecosystem processes and ecosystem conditions.
Objective: Maintain ecosystems to support natural processes.

Description of Indicator

The relative abundance of ecosystems in the DFA is a measure of its biological richness as each type of ecosystem supports its own community of flora and fauna. Maintaining a representation of a full range of ecosystem types is a widely accepted strategy to conserve biodiversity. This indicator is intended to measure the success of the Licensees/BC Timber Sales to develop ecosystem representation targets from the predictive ecosystem mapping (PEM). PEM is the stratification of a landscape into map units, according to a combination of ecological features, primarily climate, physiography, surficial material, bedrock geology, soil, and vegetation (Government of BC, 2001a). The PEM planned for the Fort St. James DFA will stratify the landscape according to biogeoclimatic ecosystem classification (BEC), sub-divided by ecosections, biogeoclimatic subzone/variant, site series, and certain site modifiers using geographic information systems (GIS) and computer modeling.

Once the PEM is completed, the Licensees/BC Timber Sales will be able to determine representation targets based on the relative abundance of each BEC subzone/variant unit in the DFA. The development of these targets is important to sustainable forest management because it enables forest managers to plan forestry operations in a manner that does not diminish the natural diversity and resilience of ecosystems in the DFA. If the natural diversity of ecosystems is maintained it is more likely native populations of flora and fauna will be self-sustaining.

Current Practices and Status of Indicator

Preliminary predictive ecosystem mapping for the Fort St. James DFA was used in the Ecosystem Representation Analysis completed March 31, 2006. The preliminary results of this analysis were presented to the PAG March 21, 2007. The results were further reviewed and interpreted by a Registered Professional Biologist in the Fall of 2007. A Risk Class Matrix was used in assessing the nature and extent to which the ecosystem groupings should be managed for in the timber harvesting land base. The Ecosystem Groupings were then placed into four different categories based on the current area on the crown forest land base as well as the area represented in the FSJ District relative to the rest of the province. Interim targets and management strategies are recommended until the final PEM data is available and the next Timber Supply Review (TSR) IV is completed.

Currently there are 50 Ecosystem Groupings in the Fort St. James Forest District.

- Common Ecosystem Groups (33 groups)
- Ecosystems with High Stewardship Responsibility (2 groups)

•Uncommon Ecosystem Groups (10 groups)

•Rare Ecosystem Groups (5 groups)

Of these 50 groupings, seven groupings do not currently meet targets. The following is the 'Interim Management Strategy' that will be implemented by Licensees and BCTS:

- No harvest in the following Rare ecosystem groups 1-05, 1-18, 2-09, 2-27
- 15% WTP in new blocks located in:
  - 2-07 (Uncommon group)
  - 2-26 (Uncommon group)
  - SBSwk3 portion of 2-21 (Stewardship group)

Establishment of Targets and Future Practices

Ecosystem representation interim targets are applicable to the entire DFA, including parks/protected areas, Timber Harvesting Land Base (THLB) and Non-Harvestable Land Base (NHLB). The Licensees and BC Timber Sales are proposing to implement interim targets for annual reporting as the THLB and NHLB are currently being reviewed under the TSR IV process. As well, the final PEM data (including latest accuracy refinements) is yet to be released. At such time when these two key components are available, the Licensees and BCTS will implement a Forest Investment Account project to rerun the Ecosystem Representation Analysis, upon which the targets and management strategies will again be reviewed.

Forecasting and Predicted Trends

The exact level of success is difficult to forecast, as it is dependent on unpredictable factors such as human oversight and technological restraints. However, it is important to identify what the accepted target means to sustainable forest management. Implementing the Ecosystem Representation interim targets and associated management strategies in a timely fashion is important for SFM because it will ultimately influence ecosystem diversity. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for an indictor such as this.

a) What if Licensees and BCTS were not able to manage for a rare or uncommon ecosystem grouping as per the required management strategies?

If Licensees were to miss a rare or uncommon ecosystem grouping during operational activities, ecological values could be at risk, and these in turn could affect economic and social values. Establishing and implementing representation targets will ultimately contribute to the maintenance of the natural range of variability across the land base. Failure to implement such targets and management strategies may result in the inadvertent loss of some rare ecosystems, or significantly reduce their area. Loss of this habitat may then reduce the population of plants and wildlife dependant on these sites. This reduction in species richness could then impact non-timber users of the DFA who may value these resources for economic and recreational uses.

Monitoring and Reporting Procedures

The indicator will be tracked and monitored by the Licensees/BC Timber Sales. This is a DFA target, however the Licensees and BCTS will report out on how they have implemented the management strategies on each of the seven Ecosystem Groupings that did not currently meet targets. As for the DFA Ecosystem Representation Analysis, this is a very complex and costly process. This will be reran in 2009 or 2010 as per the recommendations above, however no timelines for frequency of updating the analysis results will be set at this point. The success in meeting the management strategies for the applicable 7 Ecosystem Groupings will be reported in the annual SFMP for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

The Licensees/BC Timber Sales are responsible for implementing ecosystem representation 'interim targets' and associated management strategies beginning January 1, 2008. When the latest revisions are completed for the PEM Data and the TSR IV process is completed, the Ecosystem Representation Analysis will be updated and reviewed. Opportunities for improvement may be found in ways to advance PEM technology, or in additional testing the validity of PEM by ground testing PEM predictions.

Indicator 2 - Old Forest by Natural Disturbance Unit

Indicator Statement	***Target and Variance***
Maintain "old forest" within each NDU (merged BEC).	Target: Maintain average percent of total old forest and not go below minimal natural variation (*As per the "Landscape Biodiversity Objectives for the PG TSA*"). Variance: Within the range of natural variation as per the *"Landscape Biodiversity Objectives for the PG TSA*".

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 1: **Conservation of Biological Diversity -** Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element 1.1: **Ecosystem Diversity**
Value: Diversity of natural ecosystems that will support function of natural processes for future generations.
Objective: Maintain natural diversity/ distribution.

CCFM Criterion 2: **Maintenance and Enhancement of Forest Ecosystem Condition and Productivity**
CSA SFM Element 2.1: **Forest Ecosystem Resilience**
Value: Conserve ecosystem resilience by maintaining both ecosystem processes and ecosystem conditions.
Objective: Maintain the diversity of ecosystem conditions.

CCFM Criterion 4: **Forest Ecosystem Contributions to Global Ecological Cycles**
CSA SFM Element 4.1: **Carbon Uptake and Storage**
Value: Carbon Uptake and Storage.
Objective: Maintain processes that take carbon from the atmosphere and store it in forest ecosystems.

Description of Indicator
This indicator is intended to quantify the amount of the landscape occupied by "old forests" at a point in time. Old forests (late seral) are defined as forests older than 140 years from available forest inventory sources, for all Natural Disturbance Units (NDUs) with the exception of:

- the Moist Interior- plateau sub-unit- all biogeoclimatic ecosystem classification (BEC) variants
- the Omineca Valley SBSdk, SBSdw3, BWBSdk1, SBSmc2, SBSmk1
- the McGregor Plateau- SBS mk1 and SBSmh

where old forests are considered to be those stands >120 years (Landscape Biodiversity Objectives for the Prince George Timber Supply Area (PG TSA)).

Maintenance of late seral stage stands is crucial for forest management to conserve landscape ecosystem biodiversity and resilience. Old forests often contain unique plant and animal communities that contribute to ecological productivity and forest resilience. Old forests often represent large volumes of stored carbon. Their maintenance helps manage levels of atmospheric carbon that is contributing to climate change.

As harvesting usually targets older stands, forest management must consider how harvesting affects the distribution and percentage of seral stands across the landscape. The current Mountain Pine Beetle epidemic presents its own challenges as older pine leading stands are the most susceptible to infestation. By ensuring the target percentage of old forest by NDU/ BEC within the DFA is met, the long-term viability of those plant and animal species that depend on these forest types will be maintained. Forest ecosystems will also be more resilient by meeting the targets as a diverse ecosystem with representations from all its variations is more able to adjust to change and disturbances.

Current Practices and Status of Indicator

The Landscape Objective Working Group (LOWG), which has representation from the Ministry of Sustainable Resource Management (MSRM), Ministry of Forests and Range (MOFR) and timber licensees, aided MSRM in the development of landscape biodiversity objectives and old forest retention requirements for the Prince George TSA, which includes the Fort St. James DFA. These objectives utilized NDU research conducted by DeLong (2002), and as such, old forest retention objectives have been established for each NDU that occurs within the Fort St. James DFA. The current status of late seral forest within the DFA exceeds the specified targets as per the Prince George TSA Landscape Biodiversity Objectives (refer to Table 4). It is apparent that harvesting activities can continue throughout the DFA as long as levels of old seral are closely monitored to ensure the targets are continually achieved or exceeded.

Table 6. Old Forest in the DFA and Associated Targets

Unit Label	Natural Disturbance Unit	Merged Biogeoclimatic Units	Current Status as of March 31st, 2005* %	Target (%)	Target Non-pine Leading (%)	Variance (%)
E1	Moist Interior	ESSF mv1, ESSF mv3, ESSF mvp1	50%	>41%	42%	>41%
E2	Moist Interior	SBS dk	56%	>17%	43%	>17%
E3	Moist Interior	SBS mc2	61%	>17%	32%	>17%
E4	Moist Interior	SBS mk1, SBS wk3	40%	>17%	14%	>12%
E5	Moist Interior	SBS dw3	53%	>17%	27%	>12%
E6	Northern Boreal Mountains	ESSF wvp, ESSF mcp, ESSF mc, ESSF wv	90%	>37%	-	>37%
E7	Northern Boreal Mountains	SWB mks SWB mk	81%	>37%	-	>37%
E8	Northern Boreal Mountains	SBS mc2	81%	>37%	-	>26%
E9	Omineca Mtn.	ESSF mv	95%	>58%	-	>58%
E10	Omineca Mtn.	ESSF mc	84%	>58%	-	>41%
E11	Omineca Mtn.	ESSF mv3	70%	>58%	-	>41%
E12	Omineca Valley	SBS dk, SBS dw3	58%	>23%	-	>16%
E13	Omineca Valley	ICH mc1	91%	>23%		>23%
E14	Omineca Valley	BWBS dk1	69%	>23%	-	>16%
E15	Omineca Valley	SBS mc2	78%	>23%	-	>16%
E16	Omineca Valley	SBS mk1	50%	>23%	-	>16%
E17	Omineca Valley	SBS wk3	44%	>23%	-	>16%

*The current status is from the PG TSA Licensees' Memorandum of Understanding on the Order Establishing Landscape Objectives for the Prince George Timber Supply Area, Appendix 4

A landscape analysis has been conducted across the TSA with the results mentioned above. This analysis was completed for 2005. Some Licensees have also been conducting their own analyses to ensure compliance on their part, but the targets are measured across NDUs/merged BEC, not across operating areas.

Establishment of Targets and Future Practices

Targets for this measure were derived from the Order Establishing Landscape Biodiversity Objectives for the Prince George Timber Supply Area. Forest Development Plans (FDPs) or Forest Stewardship Plans (FSPs) will be analyzed to ensure they are consistent with the targets. Proposed harvesting will be adjusted if necessary to ensure compliance with targets, and will be reliant on the degree of surplus of old forest that exists (See the *LLOWG Memorandum of Understanding* for more information in Appendix 4*).*

Forecasting and Predicted Trends

Forecasting results of the old forest amount indicator under the "Scenario 2 – SFM Base Case with Increased Biodiversity" are shown in following table.

Old Forest under Scenario 2 - SFM Base Case with Increased Biodiversity

			Future Forecasting					
Unit Label	**Natural Disturbance Unit**	Target (%)	20 yrs from now (%)	50 yrs from now (%)	100 yrs from now (%)	150 yrs from now (%)	200 yrs from now (%)	250 yrs from now (%)
E1	Moist Interior	>41%	44%	41%	41%	41%	44%	41%
E2	Moist Interior	>17%	53%	38%	30%	38%	40%	40%
E3	Moist Interior	>17%	42%	22%	17%	26%	30%	27%
E4	Moist Interior	>17%	27%	12%	12%	12%	12%	12%
E5	Moist Interior	>17%	39%	21%	16%	20%	22%	22%
E6	Northern Boreal Mountains	>37%	58%	42%	37%	42%	60%	44%
E7	Northern Boreal Mountains	>37%	44%	37%	37%	38%	52%	39%
E8	Northern Boreal Mountains	>37%	69%	49%	26%	26%	39%	26%
E9	Omenica Mtn.	>58%	62%	57%	57%	58%	58%	58%
E10	Omenica Mtn.	>58%	56%	41%	41%	41%	48%	41%
E11	Omenica Mtn.	>58%	55%	45%	41%	41%	42%	41%
E12	Omenica Valley	>23%	50%	22%	16%	19%	29%	27%
E13	Omenica Valley	>23%	78%	38%	23%	29%	56%	26%
E14	Omenica Valley	>23%	53%	27%	16%	20%	35%	24%
E15	Omenica Valley	>23%	50%	23%	16%	35%	42%	29%
E16	Omenica Valley	>23%	41%	21%	16%	16%	18%	16%
E17	Omenica Valley	>23%	34%	20%	16%	16%	18%	16%

As forest harvesting continues into the future under Scenario 2, the amount of old forest will be reduced to below the volume and settle approximately at the variance targets levels as shown above. From the 50 year forecast results, E4, E10, E11, E12, E16 & E17 dip below the target and is assumed due to previous assumptions of mountain pine beetle. The Licensees and BC Timber Sales are monitoring old forest on an annual basis and will develop strategies to achieve the targets. Additional forecasting of this indicator will occur during the future indicator supply analysis, which is anticipated to be in five-year intervals.

Monitoring and Reporting Procedures

This is a DFA/NDU specific indicator and the responsibility for monitoring and reporting this indicator will occur primarily through the LLOWG. The LLOWG will convene on a yearly bases to update the current and future amount of old forest, and the Licensee apportionment (update harvested blocks, newly planned blocks, aging of forest, and Licensee operating area changes). The data produced by the LLOWG will be used to assess current and anticipated future status of old forest targets. Licensees/BC

Timber Sales will propose recruitment strategies if targets cannot be met as required. Although the LLOWG group will meet on an annual basis, the analysis will be completed as required by the Prince George TSA Landscape Biodiversity Objectives Reporting Protocol (See Appendix 4).

Responsibility and Continuous Improvement Opportunities

Each signatory Licensee/BC Timber Sales has the following responsibilities:

1) to provide a representative to participate in the Licensee LOWG (LLOWG)
2) to submit, as requested by LLOWG, an update of newly planned blocks
3) to submit, as requested by LLOWG, an update of blocks than have been harvested
4) to prepare plans that maintain old forest and old interior forest objectives and trend positively toward meeting young patch size distributions, wherever possible
5) as requested by other signatory Licensees/BC Timber Sales, to collaborate in the planning of old forest, old interior forest or young forest patches along licensee operating area boundaries
6) to collaborate in planning recruitment strategies for NDU/BEC units, where old forest or old interior forest targets cannot be met in the short term, and
7) to support the LLOWG by providing funding and/or resources, for projects that have been approved by the signatories, to facilitate implementation, monitoring and adaptive management of the landscape objectives.

In addition to these responsibilities, the LLOWG Team will look for opportunities for continual improvement. Substantial loss of old forests in some units is expected due to mortality from the mountain pine beetle infestation and resulting salvage activities. Therefore, the LLOWG has developed a surrogate for old growth, which will include a portion of dead pine stands that contain as many old growth attributes as possible. These surrogate stands are classified as Natural Forest Areas (NFAs). The Licensees/BC Timber Sales have identified the use and value of NFAs as a surrogate to old growth as a possible opportunity for continual improvement.

Indicator 3 - Old Interior Forest

Indicator Statement	***Target and Variance***
Maintain "old interior" forest conditions within each NDU (merged BEC).	Target: Greater than or equal to the targets set as per the "Landscape Biodiversity Objectives for the PG TSA", as per above target. Variance: As per the Landscape Biodiversity Objectives for the PG TSA.

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 1: **Conservation of Biological Diversity -** Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element 1.1: **Ecosystem Diversity**
Value: Diversity of natural ecosystems that will support function of natural processes for future generations.
Objective: Maintain natural diversity/ distribution.

CCFM Criterion 2: **Maintenance and Enhancement of Forest Ecosystem Condition and Productivity**
CSA SFM Element 2.1: **Forest Ecosystem Resilience**
Value: Conserve ecosystem resilience by maintaining both ecosystem processes and ecosystem conditions.
Objective: Maintain the diversity of ecosystem conditions.

Description of Indicator

Old interior forest conditions are achieved where the climatic and biotic impact of adjacent younger stands no longer influences environmental conditions. This indicator is important because many species are dependent upon old interior forest conditions for habitat needs. Historically, natural disturbance events such as fire, insects, and wind created diverse landscapes that provided sufficient reserves of mature timber to create ample interior old forest conditions. Sustainable forest management can contribute to creating these conditions by planning harvesting patterns that do not "fragment" the

landscape into patch sizes insufficient in area to achieve these goals. By creating interior forest conditions, ecosystem diversity and resilience is maintained in the DFA by creating habitat for plants and animals that depend on these ecosystems. Having a diverse representation of all ecosystem types enhances forest ecosystem resilience by providing habitat for species that contribute to the overall health and productivity of the forest. For example, old interior forests provide habitat for Pileated Woodpeckers that feed on forest pest insects.

Current Practices and Status of Indicator

The Landscape Objective Working Group (LOWG), which has representation from MSRM, MOF and timber Licensees, aided MSRM in the development of landscape biodiversity objectives for old interior forest conditions for the Prince George TSA, which includes the Fort St. James DFA. These objectives were established by MSRM in consultation with Licensees, BC Timber Sales and the MOF and utilize Natural Disturbance Unit (NDU) research conducted by DeLong (2002). Old interior forest retention objectives have been established for each NDU/Merged BEC that occurs within the Fort St. James DFA. The baseline analysis for the establishment of landscape biodiversity objectives across the Prince George TSA used 200 meters as the buffered distance from younger age classes to calculate the amount of old interior forest. The following describes the minimum percent of old forest that must be old interior condition.

Table 7. Fort St. James DFA Old Interior Forest Requirements

Unit Label	Natural Disturbance Unit	Merged Biogeoclimatic Units	Minimum percent of the Old Forest in Table 4 that must be Old Interior Forest (%)	Current Status as of March 31st, 2005* %	Variance (%)
E1	Moist Interior	ESSF mv1, ESSF mv3, ESSF mvp1	40%	45%	0%
E2	Moist Interior	SBS dk	10%	208%	0%
E3	Moist Interior	SBS mc2	10%	258%	0%
E4	Moist Interior	SBS mk1, SBS wk3	25%	173%	0%
E5	Moist Interior	SBS dw3	25%	281%	0%
E6	N. Boreal Mountains	ESSF wvp, ESSF mcp, ESSF mc, ESSF wv	40%	240%	0%
E7	N. Boreal Mountains	SWB mk, SWB mk	40%	202%	0%
E8	N. Boreal Mountains	SBS mc2	25%	293%	0%
E9	Omineca Mtn.	ESSF mv	40%	161%	0%
E10	Omineca Mtn.	ESSF mc	40%	202%	0%
E11	Omineca Mtn.	ESSF mv3	40%	159%	0%
E12	Omineca Valley	SBS dk, SBS dw3	25%	198%	0%
E13	Omineca Valley	ICH mc1	40%	380%	0%
E14	Omineca Valley	BWBS dk1	25%	342%	0%
E15	Omineca Valley	SBS mc2	25%	426%	0%
E16	Omineca Valley	SBS mk1	25%	227%	0%
E17	Omineca Valley	SBS wk3	25%	184%	0%

*The current status is from the PG TSA Licensees' Memorandum of Understanding on the Order Establishing Landscape Objectives for the Prince George Timber Supply Area, Appendix 4

Establishment of Targets and Future Practices

Targets for this indicator were derived from the Order Establishing Landscape Biodiversity Objectives. It is important that old interior forest objectives be managed with a temporal perspective (i.e. achieving the objectives over time). As stands age, Licensees and BC Timber Sales will have to demonstrate how the dynamics of old interior forest will change and be managed. A critical part of the strategy in the

immediate future will be to minimize fragmentation of mid-aged (60-100 year old) forests, as these are the stands that will provide the old interior forest conditions in the future.

Forecasting and Predicted Trends

Forecasting results of the interior old forest amount indicator under the "Scenario 2 – Increased Biodiversity SFM Plan base case are shown in the following table .

Old Forest Interior under Scenario 2- Increased Biodiversity - SFM Plan Base Case

Unit Label	Natural Disturbance Unit	20 yrs from now (ha)
E1	Moist Interior	**18%**
E2	Moist Interior	98%
E3	Moist Interior	67%
E4	Moist Interior	44%
E5	Moist Interior	83%
E6	N. Boreal Mountains	74%
E7	N. Boreal Mountains	44%
E8	N. Boreal Mountains	187%
E9	Omineca Mtn.	38%
E10	Omineca Mtn.	53%
E11	Omineca Mtn.	64%
E12	Omineca Valley	62%
E13	Omineca Valley	142%
E14	Omineca Valley	144%
E15	Omineca Valley	111%
E16	Omineca Valley	80%
E17	Omineca Valley	61%

Due to the complexity of calculating interior old forest, forecasting results are only presented into the future for 20 years. Similar to old forest, as forest harvesting continues into the future under Scenario 2, the amount of interior old forest will be reduced to approximately the minimum targets as shown above. From the 20 year forecast results, only E1dips below the target. The Licensees and BC Timber Sales are monitoring interior old forest on an annual basic and will develop strategies to achieve the targets. Additional forecasting of this indicator will occur during the future indicator supply analysis, which is anticipated to be in five-year intervals.

Monitoring and Reporting Procedures

This is a DFA/NDU specific indicator and the responsibility for monitoring and reporting this indicator will occur primarily through the LLOWG. The LLOWG will convene yearly to update the current and future amount of old interior forest and the licensee apportionment (update harvested blocks, newly planned blocks, aging of forest, and licensee operating area changes). The data produced by the LLOWG will be used to assess current and anticipated future status of old forest targets. Licensees/BC Timber Sales will propose recruitment strategies if targets cannot be met as required. Although the LLOWG group will meet on an annual basis, the analysis will be completed as required by the PG TSA Landscape Biodiversity Objectives Reporting Protocol (see Appendix 4).

Responsibility and Continuous Improvement Opportunities

The responsibilities of each signatory licensee/BC Timber Sales for achieving old interior forest objectives are the same as those outlined in the previous indicator (*Old Forest by Natural Disturbance Unit*).

In addition to these responsibilities, the LLOWG Team will look for opportunities for continual improvement. Substantial loss of old interior forests in some units is expected due to mortality from the

mountain pine beetle infestation and resulting salvage activities. Therefore, the LLOWG has developed a surrogate for old growth, which will include a portion of dead pine stands that contain as many old growth attributes as possible. These surrogate stands are classified as Natural Forest Areas (NFAs). The Licensee Team has identified the use and value of NFAs as a surrogate to old growth and interior old growth as a possible opportunity for continual improvement.

Indicator 4 - Young Patch Size Distribution

Indicator Statement	***Target and Variance***
Maintain a variety of young patch sizes in an attempt to approximate natural disturbance.	Target: As per the "Landscape Biodiversity Objectives for the PG TSA". Variance: As per the "Landscape Biodiversity Objectives for the PG TSA".

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 1: **Conservation of Biological Diversity -** Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range.
CSA SFM Element 1.1: **Ecosystem Diversity**
Value: Well-balanced and functioning ecosystems that support natural processes.
Objective: Maintain landscapes that support natural processes.

CCFM Criterion 2: **Maintenance and Enhancement of Forest Ecosystem Condition and Productivity**
CSA SFM Element 2.1: **Forest Ecosystem Resilience**
Value: Conserve ecosystem resilience by maintaining both ecosystem processes and ecosystem conditions.
Objective: Maintain the diversity of ecosystem conditions.

Description of Indicator

A patch is a forest unit with identifiable boundaries and vegetation different from its surroundings. Often patches are even aged forests established from natural disturbances such as fire, wind or pest outbreaks, or from clearcut harvesting. Patches may be created from a single disturbance event or through a combination of events such as fire and subsequent salvage harvesting. The result of varying disturbance events over time is a landscape of forest stands and patches of different sizes composed of a variety of species, stocking levels and ages. Many natural disturbance events, such as wildfire, have been reduced by forest management practices. In the absence of natural disturbance, timber harvesting is used as a disturbance mechanism and therefore influences the distribution and size of forest patches over much of the DFA. Patch size distribution created by harvesting should emulate the patterns historically created by a natural disturbance regime, where patches varied in size and shape.

Patch Size Categories:
a) < 50 hectares
b) 51-100 hectares
c) 101-1000 hectares
d) > 1000 hectares

The indicator addresses the pattern of young forest patches distributed across the landscape, where young forests are defined as stands 0 to 20 years of age. In order to remain within the natural range of variability of the landscape and move toward sustainable management of the forest resource, it is important to develop and maintain young patch size targets based on historical natural disturbance patterns. This indicator will monitor the consistency of harvesting patterns compared to the natural patterns of the landscape.

Current Practices and Status of Indicator

The Landscape Objective Working Group (LOWG) has representation from the Ministry of Sustainable Resource Management (MSRM), the Ministry of Forests and Range (MOFR) and timber licensees. This group aided MSRM in the development of landscape biodiversity objectives for patch size distribution for

the Prince George TSA, which includes the Fort St. James DFA. These objectives utilized NDU research conducted by DeLong (2002). Young forest patch size distribution objectives have been established for each NDU that occurs within the Fort St. James DFA. Table 6 describes the patch size class distribution by Natural Disturbance Unit (NDU) in the Fort St. James DFA.

Table 8. Young Forest Patch Size Classes by NDU in the Fort St. James DFA

Natural Disturbance Unit	Patch Size Category	Current Status as of March 31st, 2005* %	Target (%)	Trend	Future Condition (2010)
Moist Interior Plateau	≤ 50 ha	19.6%	5%	Toward	17.2%
	50-100	30.7%	5%	Toward	18.1%
	100-1000	40.0%	20%	Toward	27.1%
	>1000	9.7%	70%	Toward	37.6%
Moist Interior Mountain	≤ 50 ha	19.9%	40%	Toward	40.7%
	50-100	51.7%	30%	Toward	24.0%
	100-1000	28.4%	10%	Toward	27.2%
	>1000	0.0%	20%	Toward	8.0%
Omineca Valley	≤ 50 ha	19.0%	5%	Toward	13.7%
	50-100	27.7%	5%	Toward	16.8%
	100-1000	38.2%	30%	Toward	35.1%
	>1000	15.1%	60%	Toward	34.4%
Omineca Mountain	≤ 50 ha	20.8%	10%	Toward	15.4%
	50-100	32.0%	10%	Toward	23.7%
	100-1000	37.6%	30%	Toward	33.7%
	>1000	9.6%	40%	Toward	27.2%
Northern Boreal Mountains	≤ 50 ha	71.1%	5%	Toward	69.6%
	50-100	2.8%	5%	Toward	3.2%
	100-1000	26.0%	30%	Toward	27.2%
	>1000	0%	60%	No change	0.0%

The methodology used by the LOWG to calculate young patch included review of current patch size distribution on maps of each Forest District within the Prince George TSA. Each patch that was 0-20 years old was buffered according to the specifications outlined in the following table. Patches that touched, intersected or overlapped were considered to be one larger patch and buffered according to the combined patch area.

Buffering Methodology Used in Calculating LOWG Young Patch Size

Patch Size Category	Distance Required to Separate Patches
<50 ha	150m
51 - 100 ha	200m
101 - 500 ha	400m
501 - 1000 ha	600m
>1001 ha	800m

As harvesting continues, it is anticipated that the distribution of patches in the appropriate size ranges will be achieved. As the table demonstrates, while current trends will take most patch size distributions toward targets, others will actually be further from achieving objectives due to previous harvesting patterns and the effects of the current infestation of mountain pine bark beetle.

Establishment of Targets and Future Practices

Targets are derived directly from the Order Establishing Landscape Objectives for PG TSA (2004), and are based on the NDU research developed by DeLong (2002). Specific factors will limit how effective the Licensees and BC Timber Sales will be at trending toward patch size targets. These include historical harvesting patterns that have fragmented portions of the DFA and natural disturbance events such as wildfire and the mountain pine beetle epidemic. Specific attention will have to be made to change current trends for those NDU patch sizes that are trending away from targets due to Mountain Pine Beetle infestations. The LLOWG has committed to providing rationale to MSRM for those units and patch sizes that are not trending toward targets when patch size distribution information is updated.

There are some measures that can be taken to achieve patch size distribution targets. Forest health will have to be closely monitored and addressed before it creates excessive patches (either alone or by linking existing cutblocks). This will be particularly challenging in areas of high mountain pine beetle infestation. Future practice will involve connecting small and medium patches to create larger patches in order to trend toward larger patch sizes.

Forecasting and Predicted Trends

Forecasting results of the young patch indicator under the "Scenario 2 – Increased Biodiversity – SFM Plan Base" are shown in following table.

Patch Size under Scenario 2 - Increased Biodiversity – SFM Plan Base

NDU	Future Forecasted Condition			
PATCH SIZE	**< 50**	**50-100**	**100 - 1000**	**> 1000**
Moist Interior Plateau Target	**5%**	**5%**	**20%**	**70%**
20 yrs from now (%)	13.1%	6.8%	76.6%	3.4%
Moist Interior Mountain Target	**40%**	**30%**	**10%**	**20%**
20 yrs from now (%)	19.9%	9.8%	67.5%	2.8%
Omineca Valley Target	**5%**	**5%**	**30%**	**60%**
20 yrs from now (%)	9.3%	5.5%	81.3%	4.0%
Omineca Mountain Target	**10%**	**10%**	**30%**	**40%**
20 yrs from now (%)	1.8%	7.8%	76.6%	3.6%
Northern Boreal Mountains Target	**5%**	**5%**	**30%**	**60%**
20 yrs from now (%)	7.9%	2.0%	87.6%	2.5%

Due to the complexity of calculating young patch, forecasting results are only presented into the future for 20 years. The forecast did not spatial constrain the cutblock to trend toward the patch size categories therefore e the number above are just report of future condition in 2025. As forest harvesting continues, the expectation the planner will design cutblocks so that the distribution of patches in the appropriate sizes ranges will trend towards the target, however, it will take several decades for some of targets to be realized. The Licensees and BC Timber Sales are monitoring young patch on a 5-year basic and will develop strategies to trend towards the targets. Additional forecasting of this indicator will occur during the future indicator supply analysis, which is anticipated to be in five-year intervals.

Monitoring and Reporting Procedures

This indicator has a DFA/NDU specific target and will be monitored and reported through the Licensee Landscape Objective Working Group (LLOWG). Data sources used in the monitoring process include forest cover inventory, NDU maps, adjacent licensee planning and harvest history information, and database data. Forest cover inventory information with updates from Licensees and BC Timber Sales

based on harvesting activities will be reported according to the PG TSA Landscape Biodiversity Objectives Reporting Protocol to ensure forest management is moving toward patch size targets identified through the LLOWG and this SFMP.

Responsibility and Continuous Improvement Opportunities
The responsibilities of each signatory Licensee/ BC Timber Sales for achieving patch size targets are the same as those outlined in the previous two indicators (old forest and old interior forest).

Indicator 5 - Large Opening Design

Indicator Statement	*Target and Variance*
Percent of openings (> 100 ha) harvested annually that meet the large opening design criteria.	Target: >80% of openings. Variance: -10%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 1: **Conservation of Biological Diversity -** Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element 1.1: **Ecosystem Diversity**
Value: Diversity of natural ecosystems that will support function of natural processes for future generations.
Objective: Maintain natural diversity/ distribution.

CCFM Criterion: **Maintenance and Enhancement of Forest Ecosystem Condition and Productivity**
CSA SFM Element: **Forest Ecosystem Productivity**
Value: A productive forest ecosystem.
Objective: Conserving forest ecosystem productivity by maintaining ecosystem conditions (habitats) that are capable of supporting naturally occurring species.

Description of Indicator
Forests in the Fort St. James DFA have historically been shaped by large-scale disturbance events such as wildfires. These fires often created large openings that varied in shape and size, creating a mosaic of stands across the landscape. Forest managers when planning large harvesting openings try to emulate the characteristics of wildfire created stands. To help this planning process, large opening design criteria have been developed that allow planners to assess their harvest designs.

For the purpose of this SFMP, an "opening" consists of the combined area of immediately adjacent planned cut blocks (harvest boundary is identified), harvested cut blocks (<20 years from harvest date), internal and external reserve patches and non-harvested areas within the opening. The design criteria pertains to openings larger than 100 ha. Openings less than 100 ha will be designed on legal requirements for WTP retention.

The design criteria include 3 measures: Shape Index, Reserve Size and Location, and Connectivity.

- Shape Index- is a measure of the perimeter of an opening (edge) compared to the area harvested.
- Reserve Size and Location: targets for reserve size and location will depend on the opening size. Generally, the larger the opening, the larger the reserves should be, with more of the reserves internally located.
- Connectivity: examines the connectivity of reserves between harvest areas for providing travel routes and hiding cover for a variety of wildlife.

Below is a more detailed description of these design criteria. This indicator is important for SFM in that it attempts to recreate landscape patterns that have historically existed in the DFA. By recreating these

patterns, habitat characteristics that flora and fauna of the area have become dependant upon are maintained. By applying the design criteria, harvesting patterns should create a mosaic of stands that maintain the natural diversity, productivity and distribution of forest types, and the natural processes that rely on them.

SFM Large opening design criteria

For the purpose of this design criterion, an "*opening*" consists of the combined area of immediately adjacent:

- planned cut blocks(harvest boundary is identified);
- harvested cut blocks (< 20 years from harvest date);
- internal & external reserve patches; and
- non-harvested areas within the opening.

This large opening design criteria pertains to openings larger than 100 ha. Openings less than 100 ha. will be designed based on legal requirements for WTP retention.

There are currently 3 measures for this indicator, shape index, reserve size & location, and connectivity.

Shape Index

This is a measure of the perimeter of an opening (edge) compared to the area harvested. There are 2 ways to increase edge. The first one is to increase the perimeter to area ratio by creating small openings. The second one is to increase the complexity of the perimeter.

SI = P / (3.545(SQRT(A*10000))*
SI = shape index
P = perimeter of the opening in meters
A = harvested area of the opening + adjacent harvested blocks < 20 years old + adjacent planned cut blocks

SI targets

Opening size (ha)	SI target
100-500	> 1.5
501 +	> 2.5

Reserve Size and Location

Opening size targets

Opening size (ha)	Reserve Size	Reserve Location
100-1000	> 50% of the reserve area to be > 2.0 ha.	> 50% of reserve area to be internal reserves.
>1000	> 30% of the reserve area to be 2.0-10.0 ha. >50% of the reserve area to be > 10.0 ha.	> 80% of the reserves to be internal reserves.

Internal reserves include islands and bridges between harvest areas. External reserves are reserves contiguous to the outer edges of the opening.

Connectivity (bridges)

Connectivity Targets

Opening size	Percent of internal reserve area as connective

(ha)	bridges between harvest areas
100-500	>30%
500-1000	>50%
>1000	>80%

Reserve Quality
The following points should be considered when choosing reserve locations:

- Create windfirm boundaries where possible
- Design retention adjacent to riparian habitat where possible
- Incorporate important wildlife habitat into reserves
- Retain a variety of species including hardwoods
- Retain undersized trees that are less likely to be infested by beetles and more likely to provide the characteristics of mature trees in the near future
- Retain a component of dead trees
- Retain areas that have high amounts of coarse woody debris
- Retain trees with valuable wildlife attributes
- Retain unusual or significant site features
- Connective bridges should be a minimum of 50 meters wide, on average
- Connective bridges should be located on know wildlife travel routes
- Operational breaks (roads, skid trails, etc) in connective bridges are acceptable provided that the break does not exceed 50 meters.

Current Practices and Status of Indicator
The large opening design criteria were developed by Licensees/BC Timber Sales as an initiative to be implemented through the SFMP. As such, there is no current status to report for this indicator. Prior to this SFMP, large openings were designed as part of patch size analyses in relation to natural disturbance patterns in the DFA and this theory will be adopted and expanded with the implementation of the large opening design criteria.

Establishment of Targets and Future Practices
The target of >80% of large openings that meet the large opening design criteria has been established to reflect the importance the Licensees and BC Timber Sales place on maintaining ecosystem diversity. A higher target may not be possible, as previous harvesting patterns, forest health concerns, and site-specific characteristics may hamper opening design. Future practice will involve the implementation of the large opening design criteria as part of forest planning exercises. These criteria will then be implemented in the field and conformance with the criteria assessed through post harvest inspections.

Forecasting and Predicted Trends
The target of having >80% of large openings harvested annually meeting large opening design criteria is expected to be achieved. The exact level of success is difficult to forecast, as it is dependent on unpredictable events such as forest health factors and site-specific constraints. However, it is important to identify what the accepted target means to sustainable forest management. Harvesting patterns that attempt to emulate historic disturbance patterns will ultimately influence ecosystem diversity. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for an indictor such as this. As this indicator currently has the target set at >80% consistency, one other scenario should be identified:

a) What if considerably less than 80% of openings greater than 100ha harvested annually did not meet the large opening design criteria?

If considerably less than 80% of openings greater than 100ha harvested annually did not meet the large opening design criteria, ecological and social values of SFM may be impacted. The application of the large opening design criteria is an attempt to create harvesting patterns that emulate some of the characteristics of historic wildfire disturbance. These wildfires often created stands with large amounts of edge, internal unburned remnant patches, and bands of residual timber that afforded wildlife travel

corridors. The flora and fauna in the DFA are adapted to these patterns and rely on them for certain habitat requirements. Failure to recreate these characteristics may impact these species, affecting overall ecosystem diversity. With reduced ecosystem diversity, there may be resulting negative impacts to social values. The public's intrinsic value with the landscapes of the DFA could be negatively affected and this could further lead to hesitation regarding the implementation of this SFMP and the impacts related to SFM.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target. Therefore, individual Licensees and BC Timber Sales will track and monitor the number of large openings harvested annually that are consistent with the design criteria. Specifically Licensees/BC Timber Sales will assess plans for the operating year and determine the success of achieving the indicator target of >80%. Where possible, harvest schedules will be adjusted to meet the target. At the end of the operating year, Licensees/BC Timber Sales are also responsible for determining the indicator percent and including it in the annual SFMP report for the operational year April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees/BC Timber Sales are responsible for monitoring, tracking and reporting this indicator. Areas for improvement will focus on maximizing the number of large openings that meet the design criteria, and supporting research into natural disturbance patterns.

Indicator 7 - Plant Species Diversity Index

Indicator Statement	***Target and Variance***
The number of site association groups identified in Table 6, achieving plant diversity index baseline targets within managed stands.	Target: 100% Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 1: **Conservation of Biological Diversity -** Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element: **Species Diversity**
Value: Sustainable populations of flora and fauna native to the DFA (natural abundance and distribution).
Objective: Ensure habitat for species where ecologically appropriate.

Description of Indicator

Forestry operations can have a dramatic influence over the composition of plants and trees within managed stands. In order for ecosystems to function effectively and maintain their ability to recover from disturbances (such as forest harvesting) they must retain the natural diversity of communities, particularly plants. Plant diversity indices provide a way to measure this diversity.

A plant diversity index is defined as a mathematical measure of species diversity in a community. Diversity indices provide more information than simple counts of the number of species present as they consider the relative abundance of different plants in an area. The diversity of plant species also directly correlates to genetic diversity within a plant community. By using plant diversity indices, forest managers will gain important information about the rarity or commonness of species in a community, which in turn will allow them to plan activities that are consistent with the objectives of SFM. A plant diversity index also provides forest managers with an assessment of plant diversity within managed stands that can be compared against stated targets.

The Plant Diversity index utilized in the Fort St. James AUTP is the Shannon-Wiener Index:

Shannon-Wiener Index: Calculate the total of all individuals (or percent cover) and determine the proportion that each species contributes to the total (p_i). Multiply the proportion of species by the natural log of the proportion. The sum of all the species values is the Plant Diversity Index.

$$H = -\sum_{i=1}^{S} (p_i)(\ln p_i)$$

Where: *H*= index of plant diversity, *S*= the number of species, p_i= the proportion of the total sample belonging to the *i*th species, and 1n= the natural log

Using plant diversity indices will allow forest managers to assess the levels of plant diversity within manage stands and compare these levels against target standards.

Current Practices and Status of Indicator

Of the 41 Grouped Site Associations identified in, *"An Effectiveness Monitoring Program for Biodiversity Management in the Prince George TSA, Timberline 2006"*, there are 31 forested grouped site associations (see the report *"Native Plant Diversity – Benchmark Establishment and Monitoring – Timberline 2006*). The March 2007 report, *"Monitoring Native Plant Diversity in the Prince George Timber Supply Area – 2006 – by Timberline"*, details further analysis of the 31-forested grouped associations. Established plant diversity plots as well as 2006 plant diversity plots were amalgamated to refine the sample size and generate new plant diversity index targets and current status numbers. Also in this report, Timberline recommends that only the top 9 forested group site associations be monitored because they make up 81% of the TSA. The remaining 22-group site associations make up a very small part of the TSA and have limited opportunities to monitor managed stands within these site types. For these reasons, the Licensees and BC Timber Sales will be monitoring the top 9 grouped association types as detailed in the table below:

Table 9. Shannon-Wiener Plant Diversity Index Status.

Top 9 Grouped Site Association	Shannon-Wiener BaselineTarget as of March 31st, 2007
Bl - Oak fern	> 2.198
Bl - Rhododendron	> 1.952
Sb - Feathermoss	> 1.469
Sxw - Devil's club	> 2.282
Sxw - Horsetail	> 2.239
Sxw - Huckleberry	> 1.720
Sxw - Oak fern	> 2.203
Sxw - Twinberry	> 2.191
SxwFd – Pince's Pine	> 1.963

Establishment of Targets and Future Practices

Baseline targets were determined for each site association group based on natural benchmarks established within the grouped site association within the Prince George Timber Supply Area (see Timberline 2007). Baseline targets have not been established for ALL plant association groups, only those that contributed to the top nine groups within the TSA. Future work includes refinement of the plant diversity index targets through monitoring managed stands.

Forecasting and Predicted Trends

Plant diversity indices can provide an indication of the health and resiliency of an ecosystem, but it is difficult to quantifiably forecast their results. It is also uncertain what effects would occur if plant diversity is not maintained within the natural range of variation. However, it is important to identify what the target means to SFM in the Fort St. James AUTP. Future trends for plant diversity will be forecasted in this SFMP based on a logical analysis of a "what if" scenario:

a) What if plant diversity falls below the natural range of variation?

Maintaining plant diversity below the natural range of variation would likely have some impacts on disturbed ecosystems. As diversity of plants decreases it could potentially affect the quality of habitat for wildlife. Species requiring specific plants for survival may suffer if their abundance declines. Reduced plant diversity may also affect nutrient cycling within a disturbed area. This may lead to poorer performance of regenerating trees that could in turn potentially reduce the long-term economic value of timber from the AUTP.

Due to the importance plant diversity may have on the ecological and economic values within the AUTP, the Licensees and BC Timber Sales are committed to maintaining the plant diversity targets for this indicator.

Monitoring and Reporting Procedures

The primary source of the data to monitor this indicator has been Northern Interior Vegetation Management Association (NIVMA) permanent sample plots that are randomly distributed through the TSA. Permanent sample plots are re-measured on a fixed schedule, with new plots added over time if needed, or if funds are available. The indicator will use new NIVMA information, as it becomes available.

If NIVMA is discontinued, the Licensees and BC Timber Sales will consider monitoring the indicator by collecting information during regular silviculture surveys. This may include implementing the same methodology as used in the Timberline report. Once a survey procedure is developed, a monitoring and reporting plan will be developed and initiated as required.

Responsibility and Continuous Improvement Opportunities

Individual Licensees and BC Timber Sales will determine personnel to be responsible for monitoring, tracking, and reporting this indicator. Areas for improvement may include considering other indices that may provide an alternate view of plant diversity, such as *species richness* or *Simpson's PDI*.

Indicator 8 - Ungulate Winter Range Objectives

Indicator Statement	***Target and Variance***
Percentage of cutblocks and roads harvested that are consistent with legally established ungulate winter range objectives.	Target: 100% Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 1: **Conservation of Biological Diversity -** Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element 1.2: **Species Diversity**
Value: Sustainable populations of flora and fauna native to the DFA (natural abundance and distribution).
Objective: Ensure habitat for species where ecologically appropriate.

CCFM Criterion: **Maintenance and Enhancement of Forest Ecosystem Condition and Productivity**
CSA SFM Element 2.2: **Forest Ecosystem Productivity**
Value: A productive forest ecosystem.
Objective: Conserving forest ecosystem productivity by maintaining ecosystem conditions (habitats)

that are capable of supporting naturally occurring species.

Description of Indicator

Ungulates such as mule deer and caribou are found in many parts of the Fort St. James DFA. They are often dependent on suitable winter range conditions in order to survive the severe winters that can occur in the DFA. As such, Ungulate Winter Ranges were established to ensure important foraging sites were managed in an appropriate manner.

An "Ungulate Winter Range (UWR)" is an area that contains habitat that is necessary to meet the winter habitat requirements of an ungulate species. As many UWRs can be directly and indirectly affected by forest harvesting activities, it is important that Licensees and BC Timber Sales in the Fort St. James DFA track their location and implement management objectives. UWRs contain unique habitat features; therefore UWR management contributes to ecosystem diversity. Maintaining ungulate populations may enhance species diversity, including carnivore species such as wolves, cougars, and bears that rely on them for prey. Strengthening predator/ prey linkages may also conserve ecosystem productivity, as energy moves through the different trophic levels found in forest ecosystems.

Current Practices and Status of Indicator

A memorandum of Understanding (MOU) on the Establishment of Ungulate Winter Ranges and Related Objectives was developed in August of 2003. The Ministry of Forests, the Ministry of Water, Land and Air Protection (MWLAP), and the Ministry of Sustainable Resource Management (MSRM) created the MOU to meet UWR objectives across the province to support the Forest Practices Code and the new Forest and Range Practices Act (FRPA). In November of 2003 the Deputy Minister of WLAP signed the order outlining the management objectives to maintain ungulate winter ranges. In Fort St. James, all cutblocks approved post implementation of the UWR orders, will be consistent with the management guidelines in the approved Orders for Ungulate Winter Range (#U7-002, #U7-003, and #U7-015).

More information on the MOU and respective Orders can be found at the Government of BC website http://www.env.gov.bc.ca/wld/uwr/ungulate_app.html

Establishment of Targets and Future Practices

All cutblocks approved post implementation of the UWR orders will be consistent with the management guidelines in the approved Order for Ungulate Winter Ranges #U7-002 (Mule deer), #U7-003 (Mountain caribou) and #U7-015 (Northern Caribou). The orders prescribe specific objectives to maintain ungulate winter range, to provide high suitability snow interception, cover, and foraging opportunities.

Forecasting and Predicted Trends

All harvested cutblocks are expected to be consistent with legally established Ungulate Winter Range objectives. The exact level of consistency is difficult to forecast as conditions depend on variables such as human oversight. However, it is important to identify what the accepted target means to SFM. Conservation of ungulate winter range values will maintain species diversity within the DFA. Therefore, the use of a “what if scenario” is beneficial in identifying anticipated future trends for the indicator. As the indicator currently has a target of 100%, one other scenario should be identified:

a) What if only 50% of cutblocks harvested were consistent with legally established ungulate winter range objectives?

Having only 50% of harvested cutblocks consistent with UWR objectives could lead to significant impacts to SFM values. The winter-feeding habits of mule deer and mountain caribou are selective and failure to manage their winter range properly could result in an increase in winter mortality. For example, harvesting and road construction performed inconsistently with the UWR orders could reduce forage opportunities that ungulates depend on for winter survival. Such activities would be inconsistent with the objective to maintain habitats that support flora and fauna native to the DFA. The decline of ungulate populations could potentially reduce forest productivity, as they are important consumers of grasses and other browse species and are a prey source for wolves, bears, and other carnivores.

The "what if scenario" helps to identify some of the potential future impacts of not achieving the stated targets for this indicator. Therefore, the Licensees and BC Timber Sales will continue to ensure that 100% of all cutblocks harvested are consistent with legally established ungulate winter range objectives. The indicator will remain at the target of 100% if all processes and protocols are followed.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target. As such, the Licensees/BC Timber Sales will conduct: 1) pre-work meetings prior to the start of projects; 2) monitoring inspections as the work is progressing; and 3) final inspections once the work is complete, to ensure the commitments specified in the Site Plan are met in all harvested blocks. These initial, interim and final checks are part of each Licensee's/BC Timber Sales's Environment Management System (EMS) or other internal tracking system such as Standard Operating Procedures (SOPs). If a non-conformance with the Site Plan occurs in the field, this information will be recorded on an activity inspection form and then entered into an incident tracking database or other similar system, so issues can be tracked and mitigated as required. Any non-conformances with legal obligations regarding ungulate winter range management will be reported to the appropriate agency as soon as the incident is detected.

The percentage of harvested blocks, consistent with ungulate winter range objectives will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees/BC Timber Sales are responsible for being aware of the location of ungulate winter range as specified in Schedule A of the Order for Ungulate Winter Range # U7-002, 003, and 015 and the management objectives outlined in those Orders. When preparing Site Plans, Licensees/BC Timber Sales must ensure the management activities prescribed in the plan are consistent with the management objectives in each respective Order as it applies to a particular cutblock. Opportunities for improvement may focus on training for personnel preparing Site Plans to gain more understanding of ungulate winter range objectives.

Indicator 9 - Species at Risk Notices & Orders

Indicator Statement	***Target and Variance***
The percentage of cutblocks and roads harvested consistent with approved provincial Species at Risk Notice/ Orders requirements as identified in operational plans.	Target: 100% Variance:0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 1: **Conservation of Biological Diversity -** Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element 1.2: **Species Diversity**
Value: Sustainable populations of flora and fauna native to the DFA (natural abundance and distribution).
Objective: Ensure habitat for species where ecologically appropriate.

CCFM Criterion: **Maintenance and Enhancement of Forest Ecosystem Condition and Productivity**
CSA SFM Element 2.2: **Forest Ecosystem Productivity**
Value: A productive forest ecosystem.
Objective: Conserving forest ecosystem productivity by maintaining ecosystem conditions (habitats) that are capable of supporting naturally occurring species.

Description of Indicator

The indicator is intended to monitor the consistency between forest operations with approved provincial Species at Risk Notice/ Orders requirements as identified in operational plans. Being consistent with these requirements will ensure that the habitats that are required to support these Species at Risk will be

maintained. Overall ecosystem productivity will be maintained by ensuring these species continue to play their roles in the healthy functioning of the DFA's forests.

Notices and Orders are legal entities created through Government Regulations. Under Section 7 of the FRPA (BC Reg. 14/04), the DFA has one Species at Risk Order, "Category of Species at Risk", which took effect in May 2004. This Provincial Order provides a list of species at risk that may be affected by forest or range management on Crown land and require protection in addition to that provided by other mechanisms (Government of BC, 2004b). This order is shown in more detail in Appendix 6. The DFA also has one Notice, "Indicators of the Amount, Distribution, and Attributes of Wildlife Habitat Required for the Survival of Species at Risk in the Fort St. James Forest District", designed to manage caribou and mountain goat in the DFA (Government of BC, 2004b). This notice is shown in more detail in Appendix 6.

Current Practices and Status of Indicator

Current practice is for all forest operations to be consistent with all FRPA Section 7 Notices and Orders.

Establishment of Targets and Future Practices

The target of 100% of forest operations to be consistent with approved provincial Species at Risk Notice/ Orders requirements as identified in operational plans was established in recognition of the high value all Licensees/BC Timber Sales place on Species at Risk management. Operational plans such as Site Plans will continue to prescribe the most recent management techniques for Species at Risk for the areas they cover. Forestry operations will be supervised and reviewed to ensure any Species at Risk requirements in operational plans are achieved on the ground.

Forecasting and Predicted Trends

All forest operations are expected to be consistent with Species at Risk requirements as identified in operational plans. The long-term success of the Species at Risk objectives is difficult to predict, as weather events, climate and unique site characteristics will vary with time and space. However, it is important to identify what the accepted targets mean to SFM. Conservation of Species at Risk will maintain species diversity within the DFA. Therefore, the use of a “what if scenario” is beneficial in identifying anticipated future trends for the indicator. As the indicator currently has a target of 100%, one other scenario should be identified:

a) What if only 50 % of forest operations were consistent with approved provincial Species at Risk Notice/Orders requirements as identified in operational plans?

If only 50% of forest operations were consistent with the Species at Risk Notice/Orders requirements as identified in operational plans, there could be significant ecological, economic and social impacts. Species at Risk, by their very definition, are vulnerable to disturbance or destruction of even small degrees. Ecologically, the loss or decline of any species at risk would reduce species diversity in the DFA. It would also reduce forest productivity by failing to maintain ecosystem conditions that are capable of supporting naturally occurring species. As Notices/Orders are contained in legislation, failure to be consistent with their requirements could result in monetary penalties and costly litigious proceedings. In addition to these ecological and economic impacts, societal values may be reduced if only 50% of forest operations were consistent with approved provincial Species at Risk Notice/Orders requirements as identified in operational plans. These species hold intrinsic worth for many people and any activity that threatens their status will meet with disapproval.

The above "what if scenario" helps to identify some of the potential future impacts of not achieving the stated targets for this measure. Therefore, the Licensees and BC Timber Sales will continue to ensure that 100% of all forest operations are consistent with approved provincial Species at Risk Notice/Orders requirements in operational plans. The indicator will remain at the target of 100% if all processes and protocols are followed.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target. Licensee/BC Timber Sales will monitor harvesting to ensure consistency with approved provincial Species at Risk Notices/Orders. Areas of inconsistency will be noted and reported in the SFMP annual report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensee/BC Timber Sales are responsible for keeping informed and passing on management strategies to field staff. In addition, Foresters responsible for preparing Site Plans must ensure the management strategies included in the site plan are consistent with approved Species at Risk Notice/ Orders requirements. If there are problems in implementing the Site Plan management strategies, action will be taken to improve consistency. These actions may include more intensive supervision and additional training for equipment operators. Continual improvement will also involve increasing knowledge of the interactions between harvesting and Species at Risk.

Indicator 10 – Compliance with Management Strategies for sites and species of importance within the DFA.

Indicator Statement	***Target and Variance***
Percentage of blocks and roads harvested that adhere to licensee specific management strategies for: • Sites of biological significance; and, • Important wildlife, fish, and bird species; and, • Valuable plants and plant communities, within the DFA that are likely to be affected by industrial forestry activities	Target: 100% Variance: -20% (2007) -10% (2008) Reassess (2009)

Target completion of licensee specific management strategies is March 31st, 2007.

REFER TO APPENDIX 8 FOR A COMPLETE LIST OF SITES AND SPECIES APPLICABLE TO THIS INDICATOR.

Description of Indicator

This indicator involves the development of licensee specific management strategies for sites of biological significance, important wildlife, fish, and bird species, plant species and communities identified in the AUTP that may be impacted by industrial forestry activities.

Current Practices and Status of Indicator

Development and implementation of management strategies for sites and species of importance within the DFA (that do not already have strategies in place) requires knowledge of how many forest dependant species inhabit a managed area.

The list of sites of biological significance in Appendix 8 includes sites of unusual or rare forest conditions that are not covered by legislation. These sites cannot be identified from current established lists, but may be unique to the AUTP and warrant identification and appropriate management strategies. Licensees will evaluate other sites of biological significance as identified by the PAG from time to time and develop appropriate management strategies.

The list of plant and animal species as well as plant communities within Appendix 8 are taken from the document, *"Management Guidelines for Species and Plant Communities at Risk: Prince George Timber Supply Area. Timberline, March 31st, 2006".* Only species and plant communities that occur within the Fort St. James Forest District have been included in Appendix 8.

Licensee specific management strategies as identified by this indicator will be completed for all sites and species that are likely to be affected by industrial forestry activities within the AUTP. It is the responsibility of each Licensee/BC Timber Sales to establish specific management strategies for their DFA.

Establishment of Targets and Future Practices
March 31st, 2007 was chosen as the date to have completed the development of management strategies because it would allow sufficient time to develop strategies but also expedite the process to complete them in a timely manner.

Most wildlife/plant habitat requirements for the above listed categories are sufficiently known to allow the development of special management areas, or prescribe activities that will not interfere with the well being of wildlife/plant species. Management strategies will be based on information already in place (e.g., National Recovery Teams of Environment Canada, IWMS Management Strategy) and on recent scientific literature. Management strategies will be implemented through operational plans to ensure the protection of species' habitats.

The variance of -20% applies to the 2007-2008 reporting period. For the 2008-2009 reporting period, a variance of –10% will be used. The variance will be reassessed in 2009.

Forecasting and Predicted Trends
As this indicator cannot be quantifiably forecasted it is important to identify what the accepted target means to Sustainable Forest Management. To forecast these indicators, a "what if scenario" analysis can be used to help identify the importance of the stated target to overall SFM within the DFA. The analysis may be based on:

a) What if management strategies for sites and species of importance were developed 5 years after endorsement of the SFM plan?

Failure to develop management strategies for these categories of sites and species of importance by the target date may result in forest operations that do not adequately manage for these resources, thereby possibly resulting in an overall loss of species diversity in the DFA. The Licensees and BC Timber Sales are committed to completing management strategy development by March 31st, 2007.

Monitoring and Reporting Procedures
This indicator has a DFA specific target and will be managed at the DFA level.

Interim Measures: Until management strategies are developed, available and fully implemented, categories of sites and species identified in Appendix 8 will be managed through the following:

- Consult with sites and species specialists when a Site Plan has been identified as impacting one of these species.
- Protect wetlands and other water bodies adjacent to forest operations with riparian management practices.
- No harvesting or constructing roads within Class A Parks, Protected Areas, or ecological reserves.
- Be consistent with the objectives of Wildlife Habitat Areas, Ungulate Winter Ranges, and General Wildlife/Plant Species Measures where established by government.
- The Licensees and BC Timber Sales are committed to training appropriate staff on how to identify and manage for sites and species as identified in Appendix 8.

Review of management strategy implementation procedures will be completed and reported out in the SFMP annual report for the operating year of April 1st to March 31st. The management strategies will be designed so a qualified professional can determine whether or not a particular strategy should be implemented, should not implemented, or is not applicable to the situation.

Responsibility and Continuous Improvement Opportunities
Once management strategies are in place, Licensees/BC Timber Sales will be responsible for ensuring all applicable staff have the proper training to incorporate the required management strategies into operational plans. Foresters responsible for preparing Site Plans must ensure the management strategies in the Site Plan are complied with.

Continual improvement may involve increasing overall Licensee/BC Timber Sales knowledge of the interactions between harvesting and species identified through these indicators. Continual improvement will also involve periodic review of tables Appendix 8 to update the list of important sites and species that are affected by industrial forestry activities. Management strategies that are developed will be reviewed periodically for consistency with scientific research and changing legal requirements.

Indicator 13 - Site Plans with Douglas Fir Management Strategies

Indicator Statement	***Target and Variance***
For blocks where Douglas fir (Fdi) exists in the stand: the percent of Site Plans that incorporate the Douglas fir management strategy	Target: 100% Variance: 20%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion: Sustainable populations of all flora and fauna native to the DFA (Natural abundance and distribution of species within their natural range)
CSA SFM Element: Genetic Diversity
Value: Genetic Diversity
Objective: Maintain natural genetic diversity

Description of Indicator

Site Plans are the site-specific operational plans that prescribe harvesting and silviculture activities for a cutblock. They are developed prior to harvesting and address management concerns for the area to be harvested. As such, they are a crucial component of forest management. Douglas fir in the Fort St. James has been discussed previously in this SFMP (see *indicator #66 "Douglas Fir Stands"*).

Also described in Indicator #66 is the DFA specific Douglas fir management strategy developed by Licensees/BC Timber Sales to be implemented with this SFMP (see below). Douglas fir in the DFA is at the northern extent of the interior Douglas fir's range, and as such may represent unique genetic populations. Therefore, this indicator is also intended to maintain this genetic diversity.

If there are Douglas fir identified in areas to be harvested it will be the Site Plan that will incorporate management strategies for these areas. By tracking the number of Site Plans that incorporate the Douglas fir management strategy, Licensees and BC Timber Sales will be able to evaluate the success of those activities over time. They will also be able to evaluate the consistency of procedures, and compare them to other accepted approaches to managing Douglas fir.

Douglas Fir (Fd) Strategy

Douglas Fir Management Strategy

Fd plays an important role in biodiversity because it is at the northern extent of its range in Fort St. James. It contributes to genetic diversity and species diversity and acts as a unique contributor to vertical forest structure and coarse woody debris. For blocks where Fd exists in the stand implement the appropriate strategy shown below:

Percent Fd	**Retention strategy**
<10%	retain >90% of Fd stems at the time of harvest
10% to 30%	retain >30% of Fd stems at the time of harvest
30% to 80%	retain >10% of Fd stems at the time of harvest
>80%	retain >5% of Fd stems at the time of harvest

In addition, where Fd comprises more than 10% of the stand, and Fd has been harvested from the site, reforest the site with a proportion of Fd that is similar to the pre-harvest proportion of Fd. Fd can be retained in patches or as individual leave trees.

In situations where Fd can not be retained cut stems may be left on site to provide coarse woody debris.

The amount of Douglas fir on a block can be determined from cruise information, forest cover data, or field reconnaissance information.

A variance may be required for blocks where the Fd that is present exists along roads or in roadside working areas or skid trails, where steep slopes limit harvesting options, where the stand is infested with Douglas fir beetle, where the Fd stems are too dangerous to be left, or where retaining Fd restricts the removal of other merchantable timber.

Current Practices and Status of Indicator

Since 1999 the Licensees and BC Timber Sales have managed stands containing a Douglas fir component according to the BC Ministry of Forests "Douglas fir Management Guidelines for the Prince George Forest Region". This document provides guidelines for the maintenance and regeneration of Douglas fir across the PG Forest Region, which includes the Fort St. James DFA. These guidelines are generally included in operational plans such as Site Plans, which prescribe what forest activities are required to meet Douglas fir management objectives.

Establishment of Targets and Future Practices

The target (100% of blocks that have Douglas fir having Site Plans that incorporate the Douglas fir management strategy) has been established to reflect the importance the Licensees and BC Timber Sales place on Douglas fir in the DFA. A variance of 20% has been set to reflect the reality that in some sites it may not be feasible to incorporate Douglas fir strategies, or it may be unsafe to do so from an operational stand point. Future practice will incorporate the DFA specific Douglas fir strategy developed by the Licensees/BC Timber Sales. A copy of this strategy is included as Appendix 4.

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Forecasting and Predicted Trends

Planning for Douglas fir at the Site Plan level has been an aspect of forest management in the DFA for several years. Licensees have gained experience in managing for Douglas fir, and this process is predicted to continue. The exact level of consistency between blocks that contain Douglas fir and the inclusion of management strategies in the Site Plans is not easy to quantifiably forecast over a defined time frame, as it is operational in nature. However, it is important to identify what the accepted target means to SFM. To forecast this indicator, a “what if scenario” analysis can be used to help identify the importance of the stated target to overall SFM within the DFA. The following “what if scenario” consists of one scenario as the current target is set at 100%:

a) What if only 50% of blocks with Douglas fir had Site Plans that incorporated the Douglas fir management strategy?

As harvesting and silviculture activities are directed by Site Plans, failure to have appropriate management activities outlined in the Site Plan may lead to serious damage to populations of Douglas fir in the DFA. As Douglas fir are a species that are in lower numbers than other conifers in the DFA, Site Plans that fail to include management strategies for them could result in considerable impact on the overall population. Ecologically, the overall genetic diversity of the DFA could be reduced. As the objective of this indicator is to maintain genetic diversity, strategies specific to managing Douglas fir must be met. Failure to do so may threaten the sustainability of this important tree species in the DFA.

Monitoring and Reporting Procedures

Licensees and BC Timber Sales will develop a system to track blocks that contain a Douglas fir component using a combination of Forest Inventory maps, cruise data, and GIS information. Site plan information is tracked and retained by Licensees and BC Timber Sales in databases such as GENUS or filed in an appropriate manner. Licensees/BC Timber Sales will monitor consistency with the Douglas fir

management strategy through review of Site Plans. The indicator status will be included in the annual SFMP report for the operational year April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities
Licensees and BC Timber Sales are responsible for monitoring, tracking and reporting this indicator. If a Site Plan fails to have appropriate management strategies then corrective and preventative actions will be identified to ensure appropriate management strategies are prescribed. The training of key operational personnel to ensure Douglas fir strategies are prescribed where required should ensure the target is achieved.

Indicator 14 - Stand Level Retention

Indicator Statement	***Target and Variance***
Percent wildlife trees and/or wildlife tree patches associated with areas harvested annually by licensee as measured across the DFA	Target: >7% by Licensee Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 1: **Conservation of Biological Diversity -** Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element: **Species Diversity**
Value: Sustainable populations of flora and fauna native to the DFA (natural abundance and distribution).
Objective: Ensure habitat for species where ecologically appropriate.

CCFM Criterion 1: **Conservation of Biological Diversity -** Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element: **Genetic Diversity**
Value: Genetic Diversity
Objective: Maintain natural genetic diversity.

Description of Indicator
Stand level retention consists primarily of individual wildlife trees, and wildlife tree patches (WTPs), including riparian management areas. WTPs are forested patches of timber within or immediately adjacent to a harvested cutblock. Stand retention provides a source of habitat for wildlife, to sustain local genetic diversity, or to protect important landscape or habitat features. Maintenance of habitat through stand level retention contributes to species diversity by conserving a variety of seral stages, structure and unique features at the stand level that many species rely on. These features may include coarse woody debris (CWD) for cover, shrubs for browse, and live or dead standing timber for cavity sites. Stand level retention areas may also help to conserve critical habitat components that support residual populations, aid the re-introduction of populations expatriated by disturbance, and contribute to overall ecosystem function (Bunnell et al. 1999).

Stand level retention that represents natural forest stands within the prescribed area will contribute to the maintenance of the natural range of variability in ecosystem function, composition, genetics and structure. Properly planned stand level reserves can enable forestry-related disturbed sites to recover more quickly and mitigate the effects of the disturbance on local wildlife.

Stand level retention in harvested stands also contribute to a landscape level pattern that attempts to recreate aspects of wildfire disturbance. As a result of a fire event, large areas may be burned and undamaged or lightly burned patches may exist in areas within the burn boundary. Residual unburned patches vary substantially in size, shape and composition. Thus it is essential to design stand level retention to maintain the variability of these characteristics.

Current Practices and Status of Indicator

Stand level retention, including wildlife trees and wildlife tree patches, is managed by each Licensee and BC Timber Sales in the DFA on a site-specific basis. During the development of a cut block, retention areas are delineated based on a variety of factors. Stand level retention generally occurs along riparian features and will include non-harvestable and sensitive sites if they are present in the planning area. Stand level retention also aims to capture a representative portion of the existing stand type to contribute to ecological cycles on the land base. Retention level in each block is documented in the associated Site Plan, recorded in the Licensee's/ BC Timber Sales's database systems and reported out in RESULTS on an annual basis.

Establishment of Targets and Future Practices

The target for this indicator was established based on past practice for the Fort St. James Licensees/BC Timber Sales and on FRPA requirements. Past practice has shown that Licensees/BC Timber Sales are maintaining an average of 7% or more retention within harvested areas on an annual basis. FRPA, through the Forest Planning and Practices Regulation also requires that Licensees/BC Timber Sales retain greater than or equal to 7% retention based on all areas harvested within a 12-month period.

It is anticipated that the larger the cut block design, the more retention will be associated with the block. Salvage blocks initiated through beetle infestation or blowdown may have reduced retention in relation to their size compared to non-salvage blocks due to diminished quality of stand level retention features. In all cases, the minimum retention requirements will be maintained.

Forecasting and Predicted Trends

Stand level retention is not easy to quantifiably forecast. However, forecasting of this indicator can be completed with the use of a "what if scenario" to help assess anticipated future trends for stand level retention. This could include two potential scenarios:

a) What if no stand level retention was prescribed in managed stands?
b) What if three times the stand level retention was prescribed in managed stands?

The ecological benefit from stand level retention is assumed to increase with the number of retention areas present in managed stands. Benefits increase up to a saturation point where overall value then begins to level off. At this point in time it is not possible to identify this saturation point as each stand has different ecological attributes. Future research and analysis of historical planning may help to identify this point of maximum benefit. If no stand level retention was prescribed, it is expected that biodiversity values would diminish. Wildlife productivity may decline, ecosystem and genetic diversity could decrease and natural patterns across the landscape may not be represented. Conversely, If three times the stand level retention was prescribed in managed stands one could anticipate economic values from the timber resource might not be fully achieved. Silviculture activities such as reforestation could potentially become less efficient and more costly due to smaller harvesting units. Higher levels of retention would also increase fragmentation of the landscape, making patch size distribution objectives more difficult to achieve.

The comparison of the above scenarios implies that a balance of values can be achieved through an identified level of stand retention that lies somewhere in between the two situations. Although this level has not yet been identified through past experience or through scientific findings, the Licensees and BC Timber Sales are committed to achieving the indicator target and will strive to continually improve practices, as new information becomes available. Within the Fort St. James DFA, future trends suggest that stand level retention will remain constant or potentially decrease due to the current mountain pine beetle epidemic.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target. As such, information for stand level retention is found in Site Plans and Licensee/ BC Timber Sales information tracking systems such as GENUS rmt or Inform. Stand level retention will be measured within the Fort St. James Forest District by Licensee cut block area. . The average of all cut blocks harvested between April 1st and March 31st of each year must have >7.0% retention.

Annually, stand retention data will be updated as future blocks are harvested, and then reviewed to ensure targets are being achieved. The results will be reported to Licensees/BC Timber Sales and the Public Advisory Group (PAG) as part of the SFMP annual report.

Responsibility and Continuous Improvement Opportunities
Licensees and BC Timber Sales are responsible for the monitoring tracking and reporting of this indicator.

A possible opportunity for continual improvement would rely on developing strategies to assess the effectiveness associated with wildlife and biodiversity objectives through stand level retention. The Licensees and BC Timber Sales will encourage research to evaluate the success of previous stand level retention in order to improve future WTP design.

Indicator 15 - Thinning/Spacing Prescriptions & Conifer Density

Indicator Statement	***Target and Variance***
Percentage of thinning and spacing prescriptions implemented annually that specify a post-treatment conifer density greater than the original planting density.	Target: 100% Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 1: **Conservation of Biological Diversity -** Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element 1.3: **Genetic Diversity**
Value: Genetic Diversity
Objective: Maintain natural genetic diversity.

Description of Indicator
Thinning and spacing are silviculture treatments performed on young plantations to reduce the overall number of competing tree stems. This reduction is usually performed when the natural germination of conifers has been so great that the number of trees is too high for the stand to reach its growth potential. In the Fort St. James DFA, this usually occurs in plantations where lodgepole pine has regenerated, as this species has evolved to produce high numbers following a disturbance event, especially fire.

When a block is identified for thinning/spacing, a prescription is prepared describing the post-treatment conifer density. This density should be higher than the density the block was planted at for several reasons. Forests in the Fort St. James DFA (particularly pine forests) were initiated by a natural disturbance event that established conditions suitable for large numbers of young seedlings to become established. Over time, disease, pests, and competition reduced the number of trees until a more stable mature density was established. If too few trees are present in the early stages of the plantation, the subsequent losses due to pests/ disease may result in mature stands that have too few trees, representing a genetic and economic loss. Higher post-treatment conifer densities may also result in higher wood quality as inter tree competition will promote smaller branches and less juvenile wood. This improved wood quality is expected to provide higher economic returns in the future when these plantations are harvested.

The Licensees and BC Timber Sales recognize the ecological and environmental values to be gained by having a post-treatment conifer density greater than the original planting density. This indicator is intended to ensure this practice is implemented throughout the DFA.

Current Practices and Status of Indicator
Thinning and spacing prescriptions have been prepared for high-density conifer stands for many years. Each Licensee and BC Timber Sales has applied their own standards in these prescriptions for post-treatment conifer density. The result is there has been no overall consistency in spacing/thinning densities, although most have been equal to or exceeded the planting density.

Establishment of Targets and Future Practices
The target of 100% of thinning/spacing prescriptions implemented annually that specify a post-treatment conifer density greater than the planting density was established to meet ecological and economic values of SFM within the DFA. Future silviculture treatment prescriptions will establish target densities in excess of the planting density, and will reflect the forest health conditions of the stand, the species being thinned, and the anticipated future economic value of that plantation.

Forecasting and Predicted Trends
The target of 100% of thinning/spacing prescriptions that will specify a post-treatment conifer density greater than the planting density is expected to be met. The exact level of success in achieving this is not easy to quantifiably forecast over a defined time frame, as it is operational in nature. However, it is important to identify what the accepted target means to SFM. To forecast this indicator, a "what if scenario" analysis can be used to help identify the importance of the stated target to overall SFM within the DFA. The following "what if scenario" consists of one scenario as the current target is set at 100%:

a) What if only 50% of thinning and spacing prescriptions implemented annually specified a post-treatment density greater than the original planting density?

Failure to have 100% of thinning/spacing prescriptions specify a post treatment density greater than the original planting density may result in long-term ecological and economic problems. Some young forest stands may suffer high mortality from forest health issues such as stem rusts. If higher densities are not present, this mortality may reduce the number of trees to a point where the genetic diversity is unacceptably reduced. Wildlife may have fewer trees for shelter, nesting sites, and feeding. Economically, if there are insufficient trees to offset mortality, there will be fewer trees to harvest at the end of the rotation. This may threaten the future economic values of the DFA.

To maintain the genetic diversity, ecological structure, and economic potential from regenerated forest stands in the DFA, the Licensees and BC Timber Sales will strive to ensure the indicator target is met.

Monitoring and Reporting Procedures
This indicator has a Licensee/BC Timber Sales specific target and will be managed on an individual basis. Spacing/thinning prescription information is tracked and retained by Licensees and BC Timber Sales in databases such as GENUS or filed in an appropriate manner. Licensees/BC Timber Sales will monitor consistency with the indicator target through a review of treated blocks on an annual basis. The indicator status will be included in the annual SFMP report for the operational year April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities
Licensees and BC Timber Sales are responsible for monitoring, tracking and reporting this indicator and for ensuring that thinning/spacing prescriptions are prepared in accordance with this indicator. Licensees/BC Timber Sales are also responsible for overseeing contractors and for ensuring the prescription standards are met in the field. Opportunities for improvement may be found in sponsoring or reviewing scientific research that examines the impact of forest health on young plantations and the role spacing/thinning may play in meeting ecological and economic objectives.

Indicator 17 - Wildlife Habitat Guidelines

Indicator Statement	***Target and Variance***
Percentage of cutblocks and roads harvested that are consistent with established guidelines for wildlife habitat features.	Target: 100% Variance: 0%

This indicator addresses the following CSA-SFM parameters:

1) ***CCFM Criterion 1:*** **Conservation of Biological Diversity -** Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element 1.4: **Protected Areas and Sites of Biological Significance**
Value: Sites of Biological Significance

Objective: Sites of Biological Significance are identified and appropriately managed.

Description of Indicator

Legally established Wildlife Habitat Features are identified under the Government Actions Regulation of the Forest and Range Practices Act (FRPA) of British Columbia. Section 70-2 of the Forest Planning Practices Regulation of the FRPA states:

> "*An authorized person who carries out a primary forest activity must ensure that the primary forest activity does not damage or render ineffective a wildlife habitat feature"* (Government of BC, 2004c).

Site Plans are the site-specific plans that prescribe harvesting and silviculture activities for a cutblock. They are developed prior to harvesting and address management concerns for the area to be harvested. If there are wildlife habitat features in or adjacent to an area to be harvested, the Site Plan must be consistent with the guidelines established for that area to be compliant with legislation and to protect sites of biological significance in the DFA.

By tracking the number of harvested cutblocks that are consistent with established guidelines for wildlife habitat features, Licensees and BC Timber Sales will be able to evaluate the success of those activities over time. They will also be able to evaluate the consistency of procedures by comparing them to the guidelines and other Licensee approaches to managing sites of biological significance.

Current Practices and Status of Indicator

Currently, there are no identified wildlife habitat features within the Fort St. James DFA. However, when and where wildlife habitat features are encountered within cutblocks prior to harvest, site level management strategies will be developed and implemented.

Establishment of Targets and Future Practices

A target of 100% of cutblocks harvested that are consistent with established guidelines for wildlife habitat features was established to meet legal and ecological requirements of SFM. As they are developed, management guidelines for wildlife habitat features will be included in and implemented through the appropriate Site Plans.

Forecasting and Predicted Trends

It is anticipated that there will be no problems in achieving the indicator target. The exact level of consistency with established guidelines for wildlife habitat features in cutblocks harvested is not easy to quantifiably forecast over a defined time frame, as it may be subject to human oversight. However, it is important to identify what the accepted target means to SFM. To forecast this indicator, a "what if scenario" analysis can be used to help identify the importance of the stated target to overall SFM within the DFA. The following "what if scenario" consists of one scenario as the current target is set at 100%:

a) What if only 50% of cutblocks harvested were consistent with established guidelines for wildlife habitat features?

As harvesting and silviculture activities are directed by Site Plans, failure to have consistency between harvested blocks and wildlife habitat feature guidelines within these plans could lead to the degradation of wildlife habitat features. As these are features that are by definition particularly sensitive to disturbance or are in low numbers, having half of the cutblocks harvested in the DFA fail to follow established guidelines for them could result in considerable impact on the areas and the species that depend on them. Ecologically, the overall species diversity of the DFA could be reduced. As the objective of this indicator is appropriately manage sites of biological significance, guidelines specific to managing these sites must be followed. Failure to do so may threaten the sustainability of the most sensitive species in the Fort St. James DFA.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target and will be managed on an individual basis by each Licensee/BC Timber Sales. Licensees/ BC Timber Sales will monitor consistency with established guidelines for wildlife habitat features through review of Site Plans and subsequent final harvest inspections. This information is tracked and retained by Licensees and BC Timber Sales in databases such as GENUS or filed in an appropriate manner. The indicator status will be included in the annual SFMP report for the operational year April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees and BC Timber Sales are responsible for monitoring, tracking and reporting this indicator. If a harvested cutblock fails to be consistent with established guidelines for wildlife habitat features then corrective and preventative actions will be identified to ensure appropriate mitigative measures are prescribed. The training of key operational personnel to identify sites of biological significance, specifically wildlife habitat features, and ongoing research should help improve the consistency between cutblocks harvested and management strategies prescribed in Site Plans.

Indicator 21 – Conversion of Non-Forest Types (cutblock level)

Indicator Statement	***Target and Variance***
Percentage of cutblocks harvested having mappable non-forested types (> 0.5 ha) that are artificially converted to forested types through aforestation treatments.	Target: 0% Variance: +20%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 1: **Conservation of Biological Diversity -** Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element 1.4: **Protected Areas and Sites of Biological Significance**
Value: Sites of Biological Significance
Objective: Maintain naturally occurring non-forested types.

CCFM Criterion 4: **Forest Ecosystem Contributions to Global Ecological Cycles**
CSA SFM Element 4.2: **Forest Land Conversion**
Value: Maintenance of total forest land.
Objective: Maintain naturally occurring non-forested (non-treed) types.

Description of Indicator

Many cutblocks contain mappable non-forested types. For this SFMP "mappable" refers to areas greater than 0.5 ha. Non-forested types include wetlands, rock outcrops, grasslands, brush, or other areas that are not dominated by trees. These types may be valuable sites for wildlife, or may represent unique and unusual features that should be preserved in their non-forested state. If these types are not identified as being excluded from a planting area, they may be planted, either intentionally or non-intentionally, and converted to forest.

Sustainable forest management seeks to maintain the landscape diversity of the DFA and this indicator is intended to achieve this by preventing the aforestation of naturally occurring non-forested types.

Current Practices and Status of Indicator

All Licensees and BC Timber Sales prepare planting contracts that describe areas to be planted. This is usually completed through maps and contract schedules that list particular block stratums to be planted. While most Licensees and BC Timber Sales do not have formal policies preventing the planting of naturally occurring non-forested types, it is not common practice to do so. Planting these sites is not legally required (unless the Site Plan included them in the Net Area to Reforest), and it would be uneconomical to pay for the aforestation of sites where trees are likely not suitable to grow.

Establishment of Targets and Future Practices

In order to maintain naturally occurring mappable non-forested types in cutblocks, the Licensees and BC Timber Sales have established a target of 0% of these sites to be artificially converted to forest types through aforestation treatments. Licensees and BC Timber Sales will establish policies for Site Plan development to ensure these areas are not included in the Net Area to Reforest, and they will ensure planting contracts clearly identify these areas to be excluded from the planting area in all harvested cutblocks.

Forecasting and Predicted Trends

The indicator target is anticipated to be met. However, it is important to identify what the accepted target means to SFM. To forecast this indicator, a "what if scenario" analysis can be used to help identify the importance of the stated target to overall SFM within the DFA. The following "what if scenario" consists of one scenario as the current target is set at 0%:

a) What if 50% of mappable non-forested types (>0.5 ha) within cutblocks were artificially converted to forested types through aforestation treatments?

Mappable non-forested types within cutblocks may represent valuable habitats that should remain un-forested. Some shallow wetlands could be drained and converted to forest cover, but these sites can be important waterfowl and amphibian habitat and should be preserved. Grass/ shrub plant communities may be important foraging areas for ungulates and bears. In addition to their ecological value, these areas may also have social value. Open meadows/wetlands may be valuable hunting or berry picking areas, or popular camping sites. Others may be valued for their aesthetics. These non-forested types are part of the mosaic of ecosystems in the DFA, and should be maintained as a part of SFM.

As the above scenario suggests, failure to achieve the indicator target could impact ecological, and social values of sustainable forest management. As such, the Licensees and BC Timber Sales are committed to achieving the stated target.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target and will be managed on an individual basis. The locations of mappable non-forested types (>0.5ha) within cutblocks is included in the Site Plans for those cutblocks. Site Plan and planting information is tracked and retained by Licensees and BC Timber Sales in databases such as GENUS or filed in an appropriate manner. Licensees/BC Timber Sales will determine the indicator percent after the completion of planting and include the information in the annual SFMP report for the operational year April 1st to March 31st

Responsibility and Continuous Improvement Opportunities

Licensees and BC Timber Sales are responsible for monitoring, tracking and reporting this indicator. If mappable non-forested types are planted, corrective and preventative actions will be identified to improve the achievement of this indicator in the future. Improvements in Site Plan development and planting supervision will be adopted if required.

Indicator 22 – Conversion of Non-Forest Types (Landscape level)

Indicator Statement	***Target and Variance***
Existing areas of non-forested types artificially converted to forested types	Target: 0 ha. Variance: 0 ha.

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion: Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element: Protected areas and sites of biological significance.
Value: Sites of biological significance.
Objective: Maintain naturally occurring non-forested types.

CCFM Criterion: Forest ecosystem contributions to global ecological cycles.
CSA SFM Element: Forest Land Conversion
Value: Maintenance of total forest land.
Objective: Maintain naturally occurring non-forested (non-treed) types.

Description of Indicator
The Fort St. James DFA contains a variety of non-forested types that exist at the landscape level. These types may be wetlands, rock outcrops, grasslands, brush, or other areas that are not dominated by trees. These types may be valuable sites for wildlife, or may represent unique and unusual features that should be preserved in their non-forested state.

Sustainable forest management seeks to maintain the landscape diversity of the DFA and this indicator is intended to achieve this by preventing the aforestation of naturally occurring non-forested types.

Current Practices and Status of Indicator
All Licensees and BC Timber Sales prepare planting contracts that describe areas to be planted. This is usually done through maps and contract schedules that list planting stratums. While most Licensees and BC Timber Sales do not have formal policies preventing the planting of naturally occurring non-forested types, it is not common practice to do so. Planting these sites is not legally required (unless the Site Plan included them in the Net Area to Reforest), and it would be uneconomical to pay for the reforestation of sites where trees are probably not suitable to grow.

Establishment of Targets and Future Practices
In order to maintain naturally occurring non-forested types, the Licensees and BC Timber Sales have established a target of 100% of these sites to remain unplanted. Licensees and BC Timber Sales will establish policies to ensure these areas are not included in the Net Area to Reforest of harvested blocks and adjacent cutblocks, and they will ensure planting contracts clearly identify these areas to be excluded from the planting area.

Forecasting and Predicted Trends
The indicator target is anticipated to be met. However, it is important to identify what the accepted target means to SFM. To forecast this indicator, a "what if scenario" analysis can be used to help identify the importance of the stated target to overall SFM within the DFA. The following "what if scenario" consists of one scenario as the current target is set at 100%:

a) What if only 50% of existing areas of non-forested types are artificially converted to forested types?

Existing non-forested types within cutblocks may represent valuable habitats that should remain without trees. Seasonal wetlands could be converted to forest cover, but these sites can be important waterfowl and amphibian habitat and should be preserved. Grass/ shrub plant communities may be important foraging areas for ungulates and bears. In addition to their ecological value, these areas may also have social value. Open meadows/ wetlands may be valuable hunting or berry picking areas, or popular camping sites. Others may be valued for their aesthetics. These non-forested types are part of the mosaic of ecosystems in the DFA, and should be maintained as a part of SFM.

As the above scenario suggests, failure to achieve the indicator target could impact ecological and social values of sustainable forest management. As such, the Licensees and BC Timber Sales are committed to achieving 100% consistency with the target.

Monitoring and Reporting Procedures
The locations of existing areas of non-forested types are identified in Forest Development Plans/Forest Stewardship Plans and other operational plans. Planting information is tracked and retained by Licensees and BC Timber Sales in databases such as GENUS or filed in an appropriate manner.

Licensees/ BC Timber Sales will determine the indicator percent and include the information in the annual SFMP report for the operational year April 1st to March 31st

Responsibility and Continuous Improvement Opportunities
Licensees and BC Timber Sales are responsible for monitoring, tracking and reporting this indicator. If existing areas of non-forested types are planted, corrective and preventative actions will be identified to improve consistency. Improvements in operational plan development and planting supervision will be adopted if required.

Indicator 23 - Coarse Woody Debris

Indicator Statement	*Target and Variance*
Percent of audited cutblocks harvested where post harvest CWD levels are within the acceptable natural range of variability (as stated in m^3/ha).	Target: 100% Variance: -10%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 2: **Maintenance and Enhancement of Forest Ecosystem Condition and Productivity**
CSA SFM Element 2.2: **Forest Ecosystem Productivity**
Value: A productive forest ecosystem.
Objective: Conserving forest ecosystem productivity by maintaining ecosystem conditions (habitats) that are capable of supporting naturally occurring species.

CCFM Criterion 3: **Conservation of Soil and Water Resources**
CSA SFM Element 3.1: **Soil Quality and Quantity**
Value: Soil distribution and productivity.
Objective: Maintain a natural balance (distribution), dynamic cycles, and productivity.

CCFM Criterion 4: **Forest Ecosystem Contributions to Global Ecological Cycles**
CSA SFM Element 4.1: **Carbon Uptake and Storage**
Value: Carbon uptake and storage.
Objective: Maintain processes that take carbon from the atmosphere and store it in forest ecosystems.

Description of Indicator
Coarse woody debris (CWD) is defined as material greater than 10 cm in diameter, in all stages of decay and consists of above-ground logs, exposed roots and large fallen branches (BC Ministry of Forests, 2000). CWD content in the Fort St. James DFA is managed in conjunction with the *Forest and Range Practices Act* (FRPA) requirements to retain material that is greater than 7.5cm in diameter at one end. CWD is a vital component of a healthy functioning forest ecosystem in that it provides habitat for plants, animals and insects. It contributes to forest ecosystem and soil productivity by being an important source of soil nutrients and aiding in soil moisture retention. CWD can also provide on-site storage of carbon and contribute to the natural processes of the carbon cycle. These processes are needed for managing atmospheric carbon dioxide levels contributing to climate change.

Targets for CWD requirements are identified in operational plans, typically the Site Plan for a specific cutblock. Despite the fact that there is often an economic incentive to minimize debris that is left behind on site, specific CWD retention levels will be targeted in all areas to be harvested. Removal of logging debris can be detrimental if the habitat needs of organisms are compromised. Thus, retention levels have to balance economic and ecological factors. The CWD levels that exist within WTPs and riparian retention areas, unsalvaged burns, or unsalvaged mountain pine beetle sites within the DFA will also serve to compliment CWD levels retained within harvested blocks.

Current Practices and Status of Indicator

In the Fort St. James DFA, the current performance standard for harvested blocks is defined in the report *"Coarse Woody Debris Investigations Conducted within the Prince George Timber Supply Area (Timberline Natural Resource Group. March 31, 2007)".* The goal of this report was to examine both the quality and quantity of CWD in the Prince George TSA, set targets for post-harvest CWD retention by logical ecological units, and make recommendations on future data requirements for further refining CWD targets.

Establishment of Targets and Future Practices

The target of 100% of audited cutblocks harvested to have CWD levels within the acceptable natural range of variability reflects the importance Licensees and BC Timber Sales place on this indicator. A 30% variance has been established to account for the natural range of CWD variability in the DFA. Some cutblocks, due to their pre-harvest conditions or forest health issues, may be unable to meet the CWD targets on a site by site basis.

Future practice will involve an analysis of a sample set of blocks (audited blocks) to determine the average levels of coarse woody debris. These averages will be compared to benchmarks, which will identify natural ranges of variation for coarse woody debris within the DFA. This information will be monitored, tracked and reported out annually to the public.

The intention of audited cutblocks is that at least 25% of the cutblocks harvested during the reporting period will have post harvest CWD assessments completed. The results of each assessment will be compared to the benchmarks identified in the table below:

Table 10. Natural Levels of Coarse Woody Debris in British Columbia Forests

Stand Type / Moisture Class	Range (m3/ha)
Pine – Early – Dry	33.0-239.6
Pine – Early – Mesic	3.0-74.0
Pine – Late – Dry	6.2-35.9
Pine – Late – Mesic	15.4-236.7
Douglas Fir – Early – Dry	14.8-262.8
Douglas Fir – Early – Mesic	42.7-465.4
Douglas Fir – Late – Dry	55.8-168.1
Douglas Fir – Late – Mesic	57.7-299.5
Spruce – Early – Mesic	3.5-310.5
Spruce – Early – Wet	25.2-256.5
Spruce – Late – Mesic	70.3-240.4
Spruce – Late – Wet	109.0-433.7

Source: *Coarse Woody Debris Investigations Conducted within the Prince George Timber Supply Area (Timberline Natural Resource Group. March 31, 2007)*

The table above represents the most current benchmarks for natural levels of CWD in BC forests. As more precise information becomes available, this table will be updated.

CWD volume targets do not necessarily have to be met on every cutblock. As long as the average CWD volume retained over all cutblocks (within some appropriately size planning or ecological unit) meets the target, variations on individual cutblocks will emulate natural variation.

Forecasting and Predicted Trends

The target of 100% of audited cutblocks harvested where post harvest CWD levels are within the acceptable natural range of variation is expected to be achieved. The exact level of success is difficult to forecast, as it is dependent on unpredictable factors such as human error. However, it is important to identify what the accepted target means to sustainable forest management. Coarse woody debris levels can influence ecosystem productivity and diversity values of SFM. Therefore, the use of a "what if

scenario" is beneficial in identifying anticipated future trends for an indicator such as this. As this indicator currently has the target set at 100%, one other scenario should be identified:

a) What if only 50% of audited cutblocks harvested had post harvest CWD levels within the acceptable natural range of variability (as stated in m^3/ha)

If only 50% of cutblocks harvested had coarse woody debris levels within the natural range of variability there could be several negative impacts to ecosystem health and soil productivity. If insufficient CWD is retained, soil nutrient and moisture retention levels may decrease. Dispersed CWD provides shelter to small animals, as well as young seedlings that require shade and snow retention for survival. CWD piles are valuable denning sites for small furbearers whose numbers may decrease in their absence. By enhancing plant and animal habitat, CWD contributes to the overall productivity and diversity of the forest ecosystem. Therefore, all Licensees and BC Timber Sales are committed to meeting the target of 100% of audited, harvested cutblocks to have CWD levels within the natural range of variability.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target. Licensees and BC Timber Sales will monitor CWD are part of each Licensee's/BC Timber Sales Environment Management System (EMS), or similar tracking system. If a non-conformance with the Site Plan occurs in the field, this information will be recorded on an activity inspection form and then entered into an incident tracking database or other similar system so that issues can be tracked and mitigated as required.

The percentage of audited cutblocks harvested that meet target CWD levels will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Post harvest CWD surveys will be completed as per the following:

- Sample post harvest CWD in the dispersed area of the block only. Avoid sampling locations within the roadside work area.
- Option of utilizing transects or fixed radius plots.
- Fixed radius plots can be completed in conjunction with Waste and Residue surveys.
- Fixed radius plot size of 11.28 m radius = 400 m2 per sample plot.
- All pieces > 7.5 cm in diameter within the sample plot will be tallied.
- Minimum length for a CWD piece = 5 meters
- The length, and end diameters will be noted as well as stump height and diameter.
- CWD for the entire block will be estimated from the samples.
- For every 20 ha. of harvest area, 1 post harvest CWD plot or 50m transect will be completed - up to a maximum of 5 plots per block or 500 m of transect per block.
- CWD plots will be measured under snow free conditions.

Responsibility and Continuous Improvement Opportunities

Individual Licensees and BC Timber Sales are responsible for monitoring, tracking and reporting coarse woody debris levels in harvested cutblocks. There are many areas for continuous improvement opportunities to maximize the ecological value of leaving CWD without increasing harvesting costs and adhering to current utilization standards. Improvement opportunities will be site specific and may utilize one or more of the following principles:

- Maintain a wide range of diameter and decay classes.
- CWD accumulations at roadside or landings should be minimized to the extent practical. Dispersing small CWD piles throughout blocks may be more beneficial to creating small mammal habitat.
- Retaining standing live/dead trees and/or stubs on cutblocks can provide important sources of CWD recruitment.
- Larger pieces of CWD are more valuable than smaller pieces.

- Retention of a variety of species is preferred.
- The ecological benefits of CWD within riparian areas can be particularly important.
- The retention of CWD should be harmonized with other silvicultural objectives.
- Mountain pine beetle killed stands may provide high opportunities for CWD recruitment.

Indicator 24 - Soil Disturbance Levels

Indicator Statement	***Target and Variance***
Percent of cutblocks harvested where the soil disturbance limits identified in the Site Plan are exceeded (typically 5% on sensitive soils and 10% on other soils).	Target: 0% Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 2: **Maintenance and Enhancement of Forest Ecosystem Condition and Productivity**
CSA SFM Element 2.2: **Forest Ecosystem Productivity**
Value: A productive forest ecosystem.
Objective: Conserving forest ecosystem productivity by maintaining ecosystem conditions (habitats) that are capable of supporting naturally occurring species.

CCFM Criterion 3: **Conservation of Soil and Water Resources**
CSA SFM Element 3.1: **Soil Quality and Quantity**
Value: Soil distribution and productivity.
Objective: Maintain a natural balance (distribution), dynamic cycles, and productivity.

Description of Indicator

Conserving soil function and nutrition is crucial for sustainable forest management. To achieve this, forest operations have limits on the amount of soil disturbance they can create. Soil disturbance is defined in this SFM plan as disturbance caused by a forest practice on an area, including areas occupied by excavated or bladed trails of a temporary nature, areas occupied by corduroy trails, compacted areas, and areas of dispersed disturbance. Soil disturbance is expected to some extent from timber harvesting or silviculture activities, but these activities are held to soil disturbance limits identified in Site Plans (under FRPA, these disturbance limits are referred to as soil conservation standards). The Site Plan prescribes strategies for each site to achieve forest management activities, such as timber harvesting, and still remain within acceptable soil disturbance limits within the Net Area to Reforest (NAR).

An objective of soil disturbance limits is to ensure that site productivity is conserved and that impacts to other resource values are prevented or minimized (BC MOF 2001a). There are various soil disturbance hazards that must be considered when determining soil disturbance limits. Some of these include soil erosion, soil displacement, and soil compaction (BC MOF 2001a). Minimizing disturbance caused by harvesting activities conserves soil and the role it plays in the ecosystem. This indicator will measure the success of meeting soil disturbance limits and will ensure that excessive soil disturbance is detected, reported, and corrected where required.

Current Practices and Status of Indicator

Soil information is collected as a component of Site Plan preparation, and soil disturbance limits are established based on the soil hazards for that block. To be within soil disturbance limits, there are several soil conservation strategies currently used. Forest operations may be seasonally timed to minimize soil disturbance. For example, clay soils are often harvested when frozen to reduce excessive compaction. EMS or other tracking system pre-work forms require equipment operators to be aware of soil conservation measures outlined in the Site Plans. Once an activity is complete, the final EMS or other tracking system inspection form assesses the consistency with Site Plan guidelines. If required, temporary access structures are rehabilitated to the prescribed standards. Road construction within blocks is minimized, and low ground pressure equipment is used where very high soil disturbance hazards exist

Establishment of Targets and Future Practices

The target for this indicator was set at 0% of cutblocks having soil disturbance limits exceeded within the DFA. Soil disturbance limits have been in place since the creation of the Forest Practices Code and recognize the reality that some soil disturbance will occur from forest operations, but that this disturbance must be contained to certain levels (typically 5% on sensitive soils and 10% on other soils). In order to maintain soil and forest ecosystem productivity the Licensees and BC Timber Sales will strive to meet these specified limits.

Forecasting and Predicted Trends

The indicator target is expected to be achieved, but the exact degree of success is not easy to quantifiably forecast. However, it is important to identify what the accepted target means to SFM. The conservation of soil contributes to biodiversity of ecosystems through conservation of site productivity. Scientific research on the effects of soil disturbance is extensive in British Columbia, but it is not possible to predict when and where soil disturbance limits may be exceeded. Therefore, the use of a "what if scenario" is beneficial in identifying potential impacts to SFM if the target is not achieved. As the target for this indicator is set at 0% of cutblocks exceeding soil disturbance limits, the analysis of one other potential scenario is useful:

a) What if soil disturbance significantly exceeds maximum soil disturbance limits?

There could be serious impacts to the DFA's soil resources if maximum soil disturbance limits are exceeded. Soil disturbance in the Fort St. James DFA includes soil displacement, surface soil erosion, soil compaction and mass wasting. These disturbances occur in varying amounts, but it is important to note that the concentration of disturbances is a key factor to overall site productivity. Dispersal of disturbance across a site is fundamental in lowering the overall impact. While it is impossible to conduct forestry activities without a certain amount of soil disturbance, exceeding soil disturbance limits could eventually affect ecological, economic and social aspects of SFM. Excessive levels of soil disturbance may alter natural ecosystem functions such as water infiltration and drainage. It may also alter the type and health of vegetation on site, potentially affecting wildlife habitat and the perceived public value of the area. The growth rate of trees may be reduced by excessive soil disturbance, which could then affect the economic value derived from timber resources. With decreased ecosystem productivity and less economic return, social values in the DFA could also in turn decrease due to reduced aesthetic appeal and decreased recreation value from visual influences or potential wildlife declines.

Failure to achieve soil disturbance limits could potentially have extensive negative impacts on SFM values across the DFA. Licensees and BC Timber Sales will work to ensure that 0% of all harvested cutblocks exceed prescribed soil disturbance limits.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target and will be monitored by individual Licensees and BC Timber Sales. Data sources for calculating and monitoring this indicator include Site Plans and completed EMS or other tracking system pre-work and final harvest inspection forms. Final harvest inspections will use an ocular survey to determine if the soil conservation standards stated in the site plan were met. If the initial ocular estimate indicates that site disturbance limits may have been exceeded, a transect soil disturbance survey as defined in the *Soil Conservation Survey Guidebook* will be completed on the site to determine if the limits have actually been exceeded and if rehabilitation work is required. Ocular survey information (and transect survey data if required) will be tracked so that annual reports can be generated. Results for this indicator will be included in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees and BC Timber Sales are responsible for monitoring, tracking, and reporting this indicator. If soil disturbance exceeds prescribed limits, the Ministry of Forests and Range will be notified and a rehabilitation plan will be developed. The growing number of beetle killed stands will likely increase soil moisture and may result in a higher potential for soil disturbance. A better understanding of the

interaction between harvesting these stand types and the effect on their soils is necessary. The Licensees and BC Timber Sales will further investigate this indicator as more information is learned from the influence of mountain pine beetle.

Indicator 25 – Forest Land Conversion

Indicator Statement	***Target and Variance***
The total percent of forested land within the Timber Harvesting Landbase that is converted to non-forested land.	Target: <5% Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 2: **Maintenance and Enhancement of Forest Ecosystem Condition and Productivity**
CSA SFM Element 2.2: **Forest Ecosystem Productivity**
Value: A productive forest ecosystem.
Objective: Conserving forest ecosystem productivity by maintaining ecosystem conditions (habitats) that are capable of supporting naturally occurring species.

CCFM Criterion 3: **Conservation of Soil and Water Resources**
CSA SFM Element 3.1: **Soil Quality and Quantity**
Value: Soil distribution and productivity.
Objective: Maintain a natural balance (distribution), dynamic cycles, and productivity.

CCFM Criterion 4: **Forest Ecosystem Contributions to Global Ecological Cycles**
CSA SFM Element 4.2: **Forest Land Conversion**
Value: Maintenance of total forest land.
Objective: Protect forestlands (within our jurisdiction) from deforestation or conversion to non-forests.

Description of Indicator

This indicator measures the amount of area converted to non-forested land within the Timber Harvesting Landbase. Areas permanently converted to non-forested land include roads, bridges, landings, gravel pits, or other similar structures that provide access for timber harvesting. Area that is converted to non-forest are removed from the productive forestland base and no longer contributes to the forest ecosystem. Roads and associated stream crossings have the potential to increase risk to water resources through erosion and sedimentation. As such, minimizing the amount of area converted to non-forest lands protects the forest ecosystem as a whole.

Current Practices and Status of Indicator

Current practice by Licensees and BC Timber Sales contractors within the Fort St. James DFA is to minimize the amount of area converted to non-forest land. The primary harvest method utilized in the DFA is roadside harvesting, which eliminates the need for landings to be established. However, it is important for operators to identify enough road area so that wood can be processed efficiently and cost effectively.

Delineation of non-forested land will be made based on the following assumptions:

Structure	Disturbance Width(m)
Forest Service Roads	12 m
Highways	25 m
Licensee Road Permit Roads	8 m
In-block roads	6 m

Mining Trails	3 m
Gravel Pits, Rock Quarries, etc.	By shape area (ha.)

Temporary access structures, such as BBR trails, are not included in the calculation. Only disturbances within the Timber Harvesting Landbase will count towards measuring this indicator.

Establishment of Targets and Future Practices
The current target of <5% has been determined from an analysis of past practice as well as the assumptions in the previous Timber Supply Review.

Licensees/BC Timber Sales will monitor, track and report out this indicator on an annual basis.

Forecasting and Predicted Trends
The <5% target is anticipated to be achieved by all Licensees and BC Timber Sales. Future achievements are not easy to quantifiably forecast because this indicator is operational in nature. However, it is important to identify what the accepted target means to SFM. The amount of area that exists as permanent access on the landscape level contributes to ecological, economic and social values throughout the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for an indicator such as this. As this target identifies a value <5%, one other scenario should be identified:

a) What if considerably more than 5% of the the Timber Harvesting Landbase was converted to non-forested land?

Impacts to all three aspects of SFM (ecological, economic, and social) could be expected if considerably more than 5% of the Timber Harvesting Landbase was converted to non-forested land. The increase in roads and other structures could decrease the future available timber supply and forestry economic returns. Water quality and quantity may also decrease as more stream crossings could potentially be constructed, which may in turn increase sedimentation. The cumulative effects of economic and environmental deterioration could impact social values, as society relies on a sustainable economy and environment.

It is not possible to have a forest industry without permanent access structures. However, this "what if scenario" analysis implies that a balance of values can be achieved through sustaining a minimal level of permanent access within the DFA. Licensees and BC Timber Sales are committed to achieving the identified targets.

Monitoring and Reporting Procedures
This indicator has a Licensee/BC Timber Sales specific target. All information is maintained within Licensee/ BC Timber Sales databases such as GENUS. Each year the databases are queried to report the overall area of road that has been converted to non-forest land for that year and presented as a percent of the Timber Harvesting Landbase for each Licensees/BC Timber Sales DFA. Sources of data include; Licensee/BC Timber Sales GIS road data, Ministry of Forests FSR GIS road data, Ministry of Highways road data, TRIM road data, and road data available on Ministry web sites.

The operational year is between April 1st and March 31st, and the above information will be contained in the annual SFMP report for that period.

Responsibility and Continuous Improvement Opportunities
Licensees/BC Timber Sales are responsible for ensuring that the over-all level of planned road development provides adequate road access but minimizes reductions to the productive forest land base. Licensee/BC Timber Sales operations personnel and contractors are responsible for developing roads and to ensure they do not exceed target levels. There are several opportunities for continuous improvement of this indicator. Licensees can standardize road class widths to the narrowest width safety and efficiency can permit. Existing permanent access structures can be restored to the productive land

base by rehabilitation methods. Future roads that are planned to be PAS can be designed and built to be temporary access structures that are returned to the net area to be reforested. Finally, alternative harvesting systems can be implemented that reduce the amount of inblock roads and landings.

Indicator 26 - Road Related Erosion Events

Indicator Statement	***Target and Variance***
Percent of road related soil erosion events that introduce sediment into a stream identified in annual road inspections that are addressed	Target: 100% Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 3: **Conservation of Soil and Water Resources**
CSA SFM Element 3.1: **Soil Quality and Quantity**
Value: Soil distribution and productivity.
Objective: Maintain a natural balance (distribution), dynamic cycles, and productivity.

CCFM Criterion 3: **Conservation of Soil and Water Resources**
CSA SFM Element 3.2: **Water Quality and Quantity**
Value: Water quality and quantity.
Objective: Maintain water quality (sedimentation and water temperature) and quantity within natural range of seasonal variation.

Description of Indicator

Sedimentation can damage streams by degrading spawning beds, increasing turbidity, and reducing water depths. Forest management activities can potentially create unnatural inputs of sedimentation into water bodies. This may occur from roads adjacent to streams, from ditches delivering sediment to stream channels, or from ruts on road surfaces. Licensees and BC Timber Sales conduct annual road inspections to monitor the condition of the roads and to ensure sedimentation of streams is not occurring. Once sedimentation occurrences are detected, mitigating actions are taken to stop further damage and to rehabilitate the site. Tracking these mitigation actions contributes to sustainable forest management by evaluating where, when and how sedimentation occurs and the success of correcting it.

Current Practices and Status of Indicator

Sedimentation occurrences are usually detected by forestry personnel conducting road inspections. While in some situations the sites may have stabilized so that further sedimentation does not occur, in other cases mitigating actions may have to be conducted. This may involve re-contouring slopes, installing siltation fences, re-directing ditch lines, grass seeding, or deactivating roads. Current practice have not involved actively tracking and reporting out to the public the percentage of road related soil erosion events that have been addressed.

Establishment of Targets and Future Practices

All Licensees and BC Timber Sales recognize the potential damage sedimentation can inflict on streams and are committed to taking mitigative actions on 100% of occurrences. Licensees and BC Timber Sales will continue to perform annual road inspections to ensure sedimentation does not occur, and where necessary, will continue to take prompt action to mitigate its impact if it does.

Forecasting and Predicted Trends

The indicator target is expected to be achieved, but the exact degree of success is not easy to quantifiably forecast. However, it is important to identify what the accepted target means to SFM. Correcting unnatural sedimentation problems for all known occurrences is important to conserve water quality objectives. A “what if scenario” analysis will identify the importance of the target for this indicator to SFM within the DFA. As the current target is 100%, one other scenario will be analysed:

a) What if only 50% of road related soil erosion events that introduce sediment into a stream identified in annual road inspections were addressed?

Ignoring half of the events where water bodies received sedimentation caused by road related soil erosion events would be a willful disregard of sustainable forestry. Erosion represents the loss of soil quantity and quality. In addition to the loss of soil productivity, fish populations could be damaged by a decrease in water quality and destroyed spawning beds due to sedimentation. Other aquatic organisms such as amphibians could suffer from the higher concentration of soil particles suspended in the water. In addition to the environmental degradation, social values may also be impacted, as sedimentation is often an obvious and disturbing feature in the landscape. Failure to correct sedimentation problems would be perceived as the careless disregard for non-forest resources and should be avoided at every opportunity.

The Licensees and BC Timber Sales are committed to achieving the stated target for the indicator and it is anticipated that all known road related soil erosion events that introduce sediment into a stream will be acted upon as required.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target. Licensee/BC Timber Sales personnel conducting road inspections are responsible for detecting sedimentation occurrences. The responsible Licensee/BC Timber Sales will then take corrective actions and document the occurrence in their EMS or other tracking system database. The percentage of road related soil erosion events that introduce sediment into a stream that are addressed will be tracked, as well as the steps taken to rehabilitate damage. This percentage will be reported in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees and BC Timber Sales are responsible for correcting and tracking erosion events on their areas of activity. Opportunities for improvement include training field personnel to recognize sedimentation occurrences and creating sedimentation response plans so that remediation can be quick and efficient.

Indicator 27 - Fish Stream Crossings & Sediment Control

Indicator Statement	***Target and Variance***
Percentage of fish stream crossings planned and installed to a reasonable design and sediment control standards.	Target: 100% annually Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 3: **Conservation of Soil and Water Resources**
CSA SFM Element 3.2: **Water Quality and Quantity**
Value: Water quality and quantity.
Objective: Maintain water quality at stream crossings.

Description of Indicator

The conservation of water resources is an important SFM objective. Forestry roads can potentially have a large impact on water quality and quantity when they intersect with streams, particularly through sedimentation events. Sedimentation can affect fish, fish habitat, and spawning beds. Sedimentation is also a natural part of streams and lakes as water must pass over soil in order to enter a water body. When stream crossings (bridges, culverts) are installed to a reasonable design and to sediment control standards the level of sedimentation may be minimized to help sustain the natural range of variation within the stream.

This indicator will track the number of fish stream crossings that are planned and installed to a reasonable design and to sediment control standards. By tracking this indicator, the success of installing stream crossings can be assessed, and, if required, steps can be taken to improve designs and standards.

Current Practices and Status of Indicator

Licensees and BC Timber Sales currently install fish stream crossings to specified design and sediment control standards. EMS or other tracking system pre-work forms, monitoring forms and final inspection forms are also used to ensure all fish stream crossings are installed to a reasonable design and sediment control standard.

Establishment of Targets and Future Practices

All Licensees and BC Timber Sales recognize the potential damage poorly installed fish stream crossings can inflict on streams and are committed to installing 100% of crossings to a reasonable design and sediment control standard. Current practices will be continued where they meet the target of this indicator, and modified where required, or if new technology becomes available to reduce potential impacts to fish bearing streams.

Forecasting and Predicted Trends

The indicator target is expected to be achieved, but the exact degree of success is not easy to quantifiably forecast. However, it is important to identify what the accepted target means to SFM. Installing fish stream crossings in an appropriate manner is important to conserve water quality and biodiversity objectives. This indicator and the following "what if scenario" will help to substantiate the proposed target:

a) What if only 50% of fish stream crossings are planned and installed to a reasonable design and to sediment control standards?

Failure to install 50% of fish stream crossings in a proper manner could potentially negatively impact water quality and a variety of organisms dependent on that water. Increases to sedimentation may occur, thereby causing turbidity and the potential destruction of spawning beds. Other aquatic organisms such as amphibians may also suffer from a higher concentration of soil particles suspended in the water if sedimentation levels increased due to poor crossing design or installation. In addition to potential environmental impacts, social values of SFM could also potentially be impacted, as sedimentation is often an obvious and disruptive feature in the landscape. Sedimentation issues might be perceived by the public as a disregard for non-forest resources and should therefore be mitigated or avoided through proper installation of stream crossings and implementation of sufficient monitoring and inspection programs.

The Licensees and BC Timber Sales are committed to achieving the stated target for the indicator and it is anticipated that all fish stream crossings planned and installed will be done so to reasonable design and sediment control standard.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target. Crossings on fish streams will continue to be documented through EMS or other tracking system inspections done at the time of crossing installation and recorded in databases such as GENUS, or in other information management systems. The indicator percentage will be reported in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees and BC Timber Sales are responsible for all aspects of this indicator. All fish stream crossings will be installed under the supervision of Licensees/BC Timber Sales to ensure it is done to design and sediment control standards. Opportunities for improvement of this indicator include training equipment operators and other personnel involved with stream crossing installation in methods of sediment control.

Indicator 28 - Stream Crossing Inspections

Indicator Statement	*Target and Variance*
Percentage of stream crossing inspections and resulting mitigation measures completed according to schedule.	Target: 100% annually Variance: -10%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 3: **Conservation of Soil and Water Resources**
CSA SFM Element 3.2: **Water Quality and Quantity**
Value: Water quality and quantity.
Objective: Maintain water quality at stream crossings.

Description of Indicator

Regular stream crossing inspections are necessary to ensure crossings are in good condition and are not posing a threat to water quality or to traveler safety. These inspections may find some stream crossings are causing sediment to enter the stream channel, which may damage fish habitat and other aquatic life. If a stream crossing is found to be in need of mitigation measures to prevent sedimentation or to repair the structure, those measures are scheduled for action and completed at a later date. This indicator is intended to monitor the success of completing these mitigation measures according to schedule.

Detecting and correcting forest management and operational related issues is a component of SFM and continuous improvement. This indicator will allow Licensees and BC Timber Sales to evaluate how well this process occurs and make improvements where necessary.

Current Practices and Status of Indicator

Stream crossings, such as bridges and culverts, are regularly inspected to ensure they are in good condition and do not pose a threat to water quality or road safety. All Licensees and BC Timber Sales schedule these inspections to their own criteria, but in all cases if problems are detected they are scheduled for mitigation actions. This may involve re-contouring slopes, installing siltation fences, re-directing ditch lines, grass seeding, or deactivating roads. It may also require the repair or replacement of the crossing structure itself. Current practice has not been to actively track the percentage stream crossing inspections and resulting mitigation measures that were completed according to schedule.

Establishment of Targets and Future Practices

All Licensees and BC Timber Sales recognize the importance of completing mitigation measures on schedule for stream crossings on 100% of occurrences. Licensees and BC Timber Sales will continue to perform stream-crossing inspections to ensure they do not pose a threat to water quality or road safety, and will strive to have mitigation measure completed according to schedule. Future practice will not involve substantial change to current practices. However, the percent of stream crossing inspections and resulting mitigation measures completed according to schedule will be monitored, tracked and reported out to the public in the SFMP annual report.

Forecasting and Predicted Trends

The indicator target is expected to be achieved, but the exact degree of success is not easy to quantifiably forecast. However, it is important to identify what the accepted target means to SFM. This indicator and the following “what if scenario” will help to substantiate the proposed target:

a) What if only 50% of mitigation measures resulting from stream crossing inspections were completed according to schedule?

If only half of the mitigation measures were completed on time there may be significant risk to water quality from the remaining stream crossings. Sedimentation problems may begin, or become worse if prompt action is not taken where deemed necessary. If the stream crossing itself is in danger of failure, such as a culvert that has becoming plugged, there may be a sudden and large input of sediment if the

road were to wash out. By completing required mitigation measures at stream crossings on schedule these events can be prevented or minimized and help maintain water quality in the DFA.

In addition to potential environmental degradation, failure to mitigate issues at stream crossings on schedule may also pose a threat to public safety. Forestry roads are used for a wide range of recreational pursuits, and proper maintenance of crossings is needed to sustain social forestry values.

The Licensees and BC Timber Sales are committed to achieving the stated target for this indicator and it is anticipated that all mitigation measures resulting from stream crossing inspections will be completed according to schedule.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target. The Licensee or BC Timber Sales responsible for a given stream crossing will schedule any mitigation measures required and document their completion in their EMS or other tracking system databases, incident tracking systems or appropriate filing system. The percentage of mitigation measures completed according to schedule will be tracked, as well as the steps taken to meet those measures. This percentage will be reported in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensee/BC Timber Sales personnel conducting stream crossing inspections are responsible for detecting potential problems and for reporting these concerns. Licensees and BC Timber Sales are also responsible for scheduling and supervising the mitigation measures and for ensuring the completion dates are included in the appropriate database. Opportunities for improvement include training Licensee/BC Timber Sales field personnel to recognize potential problems at stream crossings. Field personnel should also be encouraged to be vigilant for identifying issues at all stream crossings, regardless of whose responsibility they may be.

Indicator 30 - Conformity to the Risk Ranking System

Indicator Statement	***Target and Variance***
Conformity to the DFA risk ranking system developed for assessing stream crossing.	Target: April 1, 2007 Variance: 6 months

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 3: **Conservation of Soil and Water Resources**
CSA SFM Element 3.2: **Water Quality and Quantity**
Value: Water quality and quantity.
Objective: Maintain water quality at stream crossings.

Description of Indicator

Assessing risks and planning according to the risk ranking system developed for assessing stream crossings in a consistent manner by the Licensees/BC Timber Sales will help maintain water quality in a proactive manner conducive to SFM. However, the risk ranking system is of little use on its own unless Licensees/BC Timber Sales in the DFA conform to this system and ensure all actions in the field reflect the recommendations generated by the risk ranking system.

This indicator is intended to ensure conformity of Licensees/BC Timber Sales to the developed DFA risk ranking system by April 1st, 2007.

Current Practices and Status of Indicator

The Risk ranking system was developed by the Licensees and BC Timber Sales in March 2006. The table below details how each of assessment criteria impact the assigning of risks to stream crossings.

					SCORE
Precipitation Factor	Very High **(9)**	High **(6)**	Moderate **(3)**	Low **(0)**	
Moisture Regime of Approaches	Subhydric **(20)**	Subhygric – hygric **(18)**	Mesic **(10)**	Xeric – Submesic **(0)**	
Avg side slope % for the crossing	>50 **(9)**	21-50 **(6)**	11-20 **(3)**	0-10 **(0)**	
Sustained road grade in approach to the crossing (100 meters)	10-12% **(15)**	6-9% **(10)**	3-5% **(5)**	0-2% **(0)**	
Most Limiting Soil Texture	Clayey **(12)**	Si, SiL, L **(9)**	SL **(6)**	S, LS **(0)**	
Structure	Round Pipe **(12)**	Imbedded Pipe **(9)**	Log culvert or Arch Pipe **(6)**	Bridge **(3)**	
Stream classification	S1 **(20)**	S2/S3 **(15)**	S4/S5 **(10)**	S6 **(5)**	
Est. Life of Crossing	> 10 years **(3)**	5 to 10 years **(2)**	2 to 5 years **(1)**	One season to 1 year **(0)**	
				TOTAL:	
				RISK RANK:	

Crossing Risk Rankings: Inspection Frequency

Very High (VH):	81-100	Semi-annually
High Risk Road (H):	61-80	Annually
Moderate Risk Road (M):	41-60	3 years
Low Risk Road (L):	0-40	5 years

Table 11. Risk Ranking System for Assessing Stream Crossings

Establishment of Targets and Future Practices

All Licensees and BC Timber Sales recognize the importance of assessing stream crossings in a consistent manner and are committed to conforming to the DFA risk ranking system by April 1st 2007. A six-month variance has been established to allow for unforeseen difficulties in transitioning and

implementing this system within each Licensee/BC Timber Sales operation. Once the risk ranking system is developed and in place, Licensees/BC Timber Sales will work towards assessing all stream crossings in the Fort St. James DFA in accordance with the risk ranking standard, and will achieve conformity with this system by April 1st, 2007.

Forecasting and Predicted Trends

The indicator target is expected to be achieved, but the exact degree of success is not easy to quantifiably forecast. However, it is important to identify what the accepted target means to SFM. This indicator and the following "what if scenario" will help to substantiate the proposed target:

a) What if conformity to the DFA risk ranking system was not achieved by April 1st, 2007?

If conformity to the risk ranking system was not achieved by April 1st, 2007, the consistency and efficiency of assessing and managing stream crossings would continue to vary between individual Licensees/BC Timber Sales. The monitoring, tracking and reporting of stream crossing assessments would not be consistent among Licensees/BC Timber Sales and future indicators of water quantity and quality may be more difficult to assess based on these differences. Further, differences in assessing risks around stream crossing could lead to some stream crossings having their risk inaccurately assessed, eventually resulting in potential sedimentation and decreased water quality. Managing stream crossings as a group according to an established ranking system will standardize this procedure across the DFA and promote proactive forest management that is conducive to SFM. Delays in conforming to the risk ranking system will delay this consistent proactive approach to assessing stream crossings in the DFA.

The Licensees and BC Timber Sales are committed to achieving the stated target for the indicator and it is anticipated that Licensees/BC Timber Sales will conform to the risk ranking system by April 1st, 2007.

Monitoring and Reporting Procedures

The Licensees and BC Timber Sales will monitor the development and implementation of the risk ranking system and will ensure conformity to this system once it is completed. The progress and success in meeting the indicator target date will be reported in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

The Licensees and BC Timber Sales are responsible for ensuring conformance to the DFA risk ranking system. Opportunities for improvement will arise once the risk ranking system is implemented and the accuracy of the system can be assessed.

Indicator 31 - Permanent Crossing Structures & Fish Passage

Indicator Statement	***Target and Variance***
Percentage of permanent crossing structures installed on fish streams that will allow for adequate fish passage *(dependant on the presence/absence of fish)*.	Target: 100% annually Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 3: **Conservation of Soil and Water Resources**
CSA SFM Element 3.2: **Water Quality and Quantity**
Value: Water quality and quantity.
Objective: Maintain water quality at stream crossings.

Description of Indicator

When forest roads are constructed it is often necessary to build permanent crossing structures (i.e. culverts, bridges) over streams that may be fish-bearing. In order to maintain the number and diversity of fish species, stream crossings cannot be a barrier to their migration. Barriers to fish passage include, but are not limited to, obstructions in culverts, placement of culverts above a stream creating an impassible step, and collapsed culverts. As fish are also an important food source for other faunal species, the

success of these structures (to provide for fish migration) contributes to the maintenance of these other species in the DFA. It is the intention for all new fish-stream crossings to allow for adequate fish passage.

Current Practices and Status of Indicator

Streams and crossing structures are identified during operational plan preparation. The streams are surveyed for their potential for bearing fish and qualified personnel determine their probable peak flow volumes. The appropriate culvert size and installation procedure is then prescribed for the stream crossing. EMS or other tracking system pre-work forms are completed prior to crossing installation and the Licensee supervisor completes an inspection form at the time of completion. In addition, many stream crossing structures are inspected over time as part of Licensee's/BC Timber Sales EMS or other tracking system procedures.

Current practices include ensuring that adequate fish passage exists on all crossings on fish bearing streams. However, this data is not formally tracked and reported out.

Establishment of Targets and Future Practices

Prior to the implementation of the Forest Practices Code, many stream crossings did not always consider fish passage. The result was permanent crossing structures that became barriers to fish movement. The Licensees and BC Timber Sales recognize the importance of installing stream crossings that allow for fish passage, and have set the target at 100% of new structures to achieve this annually. Stream crossings will continue to be identified in operational plans and procedures implemented to ensure fish passage is maintained. The percentage of crossings that allow for adequate fish passage will be monitored, tracked and reported out to the public annually through the SFMP annual report.

Forecasting and Predicted Trends

While the indicator target is expected to be achieved, the exact degree of success is not easy to quantifiably forecast. However, it is important to identify what the accepted target means to SFM. Maintaining natural processes such as stream flow is vital to sustainable forest management. This indicator and the following “what if scenario” will help to substantiate the proposed target:

a) What if only 50% of new permanent stream crossing structures installed allowed for adequate fish passage?

The above scenario would immediately restrict fish movement in many streams in the DFA. If fish species are not able to travel certain stream channels, migration patterns could be lost and populations would likely decline. Animal species reliant on fish movements upstream of a barrier could also be negatively affected. Failures in fish populations or restrictions of fish movement may also impact recreational fishing opportunity. Decreases in fish populations due to poor migration may cause fishing closures throughout the DFA. Barriers to fish passage may inhibit fish from reaching certain watersheds or lakes, thereby negatively affecting future recreational fishing of those water systems.

Meeting the target objective can maintain ecological values and social values of sustainable forest management. Therefore, the Licensees and BC Timber Sales are committed to achieving the stated target for the indicator and long term trends are anticipated to show that all new fish stream crossings will allow for adequate fish passage.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target and will be managed by each individual Licensee/BC Timber Sales operation. The indicator will be monitored through EMS or other tracking system inspections and performance will be recorded in databases such as GENUS or Inform. The percentage of crossings that will allow for fish passage will be included in the SFMP annual report for the operating period of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees and BC Timber Sales are responsible for installing new crossings that meet the objectives of this indicator. Specifically, Licensees/BC Timber Sales are responsible to oversee the installation of bridges and culverts through EMS or other tracking system checklists and final inspection reports. Completing stream surveys will provide Licensees/BC Timber Sales with information on which streams require fish management.

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Indicator 32 - Riparian Management Area Commitments

Indicator Statement	***Target and Variance***
Percent of cutblocks harvested that are consistent with riparian management commitments.	Target: 100% Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 3: **Conservation of Soil and Water Resources**
CSA SFM Element 3.2: **Water Quality and Quantity**
Value: Water quality and quantity.
Objective: Maintain water quality (sedimentation and water temperature) and quantity within natural range of seasonal variation.

Description of Indicator

Riparian areas occur next to the banks of streams, lakes, and wetlands and include both the area dominated by continuous high moisture content and the adjacent upland vegetation that exerts an influence on it (BC Ministry of Forests 1995a). Riparian Management Areas (RMAs) consist of a Riparian Management Zone (RMZ) and where required by legislation, a Riparian Reserve Zone (RRZ). The width of these zones is determined by attributes of streams, wetlands, lakes, and adjacent terrestrial ecosystems. Maintaining RMAs provides for the conservation of riparian and aquatic environments, which are key for the survival of species (flora and fauna) that are dependent on riparian conditions. RMAs frequently contain large numbers of flora and fauna species and provide for critical habitats, home ranges and travel corridors for wildlife. In addition, RMAs also function to conserve water quantity and quality features by reducing the risk induced by forest harvesting activities directly affecting the watercourses.

This indicator is intended to ensure that the riparian management area commitments made by Licensees/BC Timber Sales are actually implemented on the ground. Maintenance of riparian values is an important aspect to sustainable forest management because riparian features are vital for maintaining water quality and quantity. They are also diverse and sensitive habitats that support a wide range of plants and animals. Riparian features are also well appreciated by residents and visitors in the DFA for recreation purposes and overall aesthetics.

Current Practices and Status of Indicator

Riparian values are generally identified through the planning process, with specific management strategies incorporated into Site Plans. Implementation of these strategies is verified on the ground during harvesting operations and through final harvest inspections. Riparian values are initially identified on a map during the preparation of the FDP/FSP. The FDP/FSP outlines broad riparian management area commitments that are prescribed in greater detail in site specific Site Plans. The level of compliance with commitments in operational plans is monitored through EMS or other tracking system inspections and recorded in databases such as GENUS or Inform.

All Licensees and BC Timber Sales have managed riparian management areas according to legislated requirements for several years. This management will continue through Site Plan commitments and implementation of strategies during harvesting operations.

Establishment of Targets and Future Practices

The target of 100% was established to reflect the Licensees' and BC Timber Sales's commitment to meeting the riparian management area obligations for their operating areas. The identification and conservation of riparian values is a socially and ecologically important component of forest management. Thus, Licensees and BC Timber Sales will continue to ensure harvesting operations will be consistent with all identified riparian requirements.

Forecasting and Predicted Trends

All harvesting operations are expected to be compliant with riparian management commitments in Site Plans. However, the exact level of consistency is difficult to forecast. Conservation of riparian values influences ecological, economic and social values within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying what the accepted target means to SFM. As the indicator currently has a target of 100%, one other scenario should be identified:

a) What if there was only 50% compliance to riparian management area commitments?

Complying with only 50% of riparian management area commitments could lead to significant ecological, economic and social impacts. In an ecological sense, aquatic habitat, biological richness, water quality and species diversity could all be negatively influenced. As a result, economic values could also decrease as healthy ecosystems support sustainable economic values. Social values could also decrease in response to the negative influence on ecological and economic values. If riparian habitat is decreased, wildlife populations may also be impacted, thereby reducing recreational hunting values. Fishermen, canoeists, kayakers, and others value riparian areas for shelter, camping, and aesthetics. These users may have their recreational experiences diminished by poorly conducted forestry operations in riparian management areas.

There could be several potential future impacts of not achieving the stated target for this indicator. Therefore, the Licensees and BC Timber Sales are committed to meeting the target by ensure riparian commitments are implemented on the ground. The indicator will remain at the target of 100% if all processes and protocols are followed.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target and will be managed on an individual basis. Licensees and BC Timber Sales will conduct pre-work meetings prior to the start of projects, monitoring inspections as the work is progressing and final inspections once the work is complete to ensure the commitments specified in Site Plans are achieved in harvested blocks. These initial, interim and final checks are part of each Licensee's and BC Timber Sales's EMS or other such tracking system. If a non-conformance with the Site Plan occurs in a harvested block, this information will be recorded on an activity inspection form and then entered into an incident tracking database or other similar system so that issues can be tracked and mitigated as required.

The percent consistency with riparian management area commitments made in the Site Plan and implementation in harvested blocks will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees/BC Timber Sales are responsible for ensuring that Site Plan commitments are communicated to operational staff and implemented in all harvested blocks. Licensees/BC Timber Sales are therefore responsible for ensuring riparian commitments are implemented in the field during harvesting operations. If problems in implementing Site Plan riparian objectives in harvested blocks occur, preventative and corrective actions will be identified to improve consistency. Improvements in operational plan implementation will be adopted if required.

Indicator 34 - Reforestation Timing

Indicator Statement	*Target and Variance*
Percentage of blocks >1.0ha harvested 3 years prior to the reporting period that have been reforested.	Target: 90% Variance: -20%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 3: **Conservation of Soil and Water Resources**
CSA SFM Element 3.2: **Water Quality and Quantity**
Value: Healthy watersheds.
Objective: Maintain healthy watersheds (quantity within the natural range of variability).

CCFM Criterion 4: **Forest Ecosystem Contributions to Global Ecological Cycles**
CSA SFM Element 4.1: **Carbon Uptake and Storage**
Value: Carbon uptake and storage.
Objective: Maintain processes that take carbon from the atmosphere and store it in forest ecosystems.

CCFM Criterion 4: **Forest Ecosystem Contributions to Global Ecological Cycles**
CSA SFM Element 4.2: **Forest Land Conversion**
Value: Maintenance of total forest land.
Objective: Protect forestlands (within our jurisdiction) from deforestation or conversion to non-forests.

Description of Indicator

Prompt reforestation of harvested areas is a major component of sustainable forest management. In addition to creating wildlife habitat, new plantations help maintain hydrologic processes and contribute to the broader health of watersheds. Trees interact with water in many ways- they intercept it, transpire it, and shade it, all of which contribute to watershed function.

Regenerating cutblocks can also absorb significant amounts of carbon through photosynthesis. Because young plantations are typically healthy and rapidly growing, they sequester more CO_2 through photosynthesis than they release through decay. By reducing atmospheric greenhouse gases such as CO_2, regenerating cutblocks can contribute to reducing climate change. The sooner cutblocks are regenerated after the completion of harvest the sooner this process can begin.

Reforestation also represents a commitment to keeping the land as forest and helps maintain the total forest land base in the DFA. Prompt reforestation will ensure trees are quickly re-established and discourages the area's conversion to non-forests. Tracking plantation establishment will allow forest managers to assess how quickly and successfully regeneration is occurring, and if possible, adjust operations to reduce the time it takes to achieve reforestation.

Current Practices and Status of Indicator

Licensees and BC Timber Sales are legally required to declare the NAR (Net Area Reforestable) of a cutblock regenerated by a date defined in the Site Plan. The NAR is the area of a cutblock that must be reforested, and does not include permanent access structures (roads), wildlife tree patches, and areas of wetlands or rock. The date regeneration must be accomplished by is called the "regen" declaration date and varies depending upon the ecosystem association it is applied to. For some ecosystem associations the date may as long as 7 years after harvest, but most cutblocks are declared to be reforested before the regen period has expired. This prompt reforestation allows seedlings to become established before competing vegetation becomes too developed on the site.

Establishment of Targets and Future Practices

The Licensees and BC Timber Sales have determined that 3 years is sufficient time for a cutblock to be planted once harvesting is complete and that 90% of all harvested areas will achieve this goal. Within

those 3 years site preparation may be required, such as disc trenching or mounding, and seedlings have to be grown that are appropriate for that site. Compared to many Site Plan prescribed regen dates, 3 years is an aggressive target to be achieved. Events may occur that result in some cutblocks not being reforested within this period. Planting may be postponed as adjacent stands are harvested to salvage pine beetle killed timber. There may be insufficient seedlings to complete planting, or new plantations may suffer mortality from pests or extreme weather. In light of these possible events, a variance of -20% has been established.

To achieve this target, forestry operations have to be completed quickly and efficiently. Harvesting schedules, piling and burning of debris and road deactivation schedules all have to consider the target planting date. Licensees/BC Timber Sales will ensure site preparation and seedling acquisition is timed to meet the 3-year reforestation target date.

Forecasting and Predicted Trends
While planting 90% of harvested blocks within 3 years from the completion of harvest is expected, the exact level of success that will be achieved is difficult to forecast. Factors such as weather, seedling availability, and ongoing beetle salvage operations may disrupt planting schedules. Therefore, it is important to identify what the accepted target means to SFM. A "what if scenario" analysis will identify the importance of the target for this indicator:

a) What if only 50% of harvested blocks >1.0ha were reforested within 3 years of harvesting?

Allowing 50% of harvested areas to remain non-forested after 3 years may delay the uptake of atmospheric carbon, reducing efforts to fight climate change. It may also influence water flows and watershed health. Waiting beyond 3 years to reforest harvested blocks could allow competing vegetation to become well established, thereby potentially reducing crop performance once areas are reforested. Delaying reforestation could also be detrimental to those plant and animal species dependent on forest ecosystems. In the long term, timber supply may be reduced from an excessive lag between harvesting and reforestation, which could ultimately affect economic and social values in the DFA.

Monitoring and Reporting Procedure
This indicator has a Licensee/BC Timber Sales specific target and will be managed on an individual basis. All reforestation and survey data is monitored in Licensee/BC Timber Sales databases such as GENUS or Inform. The indicator percent will be reported in the annual SFMP report for the operational year April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities
Licensees and BC Timber Sales are responsible for the monitoring, tracking, and reporting of this indicator. Scheduling silviculture activities should take every opportunity to reduce the time between harvest and reforestation activities. For example, site preparation could occur directly after harvesting instead of waiting for the following year. Opportunities for continual improvement will include tightening silviculture timelines so that the target is achieved and even exceeded where possible.

Indicator 35 – Watershed Peak Flow Index

Indicator Statement	***Target and Variance***
The percent of watersheds achieving baseline targets for the peak flow index	Target: Annually, 85% of the watersheds will be below the baseline target Variance: +/- 15%

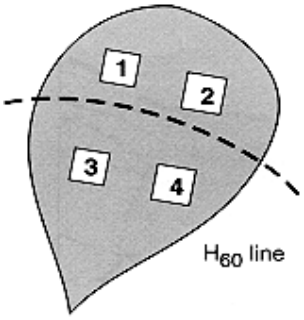
This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 3: **Conservation of Soil and Water Resources** ***CSA SFM Element 3.2:*** **Water Quality and Quantity** ***Value:*** Healthy watersheds. ***Objective:*** Maintain healthy watersheds (quantity within the natural range of variability).

Description of Indicator

Peak flow is the maximum flow rate that occurs within a specified period of time, usually on an annual or event basis. The peak flow index is a measure that indicates the potential effect of harvested areas on water flow in a particular watershed. The H60 line is the elevation for which 60% of the watershed area is above. The table below shows how the peak flow index is calculated for a hypothetical watershed.

Figure 1. Peak Flow Index Calculations (source: B.C. Ministry of Forests, 2001b)



Block no.	Area (ha)	Stand height (m)	ECA (ha)	Weight factor	Weighted ECA
1	20	4	15.0	1.5	22.5
2	30	6	15.0	1.5	22.5
3	20	1	20.0	1.0	20.0
4	30	8	7.5	1.0	7.5

Weighted total ECA = **72.5**

Peak flow index = $\frac{72.5}{1000}$ = **0.0725**

The ECA or "Equivalent Clearcut Area" is calculated from the area affected by logging and the hydrologic recovery of that area due to forest re-growth. After an area has been harvested, both winter snow accumulation and spring melt rates increase. This effect is less important at low elevations, since the snow disappears before peak flow. Harvesting at high elevations will have the greatest impact and is, therefore, of most concern. As a result, areas harvested at different elevations are weighted differently in the calculation of peak flow index.

Most hydrologic impacts occur during periods of the peak stream flow in a watershed. In the interior of British Columbia, peak flows occur as the snowpack melts in the spring.

With regards to the conservation of water quality in the AUTP, it is important to be able to maintain the watershed level conditions within natural ranges of variation to ensure that other users of water are not adversely affected. The peak flow index provides a method to forecast and evaluate the potential effects of future harvesting plans, and to ensure that these harvested areas do not contribute to the degradation of the water resource.

Current Practices and Status of Indicator

There are currently 77 of an estimated 300 watersheds delineated for monitoring PFI. All 77 watersheds (100%) are currently meeting the baseline target PFI and continue too after the Forest Development Plans are applied.

Watersheds were named according to the local name of the water body, where applicable. A basin name was also added to provide a geographic reference.

Once all watersheds were delineated, a baseline target was determined for each of the watersheds. The setting of an absolute PFI target is very difficult and can lead to significant controversy. Although there is no single widely accepted threshold value, conservative targets are suggested. Although we don't know what the physical and biological impacts from increased peak flows will be, we do know that there will be increased flows caused by the removal of a large percentage of the forest canopy. Consequently, a maximum target is set with the overall goal of maintaining the sustainability of the aquatic resource without being overly conservative. The targets must consider the type of watershed and type and stability of the fluvial system. The idea behind setting a baseline target is not to prevent changes in peak flows to

occur, but to maintain flows within levels that will not unduly accelerated rates of streambed and stream bank erosion and degrade fish habitat. The suggested target PFI values are partly subjective and are based on a combination of professional opinion, scientific literature and 20 years of personal involvement in research projects investigating peak flows by Pierre Beaudry. Further details on the development of peak flow indices can be found in the report provided to Canfor by Pierre Beaudry, "Peak Flow Index Targets for Canfor's Operating Area in the Prince George and Quesnel TSAs, January 2002".

Future plans include, the signatory licensees other than Canfor delineating and determining targets for watersheds within their DFA's by August 2006. Reporting of peak flow index would then occur during the 2006/07 reporting year.

Establishment of Targets and Future Practices

The Licensees and BC Timber Sales have established a target of 85% of watersheds will achieve baseline targets for the peak flow index, with a +/- 15% variance. The target and variance were established to reflect the fact that factors other than harvesting may influence peak flows. These may include forest health events such as the current mountain pine beetle epidemic and wildfire, in which licensees/BC Timber Sales cannot actively control potential impacts to peak flows.

Baseline targets for this indicator will result from a watershed analysis of the AUTP.

Forecasting and Predicted Trends

While it is expected the indicator target will be achieved, the results if it is not are difficult to predict. However, it is important to identify what the accepted target means to SFM. A "what if scenario" analysis will identify the importance of the target for this indicator to SFM within the AUTP. This indicator and the following "what if scenario" will help to substantiate the proposed target:

a) What if only 50% of watersheds annually are below the baseline target for peak flow indices?

If peak flows greatly exceed targets there could potentially be negative impacts to ecological values within the AUTP. Above target peak flows may result in excessive erosion and failures at downstream culverts and bridges. This may in turn degrade fish habitat by causing sedimentation and scouring of spawning beds. Reduced fish habitat may then lead to reduced wildlife populations if they are dependent on fish as a food source, and reduced recreational fishing opportunity if populations severely decline. Social values of SFM may also be reduced if only 50% of watersheds are below baseline targets for peak flow, as drinking water quality could potentially be compromised by high peak flows.

Maintaining water flows within the range of natural variability is an important component of sustainable forest management. Therefore, the Licensees and BC Timber Sales are committed to achieving the peak flow targets for this indicator.

Monitoring and Reporting Procedures

This indicator has a DFA/Watershed specific target and will be managed on a DFA level. Once a project to determine baseline targets for Peak Flow Indices is developed, the Licensees/ BC Timber Sales will create systems to monitor future planned harvesting to achieve them. Licensees/BC Timber Sales will then be responsible for ensuring targets are met. This may be achieved by using several sources of information such as forest cover and biogeoclimatic maps that are updated either by the Provincial Government or by Forest Licensees under contract with the Government. These data sources are usually only updated/replaced in five to 10 year intervals. Adjacent site information is obtained from other Licensees that share the same land base. Databases such as GENUS, or similar systems, will be maintained to provide up to date planning information.

To monitor this indicator, a watershed analysis will be conducted each year. This analysis will be used to determine the success in meeting this indicator's target. The indicator percent will be included in the annual SFMP report for the operating year April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities
Licensees and BC Timber Sales are responsible for ensuring the indicator target is met. The Licensees and BC Timber Sales will be responsible for updating their forest cover databases and for ensuring future harvesting will be responsive to PFI targets *(See indicator #36)*. Continuous improvement opportunities may be found in developing hydrologic models for the DFA watersheds to more accurately forecast the effects of harvesting on peak flows.

Indicator 36 - Watershed Reviews

Indicator Statement	***Target and Variance***
Percent of watershed reviews completed where the baseline target is exceeded, and new harvesting is planned.	Target: 100% Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 3: **Conservation of Soil and Water Resources**
CSA SFM Element 3.2: **Water Quality and Quantity**
Value: Healthy watersheds.
Objective: Maintain healthy watersheds (quantity within the natural range of variability).

Description of Indicator
The concepts of peak flow indices (PFI) and baseline targets are discussed in detail in the previous indicator. If PFI targets are exceeded, potentially detrimental impacts to water quality and quantity could occur if harvesting in these watersheds continues. This indicator is intended to ensure that where PFI targets are exceeded, the watersheds have a review completed if new harvesting is planned in the watershed. Following the review, harvesting in the affected watershed will be planned in a manner that will help meet the baseline targets in the future.

Current Practices and Status of Indicator
Watersheds in the DFA have not currently been managed to meet baseline targets for their peak flow indices, as these targets have not been fully established. Licensees/BC Timber Sales plan to initiate a project to determine these baseline targets and once they have been established, the Licensees and BC Timber Sales can take steps to monitor watersheds in accordance with peak flow objectives. Watershed reviews will be scheduled as necessary once PFI baseline data acquisition is completed.

Establishment of Targets and Future Practices
The Licensees and BC Timber Sales have established a target of 100% of watersheds that exceed baseline targets will have a watershed review completed wherever new harvesting is planned. This target reflects the importance the Licensees and BC Timber Sales place on maintaining water quality and quantity in the DFA. Once PFI targets are established, required watershed reviews will be completed by qualified hydrologists who will evaluate the potential risk of continuing to harvest in a given watershed. Depending on the results of the review, Licensees/BC Timber Sales may adjust harvest design, scheduling, and silviculture systems to mitigate any hydrologic impacts created by the harvest operations.

Information will be given to the hydrologists to review and create recommendations.

Forecasting and Predicted Trends
While it is expected the indicator target will be achieved, the results are difficult to predict. However, it is important to identify what the accepted target means to SFM. This indicator and the following "what if scenario" will help to substantiate the proposed target:

a) What if only 50% of watersheds that exceed their baseline target for peak flows have a review completed wherever new harvesting is planned?

As discussed in indicator #35, if peak flows greatly exceed targets there could be negative impacts to the DFA's ecological and social values, primarily related to water quality and potential fish habitat. If only 50% of the watersheds that exceed their baseline target peak flows have a review completed where new harvesting is planned, those watersheds that do not receive review run the risk of deteriorating further. A watershed review would help to identify potential causes of increased peak flows. Therefore, the primary method of assigning mitigative measures for these watersheds is by conducting a review prior to more harvesting activity taking place. As such, it is important that Licensees/BC Timber Sales attain the identified target.

Monitoring and Reporting Procedures

This indicator has a DFA/Watershed specific target and will be managed at the DFA/Watershed level. Once the baseline targets for the peak flow indices have been developed, the Licensees/ BC Timber Sales will develop systems to monitor peak flow indices in watersheds within the DFA.

Watersheds that have exceeded their baseline PFI targets will have a watershed review conducted by a qualified professional if new harvesting is planned within the watershed. This report will be used to monitor and report out on this indicator in the annual SFMP report for the operating year April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

It is the Licensees/ BC Timber Sales responsibility to ensure reviews are completed for watersheds that exceed their baseline peak flow targets. Continuous improvement opportunities may be found in developing hydrologic models for the DFA watersheds to more accurately forecast the effects of harvesting on peak flows.

Indicator 37 - Free Growing Obligations

Indicator Statement	***Target and Variance***
Percent of standards units declared annually that meet free growing requirements on or before the late free growing date.	Target: 100% Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 4: **Forest Ecosystem Contributions to Global Ecological Cycles**
CSA SFM Element 4.1: **Carbon Uptake and Storage**
Value: Carbon uptake and storage.
Objective: Maintain processes that take carbon from the atmosphere and store it in forest ecosystems.

Description of Indicator

A free growing stand is a stand of healthy trees of a commercially valuable species, the growth of which is not impeded by competition from plants, shrubs or other trees (BC MOF 1995b). A free growing assessment is conducted on standards units based on a time frame indicated in the Site Plan. A Standards Unit (SU) is defined in the Stocking and Free Growing Survey Procedures Manual (BC MOF 2002) as:

> *"an area that is managed through the uniform application of a silvicultural system, stocking standards, and soil conservation standards. These standards are used to determine if legal regeneration, free growing, and soil conservation obligations are met."*

The early and late free growing dates are established based on the biogeoclimatic ecosystem classification of the site and the tree species prescribed for planting after harvest.

In order to fulfil mandates outlined in legislation, standards are set for establishing a crop of trees that will encourage maximum productivity of the forest resource (BC MOF 1995b). The free growing survey assesses the fulfilment of a Licensee's obligation to the Crown for reforestation.

This indicator measures the percentage of standards units that annually meet free growing obligations across the DFA. While this percentage is important in a legal sense, as Licensees/ BC Timber Sales have an obligation to meet free growing standards, it is also important for sustainable forest management. Standard units that meet free growing standards are deemed to have reached a stage where their continued presence and development is more assured. They are in numbers, health, and height that make them less vulnerable to competition and more likely to reach maturity. Producing a free to grow stand means that the forest ecosystem will continue to develop. It means that carbon sequestration will also continue, locking up additional green house gases as cellulose in the growing plantation. As more blocks reach free to grow status, they could make a significant local contribution to reducing global climate change.

Current Practices and Status of Indicator

Free growing dates and standards for each standards unit are recorded and maintained in each Licensee's and BC Timber Sales's database, such as GENUS. Each cutblock is surveyed prior to the late free growing date to ensure the free growing standards have been met and that the stand of trees is at target heights, fully stocked, and healthy. The results of all surveys are summarized and maintained in Licensee/BC Timber Sales databases. If a survey indicates that the standards unit has not achieved free growing by the required date, corrective actions will be prescribed immediately in order to remedy the situation while still meeting the late free growing deadlines. If all free growing standards are met, the Licensee/BC Timber Sales makes an application to the Ministry of Forests and Range for the standards unit to revert to the Crown's responsibility.

Establishment of Targets and Future Practices

The target for this indicator has been established at 100% to ensure that all standards units within the DFA achieve free-to-grow status within prescribed timelines. Once standards units reach the free to grow standard, the area reverts back to Crown land and all Licensee/BC Timber Sales obligations are considered complete. A performance target of 100% is not only achievable, it is in the Licensee's/BC Timber Sales's best interest as the completion of silviculture obligations is an important financial benefit. Until the Crown assumes responsibility for a plantation, the Licensee or BC Timber Sales must bear the costs of managing that stand, including surveys, thinning, brushing, and, if necessary, replanting. Future practice will involve Licensees/BC Timber Sales continuing to meet free to grow obligations and this data will be reported out to the public annually.

Forecasting and Predicted Trends

While it is anticipated that 100% of standards units will meet the indicator target, the exact level of success is not easy to forecast. However, it is important to identify what the accepted target means to SFM. By ensuring standards units within the DFA meet the prescribed free growing date, forest managers are ensuring that the productive capability of the forested land base is conserved and that the forest resource will be available for future use. A "what if scenario" is beneficial in helping to identify the importance of meeting the specified target for an indicator such as this. As the stated target for this measure is 100%, one other potential scenario will be analyzed:

a) What if only 50% of standards units met the prescribed free growing requirements on or before the late free growing date?

If only half of standards units met the prescribed requirements on or before their free growing dates, the sustainability of the timber resource within the DFA could potentially be in peril. Free growing stands are considered to have a reached a state where they can continue to grow in a healthy manner, reasonably free of competition. Stands that have not reached this state may be suffering high pest mortality or competition from other species that may prevent them from becoming commercially viable crop trees. Quite simply, 50% fewer free growing standards units means there will be 50% less area to harvest in the future.

In addition to economic benefits, free growing stands contribute to ecological values of SFM. Achievement of free growing stands ensures that the nutrients and productivity of the site have not been

significantly altered from harvest and that the land area has not been converted to another type of vegetative cover. Wildlife species dependent on healthy forests also benefit from the creation of free growing stands. A free growing stand also represents an area that is actively storing carbon and contributing to the removal of carbon dioxide from the atmosphere. Having 100% of standards units meeting their free growing dates means that the DFA may potentially make a significant contribution to the effort to reduce atmospheric carbon dioxide.

In the long-term, failing to achieve the identified target for this measure could negatively impact economic, ecological and social values across the DFA. If the timber supply and the amount of healthy regenerating forests decline, the industries, communities and natural processes that depend on them may also suffer. In the Fort St. James DFA, trends for the immediate future will likely show that 100% of standards units will meet the prescribed free growing requirements on or before the late free growing date.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target and will be managed on an individual basis. Silviculture obligations such as free growing dates for standards units are recorded and maintained in Licensee/BC Timber Sales databases such as GENUS. Once free to grow status has been achieved, the Licensee/BC Timber Sales must submit a report to the Ministry of Forests and Range that will update the status of the standards units on the government database. These reports must be submitted on an annual basis for all standards units surveyed that operating year. The indicator percent will be included in the annual SFMP report for the operating year April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

It is Licensees/BC Timber Sales responsibility to monitor, track and report this indicator. Opportunities for continuous improvement could be found in the administration of silviculture activities. Currently, failure to meet free to grow objectives generally relates to data base tracking, survey methodology and reporting delays. These issues will be reviewed and, if necessary, a resulting action plan will be developed and implemented to minimize future negative impacts to this indicator.

Indicator 38 - Cut Level Volumes

Indicator Statement	***Target and Variance***
Percent of licensee AAC harvested over a 5 year cut control period. Percent of BCTS Volume Offered over fiscal year.	Target: 100% Variance: +/- 10%

This indicator addresses the following CSA-SFM parameters:

1) ***CCFM Criterion:*** Multiple benefits to society.
CSA SFM Element: Timber and Non-Timber Benefits
Value: Acceptable and feasible mix of a healthy forest industry and non-timber benefits.
Objective: To maintain timber harvest levels consistent with the long-term productive capacity of the Timber Harvesting Land Base.

Description of Indicator

To be considered sustainable, harvesting a renewable resource such as timber can not deteriorate the resource on an ecological, economic or social basis. It is expected that certain resource values and uses will be incompatible, however a natural resource is considered sustainable when there is a balance between the various components of sustainability. An Allowable Annual Cut (AAC) is defined as the allowable rate of timber harvest from a specified area of land. During AAC determination, various considerations are examined including the long term sustainable harvest of the timber resource, community stability, wildlife use, recreation use, and the productivity of the DFA. The AAC is generally determined every five years by the Chief Forester of British Columbia, using a number of forecasts to assess the many resource values that need to be managed. On behalf of the Crown, the Chief Forester makes an independent determination of the rate of harvest that is considered sustainable for a particular Timber Supply Area (TSA). The Fort St. James DFA is part of the larger Prince George TSA, comprising approximately 42% of the TSA area.

The harvest level for a TSA must be met within thresholds that are established by the Crown. By following the AAC determination, the rate of harvest is consistent with what is considered by the province to be sustainable ecologically, economically and socially within the DFA.

In the summer of 2004, the Chief Forester completed an expedited Timber Supply Review (TSR) and re-determined the AAC for the Prince George TSA. This review was initiated in order to address the severe mountain pine beetle infestation that currently exists throughout the TSA. The Chief Forester examined conservation values, timber supply, management practices, and the various options and implications of increasing volumes of timber harvested.

Current Practices and Status of Indicator

As stated above the Chief Forester makes a determination of the rate of harvest for a particular TSA. The licensee then must harvest the amount of volume specific in their license document within the legally specified thresholds. In the case of BC Timber Sales, In the case of BC Timber Sales, they are not bound by cut control legislation but do have a volume apportionment as set out in the Timber Supply Review by the Chief Forester. Each fiscal year BCTS is committed to offer a volume of timber (based on the volume apportioned (AAC)) for sale through a competitive bidding process. Each truckload of wood is assessed and accounted for at an approved Ministry of Forests and Range (MOFR) scale site. The MOFR uses this information to apply a stumpage rate to the wood, and monitors the volume of wood harvested and compares it to the license volume thresholds. BC Timber Sales tracks volume of timber cruised for timber sales licenses for sale.

Establishment of Targets and Future Practices

A common method for establishing targets is to benchmark the current harvest levels and extrapolate to the next 5 to 10 years. However, due to the existing mountain pine beetle epidemic in the DFA, increased harvest levels make benchmarking difficult and unpredictable. The Chief Forester apportions AAC within the DFA and the Licensee's are committed to 100% of their 5 year license volumes, while BC Timber Sales is committed to offer 100% of their volume apportionment each fiscal year.

Forecasting and Predicted Trends

The current AAC for the Prince George TSA is 14,944,000 cubic metres, effective October 1, 2004. This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination, unless the re-determination date is formally postponed according to the provisions of Section 8 of the *Forest Act.*

It is extremely difficult to forecast harvest volumes in the TSA due to the mountain pine beetle epidemic and therefore it is more difficult to forecast the harvest volumes in the Fort St. James forest district alone. The following shows the expected harvest level in the Fort St. James forest district using the starting point of the Timber Supply Review volume for the district at 3,000,000m^3 per year. The base case line below uses the best current information that is available regarding the beetle epidemic and its impacts.

Figure 2. Forecasted Total Volume Harvested in the Fort St. James District

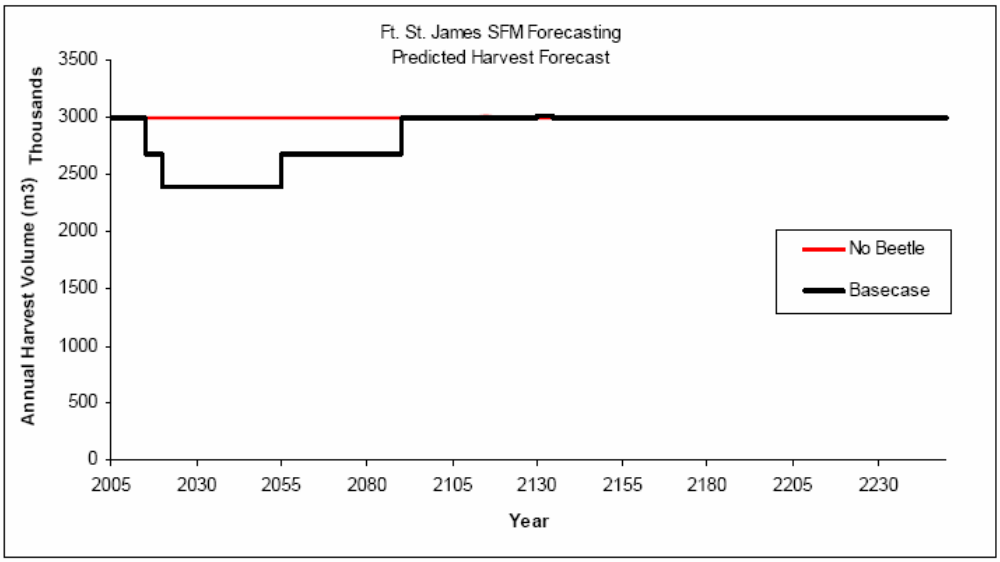


Figure 8 Harvest forecast comparison - No beetle run

This forecast uses 2005 as a starting point at approximately 3.0 million m^3/year. In year 2015, the harvest level must be stepped down to 2.7 million m^3 and in year 2020 the harvest level must again be stepped down to 2.4 million m^3/year in order for forestry to remain a sustainable resource. This harvest level must be maintained until 2055, after which it can be gradually increased to the long-term harvest level of approximately 3.0 million m^3/year. This level is reached at approximately year 2090.

The harvest volume levels shown above are likely to change in the future as more pressure is put on the district from other licensees operating in the TSA needing to move to the Fort St. James district to satisfy their volume requirements. Although this is expected to change the trending data shown above, the data can still be used with the knowledge that the higher the harvest levels go in the short term, the longer and deeper the mid-term gap in the Fort St. James forest district will be.

Monitoring and Reporting Procedures

The target for this indicator is based on the individual licensee five year cut control period and it will be measured at the end of that 5 year period. The volume harvested will be reported on an annual basis with the goal of trending toward the target over the five year cut control period. The target for BC Timber Sales is based on the fiscal year. The volume of timber actually harvested will be determined annually by a review of MOFR timber scale billing summaries for the period of January 1st to December 31st. Since the license volumes are not apportioned by the DFA, the licensees will need to report out on the volumes harvested on a TSA level. Reporting for BC Timber Sales will only include the Fort St. James Forest District.

Responsibility and Continuous Improvement Opportunities

Planning foresters are responsible for ensuring that the volume planned for harvesting will meet the licensed volume requirements. The Licensees and BC Timber Sales will work cooperatively with the Ministry of Forests and Range to better estimate the AAC and actual harvest levels. As better estimates of the current damage from Mountain Pine Bark Beetle are obtained, more accurate AAC determinations will be possible.

Indicator 39 - Visual Quality Requirements

Indicator Statement	***Target and Variance***
Percent of cutblocks and roads harvested, in known scenic areas, which have visual assessments completed and implemented according to the recommendations.	Target: 100% Variance: None

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 5: **Multiple Benefits to Society**
CSA SFM Element 5.1: **Timber and Non-Timber Benefits**
Value: Acceptable and feasible mix of a healthy forest industry and non-timber benefits.
Objective: Protect aesthetic values by ensuring that development proposals within designated scenic areas have a visual quality assessment completed.

Description of Indicator

Forests can provide intangible benefits in addition to their economic and ecological values. The perceived beauty of certain areas in the DFA is one of these benefits and must be considered in forest management. The protection and maintenance of visual quality helps give assurance that these values will be available for current and future generations. A scenic area is defined by the Ministry of Forests as 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 2001c). Established scenic areas have specified Visual Quality Objectives (VQO) attached to them in order to manage each scenic landscape appropriately. A VQO is defined as a resource management objective established by the district manager or contained in a higher-level plan; these objectives reflect the desired level of visual quality based on the physical characteristics and social concern for the area (BC MOF 2001c). The five categories of VQOs commonly used are:

1) Preservation – No visible timber harvesting activity.
2) Retention – Timber harvesting activities are not visually evident.
3) Partial Retention – Activities are visual, but remain subordinate.
4) Modification – Activities are visually dominant, but have characteristics that appear natural.
5) Maximum Modification – Activities are dominant and out of scale, but appear natural in the background.

Cutblocks and roads that are planned within established scenic areas may require some form of visual assessment such as a site line analysis, a visual simulation package or a visual impact assessment. Visual assessments are conducted in order to prescribe management strategies to conserve visual resources where present. Recommendations generated by visual assessments are incorporated into Site Plans and then implemented in the field during harvesting activities.

This indicator is designed to ensure that visual assessments are completed in all planned harvest areas that fall within identified scenic areas and to ensure that recommendations from visual assessments are implemented on the ground. The maintenance of visual quality in known scenic areas is an important aspect of sustainable forest management because it contributes to overall landscape condition and social acceptance of industrial forestry. Monitoring the success of visual assessment completion and implementation of recommendations in harvested cutblocks will help ensure that visual quality is conserved for future generations.

Current Practices and Status of Indicator

During FDP/FSP preparation, known scenic areas are identified and if harvesting operations are planned, visual assessments are completed in order to incorporate required management strategies in site level plans. Visual assessments may help determine block shape, location and internal retention options. At the site level, management strategies are included in the Site Plan to incorporate the recommendations of visual assessments and mitigate potential visual impacts if they exist.

Establishment of Targets and Future Practices

The target for this indicator has been established at 100% because the identification and conservation of visual quality is important to various stakeholders within the Fort St. James DFA. Licensees and BC Timber Sales will continue to conduct visual assessments for cutblocks located in identified scenic areas and prescribe management activities based on the recommendations of the visual assessment where required. Future practices will incorporate legislation changes as they occur and Licensees/BC Timber Sales will actively track and report out this indicator to the public.

Forecasting and Predicted Trends

It is anticipated that visual assessments will be conducted for all blocks and roads planned for harvest within scenic areas and that 100% of all visual assessments will be implemented according to recommendations. However, the exact level of success is not easily predicted as conditions vary from one site to another and circumstances, such as forest health and fire, may arise that prevent the recommendations from being achieved. As such, it is important to identify what the accepted target means to SFM through the use of a "what if scenario". Conservation of visual quality primarily influences social and economic values within the DFA. As this indicator currently has a target set at 100%, one other scenario should be identified:

a) What if only 50 % of cutblocks and roads harvested, in known scenic areas, had visual assessments completed and implemented according to the recommendations?

If only 50 % of cutblocks and roads harvested, in known scenic areas, had visual assessments completed and implemented according to the recommendations, social and economic impacts could occur within the DFA. Although the overall timber supply would likely increase if only 50% of visual quality requirements were met, it would be at the cost of other economic and social values. Visual quality helps businesses that cater to various forms of recreation including lodges, guiding and hunting, fishing and backcountry tours. By not conserving all identified visual values, these businesses could potentially lose customers dissatisfied with the state of the visual resource. Social values attributed to visual quality could also decrease if only 50% of cutblocks and roads harvested, in known scenic areas, had visual assessments completed and implemented according to the recommendations. Visual values are particularly difficult to quantify, as one's idea of beauty is individual. However, the public would likely place a high value on visual quality aspects of harvested landscapes.

Licensees and BC Timber Sales will continue to ensure that 100% of cutblocks and roads harvested, in known scenic areas, have visual assessments completed and implemented according to the recommendations. This will be achieved through detailed development planning, pre-work meetings prior to the start of projects, monitoring inspections as the work is progressing and final inspections once the work is complete to ensure the recommendations specified in visual assessments are implemented. These initial, intermediate and final checks are part of each Licensee's and BC Timber Sales's EMS or other tracking system and the future trend of this indicator will remain at the target of 100% if all processes and protocols are followed.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target and will be managed on an individual basis. Monitoring will be completed through a review of all cutblocks and roads that are located within scenic areas and identified for harvest in the reporting year to ensure all visual assessments were completed where required. An analysis of the Site Plans developed for these areas will also be conducted to ensure that the recommendations from visual assessments are included in these plans. Finally, a review of harvest inspections will be completed to ensure the recommendations in the Site Plan were followed in the field. The performance of this indicator will be included in the annual SFMP report for the operating period of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees/BC Timber Sales are responsible for identifying potential visual concerns at the FDP development stage and any harvesting that may affect them. Foresters preparing operational plans are responsible for ensuring that visual assessments are completed and that recommendations are incorporated into Site Plans. Licensees/BC Timber Sales are also responsible for ensuring that forest operations in the field are consistent with visual quality recommendations as identified in Site Plans.

The Licensees and BC Timber Sales realize that the high level of mortality of pine forests in scenic areas may impact the visual quality of some landscapes. Opportunities for rehabilitation of visual landscapes affected by the mountain pine beetle may be an area of continual improvement in the DFA.

Indicator 40 - Archaeological Assessments

Indicator Statement	***Target and Variance***
Percent of blocks and roads harvested that are consistent with recommendations contained in site level archaeological assessments.	Target: 100% Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 5: **Multiple Benefits to Society**
CSA SFM Element 5.1: **Timber and Non-Timber Benefits**
Value: Acceptable and feasible mix of a healthy forest industry and non-timber benefits.
Objective: Percent of blocks harvested annually that follow recommendations contained in site level Archaeological Impact Assessments.

CCFM Criterion 6: **Accepting Society's Responsibility for Sustainable Development**
CSA SFM Element 6.2: **Respect for Aboriginal Forest Values, Knowledge, and Uses**
Value: Interests of Aboriginal people.
Objective: Manage for cultural values, and incorporate aboriginal knowledge in forest management

Description of Indicator

The Fort St. James DFA is rich in archaeological resources from its long history of First Nations and European inhabitation. In order to determine the presence of archaeological features, Licensees/BC Timber Sales conduct archaeological assessments, including reconnaissance surveys, interim archaeological assessments or field based archaeological assessments. Archaeological resources in the Fort St. James DFA are usually of First Nation origin, but an archaeological assessment is not biased toward Aboriginal features. Archaeological features that relate to non-Aboriginal people may include artifacts from historical trappers and prospectors, or evidence of old trails and remnants from inhabitants of old lakeside cabins. Features such as these are also identified in archaeological assessment and management strategies are developed where appropriate to conserve cultural heritage for both Aboriginal and non-Aboriginal interests.

The protection of archaeological resources assures they will be identified, assessed and recorded for present and future generations. These resources often incorporate First Nation's heritage and spiritual sites, but they can also involve features protected and valued by non-aboriginal people. Maintenance of archaeological sites and cultural heritage values is an important aspect to sustainable forest management because it contributes to respecting the social and cultural needs of people who traditionally and currently use the DFA for a variety of reasons.

This indicator is designed to ensure that the recommendations from site level archaeological assessments are implemented on the ground during harvesting of roads or cutblocks. Tracking the indicator's success will allow Licensees and BC Timber Sales to evaluate how successful this implementation is and improve procedures if required.

Current Practices and Status of Indicator

FDPs/FSPs use an Archaeological Predictive Model to assess the potential presence of archaeological resources within proposed harvest areas or road access corridors. Where activities are proposed within zones of high archaeological potential, Licensees and BC Timber Sales conduct site level archaeological assessments to identify, assess and record any archaeological resources that may be present. In addition, in some cases, reconnaissance surveys are completed where the archaeological potential is moderate or low. Management measures are prescribed in Site Plans based on the results of the archaeological assessment and these management measures are implemented at the site level during harvesting operations. If a non-conformance with the Site Plan occurs in the field, this information is recorded on an activity inspection form and then entered into an incident tracking database or other similar system.

Once a strategy to conserve archaeological resources is included within a Site Plan, there is a legal obligation for the Licensee/ BC Timber Sales to implement and adhere to the strategy. Final harvest inspections ensure that these strategies are implemented in harvested cutblocks and roads as stated in the Site Plan.

Establishment of Targets and Future Practices

The target for this indicator was established at 100% with a 0% variance because the identification and conservation of archaeological resources is paramount to First Nations, other stakeholders and the public. Licensees and BC Timber Sales will continue to take measures to ensure all Site Plans for harvested blocks and roads follow the recommendations contained in site level archaeological assessments and that these recommendations are also implemented in the field. Future practices will also ensure that licensees actively monitor, track and report performance to the public on an annual basis.

Forecasting and Predicted Trends

It is anticipated that the target of 100% of harvested blocks and roads will follow recommendations contained in site level archaeological assessments. The exact level of success is difficult to forecast as it is operational in nature and is dependent on the nature of the site, and human induced error. Conservation of archaeological resources primarily influences social values within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying what the accepted target means to SFM. As this indicator currently has a target set at 100%, one other scenario should be identified:

a) What if only 50% of blocks and roads harvested followed recommendations contained in site level archeological assessments?

Implementing only 50% of recommendations contained in site level archaeological assessments could lead to significant cultural loss to both First Nations and the general public within the DFA. Contributions to planning processes by each group would likely be reduced as a result. Aboriginal communities may no longer become involved in development planning as potential infringement of unresolved treaty rights could occur if cultural heritage values are not fully conserved. Members of the general public may also lose faith in forest management and planning processes if the cultural heritage of the Fort St. James DFA was not recognized as an important value.

Due to the social importance of archaeological resources, the Licensees and BC Timber Sales will continue to ensure that 100% of recommendations from archaeological assessments are implemented on the ground during cutblock and road harvesting. They will continue to conduct pre-work meetings prior to the start of projects, monitoring inspections as the work is progressing and final inspections once the work is complete to ensure the commitments specified in operational plans are met. These initial, intermediate and final checks are part of each Licensee's and BC Timber Sales's EMS or other tracking system and the future trend of this indicator will remain at the target of 100% if all processes and protocols are followed.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target and will be managed on an individual basis. The information that is required to monitor this indicator includes a summary of the number of cutblock and road harvesting activities that are consistent with archaeological assessment recommendations. This information is collected during EMS or other tracking system checklist reviews and through harvesting inspections, and is stored in Licensee and BC Timber Sales databases such as GENUS or Inform. The indicator percent will be included in the annual SFMP report for the operational year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees/BC Timber Sales are responsible for identifying areas of archaeological potential during the FDP/FSP development stage through an Archaeological Predictive Model. Foresters responsible for preparing Site Plans have to ensure that prescribed management activities are consistent with any archaeological assessment recommendations. Licensees/BC Timber Sales are also responsible for

implementing Site Plan requirements on the ground and for ensuring any failures to achieve recommendations are tracked in associated databases. Corrective and preventative actions will be identified and implemented to improve consistency where required.

Licensees and BC Timber Sales will investigate the possibility of increasing the accuracy of predicting the presence of archaeological sites. Licensees and BC Timber Sales, in cooperation with First Nations, the public and local archaeologists, will continue to expand their awareness of archaeological values, and explore the effectiveness of strategies utilized to minimize overall impacts to these valuable resources.

Indicator 41 - Communication with Interested Individuals

Indicator Statement	***Target and Variance***
Percent of individuals who have expressed an identified interest in forest planning are communicated with.	Target: Annually, 100% Variance: -10%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 5: **Multiple Benefits to Society**
CSA SFM Element 5.1: **Timber and Non-Timber Benefits**
Value: Acceptable and feasible mix of a healthy forest industry and non-timber benefits.
Objective: Maintain opportunities to access non-timber benefits by ensuring that individuals and stakeholders who have expressed an identified interest in the planning area (guides, trappers, recreationists, water licensees, mining tenure holders etc) are specifically communicated with during forest planning.

Description of Indicator
Licensees and BC Timber Sales maintain a list of individuals who have expressed an interest in forest planning that they notify when forestry operations/ developments are to occur. This list may include individuals who responded to the Licensees'/ BC Timber Saless' general notification *(see indicator #43).* These interested parties may be private landowners, lodge operators, trappers, hunting guides, recreationists, mining tenure holders, and water licensees. Communication of planned forestry activities to these individuals should be done in a timely and efficient manner. This communication considers non-timber users and inhabitants of the DFA and realizes that forestry operations can disrupt lives and businesses. As sustainable forest management includes non-timber values, it is important that the forest industry works with these individuals to minimize impacts and to plan operations that consider their concerns. This indicator is intended to measure the success in communicating with individuals who have expressed an interest in forest planning, and, if necessary, improve that communication.

Current Practices and Status of Indicator
Licensees and BC Timber Sales contact various stakeholders and members of the public when forestry operations are planned or ready to commence in a given area. Typically this communication is done by letter, but contact is also made by telephone or face to face meetings. There are specific strategies and protocols to direct this communication to ensure the right information is supplied to all interested parties at the right time. Licensees and BC Timber Sales use a variety of tracking systems to record this communication but have not historically reported out the percentage of communication strategies that have met requirements.

Establishment of Targets and Future Practices
The Licensees recognize the importance of meeting communication strategies and have set a target of 100% to reflect this commitment. A -10% variance has been established because occasionally contact cannot be made with some interested parties. This may be the result of changes in addresses, absentee stakeholders, or outdated contact information.

Communication strategies will be mutually agreed upon by the Licensees/ BC Timber Sales and the interested individuals to ensure information is received in a timely manner. Specific issues will have their

own communication strategies developed. For example, stands with forest health concerns (such as bark beetles) that are adjacent to private land may have their management discussed with the landowner. Licensees and BC Timber Sales will continue to try and keep contact lists accurate and up to date and will strive to communicate with all identified interested individuals when required. Future practice will include monitoring, tracking and reporting this indicator to the public on an annual basis.

Forecasting and Predicted Trends

It is the intent of all Licensees and BC Timber Sales to meet the target, and it is anticipated this goal will be met. The exact level of success is not easy to quantifiably forecast as it relies on unpredictable factors such as human error. Communication with interested individuals directly affects social values and indirectly affects economic values of SFM. Therefore, the use of a "what if scenario" is beneficial in identifying what the accepted target means to SFM. As this indicator has a stated target of 100%, one other potential scenario should be developed:

a) What if only 50% of individuals who have expressed an identified interest in forest planning are communicated with annually?

If only 50% of identified interested parties are communicated with annually, a variety of interested parties may be unaware of the commencement of forest operations and forestry plans. This could potentially damage the economic interests of some of these parties. For example, a lodge may plan to take clients to a lake for fishing. Unfortunately, a Licensee failed to notify them that harvesting was occurring adjacent to the lake and the fishing experience was diminished. Socially, there may be impacts as well. Forestry operations can involve large machinery, large volumes of logging trucks, and high noise levels. All of these can be serious intrusions for people using the forest for recreational purposes, or for nearby landowners. Communication can prepare them for these activities and allow them to make comments if they wish to question the planned forestry operations.

The above "what if scenario" analysis implies that a balance of values can be achieved through meeting communication strategy requirements. Therefore, Licensees and BC Timber Sales will continue to communicate with identified interested individuals to respect the needs of other inhabitants and stakeholders in the DFA.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target and will be managed on an individual basis. The Licensees and BC Timber Sales will track and monitor this indicator using EMS or other tracking system protocols and databases such as GENUS or Inform. For every area in which forestry operations occur, the list of appropriate interested parties that were contacted in accordance with communication requirements will be reviewed. This information will be reported in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees and BC Timber Sales are responsible for monitoring, tracking, and reporting this indicator. Opportunities to improve the performance of this indicator may be linked to ongoing technological changes in communication, such as the use of email and websites. Licensees/ BC Timber Sales may also explore the opportunities of coordinating their communication strategy requirements and share information on stakeholders and interested parties.

Indicator 43 - Expression of Interest

Indicator Statement	***Target and Variance***
General notification to request expression of interest (newspaper ad).	Target: Annual notification. Variance: None

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 5: **Multiple Benefits to Society**

CSA SFM Element 5.1: **Timber and Non-Timber Benefits**
Value: Acceptable and feasible mix of a healthy forest industry and non-timber benefits.
Objective: Maintain opportunities to access non-timber benefits by ensuring that individuals and stakeholders who have expressed an identified interest in the planning area (guides, trappers, recreationists, water licensees, mining tenure holders etc) are specifically communicated with during forest planning.

Description of Indicator
As discussed in indicator #41, Licensees and BC Timber Sales maintain a list of individuals who have expressed an interest in forest planning that they notify when forestry operations/ developments are planned or are to occur. In order to provide an opportunity for individuals to be included in this communication list, Licensees and BC Timber Sales have committed to publishing a general notification to request expression of interest in a local newspaper. Interested individuals can respond to the notification by contacting the Licensee/BC Timber Sales and informing them of their desire to be included in future communication.

As sustainable forest management includes non-timber values, it is important that the forest industry works with interested individuals to plan operations that consider their concerns. This indicator is intended to measure the success in publishing the annual general notification to request expression of interest.

Current Practices and Status of Indicator
The Licensees and BC Timber Sales currently publish notifications to request expression of interest in forest planning in local newspapers that serve the Fort St James DFA when a FDP/FSP is created or amended. Through this advertisement process, all stakeholders and members of the public that have identified an interest in forest planning are communicated with in a timely manner.

Establishment of Targets and Future Practices
The Licensees and BC Timber Sales recognize the importance of providing people with the opportunity to be involved with forest planning and have set a target of annually publishing a general notification to engage an expression of interest in forest planning from the public to meet this commitment. The notification will be published annually by each signatory to the SFMP, or group of signatories, to expand on the current opportunities available for public involvement in forest planning initiatives.

Future practices will implement this annual add in order to engage the public annually rather than only when a FDP/FSP is developed or amended.

Forecasting and Predicted Trends
It is the intent of all Licensees and BC Timber Sales to meet the indicator target, and it is anticipated this goal will be met. The exact level of success is not easy to quantifiably forecast as it relies on unpredictable factors such as human error. Therefore, the use of a "what if scenario" is beneficial in identifying what the accepted target means to SFM. As this indicator has a stated target of providing an annual notification, one other potential scenario should be developed:

a) What if Licensees/ BC Timber Sales did not publish an annual general notification to request expression of interest?

Allowing the public to express their concerns and comments about forestry activities is a major component of SFM. Without annual notification to request expression of interest, the public may not be actively engaged to comment about forestry activities. This can not occur if the Licensees/ BC Timber Sales are unsure of who to communicate with. The annual general notification allows for the development of a list of interested individuals who wish to be informed of, or participate in, forest planning issues. It also ensures that the public feels more open in approaching a licensee/BC Timber Sales to discuss planning issues because they are notified and invited to participate on an annual basis. Failure to

develop open communication with the local public could potentially lead to forestry activities that compromise other non-timber interests or concerns.

As such, Licensees and BC Timber Sales are committed to publishing an annual general notification to request expression of interest in forest planning in the DFA.

Monitoring and Reporting Procedures
This indicator has a Licensee/BC Timber Sales specific target. The Licensees and BC Timber Sales will track and monitor this indicator using EMS or other tracking system protocols and databases such as GENUS or Inform. Each signatory licensee will publish a newspaper add annually or will collaborate with other licensees to publish a joint add. A copy of this add will be kept on file and any associated correspondence with members of the public will be documented and tracked for reporting purposes. Performance of this indicator will be reported in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities
Licensees and BC Timber Sales are responsible for publishing their notification and reporting their success in doing so. Opportunities to improve the performance of this indicator may be linked to ongoing technological changes in communication, such as the use of email and websites. Licensees/ BC Timber Sales may also explore the opportunities of further coordinating their notifications with other Licensees.

Indicator 44 - Personal Notification

Indicator Statement	***Target and Variance***
Annual personal notification to every "known" non-timber licensed tenure holder.	Target: 100% Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 5: **Multiple Benefits to Society**
CSA SFM Element 5.1: **Timber and Non-Timber Benefits**
Value: Acceptable and feasible mix of a healthy forest industry and non-timber benefits.
Objective: Maintain opportunities to access non-timber benefits by ensuring that individuals and stakeholders who have expressed an identified interest in the planning area (guides, trappers, recreationists, water licensees, mining tenure holders etc) are specifically communicated with during forest planning.

Description of Indicator
As discussed in indicators #41 and #43, communication with the public in regards to forest planning is a crucial component of sustainable forest management. Among the individuals that may be affected by forestry activities, non-timber licence tenure holders are of particular interest, as their commercial livelihoods depend on the cooperation of the forest industry. Known non-timber licence tenure holders include hunting guides, trappers, water users, mining interests, and range licensees that have been identified through their tenure identification.

It is an important aspect of SFM that the forest industry works with non-timber tenure holders to plan operations that consider their concerns. The indicator is intended to ensure the Licensees/ BC Timber Sales send an annual personal notification to every known non-timber licensed tenure holder that may be influenced by their operations. This notification will be in the form of a letter that informs the licensee of the communication opportunities they may use to express concerns in regards to planned forest activities.

Current Practices and Status of Indicator
The Licensees and BC Timber Sales have sent notifications to non-timber licensed tenure holders for many years as part of their Forest Development Plan/ Forest Stewardship Plan development process.

These notifications vary, but they all inform the licensee that they may provide comments on proposed harvesting activities. The decision to act upon the opportunity to provide comments rests with the licensed tenure holder.

Establishment of Targets and Future Practices
The Licensees and BC Timber Sales recognize the importance of providing people with the opportunity to be involved with forest planning and have set a target of annually personally notifying known non-timber licenced tenure holders to meet this commitment. Future practice will incorporate this annual notification so that participation in planning by non-timber tenure holders becomes regular practice and does not just occur when a FDP/FSP or amendment is submitted to government.

Forecasting and Predicted Trends
It is the intent of all Licensees and BC Timber Sales to meet the indicator target, and it is anticipated this goal will be met. The exact level of success is not easy to quantifiably forecast as it relies on unpredictable factors such as human error. Therefore, the use of a "what if scenario" is beneficial in identifying what the accepted target means to SFM. As this indicator has a stated target of providing an annual notification to 100% of known non-timber licensed tenure holders, one other potential scenario should be developed:

a) What if Licensees/ BC Timber Sales sent an annual personal notification to only 50% of "known" non-timber licensed tenure holder?

Allowing the public to express their concerns and comments about forestry activities is a major component of SFM. Licensed tenure holders in particular should have opportunities to provide input into forest planning, as they stand to suffer economically if their concerns are not considered. Failure to send 50% of tenure holders a personal notification may result in forestry activities that damage resources they depend on. For example, a trapper that is unaware of planned harvesting may lose traps and trails to harvesting operations that were equally unaware of their existence.

Besides economic values that may be lost, social values may also be at risk from poor communication with non-timber tenure holders. Many of these individuals value the lifestyles their tenures provide, and would see their loss as significant as the economic impacts. Therefore, Licensees and BC Timber Sales are committed to sending an annual personal notification to every "known" non-timber licensed tenure holder.

Monitoring and Reporting Procedures
This indicator has a Licensee/BC Timber Sales specific target. The Licensees and BC Timber Sales will track and monitor this indicator using EMS or other tracking system protocols and databases such as GENUS or Inform. For every area in which forestry operations occur, the list of known non-timber licensed tenure holders that were contacted in accordance with personal notification requirements will be reviewed. This information will be reported in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities
Licensees and BC Timber Sales are responsible for personal notification of non-timber tenure holders and reporting their success in doing so. Opportunities to improve the performance of this indicator may be linked to ongoing technological changes in communication, such as the use of email and websites. Licensees/BC Timber Sales may also explore the opportunities of coordinating their notifications with other Licensees to prevent duplication.

Indicator 46 - Known Subsistence Uses, Recreational/ Cultural Trails/ Sites & Spiritual Sites.

Indicator Statement	***Target and Variance***
Percent of cutblocks and roads harvested that	Target: 100%

have incorporated information of known subsistence uses, recreational/cultural trails/sites, or spiritual sites that have been brought forward.	Variance: 20%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 5: **Multiple Benefits to Society**
CSA SFM Element 5.1: **Timber and Non-Timber Benefits**
Value: Acceptable and feasible mix of a healthy forest industry and non-timber benefits.
Objective: Conserve known subsistence uses (berries, hunting, fishing, medicinal plants).

CCFM Criterion 5: **Multiple Benefits to Society**
CSA SFM Element 5.1: **Timber and Non-Timber Benefits**
Value: Acceptable and feasible mix of a healthy forest industry and non-timber benefits.
Objective: Respect recreational/ cultural trails/ sites, spiritual sites.

Description of Indicator

Many areas of the Fort St. James DFA are used for subsistence uses such as berry picking, mushroom picking, hunting, fishing, and medicinal plant collection. Both First Nations' communities and non-First Nations' inhabitants of the DFA may rely on these areas to supply a portion of their dietary and medicinal requirements. Many areas in the DFA are also enjoyed for their recreational, cultural, or spiritual values. While some of these sites may be protected due to their archaeological significance, there may be others that are too recent to benefit from legislative protection, or do not possess any tangible evidence of their importance. These sites may include ski trails or ATV trails used to access favorite fishing and camping sites. Or, they may be areas of spiritual significance for First Nations, such as a mountain or lake. In the case of the latter, there may be no archaeological proof of this significance, but the lack of such physical evidence should not exclude these areas from proper management for their defined value.

Cutblock and road harvesting activities may occur in the same areas as these subsistence or recreation/cultural/spiritual sites, and if they are not conducted properly, can severely damage or destroy these resources. Sustainable forest management must consider non-forestry use of the DFA land base, and these non-timber resource sites should be considered in site plans to meet this aspect of SFM.

This indicator is intended to measure the success of road and cutblock harvesting activities to incorporate information of known subsistence uses and information of known recreation/cultural/spiritual sites that have been brought forward. Site level plans that direct harvesting activities are dependent upon users of subsistence sites and recreation/cultural/spiritual sites to supply the Licensees and BC Timber Sales with the information needed to manage them appropriately. These users are encouraged to take advantage of communication strategies, such as responding to the notifications discussed in indicators #43 and #44, as well as other opportunities to provide input to forest planning.

Current Practices and Status of Indicator

The Licensees and BC Timber Sales currently provide opportunities for members of the public to provide input at the Forest Development Plan/Forest Steward Plan stage. Users of subsistence sites and recreation/cultural/spiritual sites can provide comments at this stage, and throughout the planning process. When information on these non-timber resources is brought forward, site level plans will incorporate the information and prescribe management activities during road and cutblock harvesting where possible.

While concerns about known non-timber resource sites are currently addressed by Licensees/BC Timber Sales, they have not formally tracked and reported out this information to the public.

Establishment of Targets and Future Practices

The Licensees and BC Timber Sales recognize the importance of subsistence uses and recreation/cultural/spiritual sites for many of the residents of the DFA and have set a target of having all harvested cutblocks and roads incorporate information of these known non-timber resource uses. However, in some cases non-timber resources are not able to be managed fully during harvesting

activities due to natural circumstances (ie: forest health, natural disturbance). Due to this possibility and the uncertainty of the current mountain pine beetle epidemic, there has been a 20% variance established. Licensees/BC Timber Sales will expand opportunities for the public to bring forward non-timber resource site information through annual notifications, and will store this knowledge in a manner that can be accessed by personnel preparing site level plans. Future practices will also include monitoring, tracking and reporting out this indicator on an annual basis.

Forecasting and Predicted Trends

It is the intent of all Licensees and BC Timber Sales to meet the indicator target, and it is anticipated this goal will be met. The exact level of success is not easy to quantifiably forecast as it relies on unpredictable factors such as human oversight. Therefore, the use of a "what if scenario" is beneficial in identifying what the accepted target means to SFM. As this indicator has a stated target of 100% of cutblocks and roads harvested that have incorporated information of known subsistence uses, recreational/cultural trails/sites or spiritual sites that have been brought forward, one other potential scenario should be analysed:

a) What if only 50% of cutblocks and roads harvested incorporated information of known subsistence uses, recreational/cultural trails/sites or spiritual sites that have been brought forward?

Consideration of non-forestry uses in the DFA is a major component of SFM. Failure to incorporate knowledge of known subsistence uses or recreation/cultural/spiritual sites that have been brought forward into cutblocks and roads harvested in the DFA could have two potential negative impacts. First, the non-timber resources themselves may be damaged, and the people relying on them for sustenance or social use may no longer enjoy them to the same degree. Secondly, those who bring information forward may question the whole process of public consultation if they see their concerns ignored. SFM relies on public participation in forest planning, and that public has to be confident that management practices will reflect their input. This confidence may not develop if only 50% of cutblocks and roads harvested incorporate information of known subsistence uses, recreational/cultural trails/sites or spiritual sites that have been brought forward.

While it may be unfeasible for all information of known non-timber resources to be incorporated during cutblock and road harvesting activities (hence the variance), the Licensees and BC Timber Sales are committed to meeting the indicator target to protect non-timber resources and uses in the DFA, where possible.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target and will be managed on an individual basis. The Licensees and BC Timber Sales will track and monitor this indicator using EMS or other tracking system protocols and databases such as GENUS or Inform. All knowledge of known subsistence sites and recreation/cultural/spiritual sites will be stored in the applicable database. Site level plans will be reviewed to ensure the information is incorporated where applicable. The success in meeting the indicator target will be reported in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees and BC Timber Sales are responsible for providing opportunities for people to bring forward information on subsistence sites and recreation/cultural/spiritual sites, and for storing this information in an appropriate manner. Personnel preparing site level plans are responsible for reviewing this information and incorporating it where applicable. Licensees and BC Timber Sales are responsible for a review of site level plans to determine the success in incorporating this knowledge. Opportunities for improvement may be linked to developing management techniques that can protect or enhance non-timber uses while maintaining economic benefits of harvesting activities.

Indicator 48 - Contracts Serviced by North Central British Columbia

Indicator Statement	***Target and Variance***
Percent of operational forestry contract value in dollars within the DFA serviced by north central British Columbia	Target: 90%- achieved annually (Excluding BC Timber Sales) Variance: -10% months

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 5: **Multiple Benefits to Society**
CSA SFM Element 5.2: **Communities and Sustainability**
Value: Sustainable communities.
Objective: To promote economic development opportunities for local people and businesses.

Description of Indicator

Forests provide many ecological benefits but they also provide substantial socio-economic benefits. In order to have sustainable socio-economic conditions for local communities associated with the DFA, local forest related businesses should be able to benefit from the work that is required in the management of the DFA. Furthermore, for small companies to contribute to and invest in the local economy there must be assurances that there will be a consistent flow of work. This indicator is intended to measure the percent of forestry contract value ($) within the DFA serviced by north central BC businesses. This amount will indicate the commitment the Licensees are making towards maintaining the economic sustainability of the region.

The north central interior is defined in this SFMP as the land base that includes communities from 100 Mile House to Fort St. John (south to north) and Terrace to Valemount (west to east). The total dollar value of operational forestry contracts considered to be serviced by north central BC will be calculated relative to the total dollar value of all operational forestry contracts. This calculation will be used to derive the percentage of money spent on operational forestry contracts in the DFA from suppliers in north central BC.

Current Practices and Status of Indicator

A query of the financial data stored within the Licensee's individual accounting systems allows for an indication of the current status of this indicator and serves as a methodology to track monies spent within the DFA to benefit the North Central Interior. In order to be meaningful, this financial data will be weighted by Licensee based on Allowable Annual Cut (AAC).

Establishment of Targets and Future Practices

The target was based on the past performance of Licensees and reflects a commitment to supporting North Central Interior businesses. A 90% target represents a significant financial investment in the regional economy. However, a 10% variance was established because regional contractors may not be able to supply the technical expertise required for certain operations. Or, there may be insufficient local resources to meet the current demand, forcing Licensees to seek contract services elsewhere.

BC Timber Sales is excluded from this indicator because it is a Provincially based business and can not always fully control where contract dollars are spent due to government policies.

Forecasting and Predicted Trends

This indicator is not easy to quantifiably forecast over a defined time frame. The use of a "what if scenario" can be beneficial in identifying what the accepted target means to SFM. The percent of operational forestry contract value in the DFA serviced from north central interior suppliers is an important aspect of SFM because it directly relates to sustaining the local economy. As the target for this indicator is listed as 90%, one other scenario should be analyzed:

a) What if <50% of the operational forestry contract value within the DFA was serviced by north central British Columbia?

If less than 50% of the operational forestry contract value within the DFA was serviced by north central BC, two important values could potentially be at risk. The first, and most important of these, would be a possible reduction in the overall economy of the north central interior. Utilizing services from outside of north central BC could reduce the overall economy and in turn affect local people and businesses. Forest managers sometimes must look to sources outside of the north central interior if the goods or services they require are not available in this region. Otherwise, money spent outside of north central BC simply reduces the overall economy of the region.

The second potential risk to contracting less than 50% of operational forestry activities outside of the north central interior is the lack of local knowledge and expertise that could be delivered. Businesses that are located in north central BC generally conduct most of their activities in this region and therefore have a better understanding of the area and its ecology. By utilizing north central BC suppliers, the public and employees of the forest industry are likely to receive more valuable services based on locally applied knowledge and expertise.

Due to the identified potential impacts this indicator could have on the economy and stability of communities in north central BC, the Fort St. James Licensees are committed to achieving the stated target for this indicator.

Monitoring and Reporting Procedures

This indicator has a Licensee specific target and will be monitored and reported from Licensees' accounting systems. Licensees will conduct a financial query of expenditures by postal code for suppliers and contractors within north central BC compared to the total dollars spent. The average will be weighted by the Licensee's volume of timber cut. The indicator percentage will be included in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees are responsible for the monitoring, tracking and reporting of this indicator. Specifically, accounting departments are responsible for querying the information needed to determine the percentage. In the future, Licensees may want to focus their spending on businesses in the Fort St. James DFA, or the Prince George TSA rather than just north central BC. In this way the communities closest to the DFA receive the most benefit from local forests.

Indicator 49 - Employment Opportunities Advertised Locally

Indicator Statement	***Target and Variance***
Percentage of advertised employment opportunities published in the local paper.	Target: 100% (Excluding BC Timber Sales) Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 5: **Multiple Benefits to Society**
CSA SFM Element 5.2: **Communities and Sustainability**
Value: Sustainable communities.
Objective: Creating opportunities for local employment.

Description of Indicator

Forest Licensees and the variety of contractors they employ constitute a major source of employment in the Fort St. James DFA. Many local people rely on the jobs created by forest Licensees for their careers and livelihoods. To take advantage of local employment opportunities, residents of the DFA and other members of the local public must be aware of them. This indicator is intended to measure the success of Licensees to publish advertised employment opportunities in the local paper. For the purposes of this indicator, the local paper is the Caledonia Courier or the PG Citizen.

Current Practices and Status of Indicator
Licensees currently publish all advertised employment opportunities in the local paper. BC Timber Sales is excluded from this indicator because it is required to advertise positions in accordance with public service regulations.

Establishment of Targets and Future Practices
The Licensees have established a target of 100% of advertised employment opportunities to be published locally to reflect their commitment to contributing to the local economy. They will continue to publish advertised employment in the local paper and encourage local residents to apply for positions with their organizations. Future practices will also include monitoring, tracking and reporting out this information to the public annually.

Forecasting and Predicted Trends
This indicator is not easy to quantifiably forecast over a defined time frame. The use of a "what if scenario" can be beneficial in identifying what the accepted target means to SFM. As the target for this indicator is 100% of advertised employment opportunities to be published in the local paper, one other scenario should be analyzed:

a) What if only 50% of advertised employment opportunities were published in the local paper?

Publishing only 50% of advertised employment opportunities in the local paper could potentially affect social values of SFM. If local residents of the DFA do not have opportunities to participate in the primary local industry (forestry), unemployment and poverty in the DFA may increase. Sustainable forest management relies on support and participation from the public. If the local public is not benefiting from forestry employment opportunities, they may have less perceived reason to support the goals of SFM. Publishing advertised employment opportunities in the local paper would provide more residents of the DFA an opportunity to participate in the forestry economy, and thereby potentially increase overall interest in sustainable forest management.

To sustain the social and economic values of SFM, the Licensees are committed to publishing 100% of advertised employment opportunities in the local paper.

Monitoring and Reporting Procedures
This indicator has a Licensee specific target and will be managed on an individual basis. Each Licensee will develop a system to track all advertised employment opportunities that they publish in the local paper. The indicator percentage will be included in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities
Licensees are responsible for the monitoring, tracking and reporting of this indicator. Specifically, Licensees are responsible for ensuring advertised positions are published in the local paper, and that a record of these publications is made to determine the indicator percent. Opportunities for improvement include support of training and education programs for local residents in forestry skills. Licensees may also participate in career days at local high schools to promote forestry as a career for local young people.

Indicator 50 - Bidding Opportunities for Local Forestry-Based Businesses

Indicator Statement	***Target and Variance***
Percentage of bidding opportunities that are provided to qualified local forestry-based resource businesses.	Target: 100% Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 5: **Multiple Benefits to Society**
CSA SFM Element 5.3: **Fair Distribution of Benefits and Costs**
Value: Community benefits.
Objective: Maintain a positive operating climate for local forestry based resource businesses.

Description of Indicator
Forests provide substantial socio-economic benefits in addition to their many ecological benefits. In order to have sustainable socio-economic conditions for communities associated with the DFA, local forestry-based resource businesses should be able to benefit from the work that is required by forest Licensees. Furthermore, for local forestry-based resource businesses to contribute to and invest in the local economy they must have opportunities to bid on contracts tendered by Licensees.

This indicator is intended to measure the percent of bidding opportunities that are provided to qualified local forestry-based resource businesses. Bidding opportunities include woodlands related tendered projects, other than logging, hauling, and road building. These could include cruising, block layout, road layout, and silviculture activities such as tree planting, surveys, and stand tending. Local forestry-based businesses should be able to have the opportunity to bid on these contracts and bring the economic benefits of the forest industry to the local community.

For the purpose of this indicator, local forestry based resource business are defined as those that are located within the Fort St. James DFA.

Current Practices and Status of Indicator
Currently when licensees provide opportunities to bid on woodlands related projects, they are provided to qualified local forestry resource businesses to bid on. These opportunities may be expressed as advertisements in local papers or some other form of notification. The exact percentage of these bidding opportunities that are provided to local businesses has not been formally tracked

Establishment of Targets and Future Practices
The target is based on the past performance of Licensees and reflects their commitment to supporting qualified local forestry-based resource businesses. BC Timber Sales is exempt from this indicator due to their status as a government managed, Provincial wide organization and their established protocols for project tendering.

Forecasting and Predicted Trends
It is expected that 100% of bidding opportunities will be provided to qualified local forestry-based resource businesses, but the exact success in achieving this target is not easy to quantifiably forecast. The use of a "what if scenario" can be beneficial in identifying what the accepted target means to SFM. As the target for this indicator is 100%, one other scenario should be analyzed:

a) What if only 50% of the bidding opportunities were provided to qualified local forestry-based resource businesses?

If only 50% of the bidding opportunities were provided to qualified local forestry-based resource businesses, two important SFM values could be at risk. The first, and most important of these, would be a potential reduction in the local economy. Local forestry contractors provide employment for DFA residents and spend money on local suppliers and businesses. Without employment opportunities from local forest Licensees, their contribution to the local economy is weakened and may impact the sustainability of the local economy.

The second potential risk is deteriorating social support of SFM. If local qualified forestry-based resource businesses believe that local Licensees are not providing them with bidding opportunities, they may have less incentive to support the forest industry. Overall public involvement in forest planning and

management may decline and the residents of the DFA may see fewer reasons to support SFM if they are not sharing in local economic benefits.

Due to the identified potential impacts this indicator could have on the economy and stability of local communities, the Fort St. James Licensees are committed to achieving the stated target for this indicator.

Monitoring and Reporting Procedures
This indicator has a Licensee specific target and will be managed on an individual basis. Licensees will record all bidding opportunities for appropriate woodlands related tendered projects and track the number of these opportunities that were made available to qualified local businesses. These records may be kept in databases such as GENUS, or in other information management systems. The indicator percentage will be included in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities
Licensees are responsible for the monitoring, tracking and reporting of this indicator. Specifically, Licensees are responsible for tracking bidding opportunities and the percent that are provided to local qualified forestry-based resource businesses. In the future, Licensees may want to focus their spending on businesses in the Fort St. James DFA. In this way the communities in to the DFA receive the most benefit from local forests.

Indicator 55 - Local Aboriginal Participation in Forest Management

Indicator Statement	*Target and Variance*
Solicit participation in forest management from local aboriginal communities for areas of overlapping interest.	Target: Twice a year 100% of local aboriginal communities Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion: Accepting society's responsibility for sustainable development.
CSA SFM Element: Aboriginal and Treaty Rights
Value: First nation Aboriginal and treaty rights.
Objective: Recognition and respect for Aboriginal and treaty rights.

Description of Indicator
First Nations' participation in forest management is an important aspect of SFM as it promotes management of non-timber forest resources within Crown forests. A forest industry that respects First Nations input will build the support of First Nations, creating a more economically stable and inclusive forest economy. For areas where there is overlapping interest between local aboriginal communities and the forest industry, the solicitation of First Nations' participation in forest management is of particular importance. Activities in these areas should be planned in a manner that can reflect input from local aboriginal communities. To achieve this, the Licensees and BC Timber Sales are committed to bi-annual solicitations to legally established First Nations Bands to participate in forest management. While the Licensees and BC Timber Sales cannot force any community to participate, they can continually provide the opportunities to do so.

Current Practices and Status of Indicator
All Licensees and BC Timber Sales currently solicit participation from local aboriginal communities where forest management activities are planned for areas of overlapping interest. These areas may be First Nations communities' claims of historic use, or known sites currently relied on for cultural, spiritual, or subsistence use. First Nations solicitation usually takes the form of a letter addressed to the chief and band council and occurs at the time of Forest Development Plan (FDP)/ Forest Stewardship Plan (FSP) preparation.

Table 42. Local First Nation Communities and General Locations

First Nation Community	Geographic Location
Mcleod Lake First Nation	Mcleod Lake

Nak'azdli First Nation	Fort St. James
Takla First Nation	Takla Lake
Tsay Keh Dene Band	Omineca
Tl'azt'en First Nation	Tachie
Yekooche First Nation	Stuart Lake
Gitxsan	Hazelton
Nat'oot'en First Nation	Babine Lake
Lheidli T'enneh	Prince George
Halfway River First Nation	Halfway River
West Moberly First Nation	West Moberly

Establishment of Targets and Future Practices

The indicator's target of 100% is based on a review of Licensees' and BC Timber Sales past performance in soliciting aboriginal community participation in forest management. Aboriginal input is an important aspect of the SFM process, so it is paramount that all aboriginal communities with areas of overlapping interests with the forest industry have an opportunity to participate in the management of those areas.

Bi-annually, Licensees and BC Timber Sales will solicit the participation in forest management from local aboriginal communities for areas of overlapping interest. This will be done in the form of a letter addressed to the chief and band council. Future Practices will include monitoring, tracking and reporting out this information to the public on an annual basis.

Forecasting and Predicted Trends

It is the intent of all Licensees and BC Timber Sales to meet the identified target, and it is anticipated this goal will be met. The exact level of success is not easy to quantifiably forecast as it relies on unpredictable factors such as human error. Therefore, the use of a "what if scenario" is beneficial in identifying what the accepted target means to SFM. As this indicator has a stated target of 100%, one other potential scenario should be developed:

a) What if only 50% of local aboriginal communities are solicited for participation in forest management for areas of overlapping interest?

If only 50% of local Aboriginal communities were solicited for participation in forest management for areas of overlapping interest, adequate attention would potentially not be given to valuable Aboriginal input. Aboriginal input into the SFM process is required to adequately consider cultural heritage values within the DFA and to ensure that forest management respects treaty rights. If adequate participation by First Nations was not solicited, significant loss of First Nation's cultural features could occur. Aboriginal support of SFM would likely decrease and impacts to other resource values such as cultural heritage, non-timber forest resources and biological richness could potentially occur. Traditional knowledge could also potentially be lost if opportunities are not given to Aboriginal people to become involved in the planning process within the DFA. As such, Licensees/BC Timber Sales will strive to ensure that 100% of local Aboriginal communities are solicited for participation in forest management for areas of overlapping interest.

Monitoring and Reporting Procedures

A review of the number of areas of overlapping interest versus the number solicitations to local aboriginal communities will be analyzed on an annual basis. Licensees and BC Timber Sales track communication information in various ways, but all have procedures to ensure First Nations solicitation is managed appropriately. The indicator percent will be recorded and reported in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees and BC Timber Sales are responsible for monitoring, tracking, and reporting this indicator. Specifically, Planning Foresters are responsible for identifying areas of overlapping interest during

FDP/FSP preparation and contacting the applicable aboriginal community. They are also responsible for ensuring the solicitations are recorded properly to monitor this indicator Opportunities to improve the performance of this indicator may be linked to indicator #56 as both are in the realm of First Nations involvement.

Indicator 56 - Archaeological Assessment Referrals to Aboriginals

Indicator Statement	***Target and Variance***
Percentage of archaeological assessments completed, on cutblocks and roads harvested during the reporting period, that have been referred to relevant aboriginal communities for review and comment prior to harvesting.	Target: 100% Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 6: **Accepting Society's Responsibility for Sustainable Development**
CSA SFM Element 6.1: **Aboriginal and Treaty Rights**
Value: First nation Aboriginal and treaty rights.
Objective: Recognition and respect for Aboriginal and treaty rights.

Description of Indicator

As discussed in indicator #40, the Fort St. James DFA is rich in archaeological resources from its long history of First Nations and European inhabitation. FDPs/FSPs use an Archaeological Predictive Model to assess the potential presence of archaeological resources within proposed harvest areas or road access corridors. Where activities are proposed within zones of high archaeological potential, Licensees and BC Timber Sales conduct site level archaeological assessments to identify, assess and record any archaeological resources that may be present.

Prior to their incorporation into operational plans, the results of the archaeological assessments for planned cutblocks and roads should be referred to affected aboriginal communities for review and comment prior to harvesting. Aboriginal communities have expressed a desire to be made aware of evidence of historic use by their ancestors. These communities have cultural interests in managing archeological resources and Licensees and BC Timber Sales should solicit their input when these resources are detected.

The indicator is designed to ensure that archaeological assessments for all harvested cutblocks and roads have been referred to the relevant aboriginal community for review and comment prior to harvesting. Tracking such information will allow Licensees and BC Timber Sales to evaluate how successful communication strategies are with First Nations' communities and improve procedures if required.

Current Practices and Status of Indicator

Licensees and BC Timber Sales currently conduct archaeological assessments on all harvesting areas where the Archaeological Predictive Model predicts a high potential for the presence of archaeological resources. These resources are usually of First Nation origin, but also include non-First Nation archaeological resources. All archaeological assessments are referred to the aboriginal communities that have claimed the inspected areas as areas of traditional use. The communities are invited to provide comments and this input is considered when determining management practices for archaeological resources.

Establishment of Targets and Future Practices

The target for this indicator was established at 100% because the participation of aboriginal communities in forest management is an important aspect of SFM. Licensees and BC Timber Sales will continue to take measures to ensure archeological assessments for all harvested cutblocks and roads have been referred to the relevant aboriginal communities for review and comment prior to harvesting. Future

practice will include monitoring, tracking and reporting out this information to the public on an annual basis.

Forecasting and Predicted Trends

It is anticipated that 100% of archaeological assessments for all harvested cutblocks and roads will be referred to the relevant aboriginal communities for review and comment prior to harvesting. The exact level of success, however, is difficult to forecast, as it is administrative in nature. First Nations' referrals primarily influence social values within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying what the accepted target means to SFM. As this indicator currently has a target set at 100%, one other scenario should be identified:

a) What if only 50 % of archaeological assessments for harvested cutblocks and roads have been referred to the relevant aboriginal communities for review and comment prior to harvesting?

Failure to refer all archaeological assessments to the relevant aboriginal communities for review and comment may impact Aboriginal participation in SFM. Contributions to planning processes by First Nations would likely be reduced if they perceived their input was not valued. The potential infringement of unresolved treaty rights could occur if archaeological values are not properly managed. Aboriginal communities consider their input as being crucial to forest management and wish to be notified of sites of potential historic use by their people.

Licensees and BC Timber Sales will continue to ensure that 100% of archaeological assessments for all harvested cutblocks and roads are referred to the relevant aboriginal communities for review and comment prior to harvesting.

Monitoring and Reporting Procedures

This indicator has a Licensee/BC Timber Sales specific target and will be managed on an individual basis. The information that is required to monitor this indicator includes a summary of the number of archaeological assessments completed for harvested cutblocks and roads versus the number that were sent to aboriginal communities for comment. Licensees and BC Timber Sales track communication information in various ways, but all have procedures to ensure First Nations' referrals are managed appropriately. The indicator percent will be recorded and reported in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees/BC Timber Sales are responsible for ensuring all archaeological assessments for harvested cutblocks and roads were referred to the relevant aboriginal communities for review and comment. They are also responsible for ensuring that any corresponding communication is tracked in the appropriate database so the indicator percent can be determined annually.

Licensees and BC Timber Sales, in cooperation with First Nations, the public and local archaeologists, will continue to expand their awareness of archaeological resources, and explore the effectiveness of strategies utilized to manage them.

Indicator 59 – First Nations Forest Values and Indicators

Indicator Statement	***Target and Variance***
Percent of blocks and roads harvested by Licensees and BC Timber Sales that have been previously referred to applicable First Nations. .	Target: 100% of blocks and roads harvested Variance: 0

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion: Accepting society's responsibility for sustainable development.
CSA SFM Element: Respect for Aboriginal Forest Values, Knowledge, and Uses.
Value: Interests of Aboriginal people.
Objective: Manage for cultural values, and incorporate aboriginal knowledge in forest management.

Description of Indicator

The intent of the indicator is to ensure that all development works put forward by licensees or BC Timber Sales identify and manage for important First Nations values and uses. Activities conducted by licensees and BC Timber Sales that are intended to identify and manage for important First Nations values and uses will include but are not limited to the following:

1. First Nation information sharing activities and associated management of values and uses identified through following results and strategies in Forest Stewardship Plans for licensees and BC Timber Sales to address objectives set by Government for cultural resource values. Licensee and BC Timber Sales FSP results and strategies relating to Objectives Set by Government for Cultural Heritage Resources must conserve or if necessary protect cultural heritage resources that are the focus of traditional use by aboriginals that is of continuing importance and not regulated under the Heritage Conservation Act.
2. Licensees and BC Timber Sales in conjunction with the Ministry of Forest and Range will provide First Nations with the information necessary for identifying and understanding the potential impact of forestry development works on important first nations values and usage. Subsequent dialogue will take place between applicable First Nations, Licensees or BC Timber Sales, and/or the Ministry of Forests and Range to identify First Nations values and uses as well as management strategies.
3. Licensees and BC Timber Sales will share with each other important First Nations values and interests identified through their respective information sharing activities.

Current Practices and Status of Indicator

Identification of First Nations values and interests for blocks and roads being applied for under the authority of a Forest Stewardship Plan is being undertaken and continuously updated.

Establishment of Targets and Future Practices

The target for this indicator assumes that 100% of blocks and roads harvested during the reporting period have been previously referred to the applicable First Nation(s). It is anticipated that the target related to this indicator will be effective for development activities (block or road) being proposed and applied for under the authority of a Forest Stewardship Plan or being transitioned from an approved Forest Development Plan.

It is anticipated that over time the commitment to the sharing and exchange of First Nations interests and values as well as associated management strategies will result in increased awareness of First Nations values, improved consistency of management strategies employed between licensees and increased incorporation of aboriginal knowledge in forest management.

Forecasting and Predicted Trends

As results and strategies in an FSP are legally binding on Licensees it is expected that all licensees will meet this indicator. The effectiveness of this indicator is dependent in part on participation and interest by the local First Nations.

Monitoring and Reporting Procedures

Licensees and BC Timber Sales are responsible for monitoring, tracking and reporting out on this indicator. As such Licensees and BC Timber sales will report out on the percentage of blocks and roads harvested within their respective defined forest areas that have been previously referred to the applicable first nation(s). Referred as it relates to reporting of this indicator entails licensees and BC Timber Sales, in conjunction with the Ministry of Forests and Range, providing maps showing proposed blocks and

roads in their respective defined forest areas to applicable First Nations and making reasonable efforts to solicit feedback from First Nations regarding the proposed development prior to cutting permit or road permit approval. The calculation for this indicator will be as follows:

(# Blocks and Roads Harvested in the Reporting Period Previously Referred to First Nations/
# of Blocks and Roads Harvesting in the Reporting Period) x 100

The Licensees and BC Timber Sales will monitor the indicator progress and it will be reported out on in the 2008 to 2009 reporting period.

Responsibility and Continuous Improvement Opportunities
Licensees and BC Timber Sales are responsible for supporting and helping to facilitate the activities above. Opportunities for improvement may be gained by utilizing the First Nations values and uses identified through information sharing and the management strategies developed collaboratively to protect and enhance First Nations' forest values during forest planning and operations.

Indicator 62 - Satisfaction with the PAG Process

Indicator Statement	***Target and Variance***
Percent of PAG meeting evaluations competed during the reporting period that obtain a minimum average acceptability score of 3.	Target: 80% Variance: -10%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 6: **Accepting Society's Responsibility for Sustainable Development**
CSA SFM Element 6.3: **Public Participation**
Value: Public participation in the SFM process.
Objective: A well-designed and functioning public participation process.

Description of Indicator
The PAG is one of the key elements of public involvement in the SFM process. The Fort St. James PAG provides guidance, input and evaluation during development of the SFMP. It is also instrumental in maintaining links to current local values and forest resource uses within the DFA. Therefore, it is important that the PAG participants remain satisfied with the group and continue their involvement. This indicator will use PAG satisfaction survey results to determine the level of satisfaction of the PAG with the public participation process.

Current Practices and Status of Indicator
At the start of each PAG meeting, evaluations are distributed to both the PAG and Licensees. The intent of these meeting evaluations is to provide the attendees of the meetings the opportunity to express their satisfaction with the PAG meetings and SFM in general. Meeting evaluations are summarized and presented at the next meeting.

Establishment of Targets and Future Practices
Below is a sample of the meeting evaluations that will be used to measure PAG satisfaction. These meeting evaluations will likely be changed from time to time to accommodate various measures of PAG satisfaction.

Public Advisory Group **Sept ?, 2006 Meeting Evaluation**

Please evaluation the following:	Very poor	Poor	Average	Good	Very good
1. Amount of time given to review the meeting agenda prior to the meeting					
2. Agenda followed					
3. Actions updated					
4. Meeting summary captured decisions & action items					
5. PAG Terms of Reference followed					
6. PAG members actively involved in the meeting					
7. The atmosphere of the meeting					
8. Facilitator was organized & prepared					
9. Facilitator strived for consensus decision-making					
10. Facilitator actively listened to concerns & viewpoints					
11. Facilitator addressed process issues					
12. Facilitator remained neutral on content issues					
13. Facilitator kept the meeting focused					
13. Licensee representatives organized & prepared					
14. Your satisfaction with this PAG meeting					
15. Suitability of the Meeting facility					
16. Meals and refreshments					
17. Your overall satisfaction with the PAG process					
Please list three ways the FSJ SFMP Licensee Steering Committee can improve the PAG meetings:					
1.					
2.					
3.					
General Comments:					
Please indicate who you are: ☐ PAG member /advisor ☐ First Nation ☐ Observer ☐ Advisor ☐ Licensee Team					

Forecasting and Predicted Trends

This indicator is not easy to forecast, as it is dependent on the variations of human opinion. However, the PAG membership levels may influence the success of the SFMP. Therefore, the use of a "what if

scenario" is beneficial in identifying what the accepted target means to SFM. As this indicator currently has a target set at a minimum average satisfaction score of 3, one other scenario should be identified:

a) What if there was little satisfaction with the PAG process?

If there were low levels of PAG satisfaction with the process then the entire SFMP process may become questionable. Meaningful, broad public participation in SFM is essential if the plan is to succeed or have any validity. Low PAG satisfaction might suggest there is widespread dissatisfaction with the public participation process. If low PAG satisfaction was not corrected, it may result in lower social acceptance of the SFMP and less belief in its validity.

Due to the importance of having a sufficient and satisfied PAG, the Licensees and BC Timber Sales are committed to achieving the identified target.

Monitoring and Reporting Procedures
This indicator has an AUTP specific target and will be managed at the AUTP level. Satisfaction survey results will be kept for each PAG meeting. The results will be reported in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities
It is the responsibility of the Licensees and BC Timber Sales to provide a meeting atmosphere that fosters PAG satisfaction and encourages continued participation in SFM. If PAG satisfaction is waning, Licensees/BC Timber Sales should take steps to determine the causes of dissatisfaction before satisfaction and participation reaches minimum levels.

Indicator 63 - PAG SFM Information Gap Inquiries

Indicator Statement	***Target and Variance***
Percent of PAG SFM information gap inquiries responded to within 3 months	Target: 100% Variance: 0%

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 6: **Accepting Society's Responsibility for Sustainable Development**
CSA SFM Element 6.4: **Information for Decision Making**
Value: Adequate information to make informed decisions.
Objective: Provide relevant information to interested parties.

Description of Indicator
As mentioned in indicator #61 and #62 the PAG is one of the key elements of public involvement in the SFM process. In order for the PAG to make decisions with regards to the content of the SFMP, such as indicators, targets, and levels of responsibility, they must have the necessary information to support those decisions. This information must be sufficient in amount and quality and delivered in a timely manner for the PAG to make sound decisions for the SFMP process.

This indicator is intended to measure and report the percentage of PAG SFM information gap inquiries responded to within 3 months. If the SFMP is to succeed, the people who are involved in its creation and implementation must have a level of certainty that the information they need is delivered in a timely manner.

Current Practices and Status of Indicator
Once an information gap is identified by the PAG, the Licensees/BC Timber Sales are to supply the relevant information to the PAG within 3 months. As information gaps where identified during the reporting period, Licensees/BC Timber Sales responded to the PAG within 3 months.

Establishment of Targets and Future Practices
Three months to respond to PAG SFM information gap inquiries was determined to be sufficient time to collect and deliver the information, but not so long that the information could not be adequately received and incorporated into decision making. Future SFM information gaps will be determined at scheduled PAG meetings. At that time, Licensees/BC Timber Sales will be assigned tasks to locate and provide outstanding information to the group within 3 months.

Forecasting and Predicted Trends
This indicator is not easy to forecast, as it may be dependent on human oversight. Therefore, the use of a "what if scenario" is beneficial in identifying what the accepted target means to SFM. As this indicator currently has a target set at 100% of PAG SFM information gap inquiries responded to within 3 months, one other scenario should be identified:

a) What if only 50% of PAG SFM information gap inquiries were responded to within 3 months?

If only 50% of PAG SFM information gap inquiries were responded to within 3 months, social values of SFM could potentially be reduced. Public participation requirements would not be fulfilled if the PAG was not satisfied with the process because members would have no incentive to continue participating. Without local public comment, this plan would potentially not be adequately localized to the Fort St. James DFA. Sustainability of the forest resource would be more difficult to achieve as locally important values might be overlooked without sufficient public input. Another potential effect of reduced PAG satisfaction as a result of only responding to 50% of information gap inquiries within 3 months could be a reduced public acceptance of the plan and potential skepticism of the overall intent. General understanding of SFM and resulting initiatives would also likely be reduced and future goals identified by the Licensees/BC Timber Sales would be more difficult to achieve.

Due to the impact this indicator could have on important social values of SFM, the Licensees/BC Timber Sales are committed to responding to 100% of PAG SFM information gap inquiries within 3 months. It is anticipated that Licensees/BC Timber Sales will continue to maintain a good working relationship with the PAG and continue to promote a consensus based decision making process.

Monitoring and Reporting Procedures
This indicator has a DFA specific target and will be managed at the DFA level. Any information gap inquiries will be formally presented at PAG meetings, or circulated to the members in the absence of a scheduled meeting. The inquiries will be recorded in the meeting minutes and a deadline established for a response. The percentage of inquiries that were responded to within 3 months will be determined for the operating year of April 1st to March 31st and reported in the annual SFMP report.

Responsibility and Continuous Improvement Opportunities
Licensees/BC Timber Sales are responsible for recording SFM information gap inquiries and ensuring the success in responding to these inquiries.

Licensees/ BC Timber Sales will look for ways to provide the best information possible to future PAG inquiries. This dissemination of information could utilize guest speakers, academics, recent scientific literature, and other sources of current knowledge. The Licensees and BC Timber Sales may also consider organizing field tours to help increase the PAG's general knowledge of forestry operations.

Indicator 65 - Hardwood Stands

Indicator Statement	***Target and Variance***
The percent of hardwoods (mixed wood and deciduous leading stand) within the DFA.	Target: Maintain ≥ 4.0% of deciduous in the DFA. Variance: -0.4

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 1: **Conservation of Biological Diversity -** Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element 1.2: **Species Diversity**
Value: Sustainable populations of flora and fauna native to the DFA (natural abundance and distribution).
Objective: Ensure habitat for species where ecologically appropriate.

Description of Indicator

Hardwood stands are forest stands that are dominated by deciduous species, but may include a coniferous component. The major hardwood species in the Fort St. James DFA are trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), black cottonwood (*Populus trichocarpa*), and paper birch (*Betula papyifera*). These stands are very important habitats for a variety of wildlife species and often represent unique plant communities. This indicator is intended to ensure that a certain percentage of the DFA land base is occupied by hardwood stands to maintain species diversity and to support sustainable populations of the flora and fauna that rely on them for habitat.

Historically, hardwood stands were not seen as valuable for industrial forestry uses. Many hardwood stands were cleared for agricultural production and the forest industry concentrated management efforts on the coniferous component of the DFA. However, in recent years the importance of deciduous stands is coming to light from both an ecological and potentially economic viewpoint. Ecologically, hardwood stands play an important role in creating a mosaic forest landscape. Deciduous stands are also of high value for many wildlife species for habitat purposes. From an economic viewpoint, some markets have developed for deciduous species. Aspen is used in the production of orientated strand board (OSB) and birch is increasingly seen as a valuable furniture wood.

Current Practices and Status of Indicator

Historically, deciduous species were removed from harvested stands and discarded as "waste wood". Regeneration of harvested blocks did not generally include hardwood species, with most silviculture practices targeting harwoods for removal from conifer plantations. Current practice has not changed considerably, but hardwood species are more often left standing in cutblocks, where possible, or cut out of harvest areas and retained in wildlife tree patches. If harvested, hardwoods in cutblocks are not usually regenerated and areas in the Fort St. James DFA are not currently managed as hardwood stands. Due to the low value historically placed on hardwood stands, the Licensees and BC Timber Sales have not previously monitored the overall percent of hardwoods in the DFA.

Establishment of Targets and Future Practices

Licensees and BC Timber Sales acknowledge the importance of maintaining hardwoods in the DFA from both an ecological and economic aspect and have established this indicator to ensure a percentage of the DFA remains in deciduous cover over the long-term. Due to the lack of historical interest in harvesting hardwoods, more research needs to be completed in order to determine a suitable target for this indicator. Licensees and BC Timber Sales will complete a GIS analysis of the hardwood component of the DFA based on a Vegetative Resource Inventory (VRI) and targets will be identified based on this analysis.

Forecasting and Predicted Trends

The success in maintaining the target percent of hardwoods in the DFA is not easy to quantifiably forecast over a defined time frame, as it may depend on a variety of factors such as forest health, fire, etc. However, it is important to identify what the accepted targets mean to Sustainable Forest Management. To forecast this indicator, a “what if scenario” analysis can be used to help identify the importance of the stated target to overall SFM within the DFA. The following “what if scenario” consists of one scenario as the current target is set at 4.0%:

a) What if there was considerably less than the target percent of the DFA land base as hardwoods (including mixed wood and deciduous leading stands)?

If considerably less than the target percent of the DFA was conserved as hardwood stands, overall species diversity may be reduced as many wildlife and plant communities depend on these stands for habitat. Deciduous trees support a wide range of insects, birds, and other animals that depend on their unique characteristics to survive. Hardwoods are also a valuable component of the DFA's aesthetics, and contribute to the social values of the DFA. By not meeting the target retention of hardwood stands, these social values may be compromised. Hardwood stands may play an important economic role in the future within the DFA. Failure to properly manage for the sustainability of these stands may also impact the DFA economically, as the forest industry may eventually seek alternatives to mature pine that have been lost to mountain pine beetle.

Monitoring and Reporting Procedures
Targets will be set at the landscape level for the Licensee/BC Timber Sales DFA.

The indicator status will be included in the annual SFMP report for the operational year April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities
Licensees and BC Timber Sales are responsible for monitoring, tracking and reporting this indicator. If the target percent is not being met, corrective measures will be taken to reverse the trend. Opportunities for improvement may include modifying silviculture practices to maintain more deciduous trees in conifer plantations, or actively planting hardwoods in ecologically appropriate areas.

Indicator 66 - Douglas Fir Stands

Indicator Statement	***Target and Variance***
Percent of Douglas fir (mixed stands and Douglas fir leading stands) within the DFA.	Target: Maintain ≥ 1.0% of Douglas fir in the DFA. Variance: -0.1

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion: Sustainable populations of all flora and fauna native to the DFA (natural abundance and distribution of species within their natural range).
CSA SFM Element: Species Diversity
Value: Sustainable populations of flora and fauna native to the DFA (natural abundance and distribution).
Objective: Ensure habitat for species where ecologically appropriate.

Description of Indicator
Douglas fir (*Pseudotsuga menziesii*) grows throughout much of southern British Columbia. There are two distinct forms of the species- the coastal and the interior. The Fort St. James DFA is the northern extent of the interior Douglas fir's range, where it is found in small stands, or in mixed forests with spruce, pine, or birch. Douglas fir has played an important economic role in BC's forest industry, but due to its low numbers in the Fort St. James DFA it has not been as economically important. In recent years Douglas fir has gained more recognition for its value as an important component of the forest ecosystem. Its large size, longevity, fire resistance, and unique form provides habitat for a variety of species. Winter ungulate range, especially for mule deer, is particularly dependent on Douglas fir for its maintenance. This indicator is intended to ensure the target percent of Douglas fir stands, both mixed and leading, will be maintained in the DFA to support species diversity and to ensure habitat is present for dependant species.

Current Practices and Status of Indicator
Since 1999 the Licensees and BC Timber Sales have managed stands containing a Douglas fir component according to the BC Ministry of Forests "Douglas fir Management Guidelines for the Prince George Forest Region". This document provides guidelines for the maintenance and regeneration of Douglas fir across the PG Forest Region, which includes the Fort St. James DFA. These guidelines are

generally included in operational plans such as Site Plans, which prescribe what forest activities are required to meet Douglas fir management objectives.

Establishment of Targets and Future Practices

The Licensees and BC Timber Sales acknowledge the importance of maintaining Douglas fir in the DFA and have established this indicator to ensure a percentage of the land base contains a Douglas fir component. Due to its lower importance as a commercial species in the Fort St. James DFA, more research has to be done to determine a target percent for this indicator. Past management activities have focused on Douglas fir at the stand level, and have not considered the broader presence of Douglas fir at the landscape/ DFA level. As such, there is not a reliable value for the target percent of Douglas fir (mixed stands and fir leading stands) that should be maintained for the DFA. Licensees and BC Timber Sales will complete a GIS analysis of the Douglas fir component of the DFA based on a Vegetative Resource Inventory (VRI). Targets will be based on this analysis.

Forecasting and Predicted Trends

The success in maintaining the target percent of Douglas fir in the DFA is not easy to quantifiably forecast over a defined time frame, as it may depend on a variety of factors such as forest health, fire, etc. However, it is important to identify what the accepted target means to Sustainable Forest Management. To forecast this indicator, a "what if scenario" analysis can be used to help identify the importance of the stated target to overall SFM within the DFA. The following "what if scenario" consists of one scenario as the current target is set at 1.0%:

a) What if there was considerably less than the target percent of the DFA area that contained a Douglas fir component (either in mixed stands or as Douglas fir leading stands)?

If considerably less than the target percent of the DFA area that contained a Douglas fir component was sustained, ecological, economic and social values of SFM could potentially be affected. Maintaining the target percent of Douglas fir is required to maintain species diversity and to sustain native flora and fauna populations in the DFA. Douglas fir stands (mixed and Douglas fir leading) support a wide range of insects, birds, and other animals that depend on their unique characteristics to survive. Although they are fewer in number than other coniferous species in the DFA, their presence is crucial for maintaining ungulate winter range habitat, and for creating denning/nesting sites for birds and mammals. If less than the target percent is achieved, these ecological values may decrease across the DFA. The future may also see the economic value of Douglas fir increase, as the forest industry seeks alternatives to mature pine that have been lost to mountain pine beetle. If less than the target percent of Douglas fir is maintained, these economic values may not be fully realized. Negative impacts to both ecological and economic values within the DFA could potentially have related negative social values as the public's value from the forest resource decreases.

Monitoring and Reporting Procedures

The percent of Douglas fir across the Area Under the Plan (AUTP) will be monitored to ensure that the amount existing meets the indicator target and variance by licensee DFA. Annually, harvested cutblocks will be compared to a GIS query of Douglas fir leading polygons using the most up-to-date forest inventory. Results of the query will be assessed to ensure consistency with the targets.

The indicator status will be included in the annual SFMP report for the operational year April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees and BC Timber Sales are responsible for monitoring, tracking and reporting this indicator. If the target percent is not being met, corrective measures will be taken to reverse the trend. Opportunities for improvement may include modifying silviculture practices to incorporate more Douglas fir in plantations in ecologically appropriate areas.

Indicator 68 – Strategies for Management of Recreational/Commercial & Cultural Trails

Indicator Statement	***Target and Variance***
Total percentage of forest operations that are consistent with a landscape level strategy for the management of recreational, commercial, and cultural trails as identified in the DFA.	Target: 100% Variance: -20% (to be re-assessed in June 2008)

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion: Multiple benefits to society.
CSA SFM Element: Timber and Non-Timber Benefits
Value: Acceptable and feasible mix of a healthy forest industry and non-timber benefits.
Objective: Conserve known subsistence uses (berries, hunting, fishing, medicinal plants).

CCFM Criterion: Multiple benefits to society.
CSA SFM Element: Timber and Non-Timber Benefits
Value: Acceptable and feasible mix of a healthy forest industry and non-timber benefits.
Objective: Respect recreational/ cultural trails/ sites, spiritual sites.

Description of Indicator

The intent of this indicator is to cover off all legally made known recreation/general recreation, commercial/stakeholder, and cultural/heritage trails at the Landscape Level.

Legally Made Known Recreation Trails will follow the *Order to Establish Objectives for a Recreation Site, Recreation Trail or Interpretive Forest Site* (MoF, January 2, 2001):

1. Cutting, modification, or removal of trees is not permitted within, or where adjacent within 200m of designated site boundaries, unless authorized by the District Manager.
2. Road construction is not permitted within, or where adjacent within 200m of designated site boundaries of recreation trails managed for semi-primitive, non-motorized recreation experience, unless:
    a) a road is required to access areas beyond the trail;
    b) there is no other practicable option; and
    c) authorized by District Manager.

General Recreation Trails:

1. Licensee/BC Timber Sales to GPS the location of general recreation trails where they are impacted by harvest blocks or roads.
2. Road Crossings will ensure construction debris is cleared from both sides of the road and all relevant Visual Quality Objectives will be adhered to.
3. Harvesting adjacent to recreation trails will have a 5-meter Machine Free Zone established and all non-merchantable conifers and deciduous trees will be retained within that zone, unless authorized by the District Manager. If required to reduce wind throw and future trail maintenance, harvest all mature trees within the Machine Free Zone.

Commercial/Stakeholder Trails:

1. Licensee/BC Timber Sales to GPS the location of commercial trails where they are impacted by harvest blocks or roads.
2. Attempt to identify stakeholder and attempt to consult and mitigate any potential impacts they may have regarding the trail.

3. Road Crossings will ensure construction debris is cleared from both sides of the road and all relevant legislative requirements will be adhered to.
4. Harvesting adjacent to commercial/stakeholder trails will have a 5-meter Machine Free Zone established and all non-merchantable conifers and deciduous trees will be retained within that zone, unless authorized by the District Manager. If required to reduce wind throw and future trail maintenance, harvest all mature trees within the Machine Free Zone.

Cultural and Heritage Trails:

1. Licensee/BC Timber Sales to adhere to any recommendations made by the Archaeological Impact Assessment (AIA) when these trails are located during the planning phases of blocks or road development.
2. Licensee/BC Timber Sales to adhere to any trail specific strategy developed by First Nations for best management practices on trails within their Traditional Use Area.

Current Practices and Status of Indicator

Licensees and BC Timber Sales have traditionally managed these values at the Site Plan level and there have been little coordination of information on how to protect and respect them on a broader geographic area. However, through Approved Operational Plans, such as the FSP, Cultural Heritage Resources have legally specific Results and Strategies that must be adhered to. Also, many of the resource features identified in this indicator have been made known, either legally or locally/regionally significant and Licensee's and BC Timber Sales have managed for them as such. Current status therefore cannot be reported in terms of indicator and target to date; however, current practice is to manage these trails based on the recommendations supplied by the Public, First Nations, Archeologists and Archeology Branch, and Various Ministries.

Establishment of Targets and Future Practices

The Licensees and BC Timber Sales recognize the importance of the indicator values for many of the residents of the DFA and have set a target of 100% full compliance with Landscape level recognition of these resources. Future practice will include the use of this landscape level strategy during planning processes to ensure these non-timber resource sites are managed for appropriately.

Forecasting and Predicted Trends

It is the intent of all Licensees and BC Timber Sales to meet the indicator target deadline, and it is anticipated this goal will be met. The exact level of success is not easy to quantifiably forecast as it relies on unpredictable factors such as human error and landscape level data collection. Therefore, the use of a "what if scenario" is beneficial in identifying what the accepted target means to SFM. As this indicator has a stated target of developing a proposal within one year, one other potential scenario should be developed:

a) What if it took 5 years to develop a proposal for a landscape level strategy for management of recreational/commercial & cultural trails?

Five years would be an excessive amount of time to develop the strategy. In its absence, forestry activities may reduce the long-term potential recreational, commercial, and cultural trails to exist in their natural spatial distribution, and may potentially damage trails that have not been identified at the landscape level. Even if values such as trails are identified at the site level, their extent is not fully realized until they are identified at the landscape level where they often cover a large amount of area. Opportunities may be lost to implement management of these resources arising from the landscape level strategy designed to enhance these uses. The users of these resources may see the lack of a proposal as the result of the forest industry placing a low value on non-timber resources. SFM relies on public participation in forest planning, and the public may withdraw support if they perceived a forest industry that placed a low priority on their input.

For these reasons the Licensees and BC Timber Sales are committed to completing a landscape level strategy to respect recreational, commercial, and cultural trails within one year of the plan approval.

Monitoring and Reporting Procedures
This indicator has a DFA specific target and will be managed at the DFA level. Licensees and BC Timber Sales will track and monitor the success in meeting the target date and will be reported in the annual SFMP report for the operating year of April 1st to March 31st. The variance of –20% will be revisited by June 2008.

Responsibility and Continuous Improvement Opportunities
Licensees and BC Timber Sales are responsible for carrying out the strategies from year to year. Opportunities for improvement may be linked to using local knowledge as it is brought forward and encouraging both First Nation's and non-First Nation's inhabitants to become involved in its creation. These users are encouraged to take advantage of communication strategies, such as responding to the notifications discussed in indicators #43 and #44, as well as other opportunities to provide input to forest planning.

Indicator 70 – Consistent and Appropriate road deactivation within the AUTP

Indicator Statement	***Target and Variance***
Percentage of roads deactivated that meet the deactivation criteria.	Target: 100% Variance: -20% (revisit target in spring 2008)

This indicator addresses the following CSA-SFM parameters:

CCFM Criterion 5: Multiple benefits to society.
CSA SFM Element 5.2: Communities and Stability
Value: Sustainable communities.
Objective: Ensuring consistent and appropriate road deactivation within the AUTP

CCFM Criterion 3: Conservation of Soil and Water Resource.
CSA SFM Element 3.1: Soil Quality and Quantity
Value: Soil Distribution and productivity.
Objective: Maintain a natural balance (distribution), dynamic cycles, and productivity

CCFM Criterion 3: Conservation of Soil and Water Resource.
CSA SFM Element 3.2: Water Quality and Quantity
Value: Water quality and quantity.
Objective: Maintain water quality at stream crossings

Description of Indicator
This indicator looks at the legal requirements for road deactivation while proposing a road deactivation criteria that will establish some consistency in practices amongst participating licensees and BC Timber Sales. The extent of road deactivation has not been consistent in the AUTP over the past 10 years. Under the Forest Practices Code, the extent of road deactivation was heavily governed by regulatory requirements. This is contrary to the requirements under the Forest and Range Practices Act. Sections 82 and 83 of the Forest Planning and Practices Regulation outline 6 conditions that must be met in order to deactivate a road.

This indicator will address the “how to” component of road deactivation. The Fort St. James Public Advisory Group to the SFMP have requested a set of guidelines on deactivation because of on the ongoing difficulties concerning the use of roads. Deactivation is a concern because of various other impacts on other forest resources and tenure holders. This deactivation criteria addresses legislative as well as non-legislative requirements identified by the PAG. A specific licensee may exceed the minimum

standard to accommodate a specific value if the need arises. Each situation will be assessed by the affected licensee on a site-by-site basis.

A person who deactivates a road must do the following:

1. Create deactivations that are passable with an all-terrain vehicle unless there is another reason that the road must be closed to motorized use (e.g. site conditions, sites of biological significance, sensitive wildlife habitat, unstable terrain, etc); a deactivation structure shall be considered usable with an all terrain vehicle if it is constructed at a minimum of a 2 to 1 slope. This means that the resulting slope will be twice as long as it is deep.

2. Ensure the remaining trench from the deactivation of a culvert is gently sloped and armoured where necessary in order to remain stable and provide access;

3. Armour ditch blocks where necessary;

4. Ensure that operations are shutdown during periods of heavy or persistent rainfall that could result in sediment delivery to fish bearing streams;

5. Place erodable materials outside the high-water mark of any stream to minimize the risk of erosion or sedimentation in the future;

6. Re-vegetate and/or stabilize exposed soils at fish stream crossings in order to minimize the risk of erosion or sedimentation in the future;

7. Ensure that the amount of deactivation is appropriate to the situation to the extent of controlling natural water flow and minimizing surface erosion.

This indicator is intended to measure the success of the Licensees and BC Timber Sales to implement consistent and appropriate road deactivation within their individual DFAs.

Current Practices and Status of Indicator

Currently licensees and BC Timber Sales deactivate roads for sediment control into streams, to minimize soils erosion, and to reduce long-term road liabilities.

Establishment of Targets and Future Practices

The Licensees and BC Timber Sales recognize the importance of the indicator values for many of the residents of the DFA and have set a target for road deactivation. The variance will be revisited in the spring of 2008 when the annual report is finalized. Future practice will include following this deactivation criteria to ensure that road deactivations are consistent and appropriate for each situation.

Forecasting and Predicted Trends

It is the intent of all Licensees and BC Timber Sales to meet the indicator target. The exact level of success is not easy to quantifiably forecast as it relies on unpredictable factors such as human error and landscape level data collection. Therefore, the use of a “what if scenario” is beneficial in identifying what the accepted target means to SFM. As this indicator has a stated target of adhering to the road deactivation criteria, one other potential scenario should be developed:

a) What if licensees and BC Timber Sales did not comply with this deactivation criterion?

The extent of deactivation on the landscape would be inconsistent and may not be appropriate under every situation or circumstance. Other stakeholders and forest users of these deactivated roads may view the forest industry as placing a low value on non-timber resources. SFM relies on public participation in forest planning, and the public may withdraw support if they perceived a forest industry that placed a low priority on their input.

For these reasons the Licensees and BC Timber Sales are committed to complying with the deactivation criteria on roads deactivated within the DFA.

Monitoring and Reporting Procedures

This indicator has a DFA specific target and will be managed at the DFA level. Licensees and BC Timber Sales will track and monitor road deactivation activities for compliance with the criteria. This progress and the success in meeting the target date will be reported in the annual SFMP report for the operating year of April 1st to March 31st.

Responsibility and Continuous Improvement Opportunities

Licensees and BC Timber Sales are responsible for ensuring that this indicator is met. Opportunities for improvement may be linked to using local knowledge and PAG input into the refinement of the criteria, indicator, target and variance over time.

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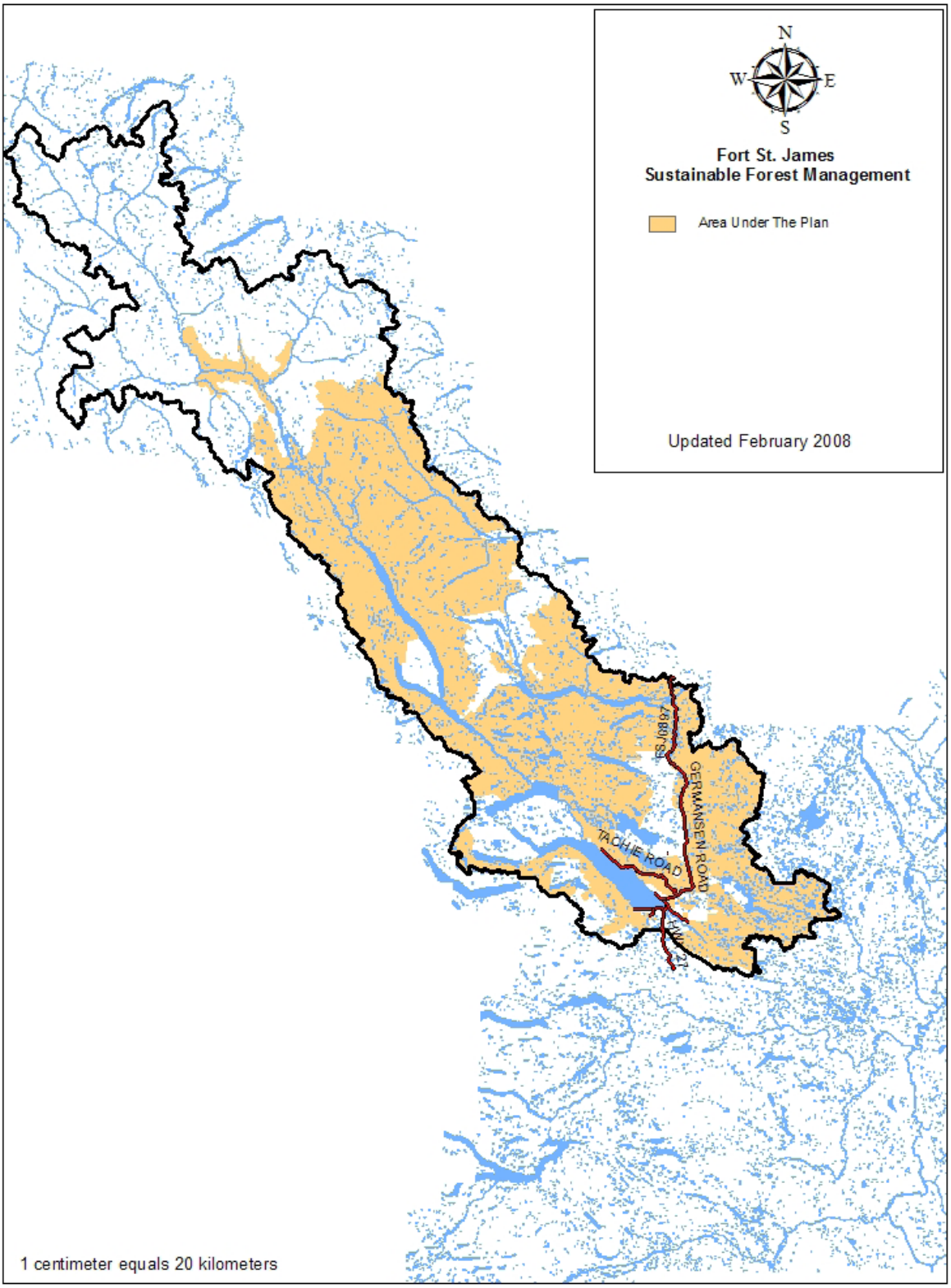
Appendix 1

Fort St. James Sustainable Forest Management - Area Under The Plan Map

Fort St. James Sustainable Forest Management - Licensee/BC Timber Sales Operating Areas Map

Fort St. James Sustainable Forest Management - Natural Disturbance Units Map

Fort St. James Sustainable Forest Management - Biogeoclimatic Ecosystem Classification Map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Sustainable Forest Management
Area Under The Plan
Updated February 2008
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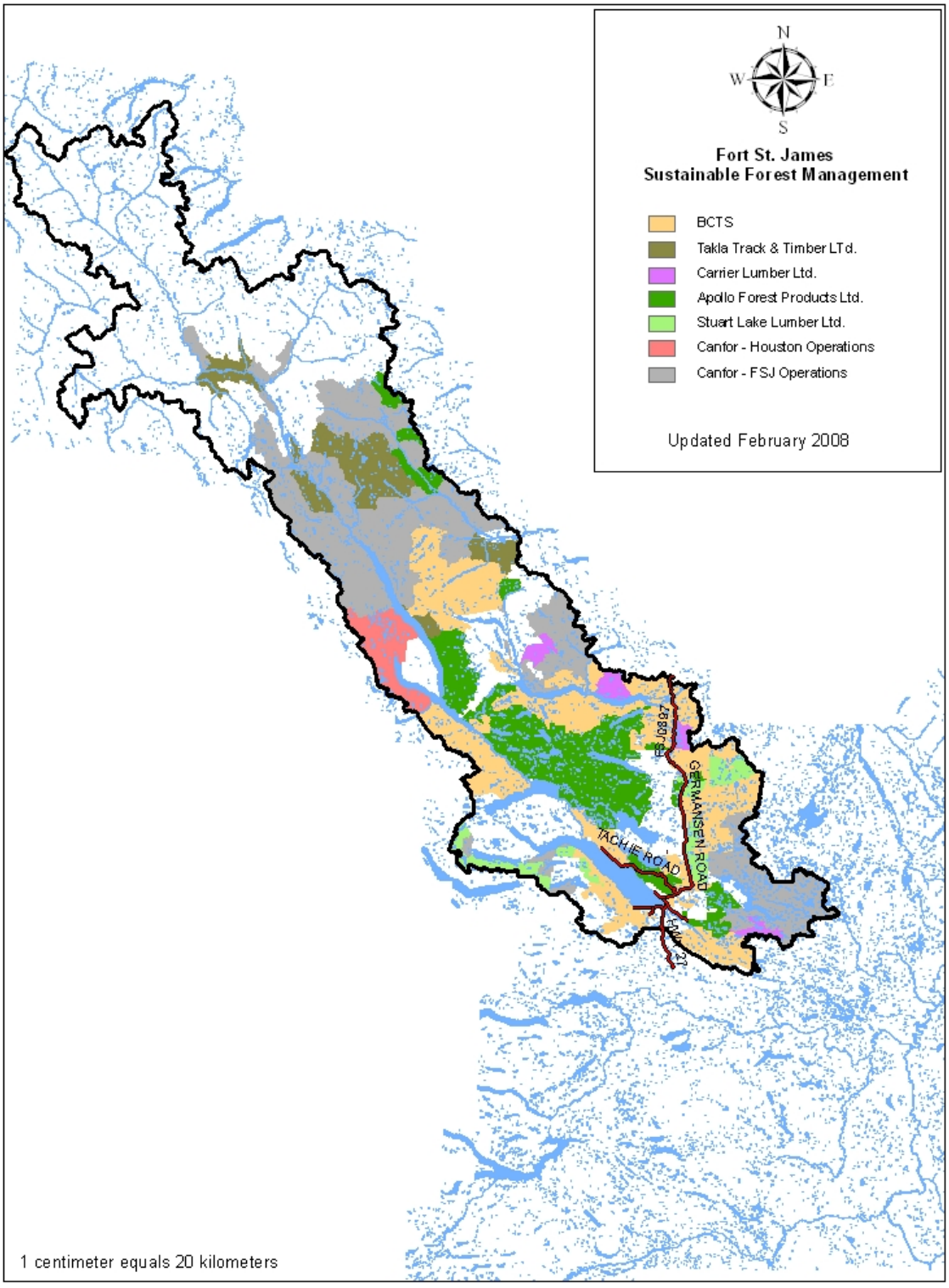
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Carrier Lumber Ltd.
Apollo Forest Products Ltd.
Stuart Lake Lumber Ltd.
Canfor - Houston Operations
Canfor - FSJ Operations
Updated February 2008
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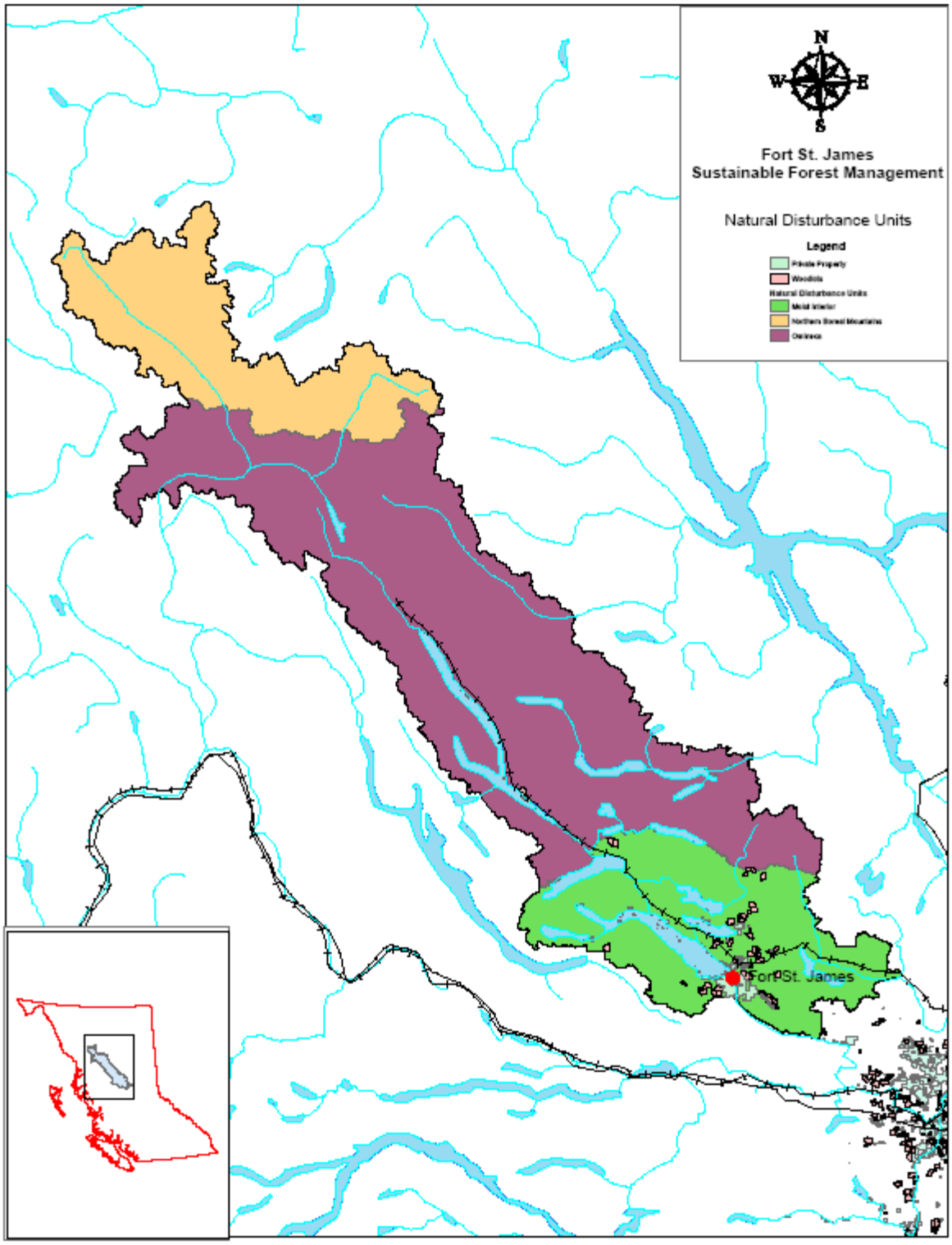
TACHIE ROAD
1 centimeter equals 20 kilometers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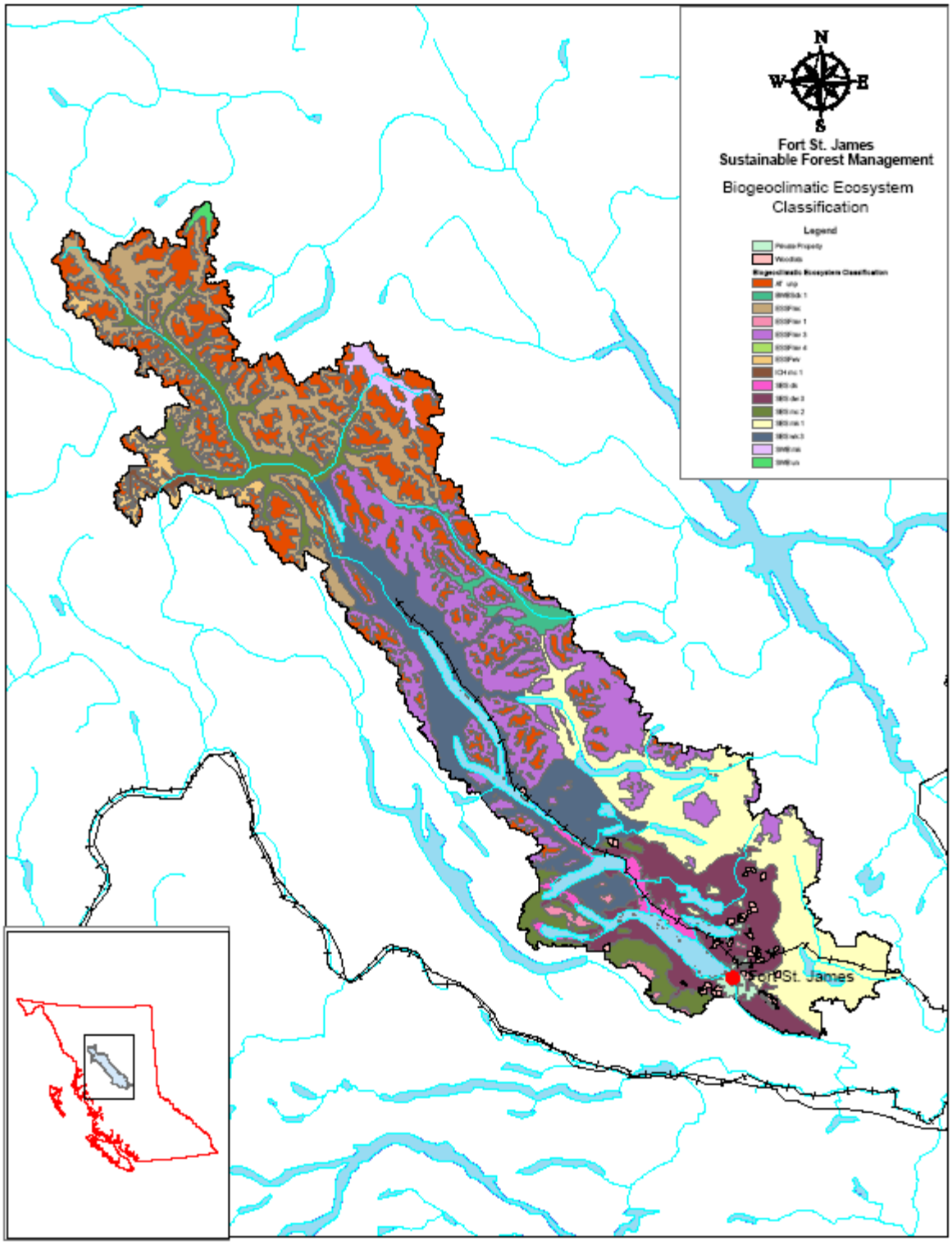
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Appendix 2

Fort St. James Public Advisory Group List of Participants

Fort St. James Public Advisory Group Terms of Reference

Name of PAG Member	Home Phone	Work Phone	Interest
Henner Grimm	996-8668		Wildlife
Randy Sulyma	996-8840	996-8499	Wildlife & ecology
Barb Rooke	996-2299	996-2299	Forest worker, wildlife
Ron Timothy	996-8405		Trapping
Joe Vogl	996-8458		Trapping, mill owner
Bob Frederick	996-0119	996-0190	Trapping
Orville Koette	996-7255		Regional district
Joanne Vinnedge		996-5200	Wildlife biologist
Sue Granger	996-0028	996-0038	Research
Beulah Broen	996-7759	996-7757	Logging
Larry Erickson			Guiding
Bryan Muloin		996-2253	Prospecting
Ted Bingham			Snowmobile club, mill worker
Ross Hamilton			Logging,Community Forest

Public Advisory Group

TERMS OF REFERENCE

APPROVED
December 4, 2004

AMENDED
February 4, 2008

Background

1.1 Purpose of Sustainable Forest Management

The objective of sustainable forest management (SFM) is to concurrently balance the sustainability of forestry-related ecological, social and economic values for a defined area over a defined timeframe. SFM is about being economically sustainable on public land, respecting the social needs of the public, and sustaining viable ecosystems.

The SFM Plan will be developed for participating licensees in the Fort St. James Forest District and will incorporate the principles of SFM. The goals of the Fort St. James SFM Plan are:

1. To provide members of the Licensee Team the opportunity to obtain Canadian Standards Association (CSA) certification, and
2. Offer an opportunity for public and other stakeholders to participate in an open public forum.

1.2 Participating Licensee Team

The Licensee Team for the Fort St. James SFM Plan consists of representatives from Apollo Forest Products Ltd., Canadian Forest Products Ltd. (Canfor – Houston, Prince George, and Vanderhoof), Lakeland Mills Ltd., L & M Lumber Ltd, Winton Global, BC Timber Sales (BCTS) – Stuart Nechako Business Area, Ta Da Chun Timber Ltd., Stuart Lake Lumber Co. Ltd., and Carrier Lumber Ltd. These licensees and BCTS have forest tenures subject to change over time in size, location and ownership. Participating Licensees may change over time.

1.3 Defined Forest Area (DFA)

The PAG provides input for values, objectives, indicators and targets specific to the DFA for the SFM plan.

The DFA for the SFM Plan is within the Fort St. James Forest District. The operating area of participating licensees and BCTS will set the geographic extent of the DFA.

1.4 Public Advisory Group

The PAG for the Fort St. James SFM Plan is comprised of a range of individuals representing the interests listed in section 3.1.1. The role of the PAG is to provide local representatives an effective forum to provide input into and receive feedback from the process of developing and monitoring the SFM plan.

Defined Goals

The goal of the PAG is to demonstrate commitment to SFM principles for the Defined Forest Area in the Fort St. James Forest District. The development and implementation of the SFM Plan will be the responsibility of the Licensee Team, guided by the PAG.

Roles and Responsibilities

3.1 Public Advisory Group

3.1.1 Membership Structure

The Public Advisory Group is designed to reflect a range of interests in the DFA, including DFA-related workers which may include but not limited to the following:

1. Research and education
2. Community stability
3. Healthy, viable environment

4. BC Wildlife Federation
5. Recreation
6. Trapping
7. Hunting
8. Fishing
9. Sawmill owner
10. Wildlife
11. Viewing (scenic values)
12. Meaningful levels of sustainability for all forest resources
13. Prospecting
14. Mineral resources
15. Ecology
16. Woodlots
17. Town council
18. Protection of water quality
19. Protection of endangered or at risk species
20. Regional district
21. Forest worker
22. Chamber of commerce
23. General Public
24. Hospitality industry,
25. Local business owner
26. Agriculture community

and such other interests that may be decided upon by PAG when a new member joins the group. It is recognized that an individual may represent more than one interest identified under this section.

3.1.2 Selection of PAG Members

The Licensee Team will recruit potential members from various interests and First Nations through invitations to individuals. As well, they will hold a public open house and advertise in local newspapers to generate interest in the PAG.

Based on the above:

a. Members of the public and the Licensee Team will review the potential membership at the initial PAG meeting. Once the PAG is established, members of the PAG and the Licensee Team can recommend changes in PAG structure and potential members.
b. The PAG and the Licensee Team will jointly confirm appointments and replacement of PAG members.
c. Local residents who feel that their values are not represented by the PAG can submit a written request to the Licensee Team to add a member for that purpose, outlining the perceived need for an additional member. The Licensee Team, and the PAG, will consider each request for membership on its merits and provide a timely response in writing.
d. To provide continuity, it is hoped that PAG members will serve for a minimum of two years. They may be replaced if their term is complete or if they are not meeting the Terms of Reference.

3.1.3 Role of PAG Members

The PAG will work according to requirements and guidance as outlined in CSA standard Z809-02 for SFM. PAG members will:

a. Attend meetings regularly
b. Have the opportunity to assign an alternate member to attend meetings if they cannot attend scheduled meetings. It is the responsibility of the members to keep alternate representatives informed of the group's progress and deliberations.
c. Strive to reach consensus or general agreement on recommendations to the Licensee Team.
d. Approve a Terms of Reference.

Work with Licensees' to:

e. Review the six criteria and associated 17 elements identified in the SFM Framework.
f. Identify any other elements of relevance to the DFA.
g. Identify at least one value for each element.
h. Identify one or more objectives for each value.
i. Identify and justify one or more quantifiable indicator(s) for each objective.
j. Identify one target for each indicator, which includes acceptable levels of variance.
k. Develop alternative strategies to be assessed.
l. Assess alternative strategies and select the preferred one.
m. Review the SFM plan.
n. Design monitoring programs, evaluate results, and recommend improvements.
o. Discuss and resolve any issues relevant to SFM on the DFA.

It is recognized that PAG members may miss some meetings due to the nature of their work or other activities. If a member is unable to attend a particular PAG meeting, he/she is encouraged to arrange for their alternate to attend and must inform the facilitator.

3.1.4 Role of Alternates

a) When an alternate attends on behalf of the member, the alternate agrees to work according to the Terms of Reference.
b) When the alternate is attending on behalf of the member, the alternate is to come informed, up-to-date and prepared for discussions based on briefing by member.
c) The alternate and member may both attend the same PAG meeting but only one person will participate in decision making.

3.1.5 Conflict of Interest

The PAG recognizes that a conflict of interest could occur if there is a potential for a member to personally and directly benefit from specific recommendations from the PAG. Therefore, if a member has a perceived or real conflict of interest that could result in a potential exclusive personal economic benefit in relation to his or her input to the Defined Goals, that member, other PAG members or a member of the Licensee Team must state the potential conflict and abstain from decisions related to the conflicting issue.

3.2 Role of Licensee Team

The role of the Licensee Team is to:

a. Provide information to the PAG as related to SFM planning and DFA.
b. Review and consider the recommendations of the PAG with the goal of incorporating recommendations in to the SFMP.
c. Make decisions regarding SFM and certification.
d. Demonstrate that all input is considered and responses are provided where PAG recommendations are not incorporated.
e. Provide the necessary human, physical, financial, information and technological resources, as reasonable.
f. Not take part in reaching consensus or decision-making by the PAG.

3.3 Role of Advisors

Advisors will be invited, as required, to provide technical information and advice to the PAG. These advisors could be from government agencies, professional organizations, educational institutions, consulting firms, or other sources.

The role of advisors is to:

a. Provide and/or clarify technical or legal information and participate in discussions as requested.
b. Not take part in reaching consensus or decision-making by the PAG.

3.4 Role of Observers

The public is welcome to observe PAG meetings but:

a. May not participate in discussions unless agreed to by the PAG, facilitator and Licensee Team.
b. May not take part in reaching consensus or decision-making by the PAG.

3.5 Role of the Facilitator

The role of the PAG facilitator is to:

a. Ensure that PAG meetings address the agreed-upon agenda topics.
b. Manage and implement the Terms of Reference, including the appropriate participation of all members of the PAG and Licensee Team, in addition to advisors and observers.
c. Ensure the circulation of draft and final meeting summaries and agendas.
d. Start and end all meetings at the times stated in the agenda.
e. Enable equitable opportunity by all PAG members to participate in the meetings.
f. Work to clarify interests and issues and help the PAG build recommendations.
g. Act as a contact for PAG members.
h. Provide scribe services at meetings.
i. Not take part in reaching consensus or decision-making by the PAG.

3.6 First Nations

The Licensees will recognize First Nations and treaty rights and agree that First Nations participation in the public participation process will not prejudice those rights. First Nations are welcome to participate in the PAG process.

Timelines

Following the completion of the SFMP, it is estimated that the PAG meeting schedule would include at least two meetings per year beginning in 2006 and potentially include:

a. Review of the SFMP annual report.
b. Complete revised input on the SFMP.
c. Include field tours where appropriate.

PAG Operating Rules

5.1 Ground Rules

All participants in this process agree to work under the following ground rules:

a. To be on time for PAG meetings.
b. To be respectful of other participants.
c. To avoid interrupting a speaker or making personal attacks.
d. To speak to the topic.
e. To try to understand each other's point of view.

Participants will direct questions and comments to the facilitator, who will recognize the speaking order as participants raise their hand to speak. Everyone will be able to speak to a topic once before participants are offered a second opportunity.

5.2 Meetings

The meeting location and schedule may change if agreed to by the PAG and Licensee Team and input on upcoming meeting agendas will be obtained during each PAG meeting. The facilitator, working with the Licensee Team will finalize and ensure the distribution of meeting agendas, meeting summaries and pre-meeting material to PAG members, advisors and observers. The agenda will include proposed objectives for the meeting.

Meeting dates will be confirmed jointly between the Licensee Team and the PAG.

Communication

6.1 Internal to the PAG

a. The facilitator will ensure the meeting agenda and minutes from the previous meeting are distributed to PAG members within one week of the meeting.
b. The facilitator will provide the opportunity for PAG members to discuss issues between meetings through the use of a PAG E-mail list or other means of communication.

6.2 External to the PAG

a. The Licensee Team will provide an annual report to the PAG and make it available to interested parties.
b. Only a Person appointed by the PAG may communicate the official position of the PAG to the media and external parties about the PAG process.
c. The appointed spokesperson can speak to the media based on consensus of the PAG
d. The PAG may draft and approve a media release on its activities and/or may invite the media to attend meetings as observers.

6.3 Internal to the Licensee Team

a. Input from the PAG will be reported at meetings of the Licensee Team.

Meeting Expenses

a. Mileage to and from PAG meetings for those members traveling more than 32 kilometers each way to the meeting site will be reimbursed at $0.45 per kilometer. PAG members traveling from outside the Fort St. James Forest District must obtain approval for travel expenses from the facilitator before the meeting.
b. Overnight accommodation for those traveling to PAG meetings will be reimbursed if pre-approved by the facilitator. As a general principle, accommodation should be economical.
c. Expense forms with copies of receipts for the above must be submitted to the facilitator within two weeks of the PAG meeting.
d. PAG requests for funding will follow the current PAG funding policy.

Decision Making and Methodology

The PAG agrees to work by consensus, defined as “no member having substantial disagreement on an issue and is willing to proceed to the next step”, or, by general agreement.

a. Every effort shall be made to achieve consensus, but if this is not possible, decisions will be carried by general agreement. General agreement is defined as 80% of the PAG members present provided there is a quorum. Members in a 20% or less minority position on a given decision may request one opportunity to

restate their case for consideration by the majority and to have a decision reconsidered by the membership. Such a request will not cause a decision to be delayed to a subsequent meeting. Where agreement is reached by general agreement, the minority view(s) will be recorded along with the decision. A PAG member abstaining from voting on an issue is deemed not to be in substantial disagreement and to indicate a willingness to proceed to the next step.

b. A quorum for any meeting of the PAG shall be greater then 50% of the average number of PAG members attending the past five (5) meetings.
c. PAG members will respect decisions made by the PAG.

Dispute Resolution Mechanism

9.1 Process Issues

The facilitator will resolve process issues.

9.2 Technical Issues

a. The PAG members will work to identify the underlying issues and work towards a solution in a positive, friendly environment.
b. The members will seek compromise, alternatives and clarification of information needed.
c. The members will commit to arriving at the best solution possible.
d. If no consensus or general agreement solution can be reached, then the outstanding issues will be summarized by the PAG and forwarded to the Licensee Team for its consideration.

Review and Revisions

The Terms of Reference will be reviewed annually after adoption, or earlier, based on consensus or general agreement of the PAG and the Licensee Team. The facilitator will coordinate comments and draft text revisions.

Approved:

Public Advisory Group	Date: December 4, 2004
Licensee Team	Date: December 4, 2004

Amended:

Public Advisory Group	Date: February 19, 2005
Licensee Team	Date: February 19, 2005
Public Advisory Group	Date: February 4, 2006
Licensee Team	Date: February 4, 2006
Public Advisory Group	Date: March 5, 2007
Licensee Team	Date: March 5, 2007
Public Advisory Group	Date: February 4, 2008
Licensee Team	Date: February 4, 2008

Appendix 3

Fort St. James SFMP Matrix

CCFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
Sustainable populations of all flora and fauna native to the DFA (Natural Abundance and distribution of species within their natural range)	1.1 Ecosystem Diversity	Diversity of natural ecosystems that will support function of natural processes for future generations (Conserve ecosystem diversity for future generations)	Maintain natural diversity / distribution (Natural biodiversity in natural ratios) (Large variety of diversity that covers all land uses, social, economic values and biota)	1	Relative abundance of ecosystems (Number/types of habitats)	~~By March 2008, develop ecosystem representation targets~~ Target: Implement Interim Targets: •Common Ecosystem Groups ≥15% in NHLB •Ecosystems with High Stewardship Resp. ≥30% in NHLB •Uncommon Ecosystem Groups ≥50% in the NHLB •Rare Ecosystem Groups 100% retention *PAG Concensus (Nov 5, 2007)* (Effective for the 2007/2008 Reporting Period)	~~None~~ 0%
				2	Maintain "old forest" within each NDU (merged BEC)	Maintain average percent of total old forest and not go below minimum natural variation	Variances set as per the "Landscape Biodiversity Objectives for the PG TSA". Within range of natural variation
				3	Maintain "old interior" within each NDU (merged BEC)	Greater than or equal to the targets set as per the "Landscape Biodiversity Objectives for the PG TSA", as per above target.	Variances set as per the "Landscape Biodiversity Objectives for the PG TSA".

CCFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
				4	Maintain a variety of young patch sizes in an attempt to approximate natural disturbance	Targets set as per the "Landscape Biodiversity Objectives for the PG TSA".	Variances set as per the "Landscape Biodiversity Objectives for the PG TSA".
				5	Percent of openings (> 100 ha.) harvested annually that meet the large opening design criteria.	>80% of openings	-10%
	1.2 Species Diversity	Sustainable populations of flora and fauna native to the DFA (natural abundance and distribution of species within their natural range)	Ensure habitat for species where ecologically appropriate Maintain a range of temporal and spatial distribution of all natural habitats necessary to support native self sustaining populations	1	Relative abundance of ecosystems (Number/types of habitats)	~~By March 2008, develop ecosystem representation targets~~ Target: Implement Interim Targets: •Common Ecosystem Groups ≥15% in NHLB •Ecosystems with High Stewardship Resp. ≥30% in NHLB •Uncommon Ecosystem Groups ≥50% in the NHLB •Rare Ecosystem Groups 100% retention *PAG Concensus (Nov 5, 2007)* (Effective for the 2007/2008 Reporting Period)	~~None~~ 0%
				7	Plant species diversity index	100%	0
				8	Percentage of cutblocks and roads harvested that are consistent with legally established ungulate winter range objectives.	100%	0
				9	Percentage of cutblocks and roads harvested consistent with approved provincial species at risk notice/orders requirements as identified in operational plans.	100%	0

CCFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
				10	Percentage of blocks and roads harvested that adhere to licensee specific management strategies for: Sites if biological significance; and. Important wildlife, fish, and bird species; and, Valuable plants and plant communities, Within the DFA that are likely to be affected by industrial forestry activities.	100%	-20% (2007) -10% (2008) Reassess (2009)
				65	Percent of hardwoods (mixed wood and deciduous leading stands) within the DFA	To be determined at a later date.	To be determined at a later date.
				66	Percent of Douglas fir (mixed stands and Douglas fir leading stands) within the DFA.	To be determined at a later date.	To be determined at a later date.
				14	Percent wildlife trees and/or wildlife tree patches associated with areas harvested annually by licensee as measured across the DFA.	> 7% by licensee	none
	1.3 Genetic Diversity	Genetic Diversity	Maintain natural genetic diversity	13	For blocks where Douglas fir (Fd) exists in the stand: the percent of Site Plans that incorporate the Douglas fir management strategy	100%	20%
				14	Percent wildlife trees and/or wildlife tree patches associated with areas harvested annually by licensee as measured across the DFA.	> 7% by licensee	none
				15	Percentage of thinning and spacing prescriptions implemented annually that specify a post-treatment conifer density greater than the original planting density.	100%	0%

CCFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
	1.4 Protected Areas and Sites of Biological Significance	Sites of Biological Significance	Sites of Biological Significance are identified and appropriately managed	17	Percentage of cutblocks and roads harvested that are consistent with established guidelines for wildlife habitat features	100%	0
			Maintain naturally occurring non-forested (non-treed) types	21	Percent of cutblocks harvested having mappable non-forested types (>0.5 ha.) that are artificially converted to forested types through aforestation treatments.	100%	20%
			Maintain naturally occurring non-forested (non-treed) types	22	Existing areas of non-forested types artificially converted to forested types	0 ha.	0 ha.

CCFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
Maintenance and Enhancement of Forest Ecosystem Condition	2.1 Forest Ecosystem Resilience	Conserve ecosystem resilience by maintaining both ecosystem	Maintain the diversity of ecosystem conditions.	2	Maintain “old forest” within each NDU (merged BEC)	Maintain average percent of total old forest and not go below minimum natural variation	Variances set as per the “Landscape Biodiversity Objectives for the PG TSA”. Within range of natural variation

CCFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
and Productivity		processes and ecosystem conditions		3	Maintain "old interior" within each NDU (merged BEC)	Greater than or equal to the targets set as per the "Landscape Biodiversity Objectives for the PG TSA", as per above target.	Variances set as per the "Landscape Biodiversity Objectives for the PG TSA".
				4	Maintain a variety of young patch sizes in an attempt to approximate natural disturbance	Targets set as per the "Landscape Biodiversity Objectives for the PG TSA".	Variances set as per the "Landscape Biodiversity Objectives for the PG TSA".
			Maintain ecosystems to support natural processes	1	Relative abundance of ecosystems	~~By March 2008, develop ecosystem representation targets~~ Target: Implement Interim Targets: •Common Ecosystem Groups ≥15% in NHLB •Ecosystems with High Stewardship Resp. ≥30% in NHLB •Uncommon Ecosystem Groups ≥50% in the NHLB •Rare Ecosystem Groups 100% retention *PAG Concensus (Nov 5, 2007)* (Effective for the 2007/2008 Reporting Period)	~~None~~ 0%
	2.2 Forest Ecosystem Productivity	A productive forest ecosystem	Conserving forest ecosystem productivity by maintaining ecosystem conditions (habitats) that are capable of supporting naturally	8	Percentage of cutblocks and roads harvested that are consistent with legally established ungulate winter range objectives.	100%	
				9	Percentage of cutblocks and roads harvested consistent with approved provincial species at risk notice/orders requirements as identified in operational plans.	100%	0
				5	Percent of openings (> 100 ha) harvested annually that meet the large block design criteria	>80% of openings	-10%

CCFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
			occurring species.	23	Percent of audited cutblocks harvested where post harvest CWD levels are within the acceptable natural range of variability (as stated in m3/ha).	100% (Sampling intensity and audit percentage requirements changed at March 10, 2008 PAG Meeting. Effective for the 2007/2008 Reporting Period)	-10%
				24	Percent of cutblocks harvested where the soil disturbance limits identified in the site plan are exceeded (typically 5% on sensitive soils and 10% on other soils).	0%	0
				25	The total of forested land within the Timber Harvesting Landbase that is converted to non-forest land.	< 5	0

CFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
Conservation of Soil and Water Resource	3.1Soil Quality and Quantity	Soil Distribution and productivity	Maintain a natural balance (distribution), dynamic cycles, and productivity	24	Percent of cutblocks harvested where the soil disturbance limits identified in the site plan are exceeded (typically 5% on sensitive soils and 10% on other soils).	0%	0
				25	The total of forested land within the Timber Harvesting Landbase that is converted to non-forest land.	< 5	0
				23	Percent of audited cutblocks harvested where post harvest CWD levels are within the acceptable natural range of variability (as stated in m3/ha).	100%	-10%
				26	Percent of road related soil erosion events that introduce sediment into a stream identified in annual road inspections that are addressed.	100%	0

CFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
				70	Percentage of roads deactivated that meet the deactivation criteria.	100%	-20%
	3.2 Water Quality and Quantity	Water quality and quantity	Maintain water quality at stream crossings	27	Percentage of fish stream crossings planned and installed to a reasonable design and sediment control standards	100%	0%
				28	Percentage of stream crossing inspections and resulting mitigation measures completed according to schedule	100%	-10%
				~~29~~	~~Creation of a DFA risk ranking system for assessing stream crossings~~	~~April 1, 2006~~ Removed by PAG Consensus June 16, 2008	~~+ 3months~~
				30	Conformity to the DFA risk ranking system developed for assessing stream crossings	By April 1, 2007	0
				31	Presence/absence of fish: – percentage of permanent crossing structures installed on fish streams that will allow for adequate fish passage	100%	0
				70	Percentage of roads deactivated that meet the deactivation criteria.	100%	-20%
			Maintain water quality (sedimentation	32	Percent of cutblocks harvested that are consistent with riparian management commitments.	100%	0

CFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
			and water temperature) and (quantity within natural range of seasonal variation)	26	Percent of road related soil erosion events that introduce sediment into a stream identified in annual road inspections that are addressed.	100%	0
		Healthy Watersheds	Maintain healthy watersheds (quantity within the natural range of variability)	34	Percentage of harvested blocks > 1.0 ha harvested, 3 years prior to the reporting period, that have been reforested	90%	20%
				35	The percent of watersheds achieving baseline targets for the peak flow index	Annually, 85% of the watersheds will be below the baseline target.	+/- 15%
				36	Percent of watershed reviews completed where the baseline target is exceeded, and new harvesting is planned.	100%	0%

CCFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
Forest Ecosystems Contributions to Global Ecological Cycles	4.1 Carbon Uptake and Storage	Carbon Uptake and Storage	Maintain processes that take carbon from the atmosphere and store it in forest ecosystems	34	Percentage of harvested blocks > 1.0 ha harvested, 3 years prior to the reporting period, that have been reforested	90%	20%
				23	Percent of audited cutblocks harvested where post harvest CWD levels are within the acceptable natural range of variability (as stated in m3/ha).	100%	-10%
				2	Maintain "old forest" within each NDU (merged BEC)	Maintain average percent of total old forest and not go below minimum natural variation	Variances set as per the "Landscape Biodiversity Objectives for the PG TSA". Within range of natural variation
				37	Percentage of standards units declared annually that meet free growing requirements on or before the late free growing date.	100%	0%
	4.2 Forest Land Conversion	Maintenance of total forest land	Protect forestlands (within our jurisdiction) from deforestation or conversion to non-forests	25	The total of forested land within the Timber Harvesting Landbase that is converted to non-forest land.	< 5	0
				34	Percentage of harvested blocks > 1.0 ha harvested, 3 years prior to the reporting period, that have been reforested	90%	20%
			Maintain naturally occurring non-forested (non-treed)	21	Percent of cutblocks harvested having mappable non-forested types (>0.5 ha.) that are artificially converted to forested types through aforestation treatments.	100%	20%

CCFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
			types	22	Existing areas of non-forested types artificially converted to forested types	0 ha.	0 ha.

CCFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
Multiple Benefits to Society	5.1 Timber and Non-timber Benefits	Acceptable and feasible mix of a healthy forest industry and non-timber benefits.	Protect aesthetic values by ensuring that development proposals within designated scenic areas have a visual quality assessment completed.	38	Percent of licensee AAC harvested over a 5 year cut control period. Percent of BCTS volume offered over fiscal year. (Effective for the 2007/2008 reporting period) *PAG Concensus (March 10, 2008*)	100%	+/-10%
				39	Percent of cutblocks and roads harvested, in known scenic areas, which have visual assessments completed and implemented according to the recommendations	100%	None
			Protect culture & heritage values by ensuring that development proposals adjacent to cultural heritage features have an archaeological assessment completed.	40	Percent of blocks and roads harvested that are consistent with recommendations contained in site level archeological assessments.	100%	None
			Maintain opportunities to access non-timber benefits by ensuring that individuals and	41	The percent of individuals who have expressed an identified interest in forest planning are communicated with.	Annually, 100% of individuals that have expressed an interest forest planning must be communicated with.	10%
				43	General notification to request expression of interest (newspaper ad)	Annual notification	None

CCFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
			stakeholders who have expressed an identified interest in the planning area (guides, trappers, recreationists, water licensees, mining tenure holders etc.) are specifically communicated With, during forest planning	44	Annual Personal notification to every "known" non-timber licensed tenure holder (who does not fall into the above categories)	100%	0%
			Respect known subsistence uses (berries, hunting, fishing, medicinal plants), recreational/cultural trails/sites, spiritual sites	46	Percent of cutblocks and roads harvested that have incorporated information of known subsistence uses, recreational/cultural trails/sites, or spiritual sites that have been brought forward.	100%	20%
				68	Total percentage of forest operations that are consistent with a landscape level strategy for the management of recreational, commercial, and cultural trails as identified in the DFA.	100%	-20%
	5.2 Communities and Sustainability	Sustainable communities	To promote economic development opportunities for local people and businesses.	48	Percentage of operational forestry contract value in Dollars within the DFA serviced by north central British Columbia.	90%	-10%

CCFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
			Creating opportunities for local employment	49	Percentage of advertised employment opportunities published in the local paper.	100%	0
			Ensuring consistent and appropriate road deactivation within the AUTP.	70	Percentage of roads deactivated that meet the deactivation criteria.	100%	-20%
	5.3 Fair distribution of Benefits and Costs	Community benefits	Maintain a positive operating climate for local forestry-based resource businesses.	50	Percentage of bidding opportunities that are provided to qualified local forestry-based resource businesses	100%	0

CCFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
Accepting Society's Responsibility for Sustainable Development	6.1 Aboriginal and Treaty Rights	First Nation Aboriginal and Treaty Rights	Recognition and respect for Aboriginal and treaty rights	55	Solicit participation in forest management from local aboriginal communities for areas of overlapping interest.	Twice a year 100% of local aboriginal communities	0%
				56	Percentage of archeological assessments completed, on cutblocks and roads harvested during the reporting period, that have been referred to relevant aboriginal communities for review and comment prior to harvesting.	100%	0%
	6.2 Respect for Aboriginal Forest Values,	Interests of Aboriginal People	Manage for cultural values, and incorporate aboriginal	40	Percent of blocks and roads harvested that are consistent with recommendations contained in site level archeological assessments.	100%	None

CCFM Criterion	CSA SFM Element	Value	Objective	#	Indicator	Target	Variance
	Knowledge, and Uses		knowledge in forest management	59	~~Develop management strategies with the purpose of obtaining a list of important forest values and corresponding indicators from the first nations whose traditional territories in which the Licensees operate.~~ Percent of blocks and roads harvested by Licensees and BC Timber Sales that have bee previously referred to applicable First Nations. (Effective for the 2007/2008 reporting period) *PAG Concensus (Feb 4, 2008)*	~~Within 1 year of adopting the SFMP~~ 100% of blocks and roads harvested *PAG Concensus (Feb 4, 2008)*	~~6 months~~ 0%
	6.3 Public Participation	Public participation in the SFM process	A well designed and functioning public participation process	62	Sufficient and satisfied PAG membership	Membership minimum size of 8 as an indicator of level of satisfaction	-2 people
	6.4 Information for Decision Making	Adequate information to make informed decisions	Provide relevant information to interested parties	63	Percent of PAG SFM information gap inquiries responded to within 3 months.	100%	0
				~~64~~	~~A Fort St. James SFM website with the goal of providing SFM information to the community of Fort St. James and to the PAG members.~~	~~Functioning website by July 2006~~ Removed by PAG Consensus June 16, 2008	~~+/- 6 months~~

Appendix 4

The Licensee Landscape Objective Working Group Memorandum of Understanding

The Prince George Timber Supply Area Landscape Biodiversity Objectives Reporting Protocol July 2005

PG TSA Licensees'/BCTS Memorandum of Understanding on the Order Establishing Landscape Objectives for the Prince George Timber Supply Area

A. PREAMBLE

It has been a priority of the Northern Interior Region of the Ministry of Sustainable Resource Management (MSRM) to develop landscape level biodiversity objectives based on current research relevant to the PG TSA. MSRM elected to work with major licensees and BC Timber Sales in developing the objectives, and the Landscape Objectives Working Group (LOWG) was formed in October of 2002. The group is led by MSRM and includes representation of all major licensees in the PG TSA, including BCTS. The group collaborated to establish objectives that meet the needs of both government and the forest industry. The objectives for old forest, old interior forest and young forest patch size distribution were completed by the LOWG in June 2004. Significant achievements for both parties have been the development of aspatial objectives, and to provide licensees the opportunity to work cooperatively in achieving the objectives at a true landscape level.

Now that the objectives have been set, major licensees/BCTS need to prepare to deliver on the objectives. A collaborative approach offers benefits to the participants in terms of providing greater flexibility in harvesting of old and old interior forest, shared costs of landscape level analysis, and greater credibility in managing for landscape level biodiversity. For the purpose of achieving these benefits, the licensees of the LOWG formed their own group, known as LLOWG, and developed this Memorandum of Understanding (MoU).

B. MoU OBJECTIVE

1. To facilitate the collaboration of the signatory licensees in meeting landscape objectives for the amount of old forest, old interior forest, and young forest patch size distribution, in the PG TSA;

2. To provide evidence to government that PG TSA Licensees are working together to achieve the objectives.

C. PRINCIPLES

The undersigned PG TSA Licensees/BCTS agree to:

1. collective management of the old forest, old interior forest and young forest patch size objectives;

2. collective management of joint recruitment strategies, where the old forest and/or old interior forest objective will not be met in the short term;

3. individual licensee responsibilities to maintain the amount of old forest, old interior forest, or recruitment old/interior forest, as agreed between the licensees in the Natural Disturbance Unit/merged biogeoclimatic unit (NDU/BEC), as described in the Biodiversity Order;

4. roles and responsibilities in working collaboratively to meet landscape objectives for old forest, old interior forest, and young forest patch size distribution in the PG TSA, and;

5. support a Licensee Landscape Objectives Working Group (LLOWG) in order to collaborate, implement, monitor, and apply adaptive management in meeting landscape objectives.

D. ROLES AND RESPONSIBILITIES

Each signatory licensee/BCTS has the following responsibilities:

1. to provide a representative to participate in the Licensee LOWG (LLOWG);

2. to submit, as requested by LLOWG, an update of blocks that have been harvested;

3. to submit, as requested by LLOWG, an update of newly planned blocks;

4. to prepare plans that maintain old forest and old interior forest objectives, and trend positively toward meeting young patch size distributions, wherever possible;

5. as requested by other signatory licensees, to collaborate in the planning of old forest, old interior forest or young forest patches along licensee operating area boundaries;

6. as requested by other signatory licensees, to collaborate in planning recruitment strategies for NDU/BEC units, where old forest or old interior forest targets cannot be met in the short term, and;

7. to support the LLOWG by providing funding and/or resources, for projects that have been approved by the signatories, to facilitate implementation, monitoring and adaptive management of the landscape objectives.

E. NON-PARTICIPATING FOREST LICENSEES

1. Where licensees listed in the appendices are not signatories to this agreement, the amount of old and old interior forest is shown for information only. Surpluses or

deficits for non-signatory licensees are not managed through this MoU.

2. As **new volume based licences and licensees** are allocated to planning cells in the PG TSA, they will be included in the next update of the appendices. If the licensee is not yet a signatory to the MoU, the licensee will be given opportunity to become a signatory. In the interim, the new licensees will be expected to seek direction from the planning cells' previous operator in specifying the amount or location of old and old interior forest to be retained to meet the expectation of the MoU licensees. If the new licensee is not the sole operator for the area, they will be expected to perform as described below in 4.

3. As **new area based and community forest licences** are added to the landbase, their areas will be removed from the appendices at the time of updating. These tenures are not subject to the PG TSA Biodiversity Order. In the interim, if necessary, the previous licensees will manually calculate and remove the existing and target old forest from their areas.

4. Where **two or more signatory licensees operate in the same area**, they must collaborate in meeting the requirements for old and old interior forest retention for the area. Both licensees will apportion, or spatially assign, the old and old interior forest retention to be met for the area. The MoU licensees expect that government will withhold approval for a non-signatory licensee's plans that do not meet the reasonable expectations of signatory licensees for apportioned old and old interior forest.

F. IMPLEMENTATION, MONITORING AND ADAPTIVE MANAGEMENT

The Licensee LOWG will convene as required to fulfill the following objectives:

1. to update the current and future amount of old and old interior forest, and the licensee apportionment in the appendices (update harvested blocks, newly planned blocks, aging of forest, licensee operating area changes);

2. to assess current and anticipated future performance of the collective signatory licensees in meeting old forest, old interior forest and young forest patch size targets;

3. to undertake projects aimed at adaptive management;

4. to amend this MoU, as needed and agreed upon between the signatory licensees.

5. to recommend changes to the Landscape Biodiversity Order or its implementation, to MSRM.

G. OLD AND OLD INTERIOR FOREST TARGET

Appendix A and B show the target, current (March 31st, 2004) and expected future (all planned blocks harvested) amount of old and old interior forest by NDU/mBEC. In addition, Appendix B shows the licensee/BCTS apportioned amounts of old and old interior forest. Licensee/BCTS apportionment was calculated by applying the target percent to the licensee/BCTS' crown forest land base within the NDU/mBEC unit. Where parks or "existing volume" are located within the unit, the licensee/BCTS target amounts were reduced proportional to their crown forest land base.

Definitions:
Planned Development: development has been included in the appendices results.
New Development: development has not yet been included in the appendices results.
Licensee: includes BCTS

1. Where a **large amount** of surplus old and old interior forest exists within the NDU/mBEC (200 % surplus (current surplus/target) or >5,000 ha surplus), licensees/BCTS can proceed with planned and new development with no communication or interaction required with other signatory licensees.

2. Where a **moderate amount** of surplus old and old interior forest exists within the NDU/mBEC (150 % surplus or 1,000 - 5,000 ha), licensees can proceed with planned and new development with little communication or interaction expected. However, if a large amount of new development is planned to be completed prior to the next updating of the database, the licensee must query the other licensees in the unit to establish whether the combination of licensees' harvest activities will result in a deficit of old forest. If a deficit is forecasted, the proponent must resolve the deficiency, or develop and seek approval for a recruitment strategy for the unit with the other signatory licensees.

3. If only a **small amount** of surplus old and old interior forest exists within the NDU/mBEC (< 150 % or <1,000 ha), licensees may only proceed with planned development. New development must be incorporated in the next update of the appendices, or be communicated to the other forest licensees, to ensure that a deficiency is not created. If a deficiency is forecasted due to the new harvest planning, the proponent must resolve the deficiency with the other signatory licensees in the unit, or develop and seek approval from MSRM for a recruitment strategy for the unit.

4. Where a **deficiency** in old or old interior forest exists within the NDU/mBEC, licensees will not apply for new cutting permits until the deficiency is resolved, or a recruitment strategy is approved for the unit.

H. YOUNG FOREST PATCH SIZE DISTRIBUTION

Appendix A and B contain the target, current (March 31st, 2004), expected future and trend in young forest patch size distribution by NDU/Forest District.

1. The LLOWG will provide rationale to MSRM for those units and patch sizes that are not trending toward the targets when the appendices are updated.

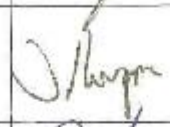
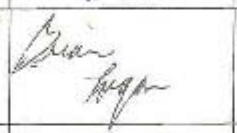
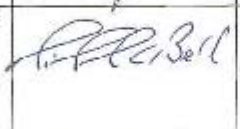
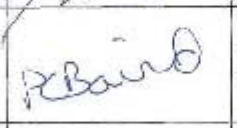
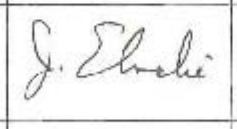
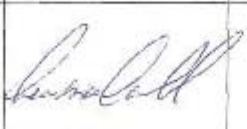
I. BUDGET

Prior to undertaking contract projects, the signatory licensees must agree to the budget and cost allocation of the project.

N.B. The expected cost to update the analysis results in the appendices once between June 2004 and June 2005 is approximately $10,900.

Agreed to the above are:

Licensee	Signature	Name/Title	Licensee Contact Info
Apollo Forest Products Ltd. & Ta Da Chun Timber Ltd.		MANAGER	Darwyn Koch dkoch@apolloforest.com 996-8297 Tachie Rd. Fort St. James
BC Timber Sales - Vanderhoof		TIMBER SALE MANAGER	Leone MacDonald Leone.MacDonald@gems6 gov.bc.ca 567-6363 1522 E. Highway 16 Vanderhoof
BC Timber Sales – Prince George		ACTING TIMBER SALES MANAGER	Sharon Dow Sharon.Dow@gems8.gov.bc.ca 614-7400 2000 S. Ospika Blvd. Prince George
Canfor FSJ Operations		Kolin Ulrich Woodlands Manager	Annette Constabel Annette.Constabel@canfor.com 996-5465 Takla Road Fort St. James
Canfor PG Operations & Consortium #6		Peter C. Baird Strategic Planning Manager	Kerry Deschamps Kerry.Deschamps@canfor.com 962-3276 5162 Northwood Pulpmill Rd., Prince George
Canfor Houston Operations			~~Jim McCormack~~ ~~Jim.McCormack@canfor.com~~ 845-5225 1397 Morice River Rd. Houston

Licensee	Signature	Name/Title	Licensee Contact Info
Canfor Vanderhoof Operations		Woods Limits Maintenance	Terry Lazaruk Terry.Lazaruk@canfor.com 567-4725 1359 Boarbend Rd. Vanderhoof
Carrier Lumber Ltd.		Woodlands Manager	Bernard Tobin btobin@carrierlumber.bc.ca 563-9271 203-1717 3rd Ave. Prince George
L&M Lumber Ltd.		Woods Manager	Stuart Sinclair ssinclai@hwy16.com 567-2111 1241 W. Highway 16 Vanderhoof
Lakeland Mills Ltd.		Woods Manager	Brian Logan blogan@lakelandmills.bc.ca 564-6810 1385 River Road Prince George
Sinclair Group (Planning Cells in the Fort St. James District)		Woods MANAGER	Darwyn Koch dkoch@apolloforest.com 996-8297 Tachie Rd. Fort St. James
Stuart Lake Lumber Co. Ltd.		Woods Manager	Christie Willmot christiewillmot@stuartlakelumber.com 996-8259 700 Stuart Lake Lumber Rd. Fort St. James
Takla Track and Timber Ltd.		Peter C. Baird Strategic Planning Manager	Kerry Deschamps Kerry.Deschamps@canfor.com 962-3276 5162 Northwood Pulpmill Rd Prince George
The Pas Lumber Co. Ltd. doing business as Winton Global		Woodlands Manager	David Jewesson david@paslbr.bc.ca 562-3361 1850 River Rd. Prince George
Fraser Lake Sawmills, a division of West Fraser Mills, Ltd.		Woods manager	Dean MacDonald dean.macdonald@westfraser.com 699-6235 P.O. Box 100 Fraser Lake, BC

Prince George Timber Supply Area
Landscape Biodiversity Objectives
Reporting Protocol
July 2005

The following reporting protocol has been discussed and agreed to by the members of the Landscape Objectives Working Group, made-up of

Forest Licensees and BC Timber Sales, as represented by:
- Canadian Forest Products Ltd. (PG and Vanderhoof Operations)
- BC Timber Sales (Vanderhoof, PG and Fort St. James)
- Carrier Lumber Ltd.
- Lakeland Mills Ltd.
- Winton Global
- Fraser Lake Sawmills
- L&M Lumber Ltd.

AND

BC Government, as represented by:
- Integrate Land Management Bureau, Northern Interior Region staff,
- Ministry of Forests and Range, Northern Interior Region's Ecologist, and Stewardship staff at the Prince George, Fort St. James and Vanderhoof forest Districts
- Ministry of Environment staff

The proposed reporting formats are indicated below. It is anticipate that these may be modified and made more explicit as the reporting protocol is implemented. The following products will be produced and provided for Summer 2005:
- map products at about 1:250,000 scale (paper copies, plot files)
- ArcInfo coverages (e.g. consolidated disturbance layer, Crown Forested Land Base, old and interior old forest layer)
- database (.mdb format and resultant similar to what is provided in Timber Supply Review database and Natural Range of Variability analysis for the Landscape Objectives Working Group database)
- tables (paper and .xls files)

The content of the above products are anticipated to contain information similar to the products produced during the LOWG development process. That is, maps would include operating areas, old growth management areas (where appropriate), areas where interior forest conditions are being met, young seral patches and recruitment areas (where appropriate). Tables would include the detailed numbers for how each of the objectives is met by each licensee and how each of the licensees roll-up to meet the objectives for the merged BEC units. The standards/methodology/assumptions used to generate each of the products will be provided.

A listing of all data sources for depletion information should be included (all replaceable forest licensees, non-replaceable forest licensees, salvage non-replaceable forest licensees contributing to the depletion data); this maybe the same as the signatories to the PG TSA Licensees / BC Timber Sales Memorandum of Understanding.

The products will be provided to Ministry of Sustainable Resource Management who will share with other government agencies, as required. The information is considered to be public; however, the Forest Licensees will be provided opportunities to lead in sharing the information with other tenure holders, groups (Public Advisory Groups, Land and Resource Management Plan Tables, etc.) and other stakeholders.

1. Old Forest and Interior Old Forest:

In order to demonstrate old forest and interior old forest objectives are being achieved, the Forest Licensees and BC Timber Sales will provide to the BC Government the following information, at the times indicated in Table 1.

Table 1: Reporting for old forest and interior old forest objectives.

Reporting out Date	reporting out items		
	MAPS	TABLES	
Summer 2005	Map of old and interior old for 2005 (all units)	Table of old and interior old for 2005 (all units)	Table of forecast of range of anticipated drawdown for 2010 (all units)
Summer 2006	Map of old and interior old for 2006 (priority units)	Table of old and interior old for 2006 (priority units)	Table of forecast of range of anticipated drawdown for 2011 (priority units)
Summer 2007	Map of old and interior old for 2007 (all units)	Table of old and interior old for 2007 all units)	Table of forecast of range of anticipated drawdown for 2012 (priority units)
Summer 2008	Map of old and interior old for 2008 (priority units)	Table of old and interior old for 2008 (priority units)	Table of forecast of range of anticipated drawdown for 2013 (priority units)
Summer 2009	Map of old and interior old for 2009 (all units)	Table of old and interior old for 2007 all units)	Table of forecast of range of anticipated drawdown for 2014 (priority units)

2. Young Forest Patch Size Distribution:

In order to demonstrate that the young forest patch size distribution objectives are being achieved the Forest Licensees will provide to the BC Government the following information at the times indicated in Table 2.

Table 2: Reporting for young forest patch size distribution objectives.

Patch Size:

Reporting out Date	reporting out items	
Spring 2005	Map of young patch size 2005 (all units)	Table of young patch size for 2005 (all units)
Spring 2010	Map of young patch size for 2010 (all units)	Table of young patch size for 2010 (all units)

A strategy will be developed by the Licensees Landscape Objective Working Group, to assist operational planners, working with the Forest Licensees and BC Timber Sales, to assess how new harvest block proposal will fit with existing young patch size distribution.

Adopted by Landscape Objectives Working Group:

This Reporting Protocol will be reviewed annually or as requested by either the Licensees / BC Timber Sales OR the BC Government.

Appendix 5

Licensee SFMP Memorandum of Understanding

FSJ-SFMP MOU

Fort Saint James Sustainable Forest Management Plan (FSJ-SFMP) Memorandum of Understanding

Background

Forest Licensees and BCTS operating in the Fort Saint James Forest District have agreed to participate in the development of a collaborative SFMP that may then be used by each company towards partial fulfillment of the CSA certification requirements (Z809-02 Standard). Similar processes are underway in Vanderhoof and in Prince George. Participation in the development of the FSJ-SFMP will require each licensee to work within a public process to jointly develop SFM measures and targets. The partnering Licensees and BCTS will use the SFM measures and targets to monitor progress, publicly report, and promote continuous improvement of the FSJ-SFMP over the term of the Plan.

Objectives

The FSJ-SFMP partners agree to the following objectives:

1. To jointly develop an SFMP covering a defined forest area within the Fort Saint James Forest District that meets the requirements of the CSA SFM standard (Z809-02). ***Note:*** *Although the SFM Plan will be developed using the CSA standard, it is expected that the resulting plan will achieve many of the requirements of the Sustainable Forest Initiative (SFI) as well. Each licensee will decide for themselves the brand and timing of certification if any.*
2. To work together over the term of the agreement to fulfill the FSJ-SFMP commitments including, data collection and monitoring, delivery of implementation strategies, participating in public processes, producing public reports, and continuous improvement.

Term

The term of this agreement is 4 years, expiring on February 8, 2009. The agreement may be amended from time to time to accommodate change as directed by the steering committee.

FSJ-SFMP Partnership

In this MOU, "Licensee" refers to a party required to prepare a forest development plan under the Forest Practices Code of British Columbia Act or a forest stewardship plan under the Forest and Range Practices Act.

FSJ-SFMP MOU

FSJ-SFMP Partners

1. Canadian Forest Products Ltd. – Fort Saint James Division
2. Canadian Forest Products Ltd. – Houston Division
3. Canadian Forest Products Ltd. – Vanderhoof Division
4. Canadian Forest Products Ltd. – Prince George Division
5. Apollo Forest Products Ltd.
6. Winton Global Ltd.
7. Lakeland Mills Ltd.
8. L&M Lumber Ltd.
9. Stuart Lake Lumber Ltd.
10. Ta Da Chun Timber Ltd.
11. Carrier Lumber Ltd.
12. BCTS – Stuart Nechako Business Area
13. Takla Track and Timber Ltd.
14. Tanizul Timber

FSJ-SFMP Steering Committee

1. Canfor – Phil Smith/Annette Constable
2. Sinclar Group – Darwyn Koch
3. Stuart Lake Lumber – Christie Hoy
4. Carrier Lumber – Kevin Bedford
5. BCTS – Leone MacDonald
6. Canfor – Houston – Glenn McIntosh

Public Advisory Group
Facilitator
Public Group

Technical Advisory Group
Independent Experts
Government Experts

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FSJ-SFMP MOU

Business Case

Although the initial reason for the FSJ-SFMP is to promote SFM certification there are other value added benefits. The significant benefits of the FSJ-SFMP are described below:

1. Maintain market access through SFM certification of chip and log supply.
2. Streamlining government and industry planning processes.
3. Enhancing local public acceptance of our practices.
4. Leveraging value from our collective effort.

Maintain market access through SFM certification of log and chip supply
Time Inc. has recently announced that by 2006 they will require their Canadian pulp supply to be SFM certified. The Prince George Pulp Mills have made commitments to their customers to supply SFM certified pulp and have intern asked their suppliers to deliver SFM certified chips. Other influential customers such as The Home Depot and Centex Homes are also considering such requirements for solid wood products. Supporting the FSJ-SFMP will provide a significant part of the requirement to become SFM certified under either the CSA or the SFI standards.

Streamlined government and industry planning processes
Streamlining the planning processes by providing for a collaborative central plan will reduce costs, reduce confusion, and increase effectiveness of forest management practices across many "shared" landscapes. The results based forest practices code (FRPA) will provide opportunities for companies to collaborate on innovative solutions, which can reduce our costs and provide much more flexibility to access the timber resource. However these opportunities can only be accessed provided the industry could demonstrate the cumulative impact of forest practices in any given landscape.

Enhancing public acceptance of our practices
The FSJ-SFMP will promote meaningful public involvement by providing a process that is inclusive and transparent, and where accountabilities are clear. The FSJ-SFMP process will provide confidence in forest management at the local community level. If there is no venue for public discussion of forest management then resource managers will bear the brunt of public dissatisfaction with unresolved issues.

Leveraging value from our collective effort
Companies interested in SFM certification (particularly CSA) and that are facing the requirements of the Forest Stewardship Plan will have a fixed cost to produce and maintain these plans. It makes sense to join together at this time to collaborate towards a common SFM Plan and share the fixed cost over time. This is the most cost effective solution.

Basic Principles

Time Frame
Target completion date for the development of the SFM Plan including indicator and objectives development, forecasting, and monitoring and reporting protocols is October 31, 2005.

Agreement between Participants
All decisions related to the development and maintenance of the SFM plan will be by consensus of all participants. If consensus cannot be reached then a majority vote will decide the issue.

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Indicators
Where possible, existing publicly developed indicators will be used. Where additional indicators are required to meet the standard, efforts will focus on currently available and practical data / research. We will agree on a set of draft indicators to take to the public.

Funding
It is anticipated that all of the development costs (PAG, resource analysis, document preparation, etc.) will be funded through the licensees Forest Investment Accounts (FIA). Where SFMP projects are ineligible for alternate funding sources, the licensee team will review the project scope and related costs. If required, the licensee team will develop a mechanism for allocating of costs.

Facilitator
A facilitator will be hired to co-ordinate and run public meetings, provide support and information to public members as needed and arrange for technical experts as required.

New Partners
The licensee team will attempt to incorporate newly formed forest tenure holders into this agreement and the SFMP. This agreement may be amended by the Steering Committee at anytime to accommodate other licensees operating in the DFA.

In recognition of past licensee costs incurred by the partnership in the development of the SFMP, new partners may be required to pay a one-time start-up fee to be included in the SFMP. Costs associated with FIA funded projects will not be carried forward to new partners. The new partner will also be required to pay their share of the annual costs associated with maintaining the SFMP. Funds recovered through the addition of new partners will be used to offset future projects related to this SFMP.

Termination

Since successful implementation of the SFMP and maintenance of subsequent SFM certification registration will be dependent on the participants fulfilling obligations specified in this MoU, six months notice will be provided to the signatories of this MoU prior to withdrawal by a participant. This notice will provide the remaining signatories the opportunity to develop action required to maintain SFM certification registration.

Roles

Steering Committee
The Steering Committee will provide corporate direction on the development of the FSJ-SFMP. The Steering Committee will be actively involved in the public participation processes, gathering and evaluating data, reporting, continuously improving the plan over time, and ensuring that the FSJ-SFMP commitments are implemented within their organizations. The Steering Committee will meet at least once per year to review this agreement, continuous improvement, and any other business related to the FSJ-SFMP.

Public Advisory Group (PAG)
The Steering Committee will form a PAG and retain a facilitator to manage the meetings and complete a Terms of Reference. The role of the PAG is to provide the Steering Committee with public input on the Values, Objectives, Indicators and Targets that will form the basis of the FSJ-SFMP consistent with the terms of the CSA Standard (Z809-02).

FSJ-SFMP MOU

Technical Advisory Group (TAG)
The Steering Committee will ask experts to assist in the development of the FSJ-SFMP. Experts may be used to assist directly in the development of Values, Objectives, Indicators and Targets, present technical concepts to the PAG, or analyze and forecast information. Experts from government agencies or the private sector may be involved in the FSJ-SFMP at the request of the Steering Committee. The use of experts will be consistent with the terms of the CSA Standard (Z809-02).

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FSJ-SFMP MOU

Signatures

Forest Company	Name & Title	Signature
Canadian Forest Products Ltd. Fort St. James Operations	Kalin Uhrich Woodlands Manager	
Canadian Forest Products Ltd. Prince George Operations	Peter Baird Strategic Planning Manager	
Canadian Forest Products Ltd. Vanderhoof Operations	Bob Montague Woodlands Manager	
Canadian Forest Products Ltd. Houston Operations	Tim Smith Woodlands Manager	
Takla Track and Timber	Gerry Fraser Operations Manager	
Apollo Forest Products Ltd. Winton Global Ltd. Lakeland Mills Ltd. L&M Lumber Ltd. Ta Da Chun Timber Ltd.	Mike Bell Woodlands Manager	
Stuart Lake Lumber	Andy Little Woodlands Manager	
Carrier Lumber Ltd.	Terry Kuzma Woodlands Manager	
BCTS – Stuart Nechako Business Area	Ian Hamann Timber Sales Manager	
Tanizul Timber (TFL 42)	Allan McDonald Woodlands Manager	

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Appendix 6

FRPA Section 7 Order/Notice for the Fort St. James Forest District

BRITISH COLUMBIA

NOTICE – INDICATORS OF THE AMOUNT, DISTRIBUTION AND ATTRIBUTES OF WILDLIFE HABITAT REQUIRED FOR THE SURVIVAL OF SPECIES AT RISK IN THE FORT ST. JAMES FOREST DISTRICT

This Notice is given under the authority of section 7(2) of the *Forest Planning and Practices Regulation* (B.C. Reg. 14/04) and 9(3) of the *Woodlot Licence Planning and Practices Regulation* (B.C. Reg. 21/04).

The following Notice includes indicators of the amount, distribution and attributes of wildlife habitat required for the survival of the species at risk outlined in Schedule 1.

Approved Wildlife Habitat Areas are not included in the indicators of amount, distribution and attributes for each of the species outlined in Schedule 1. As per section 7(3) of the *Forest Planning and Practices Regulation*, forest tenure holders are exempt from the obligation to specify a result or strategy in relation to the objective set out in section 7(1) of the *Forest Planning and Practices Regulation*, for approved Wildlife Habitat Areas.

This Notice applies to the Fort St. James Forest District.

Schedule 1

1) Northern Caribou (*Rangifer tarandus caribou*)

Amount

- Must not exceed an impact to the mature timber harvesting landbase of 9,800 ha.

Distribution

- Northern caribou herds distributed within the Southern Mountain National Ecological Area - map-based depiction in the *Accounts and Measures for Managing Identified Wildlife* (Identified Wildlife Management Strategy Version 2004).
- SAR Elements for northern caribou are generally distributed in locations as described below:

SAR Elements	*BEC Unit*	*Size*	*Comments*
Calving Range	At, ESSF	50-300ha	May overlap spatially with calving range, rutting range, connectivity matrix, or ungulate winter range
Rutting Range	At, ESSF	50-300ha	
Connectivity Matrix	SBS, BWBS	Matrix should be 2km wide and at least 5km long (1,000ha)	
Mineral Lick	Any	50ha	None identified.

Habitat Attributes:

- **Calving and Rutting Range** - Flat or convex shaped, vegetated alpine (i.e., not rock) sites with south or westerly aspects. Alternatively, arboreal lichen associated sites in mature to old, sub-alpine fir stands with moderate slopes.
- **Mineral Lick** – Any dry or wet mineral lick used by caribou (note: none have been made known in the Ft. St. James FD).
- **Connectivity Matrix** – Low elevation, intermediate/mature forest cover following major rivers.
- **Anti-predation Matrix** – Forested areas adjacent to winter ranges that are managed to discourage: 1) intensive activity by humans (100 m buffer) and 2) an abundance of moose and wolves (5 km buffer).

SAR Element	*Slope*	*Forest Cover*	*Stand Age*	*Elev m asl*	*Other*
Calving Range Rutting Range	<40%	Al, Not rock	Na	Na	Convex rather than concave topography
		Ba overstory	>120	>1000	
Connectivity Matrix	<30%	Forested	>40 (if shrub dominated)	<1000	Buffer major rivers 1km each side
Anti-predation Matrix	Na	Forested	>40 (if shrub dominated)	Na	No linear corridors within 100 m of habitat Stand age conditions to be met within 5 km of habitat

2

BRITISH COLUMBIA

NOTICE – INDICATORS OF THE AMOUNT, DISTRIBUTION AND ATTRIBUTES OF WILDLIFE HABITAT REQUIRED FOR THE WINTER SURVIVAL OF UNGULATE SPECIES IN FORT ST. JAMES FOREST DISTRICT WITHIN THE PRINCE GEORGE TIMBER SUPPLY AREA

This Notice is given under the authority of section 7(2) of the *Forest Planning and Practices Regulation* (B.C. Reg. 14/04) and 9(3) of the *Woodlot Planning and Practices Regulation* (B.C. Reg. 21/04).

The following Notice includes indicators of the amount, distribution and attributes of wildlife habitat required for the winter survival of the ungulate species outlined in Schedule 1.

This Notice applies as specified within the Fort St. James Forest District portion of the Prince George Timber Supply Area.

Schedule 1

Fort St. James Forest District within Prince George Timber Supply Area

Ungulate Species:
Northern Caribou and Mountain Goat

Amount

I) Northern Caribou

- A maximum of 89, 834 ha

II) Mountain Goat

- A maximum of 18, 098 ha

Not exceeding a net impact to the timber harvesting landbase for both species of

- 37,205 ha, including consideration of the direction for Northern Caribou management as outlined in the Fort St. James Land and Resource Management Plan.

Distribution

I) Northern Caribou

- Ungulate winter ranges are generally distributed in locations at both high- and low-elevations as described below:

UWR Type	BEC Unit	Size	Comments
High elevation	AT ESSF	50-300 ha	Attribute may overlap with calving range, rutting range, or connectivity

- 1 -

Low elevation	SBSdk, SBSdw3	50-300 ha	matrix

II) Mountain Goat

The amount of habitat referenced above must be distributed to provide:

- Provide winter range habitat in areas of steep rocky escape terrain according to the attributes identified below.

Attributes

I) Northern Caribou

- **High-elevation range** – Flat or convex shaped, vegetated alpine (i.e., not rock) sites with south or westerly aspects. Alternatively, arboreal lichen associated sites in mature to old, sub-alpine fir stands with moderate slopes.
- **Low-elevation range** – Areas with abundant terrestrial lichen forage. Dry nutrient poor, mature pine stands on flat ground or low slopes with east-south-west aspects where these stands are located in low elevation, low snow accumulation areas.
- **Anti-predation Matrix** – Areas adjacent winter ranges managed to discourage: 1) intensive activity by humans (100 m buffer) and 2) an abundance of moose and wolves (5 km buffer).

UWR Type	*Forest Cover*	*Stand Age*	*Tree Ht.*	*Stocking*	*Nutrient Regime*	*Moisture Regime*	*Slope*	*Aspect*	*Elev m asl*	*Bec Unit*	*Other*
High Elevation	AT	Na	Na	Na	Na	Na	<40%	Na	Na	At (not rock), ESSF	Convex rather than concave topography
	80% Ba	>120	>15m	Na	Na	Na	Na	225°-360°	>1200		
Low Elevation	>90% Pl	>70	Na	Low	0-2	A-B	<5%	flat	<1000	SBSdk, SBSdw3	Na
							>5%	45°-315°			
Anti-predation Matrix	Forested	>40 (if shrub dominated)	Na	Na	Na	Na	Na	Na	Na	Na	No linear corridors within 100 m of UWR. Stand age conditions to be met within 5 km of UWR

II) Mountain Goat

1) Escape terrain
   - Rock outcrops or cliffs that provide good visibility for vigilant goats and are sufficiently rugged to be generally inaccessible to predators
   - Slopes >30° and <60°

2) Accessible and abundant forage in close proximity to escape terrain
   - Areas of low snow-loading that allow goats to access available forage:
     - Forest canopies with high snow interception characteristics in coastal or transition areas, and/or
     - Warm, southerly aspects with high melt and snow-shedding characteristics in coastal and transition areas, and/or high-exposure, windswept slopes in transition areas
     - Areas that provide high quality forage, e.g., rooted forage versus litterfall

3) Evidence of winter use by mountain goats or use by mountain goats in nearby areas

Appendix 7

Forecasting Assumptions and Scenario Analysis Results

SFM Indicator Forecasting for the Ft. St. James District-wide SFM Plan

Data Package and Basecase Report

March 7, 2006

Prepared for:
Ft. St. James Licensee Group

A Project Submitted by: Forest Ecosystem Solutions Ltd.
227-998 Harbourside Drive
North Vancouver, BC V7P 3T2

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Introduction

This report contains the overview of data inputs, assumptions, baseline values, results and interpretations from the scenario and forecasting project in support of the development of the sustainable forest management plan and the application for certification under the Canadian Standards Association.

Data Preparation

The following information provides a description of the key data and assumptions that were used in the forecasting of scenarios presented in this report. There are numerous other detailed assumptions that apply to these analyses and if readers are interested they could refer to the documents listed below.

The base data used for this analysis was compiled during the 2004 Natural Disturbance Unit analysis conducted for the Prince George TSA. This data was supplied in the form of 33 individual landscape unit Arc overages. These datasets were developed from the TSR II analysis, and also used in the 2004 Expedited Timber Supply Review. Input data was updated to reflect the most current available information for the following elements;

- Caribou Habitat
- Mule Deer Habitat
- Recent Depletions (up to March 31st, 2005)
- Sustut LRUP Preservation Zone
- Visual Preservation Areas

Previous analysis projects that used these datasets were conducted using an aspatial model. For the Ft. St. James SFM Indicator Forecasting project, FESL's proprietary spatial model Forest Simulation and Optimization System (FSOS) was used. A significant amount processing was required to adapt the datasets for use with FSOS.

Number of Polygons / Polygon Size

Initially the resultant dataset had over 1 million polygons, of which approximately ½ were less than .5 ha in size. In order to provide meaningful spatial results the total number of polygons had to be reduced. GIS processes were used to initially eliminate and remove many of the small sliver polygons.

Aspatial Riparian Reserves and Management Zones

To further reduce the number of polygons, the riparian buffers and reserve zones were removed from the dataset. Through a process referred to as 'rating', the area of the resulting polygons contained within the riparian areas was then calculated, and the timber harvesting landbase in those polygons was reduced accordingly.
The result of this spatial processing was a resultant with slightly over 300,000 polygons, reduced from over 1,000,000 polygons.

Definition of the timber harvesting landbase

A new timber harvesting landbase area was calculated based on the area netdown reductions from the 2004 Expedited TSR and the 2004 PG TSA NDU analysis being run on the updated dataset. The following describes the types of land that do not contribute to the timber harvesting land base. Table 1 summarizes the areas in each category, and shows the area of the timber harvesting land base.

- non-forest areas — areas not occupied by productive forest cover (e.g., rock, swamp, alpine areas and water bodies).
- woodlots — Crown managed productive forest excludes woodlots, which are not administered as part of the TSA for AAC determination.
- land not managed by the B.C. Forest Service — non-Crown areas such as private land, Indian reserves, federal and municipal lands.
- parks and eco-reserves — areas not administered by the B.C. Forest Service, but explicitly identified since they contribute to landscape-level biodiversity* objectives.
- non-commercial areas — areas occupied by non-commercial brush species.
- lake and riparian area* — areas unavailable for harvesting to provide protection for riparian habitat, stream ecosystems, and lakeshores.
- physically inoperable areas* — forested areas that are considered inoperable based on slope, and surficial geology information.
- problem forest types* (PFT) — stands which are physically operable and exceed low site criteria yet are not currently utilized or have marginal merchantability, such as leading-black spruce stands.
- economically inoperable — geographically– identified areas with projected high operating costs.
- high value recreation areas.
- non-merchantable forest types* — conventionally accessible stands that generally have less than 120 cubic metres per hectare at maturity, or cable or aerial accessible stands that have less than 200 cubic metres per hectare at maturity, are excluded.
- immature stands on low sites — areas occupied by younger forests with low timber growing potential.
- Caribou Habitat – areas identified as High value Caribou habitat, or caribou corridors.
- Ungulate Winter Range – area identified as u-7-003 removed from THLB.

Table 1 Netdown Table

	Area (ha)
Total District Area	3,084,653
Non Crown Forest	976,456
Reserve	4,706
Non Forest	26,555
Private Crown Grant	17,392
Small Leases	20
Woodlots	2,768
Crown Forested Landbase	**2,056,758**
Reductions to CFLB	
Non Commercial	22,221
Non Merchantable	76,277
Parks and Protected Areas	90,194
Isolated High Cost Planning Cells	990
Physically Inoperable	2,418
Economically Inoperable	204,710
RMZ	465
Visual Preservation Area	1,229
Caribou Habitat	9,772
ESA's	125,644
Semi Spatial Reductions (Roads, Trails, Landings, Riparian, IWAP)	177,863
Current Timber Harvesting Landbase	**1,344,976**
Future Roads, Trails and Landings	2,985
Long Term Timber Harvesting Landbase	**1,341,991**

Table 2 compares the timber harvesting and non-timber harvesting landbase used in previous analysis projects, with the areas used in this project. The THLB area calculated for this analysis is less than .5 percent greater than that used in the NDU Analysis. This variation is considered to be well within acceptable limits. Areas vary from the TSR II figures by a greater percentage. This is largely due to updates in the data, and assumptions.

Difference between the assumptions include changes to deciduous stand inclusion, Wildlife tree patch percentages, road reductions, Identified wildlife management areas, the McLeod Lake Treaty area.

Table 2 Area comparison

	TSR II	NDU Analysis	2005 SFM Indicator Analysis
Timber Harvesting Landbase (ha)	1,340,200	1,340,199	1,344,976
Non-Contributing Landbase (ha)	695,921	695,921	711,782
Crown Forested Landbase (ha)	2,036,121	2,036,120	2,056,758

Management Assumptions

With the exception of Mountain pine beetle, the management assumptions used in 2004 ExTSR, and the 2004 NDU Analysis will be carried through to this analysis. Below is a brief description of the key assumptions;

1. WTPs – 3.5% of the THLB (TSR II Addendum run)
2. Roads, Trails, Landings – PG Current 5.7%, Future 5.7, FSJ Current 5.6%, Future 5.7% (2004 NDU)
3. Old Forest Constraints – Natural Disturbance Unit based old seral targets (2004 NDU).
4. Deciduous partition - deciduous leading and >= 17.7m site index included in THLB (2004 NDU).
5. Natural Disturbance in the inoperable landbase – use Disturbance rates based on professional knowledge and analysis from Craig DeLong, Regional Ecologist, Ministry of Forests, Prince George, 2003
6. Supply Block A Partition – 400,000 m3 /yr for the first three years of the planning horizon.

Other assumptions will be as per TSR II / Beetle II analysis.

Natural Disturbance Unit (Old Forest Targets)

Table 3 Old Forest NDU Targets

Unit Label	Natural Disturbance Unit	Merged Biogeoclimatic Unit	Minimum Percent of the CFLB retained as old forest
E1	Moist Interior Mountain	ESSF mv1, ESSF mvp1, ESSF mv3	41%
E2	Moist Interior Plateau	SBS dk	17%
E3	Moist Interior Plateau	SBS mc2	17%
E4	Moist Interior Plateau	SBS mk1, SBS wk3	12%
E5	Moist Interior Plateau	SBS dw3	12%
E6	Northern Boreal Mountains	ESSF wvp, ESSF mcp, ESSF mc, ESSF wv	37%
E7	Northern Boreal Mountains	SWB mks, SWB mk	37%
E8	Omineca - Mountain	SBS mc2	26%
E9	Omineca - Mountain	ESSF wvp, ESSF wv, ESSF mcp	58%
E10	Omineca - Low Elevation	SWB mks, SWB mk, ESSF mc	41%
E11	Omineca - Low Elevation	ESSF mvp3, ESSF mv3	41%
E12	Omineca - Low Elevation	SBS dk, SBS dw3	16%
E13	Omineca - Low Elevation	ICH mc1	23%
E14	Omineca - Low Elevation	BWBS dk1	16%
E15	Omineca - Low Elevation	SBS mc2	16%
E16	Omineca - Low Elevation	SBS mk1	16%
E17	Omineca - Low Elevation	SBS wk3	16%

Table 4 Old Forest Non-Pine Leading Targets

Unit Label	Natural Disturbance Unit	Merged Biogeoclimatic Unit	Minimum Percent of the CFLB retained as old forest	Minimum percent of the CFLB retained as old non-pine leading forest
E1	Moist Interior Mountain	ESSF mv1, ESSF mvp1, ESSF mv3	41%	33%
E2	Moist Interior Plateau	SBS dk	17%	13%
E3	Moist Interior Plateau	SBS mc2	17%	10%
E4	Moist Interior Plateau	SBS mk1, SBS wk3	12%	4%
E5	Moist Interior Plateau	SBS dw3	12%	6%

Zone or Group	Max Allowable Disturbance Area	Green-up Height (meters)	Minimum Retained Area (%)	Minimum age for retention (years)
VQO – retention	4	5	N/A	
VQO – partial retention	11	5	N/A	
VQO – modification	21	5	N/A	
VQO – max modification	33	5	N/A	
Caribou – As per UWR Orders				
Other IMA	20	3		

Mountain Pine Beetle

The mountain pine beetle epidemic was modeled using the provincial spread projections. Each resultant polygons was assigned a percent killed / percent pine volume lost for each year. The percent pine volume lost was then multiplied by the projected shelf-life (using conservative assumptions by dry, medium and moist sub-zones). The result was a percent of usable pine volume by polygon for year of the first 30 years of the model. See Appendix 1 for a detailed description of the assumptions used in modeling the MPB epidemic.

Analysis Units

The analysis units used in this project as based on the broad species groupings used in previous analyses. In order to facilitate the FORECAST indicator modeling and the more detailed approach to modeling the mountain pine beetle epidemic, further refinement of the analysis units was required. Analysis units for this project are made up of five characters, as indicated below. The criteria to define each analysis unit is shown in

1	2	3	4
Natural or Managed	Inventory Type Group	Site Index	Pine Percent

Origin		Inventory Type Grp.		Site Index		Percent Pine	
No.	Description	No.	Description	No.	Description	No.	Description
1	Natural	1	ITG (1 - 8)	1	All SI	1	< 10%
2	Managed					2	<= 10%
		2	ITG (9 - 11)	1	All SI	1	All
		3	ITG (12 - 17)	1	All SI	1	All
		4	ITG (18 - 24)	1	All SI	1	All
		5	ITG (21 - 26)	1	SI <= 11.9	1	< 10%
				2	SI > 11.9	2	<= 10%
		6	ITG (27 - 34)	1	All SI	1	<= 50 %
						2	50 - 80 %
						3	>= 80 %
		7	ITG (35 - 42)	1	All SI	1	< 10%
						2	<= 10%

Growth and Yield

All growth and yield assumptions were taken directly from 2004 ExTSR. "Two growth and yield models were used to estimate timber volumes for the Ft. St. James District. The variable density yield prediction (VDYP) model* supported by the Ministry of Sustainable Resource Management, Terrestrial Information Branch, was used for estimating volumes in unmanaged coniferous stands and both unmanaged and regenerating deciduous stands. The table interpolation program for stand yields (TIPSY)*, developed by the B.C. Forest Service, Research Branch, was used to estimate yields for coniferous managed stands. In the analysis, managed stands were defined as coniferous stands aged 12 years or younger. Where regenerating stands included a mix of coniferous and deciduous species, yield curves were developed by combining values from TIPSY and VDYP."

Current Conditions

The following figures describe the current conditions of the landbase. The Ft. St. James district is heavily weighted to Balsam, Spruce and Pine analysis units.

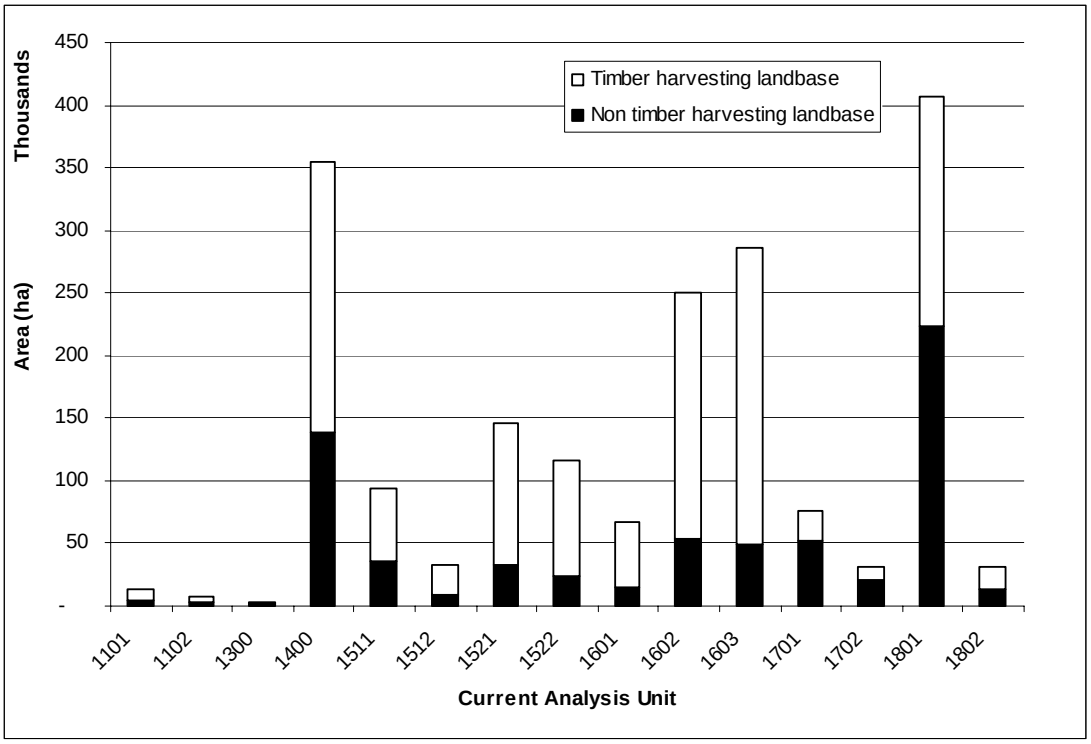

Figure 1 Area by analysis unit (Natural stands)

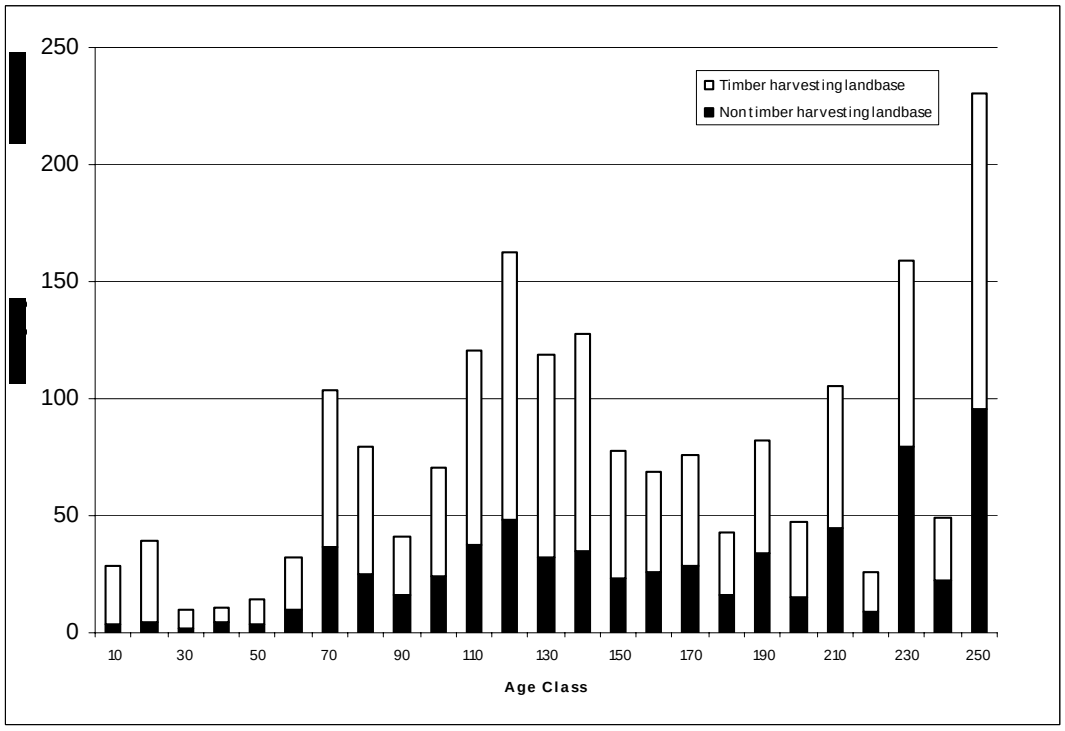

Figure 2 Area by age class

Results

Forecasted harvest levels of the Draft SFM Base Case are shown in Figure 3. The harvest levels of the expedited timber supply review for the Ft. St. James district are provided for comparison (harvest level was 3,000,000 m3/yr for the entire planning horizon). The first step in forecasting the SFM base case was to attempt the expedited TSR harvest levels. There was insufficient volume available in the forest district to fulfill these harvest levels, resulting in a large timber supply shortage ("crash") between 15 and 85 years into the future. This crash is shown in red in Figure 3. Expedited TSR harvest levels were achievable beyond 90 years.

There are many possible ways to distribute the timber supply impact over a longer period to dampen the acute timber supply shortage at year 40. The approach taken for the SFM base case was to maintain the current harvest levels (3.5 million m3) for the first fifteen years of the planning horizon, then step down by 10% per decade to a minimum harvest level of 1.9 million m3/year. This harvest level is maintained for 5 years before stepping up to 2.06 million m3 / yr. This harvest level is maintained until 2075 when it begins to increase at 10 % per decade to 3 million m3/year. The expedited TSR long term harvest level of 3million m3/year is resumed in year 90. The average annual harvest over the medium term (11-125 years) is 2.4 million m3/yr, which is 20% lower than the Expedited TSR medium term harvest forecast.

The growing stock of the SFM Base Case is shown in Figure 4. Total growing stock is reduced during the first 50 years of the planning horizon. Following the reduction, the growing stock increases to a stable long term level of approximately 175 million cubic meters. The overriding factor in the drastic reduction of growing stock in the short term is the mountain pine beetle infestation. The implications of the MPB will be discussed further in the sensitivity analysis.

Total harvest area, average harvest volume and average harvest volume are reliable indicators of sustainable harvest levels (Figure 5, Figure 6, Figure 7). The long term harvest level is likely non-sustainable if harvest area is increasing or average harvest volume is decreasing at the end of the planning horizon. The SFM Base Case indicates stable levels of harvest area and volume.

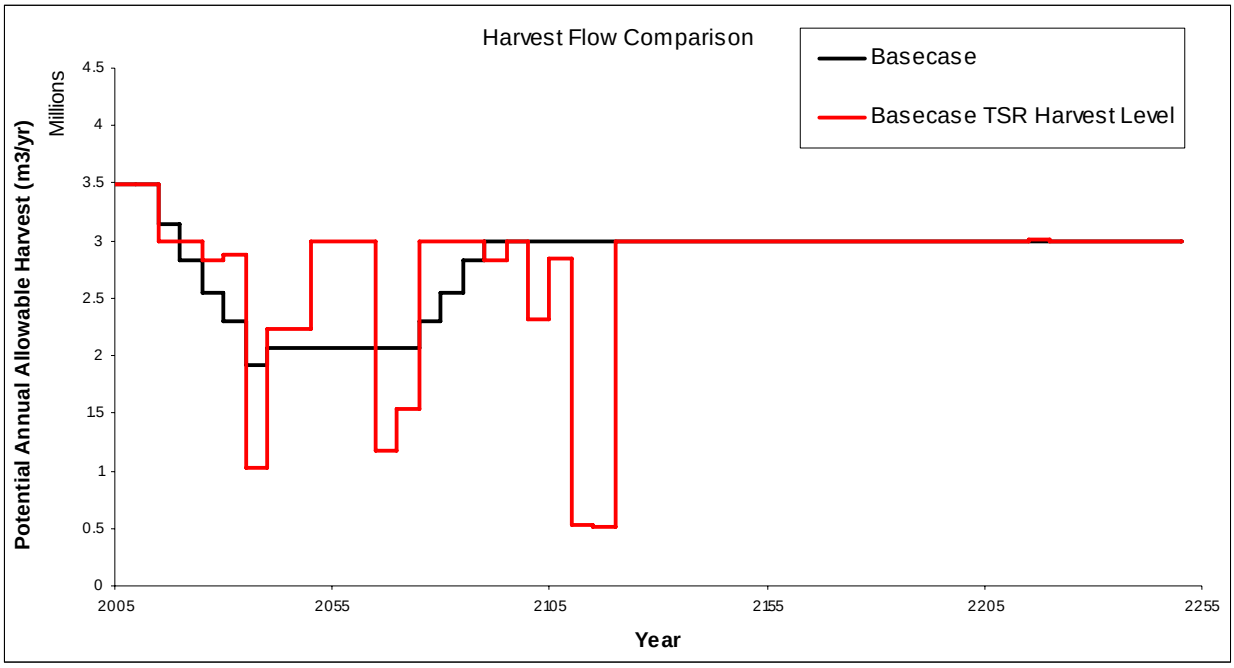

Figure 3 Basecase harvest forecast

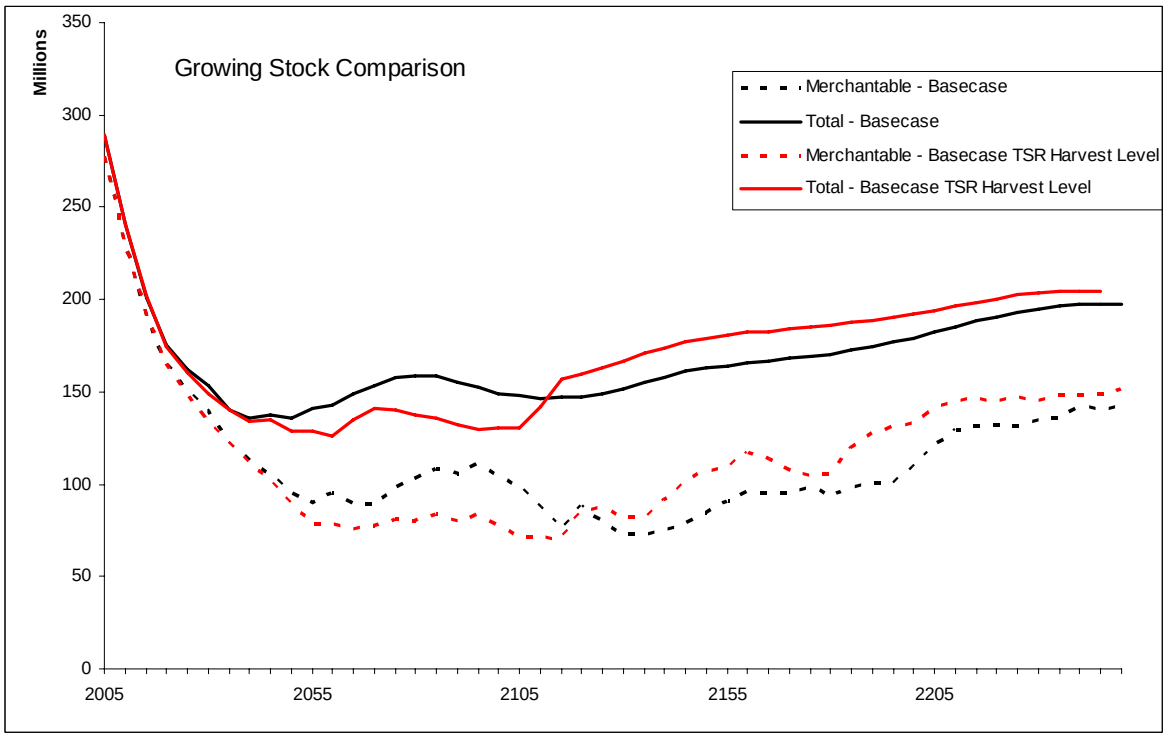

Figure 4 Growing stock comparison

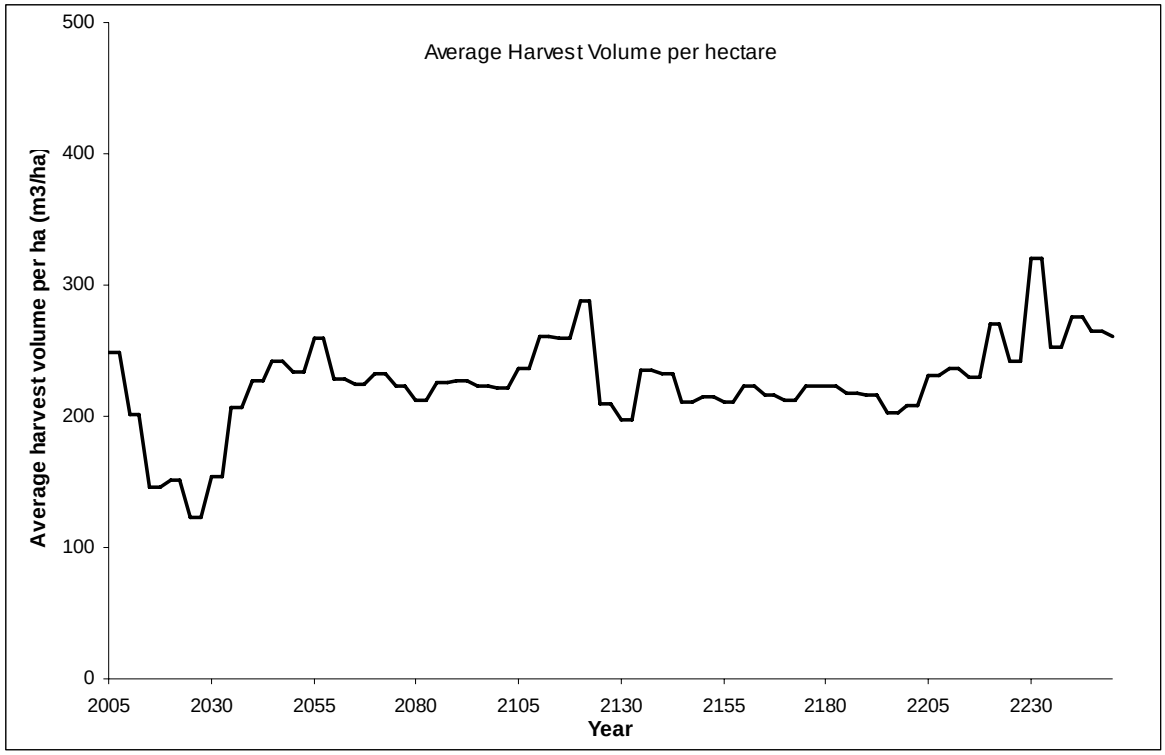

Figure 5 Average harvest volume per hectare

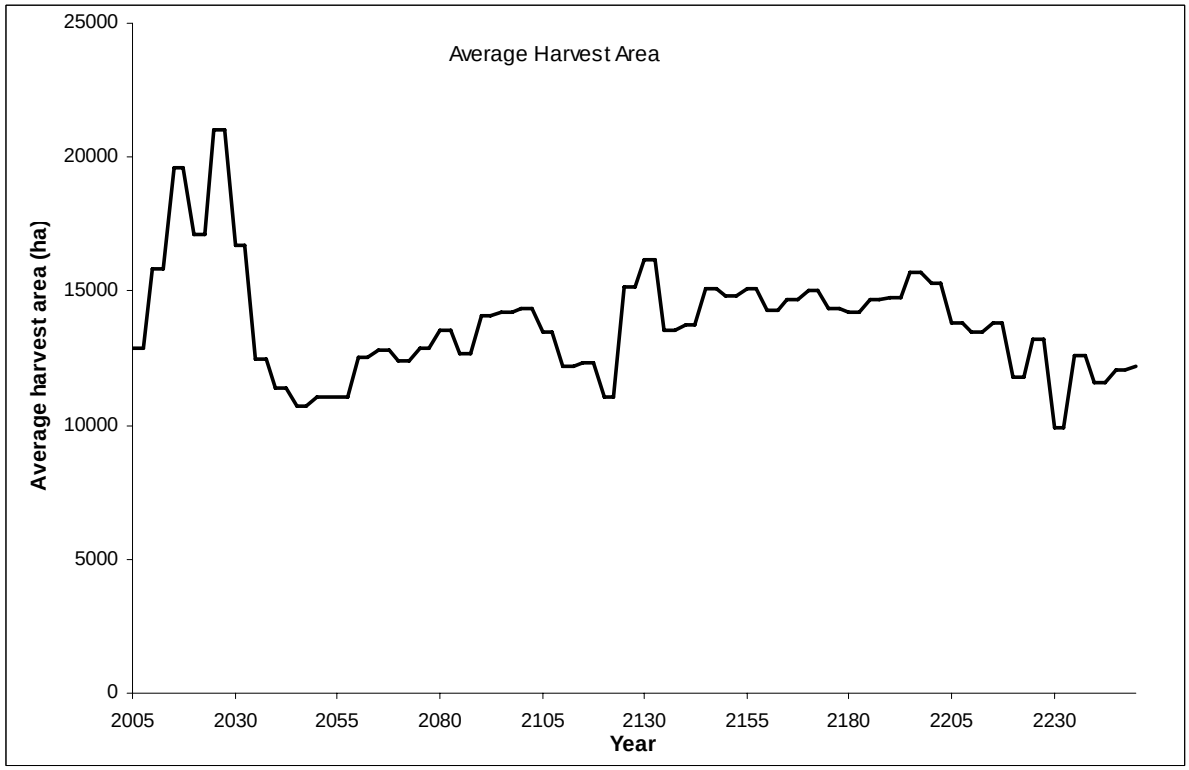

Figure 6 Average harvest area

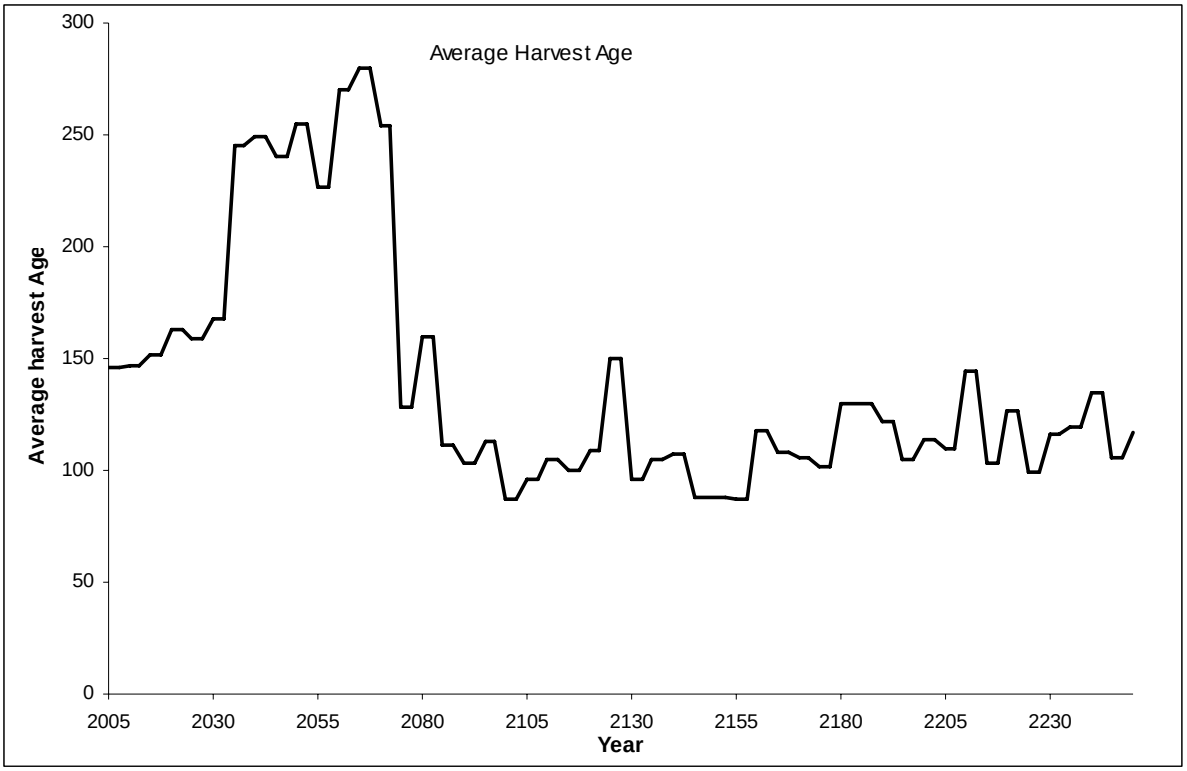

Figure 7 Average harvest age

Sensitivity Analysis

Simple sensitivity analyses were performed to investigate the role of beetle attack and old growth assumptions in the timber supply analysis. The purpose of the sensitivity analyses is to determine the relative impacts of these assumptions. Simply documenting the size of the timber supply crash, rather than the associated sustainable harvest levels, is sufficient for this purpose.

The timber supply crash associated with SFM Base Case assumptions results in 20% less volume harvested during the medium term (11-125 years). In other words, there is a 20% medium term timber supply shortage associated with the SFM Base Case assumptions. Removing the old growth targets has no impact on the available timber supply, indicating that the old seral (NDU based) targets are not constraining the timber supply in the short and medium term. When the beetle attack assumptions are removed from the model, the expedited TSR harvest level of 3 million m3/yr remains unachievable. The shortage is significantly decreased. The crash associated with the no beetle scenario shown in Figure 8. This indicates that the assumptions developed around beetle attack, shelf life, and future spread are causing the majority of the reduction in medium term timber supply in the SFM Basecase.

Other assumptions such as forest cover requirements could also be playing a significant indirect role. For example, the landscape greenup requirement specifies that no more than 25% of an individual resource management zone or landscape unit can be below 3m in height. This could exacerbate the impacts of old growth targets and beetle attack by limiting the extent to which salvage activities can be concentrated in areas with high beetle kill and/or a surplus of old growth. An additional sensitivity analysis was performed to test the effect of landscape greenup requirements (Figure 9). Removing all landscape greenup requirements had no effect on the timber supply reduction in the medium term, suggesting that medium-term timber supply shortages are not primarily created by indirect effects of greenup-related harvest scheduling constraints.

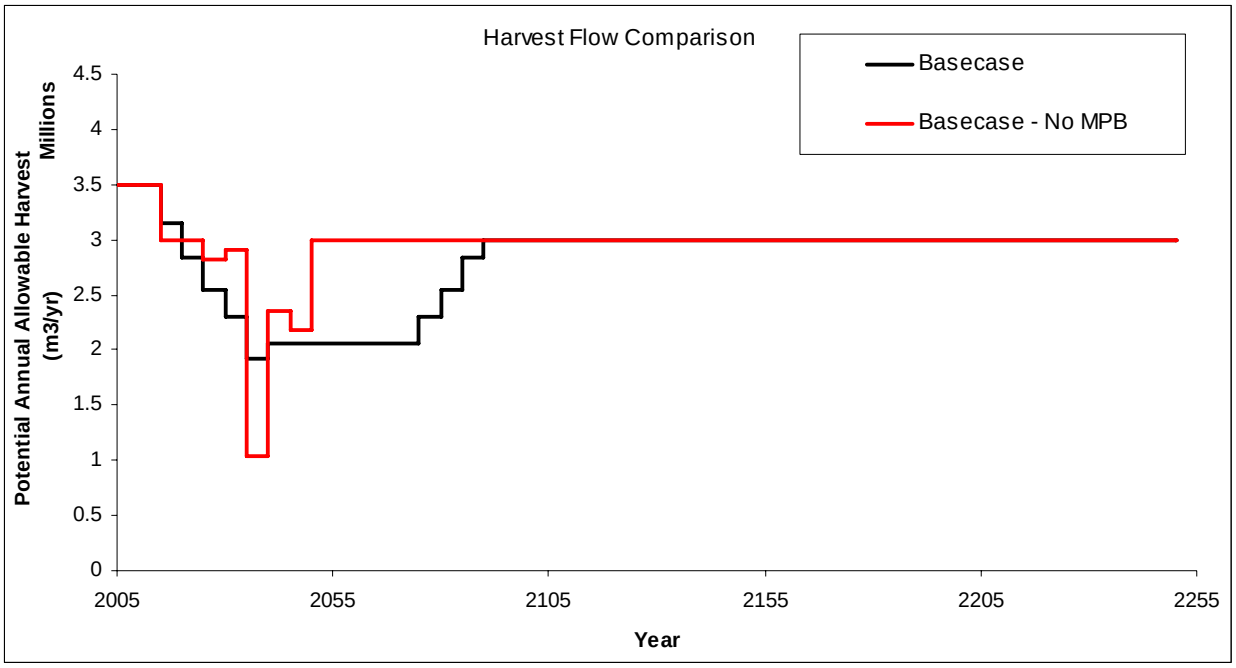

Figure 8 Harvest forecast comparison - No beetle run

Discussion

Harvest flow projections in the preliminary SFM Basecase show a 13.68 million m3 (13.4%) reduction in the total volume harvested over the first 85 years of the planning horizon, compared with the Ft. St. James portion of the 2004 Expedited TSR Basecase. An initial review of the results has identified 2 factors that could be contributing to this shortfall.

Mountain Pine Beetle Future Attack

The SFM Basecase incorporates the provincial-level projections for future spread of the MPB epidemic. The harvest levels of the 2004 Expedited TSR were did not include future spread of the MPB beyond 2004. The approach taken in the SFM Basecase adds downward pressure to the medium term timber supply.

Scale of Analysis

Some previous analysis projects (2004 NDU analysis) have covered the Prince George TSA as a whole, while the SFM Basecase models timber supply for the Ft. St. James. Whenever the size of an analysis area is reduced, the model is more constrained in finding stands for harvest at any given point in time. Managing timber supply at the level of the Prince George TSA likely involves periodically shifting the focus of harvesting between the Prince George, Vanderhoof, and the Ft. St. James districts (particularly in the medium term, following the reduction in available volume resulting from the MPB epidemic.

APPEDIX I

We have obtained the spatial year 2 results for the provincial level projection of the mountain pine beetle attack (BCMPB2). We are proposing to use this data to model volume losses to mountain pine beetle in the Prince George and Fort St. James CSA forecasting projects.

The BCMPB2 data is advantageous for CSA forecasting because:

- It is the best available projection of how the beetle attack will proceed;
- It is spatial, allowing meaningful projections of other indicators that are spatially variable;
- Most of the assumptions about beetle are built into the projection, which reduces the research involved in creating and seeking approval for new assumptions.

This memo briefly describes the BCMPB2 data and how it will be incorporated into the CSA forecasting project. It also poses a list of questions that need to be answered before proceeding with this method.

Year 2 BCMPB data

All data was provided on a 16-ha grid and is complete for the province. Marvin Eng provided the "no harvest" scenario, which gives cumulative percent pine killed in each grid cell *assuming that there is no harvesting after 2004*. This is good because it means we can do our own harvesting and do not have to incorporate their management assumptions. The projection is annual and proceeds until 2024, by which time most of the susceptible pine volume is killed. Marvin also provided some of the input data in grid form (age, ITG, total volume, pine volume, susceptibility).

Application in CSA Forecasting

There are two challenges in converting the BCMPB data into a form that we can use in the CSA forecasting projects:

1. Getting the grid data into the resultant polygons
2. Converting "% killed" to "% volume lost" using shelf life curves.

Getting the grid data into the resultant polygons

Beetle attack in the BCMPB projection only occurs in susceptible grid cells. Simply rating the grid data onto the resultant is not sufficient for our purposes because it will "orphan" susceptible resultant polygons that occur in non-susceptible grid cells. There is also the inverse problem that pine could be killed in non-susceptible stands.

We will classify resultant polygons into susceptible and non-susceptible using the same criteria used to classify the grid. Then, susceptible polygons will be assigned the attack sequence of the nearest susceptible grid cell (within some tolerance: e.g. 1km). This process is illustrated in Figure 9.

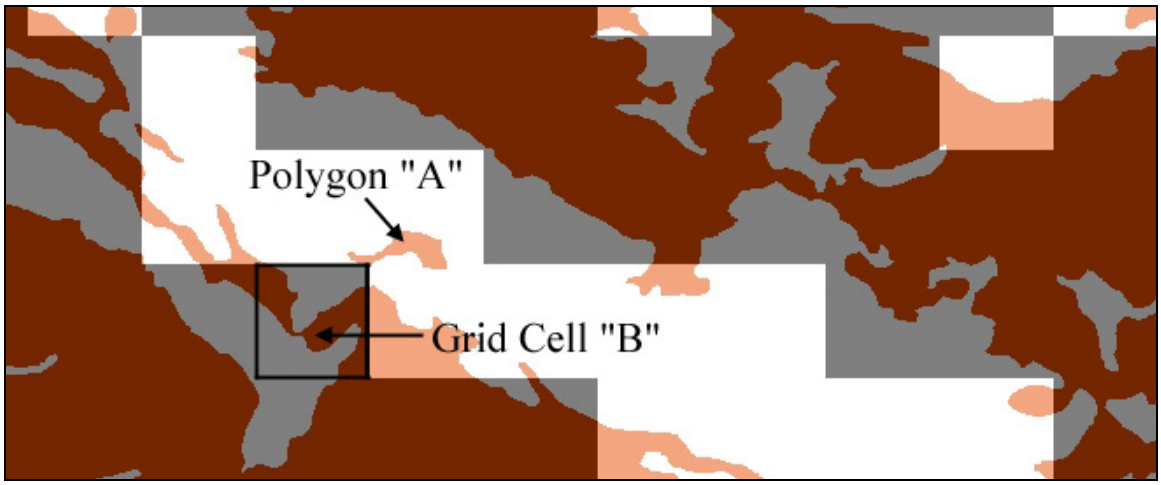

Figure 9: susceptible grid cells are shown in dark gray, susceptible resultant polygons are shown in red. Polygon "A" is in a non-susceptible grid cell. Our method will assign this polygon the attack sequence of grid cell "B."

Converting "% killed" to "% volume lost" using shelf life curves

Once the BCMPB grid attributes have been assigned to susceptible resultant polygons, each polygon will have:

- An attack chronosequence of % pine volume killed (from BCMPB)
- A shelf life curve that varies depending on general climate categories ("Dry", "Moist", and "Wet" BGC subzones; also from BCMPB).

The chronosequence and shelf life curve can be combined to produce a curve of percent pine removed from timber supply availability ("loss curve"). The loss curves will be unique to each grid cell, and so will need to be simplified to produce a dozen or so general loss curves. The general loss curves are the inputs to FSOS.

Modeling beetle attack in FSOS

A hypothetical loss curve is shown in Figure 10. This loss curve would be applied to the pine volume of all susceptible resultant polygons covered by the associated BCMPB grid cell.

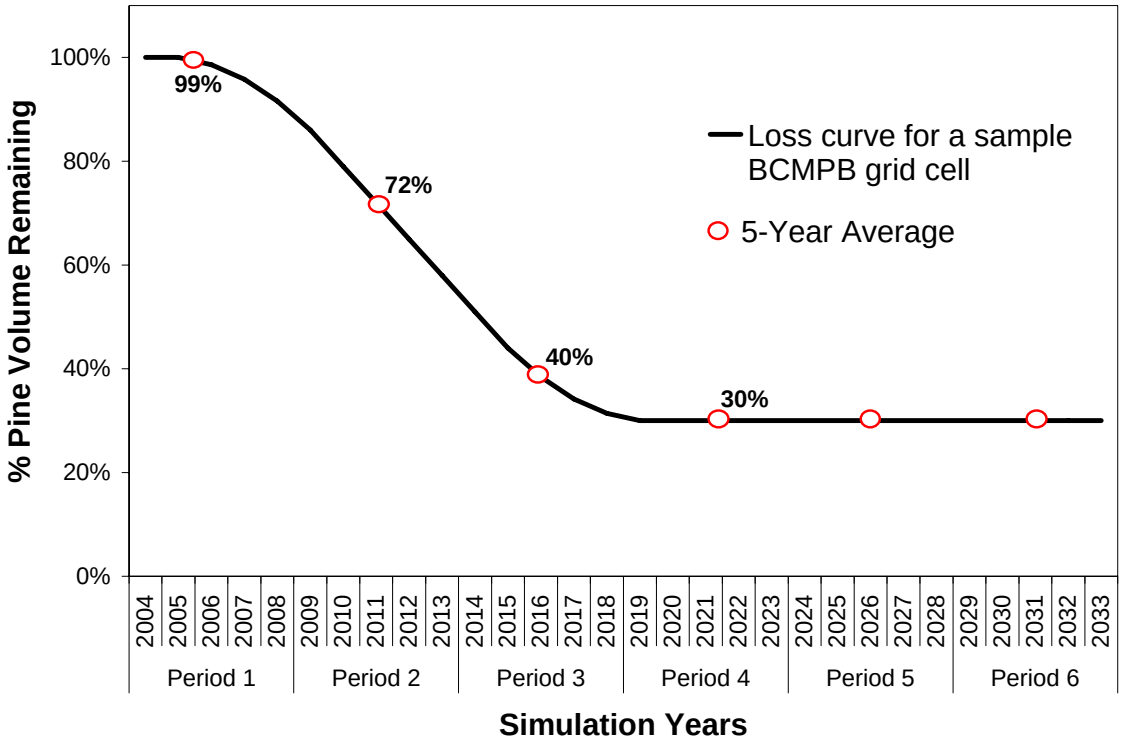

Figure 10: Volume loss curve for a hypothetical BCMPB grid cell.

Figure 11 gives an example of how the loss curve would be applied in a single resultant polygon. The hypothetical stand in this example contains a minority component of pine. It is 70 years old in 2004 (the start of the analysis). The yield adjustment for mountain pine beetle attack is 99% in 2004, meaning that the pine component of the stand is reduced by 1%. At age 75, the merchantability of some of the pine volume in the stand has begun to decrease, and the yield adjustment has dropped to 72% of the original merchantable pine volume. By 2019, at age 85, the shelf life of the attacked wood in the stand has passed, and the 30% pine component that is assumed to be unattacked continues to grow normally from this point on. The adjusted yield table would look different for a stand that is 100 years old in 2004, because the successive reductions to the yield table would begin at 100 years rather than at 70 years stand age.

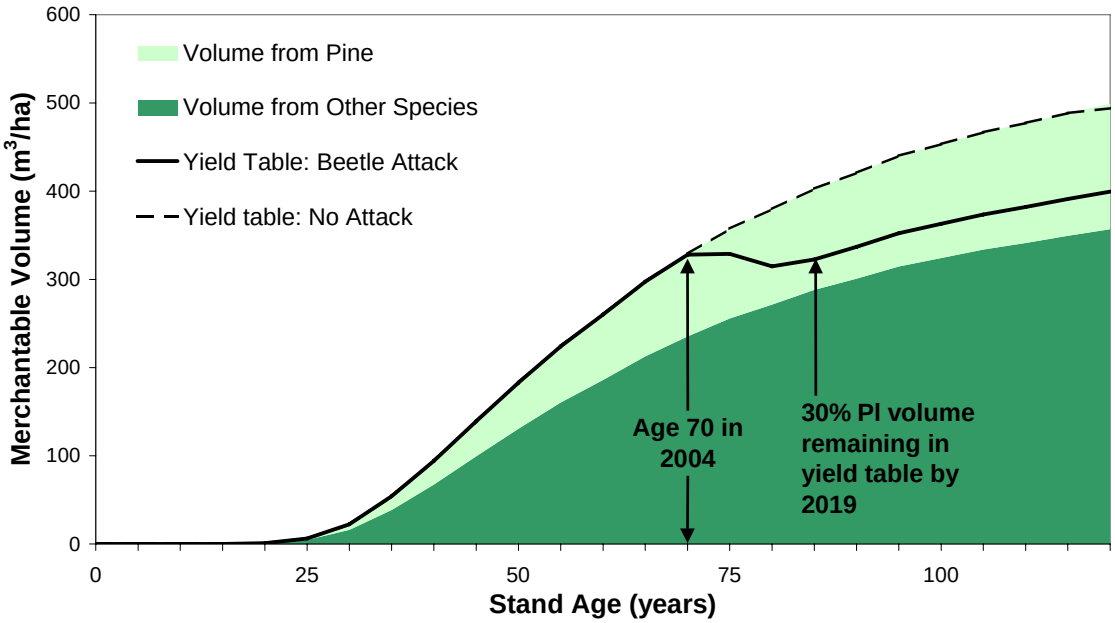

Figure 11: example of how the yield adjustment curves are applied to the yield tables of susceptible stands in the timber supply analysis.

Outstanding Issues

Many issues are resolved by using the BCMPB2 data. Nevertheless, some questions remain:

- What is an appropriate regeneration delay for high-pine-component stands that remain unsalvaged?
- What is an economically feasible shelf life for beetle-killed wood from stands in the study area?

Shelf Life

The merchantability of beetle-killed wood remains an important uncertainty for projecting the timber supply impact of the MPB epidemic. The status quo shelf life assumption in most timber supply analyses to date have assumed 100% retention of merchantability for 10 years, after which the volume is no longer usable (BC MoF 2004; Foresite 2004). However, the year 2 BCMPB assumptions indicate that 10 years is probably an optimistic shelf life assumption for the Prince George TSA. They provided “pessimistic”, “conservative”, and “optimistic” shelf life assumptions for “Dry”, “Moist”, and “Wet” groups of BGC subzones (Figure 12). All climate categories occur in the Prince George and Fort St. James Forest Districts.

An important distinction was made between shelf life for sawlogs and “alternative” volume (pulp, OSB, fuel, etc.). The conservative assumption is that all volume is available for sawlogs and alternative uses for 3-5 years after attack.

No volume is available for sawlogs after 5-7 years, but decreasing volumes for alternative uses are available for 10-15 years after attack.
Determining the average economically feasible shelf life for stands in the study area is an issue. FESL proposes to use a shelf life curve between the curves for sawlogs and alternative products.

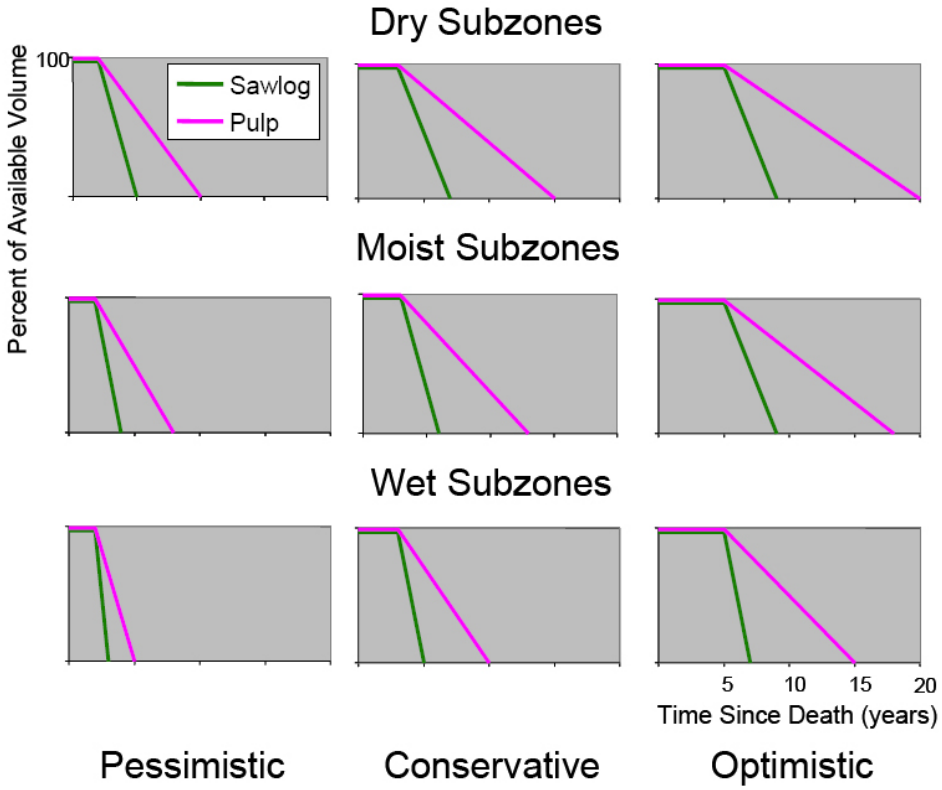

Figure 12: BCMPB shelf life assumptions for moist climates. Shelf life is differentiated between sawlogs (green) and alternative products (red).

Regeneration Delay
Unsalvaged stands with a low to moderate percentage of pine will be assumed to continue to grow as mature stands. However, stands with a high component of pine will be assumed to break up and regenerate naturally after beetle attack. The recent Expedited TSR used a regeneration delay of 15 years from the time off attack, while the 2004 NDU analysis used a regen delay of 10 years following the stand being declared dead. FESL proposes to use regen delay of 10 years after the stand is dead. This approach provides modeling results that can be interpreted in a more straight forward way.

Appendix 8

Indicator #10 background Information

APPENDIX 8

The following descriptions apply to indicator #10.

Sites of Biological Significance:
Sites of biological significance include sites of unusual or rare forest conditions that are not covered by legislation. These sites cannot be identified from current established lists, but may be unique to the AUTP and warrant identification. Sites of Biological Significance may include the following:

- Nests
- Snags
- Overstory Trees
- Coarse Woody Debris
- Witches Broom
- Mineral Licks
- Rock Features
- Denning Sites
- Avalanche Shoots
- Ecological Reserves
- Other sites of significance identified by the PAG from time to time.

Important Wildlife, Fish, and Bird Species:
Lists for important wildlife, fish, and bird species are taken from 2 sources, species identified through external processes, and species of importance to the PAG. The majority of the list is obtained from 4 external sources; legally identified wildlife (Section 7.0 notices), CDC ranked blue and red listed species, regionally important wildlife, and Species at Risk.

Some of these above listed species in British Columbia are found in areas of industrial forestry development. Therefore, sustainable forest management must consider their needs when preparing and implementing operational plans. Appropriate management of these species and their habitat is crucial in ensuring populations of fauna are sustained in the DFA.

Valuable plant species and plant communities:
Lists for valuable plant species and plant communities are taken from the document, *"Management Guidelines for Species and Plant Communities at Risk: Prince George Timber Supply Area. Timberline, March 31st, 2006".* Some of these listed species in British Columbia are found in areas of industrial forestry development. Therefore, sustainable forest management must consider their needs when preparing and implementing operational plans. Appropriate management of these species and their habitat is crucial in ensuring populations of flora are sustained in the DFA.

Description of the various classifications established for species and ecosystems at risk.

Global Conservation Status

A Global Rank applies to a species/ecological community across its entire range. The ranks have the following meaning:

1 = critically imperiled
2 = imperiled
3 = vulnerable to extirpation or extinction
4 = apparently secure
5 = demonstrably widespread, abundant, and secure.
NR = unranked - Global Rank not yet assessed.

Provincial Conservation Status

Provincial Ranks apply to a species' or ecological community's conservation status in British Columbia.
The numbers have the following meaning:

1 = critically imperiled
2 = imperiled
3 = special concern, vulnerable to extirpation or extinction
4 = apparently secure
5 = demonstrably widespread, abundant, and secure.

COSEWIC Ranks

Each COSEWIC (Committee On the Status of Endangered Species In Canada) rank is followed by the date that the rank was last reviewed.

Ranks have the following meanings:

XX = EXTINCT: A species that no longer exists.
XT = EXTIRPATED: A species that no longer exists in the wild in Canada, but occurring elsewhere.
E = ENDANGERED: A species facing imminent extirpation or extinction.
T = THREATENED: A species that is likely to become endangered if limiting factors are not reversed.
SC = SPECIAL CONCERN: A species of special concern because of characteristics that make it is particularly sensitive to human activities or natural events.
NAR = NOT AT RISK: A species that has been evaluated and found to be not at risk.
DD = DATA DEFICIENT: A species for which there is insufficient scientific information to support status designation.

BC List Status

Species are assigned to one of four provincial lists depending on their Subnational Conservation Status. The lists are as follows:

Extinct: Species that no longer exist.

Red: Includes any indigenous species or subspecies that have- or are candidates for- Extirpated, Endangered, or Threatened status in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. Not all Red-listed taxa will necessarily become formally designated. Placing taxa on these lists flags them as being at risk and requiring investigation.

Blue: Includes any indigenous species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia. Taxa of Special Concern have characteristics that make them particularly sensitive or vulnerable to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened.

Yellow: Includes species that are apparently secure and not at risk of extinction. Yellow listed species may have Red- or Blue-listed subspecies.

No Status: When all subspecies or populations of a species are assigned to either the Red List or the Blue List, the species will not be assigned to a List. For example, there are two subspecies of Mountain Beaver in BC; one subspecies is on the Red list, the other is on the Blue list. The species record for Mountain Beaver is therfore not assigned to a list.

Exotic: Species that have been moved beyond their natural range as a result of human activity. Exotic species are also known as alien species, foreign species, introduced species, non indigenous species and non native species. Exotic species are excluded from the Red, Blue and Yellow lists.

Accidental: Species occurring infrequently and unpredicatably, outside their usual range. Accidental species are excluded from the Red, Blue and Yellow list.

Animal Species at Risk in the AUTP

Common Name	Scientific Name	Global Rank	Prov. Rank	BC Status	COSEWIC	BGC	Habitat
Fish							
White Sturgen (Nechako River Population	*Acipenser transmontanus* pop.3	G4T1Q	S1	Red	E (Nov. 2003)	SBS	Large, cool rivers of streams, and large lakes
Bull Trout	*Salvelinus confluentus*	G3	S3	Blue	-	BWBS, ESSF, ICH, SBPS, SBS, SWB	Cool, clear mountain streams, typically with an abundance of cobbles, stones and CWD, and high elevation lakes.
Dolly Varden	*Salvelinus malma*	G5	S3	Blue	-	BWBS, ESSF, ICH, SBS	Cool, clear mountain streams, typically with an abundance of cobbles, stones and CWD.
Invertebrates							
Butterfly	*Boloria epithore sigridae*	G5, T3	S2, S4	Red	-	ESSF, SWB	Mountain Meadows
Birds							
Sandhill Crane	*Grus canadensis*	G5	S3, S4B	Blue	NAR (May 1979)	BWBS, ICH, SBPS, SBS	Isolated and undisturbed wetlands (> 1ha.) with abundance emergent vegetation, surrounded by forest cover.
Barn Swallow	*Hirundo rustica*	G5	S3, S4B	Red	-	ESSF, ICH	Open country near buildings, bridges, culverts, cliff faces, and caves near water bodies.
American White Pelican	*Pelecanus erythrorhynchos*	G3	S1B	Red	NAR (May 1987)		Slow-moving streams and rivers, and shallow open waters.
Great Blue Heron	*Ardea herodias herodias*	G5T5	S3B, S4N	Blue	-		Cool, clear mountain streams, typically with an abundance of cobbles, stones, and CWD.
Sharp-Tailed Grouse	*Tympanuchus phasianellus columbianus*						
Mammals							
Wolverine	*Gulo gulo*	G4T4	S3	Blue	SC (May 2003)	AT, BWBS, ESSF, ICH, SBPS, SBS,	Females tend to inhabit higher elevations with early successional

						SWB	(alpine-type) and late successional (coniferous forests) stands in summer, during the rearing season; females in winter and males all year round, tend to use lower elevations with late successional stands.
Fisher	*Martes pennanti*	G5	S2,S3	Blue	-	BWBS, ESSF, ICH, SBS, SWB	Late-successional (>80 year-old) coniferous and mixed coniferous-deciduous forests, with an advanced structural stage (>6), a 30-60% canopy closure, and > 20m2 basal area in mature trees.
Caribou (northern and mountain populations)	*Rangifer tarandus* pop.15	G5T4Q	S3,S4	Blue	T/SC (May 2002)	BWBS, ESSF, SBS	In mid – and late – winter, they inhabit either low elevation forested winter ranges, or higher elevation alpine/subalpine winter ranges to feed on terrestrial lichens. In spring, they are found between late winter and high elevation summer ranges, where forage is abundant.
Grizzly Bear	*Ursus arctos*	G4	S3	Blue	SC (May 2002)	AT, BWBS, ESSF, ICH, SBPS, SBS, SWB	A mosaic of non-forested sites, immature, young and late successional stands. Bears frequent avalanche chutes, salmon streams, riparian sites rich in succulent vegetation.
Moose	*Alces alces*	-	-	-	-	BWBS, ESSF, ICH, SBPS, SBS, SWB	
Marten	*Martes americana*	-	-	-	-	BWBS, ESSF, ICH, SBPS, SBS, SWB	

Forest related Vascular Plants at Risk known to occur within the AUTP

Common Name	Scientific Name	Global Rank	Prov. Rank	BC Status	COSEWIC	BGC	Last known site
Bourgeau's milk-vetch	*Astragalus bourgovii*	G5	S3	Blue	NR	AT	Mount Pope
Northern Jacob's ladder	*Polemonium boreale*	G5	S2,S3	Blue	NR	AT, BWBSdk, ESSFmv	Murray Ridge
Elegant Jacob's ladder	*Polemonium elegans*	G4	S2,S3	Blue	NR	AT, ESSFmv, SBSdw	Murray Ridge
Kruckeberg's holly fern	*Polystichum kruckebergii*	G4	S2,S3	Blue	NR	ESSFwk, SBSdk, SWB	Baptiste Valley
Sheathing pondweed	*Stuckenia vaginata*	G5	S2,S3	Blue	NR	BWBSdk, SBSdw, SWBun	Parrens Bay – Stuart Lake
Alpine Cliff Fern	*Woodsia alpina*	G4	S2, S3	Blue	NR	SBSdw, SBSmk	Mount Pope – steep limestone outcrops
Dark Lamb's-quarters	*Chenopodium atroviens*	G5	S1	Red	NR	SBS dw	

Forested Plant Communities at Risk within the AUTP

Common Name	Global Rank	Prov. Rank	BC Status	COSEWIC	BGC
Forested Floodplain plant communities					
Black cottonwood / red osier dogwood – prickly rose	NR	S3	Red	NR	SBSdk/08
Forested Upland plant communities					
Douglas fir – hybrid white spruce / knight's plume	G3	S3	Blue	NR	SBSmk1/04; SBSmw/04; SBSwk1/04
Douglas fir – hybrid white spruce / thimbleberry	NR	S3	Blue	NR	SBSdw1/06; SBSmh/01; SBSmh/05; SBSmh/06; SBSvk/03; SBSwk3/03; SBSwk3a/01; SBSwk3a/03
Douglas fir – lodgepole pine / clad lichens	NR	S3	Blue	NR	SBSdw1/01; SBSdw2/02; SBSdw3/02; SBSmh/02; SBSmh/03

Douglas fir / red-stemmed feathermoss – step moss	G3	S3	Blue	NR	SBSdk/04
Hybrid white spruce / hardhack – prickly rose	NR	S2, S3	Blue	NR	SBSdw3/06
Lodgepole pine – black spruce / red-stemmed feathermoss	G3	S3	Blue	NR	SBPSdc/04; SBSdw2/07; SBSdw3/05
Lodgepole pine / black huckleberry / reindeer lichens	G3	S3	Blue	NR	SBSvk/09; SBSwk1/02; SBSwk2/02; SBSwk3/02
Lodgepole pine / common juniper / rough leaved ricegrass	NR	S3	Blue	NR	SBSdk/02
Western hemlock / kinnikinnick / clad lichens	NR	S3	Blue	NR	ICHmc1/02
Forested Wetland plant communities					
Lodgepole pine / few-flowered sedge / peat moss	NR	S2, S3	Blue	NR	ESSF/Wb10; ICH/WB10; SBPS/Wb10; SBS/Wb/10
Spruces – subalpine fir / skunk cabbage	NR	S3	Blue	NR	SBSvk/10; SBSwk1/Ws11; SBSwk2/Ws11; SBSwk3/Ws11