Sustainable Forest Management Plan

For

Fort Nelson Defined Forest Area

Third Edition

May 9, 2018

First Edition: December 9, 2004
First Edition Revised: March 31, 2005
Second Edition Z809-08, April 1, 2011
Second Edition Revised: February 21, 2012
Second Edition Revised: March 23, 2012
Second Edition Revised: May 23, 2012
Second Edition Revised: October 19, 2012
Second Edition Revised: March 14, 2013
Second Edition Revised: February 4, 2014
Second Edition Revised July 16, 2014
Third Edition Z809-16 May 9, 2018

This SFMP prepared on behalf of the participants by:

BCTS

Jason Smith, RPF
Woodlands Supervisor
Peace-Liard Business Area

Canadian Forest Products Ltd.

Darrell Regimbald, RPF
Planning Coordinator
North Operations

BC Timber Sales

CANFOR

Executive Summary

Between July 2003 and March 2005 forest tenure holders ("licensees") operating in the Fort Nelson Defined Forest Area (DFA), Canadian Forest Products Ltd. – Peace Liard Woodlands, Liard Business Unit (Canfor) and British Columbia Timber Sales – Peace Liard Business Area (BCTS), worked with members of the public, local stakeholders, Ministry of Forests and Range, Integrated Land Management Bureau, Ministry of the Environment, and First Nation representatives to develop a Sustainable Forest Management Plan (SFM Plan) for the Fort Nelson DFA. This SFM Plan has since been updated (October 2008) to address changes in forest condition, public, stakeholder, and First Nations input and local community values. A further update in 2011 has taken place in order to change the plan from the old "SFM Framework" format to suit the wording and requirements of the CSA Z809-08 standard, and then again in 2017 to meet the requirements of CSAZ809-16.

The CSA standards set performance objectives and targets over a DFA to reflect local and regional interests. Consistent with most certifications, the CSA standards expect compliance with existing forest policies, laws and regulations. This edition of the SFM Plan includes updated references to the applicable laws and regulations, as well as an updated suite of Elements, Core Elements and targets that address the current environmental, economic and social conditions within the Fort Nelson DFA. This Plan is based on the Canadian Standards Association (CSA) Sustainable Forest Management Requirements and Guidance (CSA Z809-16), which is one of the most common forest certification systems in use in British Columbia. This SFM Plan localizes the implementation and monitoring of the elements.

The initial development and subsequent changes to the SFM Plan have been achieved through the ongoing input and support of the Fort Nelson SFM Public Advisory Group (PAG), also known as the Public Response for Integrated Sustainable Management (PRISM). Members of the PAG represented a broad cross-section of local interests including, but not limited to, recreation, tourism, education, trapping, farming, forestry, conservation, water, community, and First Nations.

The SFM Plan is a dynamic and evolving document that is to be reviewed and revised on a regular basis (approximately every 5 years) with the input from the PAG (PRISM). Canfor and BCTS are committed to the achievement of the targets set out in the SFM Plan. On an annual basis the PAG reviews and provides input with respect to individual annual reports prepared by both Canfor and BCTS in reference to the achievement of performance measures established in the SFM plan. This monitoring process provides Canfor and BCTS, the public, and First Nations with an opportunity to bring forward new information and to provide input concerning new or changing public, stakeholder, and First Nations values and interests that can be incorporated into future updates of the SFM Plan, both at the DFA and TSA level.

As this SFM Plan represents a switch from the SFM Framework developed for Slocan to the nomenclature of the CSA standard itself, it may be difficult to recognize the changes made through the update. To aid in this respect the following table represents a summary of the re-alignment of the old Criteria and Measures to the new Criteria, Elements and Indicators. The second table indicates deleted Measures and the reasons for their deletion.

Table 1: Summary of changes to CRITERIA from the 2004 SFMP to the 2011 SFMP

2004 Criteria	*CSA Z809-16 Criteria*
C1 Biological richness and its associated values are sustained in the defined forest area (DFA)	C1 Biological Diversity
C 2. The productive capability of forest ecosystems within the Timber Harvesting Land Base (THLB) are sustained	C2 Ecosystem Condition and Productivity
C 3. Forest ecosystem contributions to global ecological cycles are sustained within the DFA	C3 Soil and Water
C 4. The flow of economic benefits from forests through the forest industry is sustained	C4 Role in Global Ecological Cycles
C 5. The flow of marketed non-timber economic benefits from forests is sustained	C5 Economic and Social Benefits
C 6. Forest management contributes to a diversified local economy	C6 Society's Responsibility
C 7. Decisions guiding forest management on the DFA are informed by and respond to a wide range of social and cultural values	C7 Aboriginal Relations
C 8. Forest management sustains or enhances the cultural (material and economic), health (physical and spiritual) and capacity benefits that First Nations derive from forest resources	
C 9. Forest management sustains ongoing opportunities for a range of quality of life benefits	

It is worth noting that while there are fewer Criteria for the CSA Z809 standard, the same concerns are covered. They are simply covered under a broader spectrum for each criterion.

Of more interest to those comparing the 2004 plan to the 2010 plan will be the conversion of the measures to core and local indicators. In the last update to the 2004 plan, there were 60 measures, while under the new plan, there are 42 core and local measures. This is not to say that the scope of reporting was narrowed, merely that the data being measured are more focussed to reflect the desired end results. The changes are summarized in table 2.

Table 2: Summary of changes from 2004 Measures to 2011 Indicators[1]

CSA Z809-16 Core indicator or Local Indicator	*Measure replaced from the 2008 update of the 2004 plan*
1.1.1 Ecosystem area by type	1-1.1 Ecosystem Representation
1.1.2 Forest area by type or species composition	1-2.1 Habitat elements
1.1.3 Forest area by seral stage or age class	1-1.2 Seral stage
1.1.4.1 Degree of within stand structural retention – WTP percentage	1-2.1 Habitat elements
1.1.4.2 Degree of within stand structural retention – Dispersed Retention	1-2.1 Habitat elements
1.1.4.3 Degree of within stand structural retention – Riparian Management	1-2.1 Habitat elements
1.1.5 Shrub Habitat	1-2.1 Habitat elements
1.2.1 Degree of habitat protection for focal species including species at risk	1-3.1 Vertebrate species populations 1-3.2 SAR management strategies 1-4.1 Operations in parks, reserves and PA's 1-4.2 Special sites of biological significance 1-4.3 Management activities consistent with the Muskwa-Kechika management area 1-4.4 Management activities consistent with legal objectives
1.2.2 Degree of suitable habitat in the long term for selected focal species including species at risk	1-2.1 Habitat elements 1-3.1 Vertebrate species populations 1-4.1 Operations in parks, reserves and protected areas 1-4.2 Special sites of biological significance 1-4.3 Management activities consistent with the Muskwa-Kechika management area 1-4.4 Management activities consistent with legal objectives
1.2.3 Proportion of regeneration comprised of native species	1-6.1 Conifer seed use in accordance with regulation

[1] Based on the work done by P.L. Carruthers, 2009

CSA Z809-16 Core indicator or Local Indicator	*Measure replaced from the 2008 update of the 2004 plan*
	1-6.2 Aspen regeneration – Natural regeneration
1.3.1 Percentage of stands artificially regenerated that are free of genetically modified organisms	New Measure with no equivalent from the older plans
1.4.1 Proportion of identified sites with implemented management strategies	1-4.1 Operations in parks, reserves and protected areas 1-4.2 Special site of biological significance 1-4.4 Management activities consistent with legal objectives 9-3.1 compliance with documented strategies
1.4.2 Protection of identified sacred and culturally important sites	8-2.1 Percentage of specific/confirmed culturally important sites identified by first nations
2.1.1.1 Reforestation success – Regen Delay	2-3.1 Regeneration delay 2-3.2 Compliance with regeneration standards
2.1.1.2 Reforestation success – Free Growing	2-3.3 Compliance with free growing
2.1.1.3 Percentage of silviculture obligation areas with significant detected forest health agents which have treatment plans	4-6.2 Management strategies for damaging events or agents
2.1.1.4 Evidence of efforts being made to manage known significant forest health damaging agents	4-6.1 Assessment of damaging events or agents
2.1.2 Proportion of regeneration comprised of native species	See 1.2.3
2.1.3 Addition and deletions to the forest area	2-2.1 forest converted to non-forest use 2-2.3 Landslides
2.1.4 Percentage of long term sustainable harvest level that is actually harvested	4-1.1 Harvested Volume 4-1.2 Timber supply certainty
3.1.1 Level of Soil disturbance	2.-2.2 Long term detrimental soil disturbance
3.1.2 Level of downed woody debris	1-2.1 Habitat elements 2-1.2 Coarse woody debris
3.2.1.1 Proportion of watershed or water management areas with recent stand replacing disturbance - Watersheds	1-5.1 Stream crossings – WQCR 1-5.2 Stream crossings – installed/removed to design/standard 1-5.3 Stream crossings - inspections

CSA Z809-16 Core indicator or Local Indicator	*Measure replaced from the 2008 update of the 2004 plan*
3.2.2 Proportion of forest management activities, consistent with prescriptions to protect identified water features	1-5.1 Stream crossings – WQCR 1-5.2 Stream crossings – installed/removed to design/standard 1-5.3 Stream crossings - inspections
4.1.1.1 Net Carbon Uptake – Total Carbon Storage	3-1.1 Carbon stored in trees and non-tree vegetation **Note this measure was pulled directly across**
4.1.1.2 Net Carbon Uptake – Carbon sequestration rate	3-3.1 Carbon Sequestration **Note this measure was pulled directly across**
4.1.2 Reforestation success	As per indicator 2.1.1
4.2.1.1 Additions and deletions from to the forest area	As per indicator 2.1.3
4.2.1.2 Evidence of best efforts to coordinate forest management activities with the oil and gas industry	2-2.4 Information requests – oil and gas industry
5.1.1 Documentation of the diversity of timber and non-timber resources, including products and services produced in the DFA	As per indicator 2.1.4 5-1.1 Potential for marketed non-timber resource benefits 5-1.2 Amount of marketed non-timber resource activity
5.1.1.3 Participants forest management activities will not negatively impact established recreational sites and trails	9-1.1 Number of forest recreation sites/facilities maintained
5.1.1.4 Forest management activities will be consistent with Visual Quality Objectives (VQO's)	9-2.1 Compliance with Visual Quality Objectives
5.1.1.5 Evidence that the organization has co-operated with other forest dependant businesses, forest users and the local community to strengthen and diversify the local economy	New Measure with no equivalent from the older plans
5.1.2 — Evidence of open and respectful communications with forest dependent businesses, forest users and local communities to integrate non-timber resources into forest management planning. When significant disagreement occurs, efforts towards conflict resolution are documented.	
5.1.2 — Evidence of open and respectful communications with forest dependent businesses, forest users and local communities to integrate non-timber resources into forest management planning. When significant disagreement occurs, efforts towards conflict resolution are documented	New CSA Indicator CSA Z809-16
5.2.1.1 Level of participation and support in initiatives that contribute to community sustainability	New Measure with no equivalent from the older plans

CSA Z809-16 Core indicator or Local Indicator	*Measure replaced from the 2008 update of the 2004 plan*
5.2.1.2 Amount of stumpage paid in the Fort Nelson DFA	4-3.1 Fees paid by the Forest Industry
5.2.2 Level of participation and support in training and skills development	New Measure with no equivalent from the older plans
5.2.3 Level of direct and indirect employment	4-2.1 Direct employment in the forest industry 4-2.2 Indirect and induced employment
6.1.1 Level of Participant satisfaction with the public process	7-1.3 Effective public advisory group 7-1.4 Equitable and inclusive deliberation process
6.1.2 Evidence of efforts to promote capacity development and meaningful participation in general	7-1.2 Methods used for public communication 7-1.3 Effective public advisory group 7-1.5 perceptions of members of the Fort Nelson public advisory group
6.1.3 Availability of summary information on issues of concern to the public	New Measure with no equivalent from the older plans
6.2.1 Evidence of co-operation with DFA related workers and their unions to improve and enhance safety standards, procedures and outcomes in all DFA workplaces and affected communities	9-4.1 Safe company registration and certification 9-4.2 safety incidences 9-4.3 Number of serious injuries 9-4.4 Number of fatalities
6.2.2 Evidence that a worker safety program has been implemented and is periodically reviewed and improved	9-4.1 Safe company registration and certification
7.1.1 Evidence of good understanding of the nature of Aboriginal title and rights	New Measure with no equivalent from the older plans
7.1.2 Evidence of ongoing open and respectful communications with Aboriginal communities to foster meaningful engagement, and consideration of the information gained about their Aboriginal title and rights through this process. Where there is communicated disagreement regarding the organization's forest management activities, this evidence would include documentation of efforts towards conflict resolution.	New CSA Indicator CSA Z809-16 8-1.1 Percentage of cutblocks where information sharing took place 8-2.1 Access to resources for first nations 8-3.1 First nations opportunities to comment 8-3.2 Percentage of archaeological impact assessments sought
7.2.1 Evidence of efforts to promote capacity development and meaningful participation for Aboriginal individuals,	4-4.1 Opportunities for first nations 4-4.2 Opportunities for first nations

CSA Z809-16 Core indicator or Local Indicator	*Measure replaced from the 2008 update of the 2004 plan*
communities and forest-based companies	(BCTS)
	New Measure with no equivalent from the older plans – 6.4.3 Evidence of efforts to promote capacity development and meaningful participation for Aboriginal communities
7.2.2 Evidence of understanding and use of Aboriginal knowledge through the engagement of willing Aboriginal communities, using a process that identifies and manages culturally important resources and values	8-1.1 Percentage of cutblocks where information sharing took place 8-2.1 Access to resources for first nations
7.2.3 Level of management and/or protection of areas where culturally important practices and activities occur	8-1.1 Percentage of cutblocks where information sharing took place 8-2.1 Access to resources for first nations 8-3.1 First nations opportunities to comment

Of the original 60 measures, only 10 have been dropped. The dropped measures are summarised in table 3.

Table 3: Dropped Measures from the Amended 2004 SFMP

Dropped Measure	*Reason for deletion*
2-1.1 Site index	This measure was dropped because of the high variability in the methodology of measuring Site Index for any given site. There are three methods for calculating SI, and there is no way of knowing how the original SI was derived. This makes any comparison to a newly calculated SI very difficult to reconcile.
2-4.1 Treatment plans for natural disturbance events	As natural disturbance events are not under the control of the Participants, neither is the legal responsibility for management of these events which are not triggered by the actions of the participants. The treatment of such areas would have to be voluntary. Such losses to natural disturbance would be taken into account by the TSR process, resulting in downward pressure on AAC in the short term.
2-4.2 Percent of catastrophic natural disturbance events due to forestry activities	If forestry activities were to result in a catastrophic natural disturbance or to exacerbate a natural disturbance, the Participants would be required to help with the mitigation as a matter of law.
4-2.3 Dollar value of BCTS timber sales and total timber volume advertised by BCTS	This measure did not really fit in with any of the elements from the 6 CSA criteria.
4-3.2 Personal income taxes paid	This measure did not fit in with any of the elements from the 6 CSA criteria, and was considered inappropriate by the Participants as it was reporting personal information.
4-5.1 Perceptions of Canfor and BCTS	This measure did not really fit in with any of the elements from the 6 CSA criteria.
4-5.2 Competitive primary milling facility	This measure was removed as the presence of a competitive primary milling facility is controlled by the lumber market, which is beyond the control of the Participants to influence.
6-1.1 Employments by broad sector	This measure is out of the scope of control of the Participants and as such not appropriate for the SFMP
6-1.2 Employment by industry	This measure is out of the scope of control of the Participants and as such not appropriate for the SFMP
7-1.1 Stakeholder database	This measure did not really fit in with any of the elements from the 6 CSA criteria. The stakeholder database has been retained as a tool to be used by the participants to assist in efforts to inform the public about the SFM activities of the participants.

Dropped Measure from the 2011 SFMP

Dropped Measure – CSA-Z809-16	*Reason for deletion*
6.5.1 Number of people reached through educational outreach	CSA-Z809-16 dropped this indicator. Relevant information included within Indicator 37

SFM Policy – Canfor

Canfor believes in conducting its business in a manner that protects the environment and ensures sustainable forest management. In July of 1999, Canfor formally announced its commitment to seek sustainable forest management certification of the company's forestry operations under the Canadian Standards Association Sustainable Forest Management (SFM) standard. The Sustainable Forest Management Plan presented here and its implementation is intended to fulfill that commitment for Canfor's Peace Liard Woodlands – Liard Business Unit.

The management of Canfor has set out a number of commitments which define the mission, vision, policies and guiding principles for the company. These include the Canfor Environment Policy and Sustainable Forest Management Commitments. These commitments have been used to enable and guide the development of this Sustainable Forest Management Plan. In addition, they also commit to continual improvement of performance through implementing the plan under the principles of adaptive management. Canfor's Environmental Policy and Sustainable Forest Management Commitments detail the commitments to Environmental and Sustainable Forest Management for the Canfor Fort Nelson DFA. These commitments are communicated internally and externally to all interested parties.

Figure 1: Canfor Environment Policy

ENVIRONMENT POLICY

CANFOR

WE ARE 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 continually improve our sustainable forest management and environmental performance.
- Provide opportunities for interested parties to have input into our sustainable forest management planning activities.
- Promote environmental awareness throughout our operations.
- Conduct regular audits of our forest and environmental management systems.
- Communicate our sustainable forest management and environmental performance to our Board of Directors, shareholders, employees, customers and other interested parties.

JUNE 2016

DON KAYNE
President and Chief Executive Officer

MICHAEL KORENBERG
Chairman

CANADIAN FOREST PRODUCTS LTD. and affiliated companies

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Figure 2: Canfor Sustainable Forest Management Commitments

SUSTAINABLE FOREST MANAGEMENT COMMITMENTS

CANFOR

SUSTAINABLE FOREST MANAGEMENT

WE WILL MANAGE FORESTS TO MAINTAIN AND ENHANCE THE LONG-TERM HEALTH OF FOREST ECOSYSTEMS, WHILE PROVIDING ECOLOGICAL, ECONOMIC, SOCIAL AND CULTURAL OPPORTUNITIES FOR THE BENEFIT OF CURRENT AND FUTURE GENERATIONS. IN THE MANAGEMENT OF FORESTS, WE WILL HONOUR RELEVANT INTERNATIONAL AGREEMENTS AND CONVENTIONS TO WHICH CANADA IS A SIGNATORY.

ACCOUNTABILITY

We will be accountable to the public for managing forests to achieve current and future values. One way we will demonstrate this is by certifying our forestry operations to internationally recognized, third-party verified sustainable forest management certification standards.

ADAPTIVE MANAGEMENT

We will use adaptive management to continually improve sustainable forest management by identifying values, setting objectives and targets for the objectives, and monitoring results. We will modify management practices as necessary to achieve the desired results.

SCIENCE

We will utilize science to improve our knowledge of forests and sustainable forest management and will monitor and incorporate advances in sustainable forest management science and technology where applicable.

MULTIPLE VALUE MANAGEMENT

We will manage forests for a multitude of values, including biodiversity, timber, water, soil, wildlife, fish/riparian, visual quality, recreation, resource features and cultural heritage resources.

HEALTH AND SAFETY

We will conduct our operations in a manner which will provide a safe environment for employees, contractors, and others who use roads and forest areas we manage.

ABORIGINAL PEOPLES

We recognize and will respect Aboriginal rights, title and treaty rights when planning and undertaking forest management activities.

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SUSTAINABLE FOREST MANAGEMENT COMMITMENTS

OPPORTUNITIES FOR PARTICIPATION

We will provide opportunities for the public, communities, Aboriginal Peoples and other stakeholders and with rights and interests in sustainable forest management to participate in the development and monitoring of our Sustainable Forest Management Plans.

SCALE

We will define objectives over a variety of time intervals (temporal scales) and at spatial scales of stand, landscape and forest. This produces ecological diversity and allows for the management of a range of conditions, from early successional to old growth.

TIMBER RESOURCE

We will advocate for a continuous supply of affordable timber from legal sources in order to carry out our business of harvesting, manufacturing and marketing forest products for the sustained economic benefit of our employees, the public, communities and shareholders, today and for future generations.

FOREST LAND BASE

We will advocate for the maintenance of the forest land base as an asset for current and future generations.

JUNE 2016

DON KAYNE
President and Chief Executive Officer

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SFM Policy – BCTS

In April 2003 BC Timber Sales was fully implemented as a part of the widespread policy and organizational change across the Ministry of Forests and Range, targets at revitalizing British Columbia's forest industry.

High quality stewardship is an important aspect of achieving success with BCTS and the organization is committed to certification. The BCTS Peace-Liard Business Area obtained ISO 14001 certification with an Environmental Certification System in March 2005. BCTS completed a joint Sustainable Forest Management Plan in December 2004, and was certified jointly with Canfor- Fort Nelson Division in April 2005.

Through the ongoing efforts of the Public Advisory Group (PAG) and the Participants, the content of the sustainable management plan and it measures have been reviewed and streamlined. The plan presented here reflects the updated information and criteria for the CSA Z809:08.

The attached vision and mission of the Ministry of Forests and Range and BC Timber Sales, along with the strategic Context of the Ministry of Forests and Range provides the background and guidance in our involvement in the joint development of the SFM plan along with Canfor for the Fort Nelson Defined Forest Area. The Ministry of Forests has shown itself as a leader that models the principles underlying the continuous improvement as an essential ingredient for success. BCTS will ensure that these principles continue to be at the forefront in the development and growth of this SFM plan in addition to incorporating an adaptive management approach.

BCTS will ensure that our operations contribute to an equitable, safe, healthy and satisfying work environment and that our operations are conducted in a manner that will not jeopardize human health and safety and commit to maintaining an excellent safety record.

BCTS will liaise closely with the Ministry of Forests Sciences Program in its efforts to seek and provide innovative solutions to high priority forest resources management problems in British Columbia and to seek opportunities to advance resource stewardship based on sound scientific principles in our efforts to fulfil our forest management responsibilities.

SUSTAINABLE FOREST MANAGEMENT POLICY

BCTS
BC Timber Sales

BC Timber Sales (BCTS) is committed to managing and administering forest management activities on our operations through effective measures that ensure *sustainable forest management (SFM)*.

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 we subscribe;
- Provide public participation opportunities;
- Confer with, and provide opportunities for participation by, Aboriginal Peoples;
- Respect and recognize Aboriginal title and rights, and treaty rights;
- Maintain an organizational culture where all staff proactively participate in providing conditions and safeguards for the health and safety of staff, clients and the public;
- Honour all international agreements and conventions to which Canada is a signatory;
- Improve knowledge of the forest and SFM, monitor advances in science and technology, and incorporate these advances where applicable;
- Promote awareness of SFM to our clients and the public;
- Strive for excellence in forest management by continually improving the performance of resource management activities and practices.

Original signed

_____

Executive Director
BC Timber Sales

December 5, 2012

Acknowledgements

The development of this Sustainable Forest Management Plan would not have occured without the dedicated efforts and hard work of the people and organizations listed below.

Canfor – Fort Nelson Woodlands – Darrell Regimbald, Kevin Kuhn, Alliette Seigel, Brad Mitchell

Canfor Group – Head Office – Alex Ferguson

BCTS – Peace Liard Business Area – Angela Thomas, Roger St. Jean, Jason Smith, Stephanie Smith

BC Ministry of Forests and Range – Fort Nelson Forest District and Northern Interior Forest Region – Steve Lindsey, Craig Delong

BC Ministry of Sustainable Resource Management – Omineca Peace Region – Anna Regnier

BC Water Land and Air Protection – Peace Region – Joelle Scheck, Graham Suther

Facilitators – Paul Jeakins and Jane Perry

Forestry Consultant – Chris Niziolomski

Forestry Consultant – Philip Carruthers

Forestry Consultant – Pat Salm

Members of the PRISM (2003 to present)

Contribution of presenters, speakers, and technical advisors too numerous to list individually.

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1.0 Introduction

1.1 Background

Previously, a multi-faceted partnership designed an innovative Framework for Sustainable Forest Management (SFM), building on work undertaken by others in B.C., Canada and other countries. This SFM Framework was not so much a radical shift in how forest management should be conducted, but rather a systematic approach that organizes, connects and provides detailed rationales for the many individual resource management processes that currently exist.

Founded on commitments to concurrent, balanced, multi-value sustainability and continual improvement, the Framework uses criteria and elements (C&I) as guideposts for transparent forest management decisions and actions. (A Framework for Sustainable Forest Management: Designing a scientifically credible and operationally feasible approach to multi-value forest management in British Columbia May 2004).

The SFM Framework was made up of three major parts: an introductory document, which describes the broad rationales and assumptions for the Sustainable Forest Management Framework; the Scientific Foundation comprising of the background research, reports and papers on which the rationales are based; and local SFM plans, which describes how components of the Framework are implemented at the local level.

The overall objective of the SFM Framework was to demonstrate to government and industry managers, area residents, stakeholders, and customers of forest resources that it is possible to implement sustainable forest management at the management unit level. The successful achievement of SFM is intended to occur through the ongoing refinement and development, implementation and maintenance of this SFM Plan. This SFM Plan translates the strategic goals of the SFM Framework to operational reality on the ground.

Additionally, third party certification continues to be an important factor in the marketability and competitiveness of forest products. Market campaign pressures have lead many forest product customers to develop procurement policies that guide suppliers in terms of acceptable practices. More and more forest companies in BC and other areas in Canada are seeking certification of their practices to assure buyers that their wood products meet the requirements considered critical for SFM.

Many of the larger wood products customers require that a forest company have Sustainable Forestry Initiative (SFI), Canadian Standards Association (CSA) or Forest Stewardship Council (FSC) third party certification for their woodlands operations.

Canfor and BCTS are committed to SFM in the Fort Nelson area, and have provided and communicated these commitments publicly. The policies and principles found in the Preamble of this document provide the SFM commitments for Canfor and BCTS, respectively.

1.1.1 CSA SFM Certification Process

The CSA Sustainable Forest Management (SFM) Standard initially developed in 1996 and subsequently revised and improved in 2002, 2009 and again in 2016 is Canada's national certification standard. The standard is a voluntary tool that provides independent third party assurance that an organization is practicing sustainable forest management. Consistent with most certifications, the CSA standard expects compliance with existing forest policies, laws and regulations.

Participants under the CSA certification system must address the following two components:

- Participants must develop and achieve performance measures for on-the-ground forest management, monitored through an annual public review with the input of the public and Aboriginals (Sec 2.2.2 following).
- Participants who choose to be registered to the CSA standard must incorporate CSA defined systems components into an internal environmental management system (EMS) (Sec 2.2.3 following).

For a licensee seeking certification to the CSA SFM standard, the DFA SFMP or a licensee-specific plan, complimentary to the DFA SFMP, is developed. The licensee-specific plans may contain additional information such as their defined forest area and internal means to monitor and measure the DFA SFMP components.

Applicants seeking registration to the CSA standard require an accredited and independent third party auditor to verify that these components have been adequately addressed. Following registration, annual surveillance audits are conducted to confirm that the standard is being maintained. A detailed description of these two components and a summary of the CSA registration process are as follows.

1.1.2 Public and Aboriginal involvement: Performance Requirements and Measures

The CSA standards include performance requirements for assessing sustainable forest management practices that influence on-the-ground forestry operations. The performance requirements are founded upon seven sustainable forest management criteria:

1. Biological diversity,
2. Ecosystem condition and productivity,
3. Soil and water,
4. Role in global ecological cycles,
5. Economic and social benefits,
6. Society's responsibility, and
7. Aboriginal relations

Each criterion has a number of "elements" that further define the intent. The criteria and associated elements are all defined under the CSA standards and must be addressed during development of the SFM Plan. The criteria are endorsed by the Canadian Council of Forest Ministers and are aligned with international criteria.

For each set of criteria and elements, forest managers, and the advisory group must identify local values and objectives. Indicators and targets are assigned to the values and objectives to measure performance.

> **Discussion Items** identified in the CSA Z809 Standard for each of the seven SFM criteria have been reviewed and discussed as needed by the public advisory group in conjunction with the development of this SFM Plan. Detailed information on the topics discussed can be found in the meeting summaries and reference material associated with the development of this Plan.
>
> **Values** identify the key aspects of the elements.
>
> **Objectives** describe the desired future condition, given an identified value.
>
> **Indicators** are measures to assess progress toward an objective. Indicators are intended to provide a practical, cost-effective, scientifically sound basis for monitoring and assessing implementation of the SFM Plan. There must be at least one indicator for each element and associated value. Core indicators have been included in the CSA standard for nearly all elements. Additionally, local indicators can be added to the SFM Plan.
>
> **Targets** are specific short-term (one or two year, in some cases 5 or 6 years) commitments to achieve identified objectives. Targets provide a clear, specific statement of expected results, usually stated as some level of achievement of the associated indicator.

Values, objectives, indicators, and targets apply to social, economic and ecological criteria and may address process as well as on-the-ground forest management activities.

As part of the process of developing values, objectives, indicators and targets, the SFM Advisory Group also assisted in the development of forecasts of predicted results for indicators and targets. This information and interrelationship is further described in Section 6. Forecasts are a prediction of the expected future condition of an indicator. These have been incorporated into the SFM Plan targets as predicted results or outcomes for each objective. Forecasting is further described in Section 6.

1.1.3 Environmental Management System Components

The CSA SFM system includes a number of processes or systems-related requirements called "systems components" as follows:

- **Commitment:** A demonstrated commitment to developing and implementing the SFM Plan.
- **Public and Aboriginal Group participation:** The CSA standard requires informed, inclusive and fair consultation with Aboriginal groups and members of the public during the development and implementation of the SFMP.
- **CSA-aligned management system:** The management system is an integral part of the implementation of the SFM Plan and is designed to meet CSA standards. The management system has four basic elements: 1) Planning; 2) Implementing; 3) Checking and Monitoring; and 4) Review and Improvement. The management system includes the following base components:
    - Identify environmental commitments including those within the SFM Plan.

- Identify standard operating procedures or develop performance measures to assess and achieve environmental commitments.
- Develop emergency procedures in the event of an incident causing environmental impact.
- Review all laws and regulations.
- Establish procedures for training. (Providing updated information and training ensures that forestry staff and contractors stay current with evolving forest management information and are trained to address environmental issues during forestry activities.)
- If an incident does occur, conduct an investigation or incident review and develop an action plan to correct and prevent subsequent occurrences.

- **Continual improvement:** within the context of the management system, monitoring and reviewing the system and its components continually improve the effectiveness of the SFM Plan. This includes a review of ongoing planning, and public process to ensure that the management system is being implemented as effectively as possible. SFM Plan improvements generally occur on an annual basis. Changes are generally made as a result of annual plan performance reporting and changes in science and technology. The changes can be initiated by the public (often those participating in the advisory group) or the managing Participants (for example as a result of internal discussions that occur during the Participants annual management review). The management review is intended to evaluate trends towards or away from the SFM commitments and to identify opportunities to strengthen the SFM plan and determine where improvement is needed.

1.1.4 Canadian Standards Association Registration

Following completion of a SFMP and the development of an environmental management system in accordance with the CSA standard, a licensee may apply for registration of its DFA. The determination of whether all the components of a sustainable forest management system applied to a DFA are in place and functional involves an on-the-ground audit of the DFA including field inspections of forest sites. The intent of the registration audit is to provide assurance that the objectives of sustainable forest management on the DFA are being achieved. The registration of a licensee's DFA follows a successful registration audit by an eligible independent third party auditor who has assessed and determined:

- an SFMP, that meets the CSA standard, has been developed and implemented, including confirmation that quantified targets for meeting sustainable forest management criteria have been established through a public participation process;
- a FMS has been developed and is being used to manage and direct achievement of the SFMP performance measures; and
- progress toward achieving the targets is being monitored, and monitoring results are being used for continual improvement of the Sustainable Forest Management Plan and Environmental Management System.

A typical registration audit may include:

- interviews with public advisory group members;
- a review of monitoring and reporting responsibilities related to Canadian Standards

Association performance measures;

- meetings with government officials to discuss licensee performance and government involvement in development of the Sustainable Forest Management Plan;
- field reviews visiting harvest and road construction operations;
- interviews with staff and/or contractors to review their understanding of the environmental management system requirements; and
- meetings with management to assess the level of commitment to environmental performance and sustainability.

In addition to the registration audit, regular surveillance audits are conducted to examine performance against all aspects of Canfor's FMS, including the requirement that regulatory standards and policy requirements are met or exceeded.

Audits and Public Review

Each year the registrants (Participants) compile a report that summarizes results for each of the performance measures. This annual report is provided to the SFM Advisory Group for review and comment. Annual monitoring of the achievement of the Plan and comparison of the actual results to forecasts will enable the effectiveness of the SFM Plan to be continually improved, in keeping with CSA standards. Additionally, the Participants will provide summary information of the individual results, specific to their Defined Forest Area.

The achievement of performance measures (indicators and targets) will be assessed annually through surveillance audits carried out by a registered third party auditor. The audits will determine whether the registrant has successfully implemented the SFM Plan and continues to meet the CSA Standard. Audit summaries are made available to the public by the Participants.

Management Review

Each year, management staff of the Participant's conduct a review of performance in achieving the targets. This information is used to evaluate trends in moving toward or away from the objectives and targets in the Participants Environmental Management System and the SFMP. The information is used to make recommendations for improvement to the plan to achieve the Environmental Management System and Sustainable Forest Management Plan objectives and targets.

1.2 Purpose of an SFM Plan

The purpose of this Sustainable Forest Management Plan (SFMP or SFM Plan) for the Fort Nelson Defined Forest Area (DFA) is to provide an SFM-related planning document that localizes and operationalizes aspects of the SFM Framework with the CSA Z809-08 standard. The SFM Plan provides the "on-the-ground" implementation of CSA Elements, Core Indicators as well as locally developed Indicators, by addressing a range of social, ecological and economic values for the DFA. It is updated annually through the SFMP Annual Report and wholly revised approximately every 5 years, or as may be necessary to remain consistent and/or compliant with; 1) significant aspects of the CSA Z809-08 standard, 2) public, stakeholder and First Nations values, interests and/or treaty rights, and 3) provincial forestry laws, legislation and/or regulatory requirements.

The Sustainable Forest Management Framework Document (2003) was the document that initially provided many of the concepts and rationales supporting the current SFM approach, developed by Slocan Forest Products Ltd and adopted by the SFMP participants in the Fort Nelson DFA (Canfor and BCTS). The SFM Plan has now migrated to the Z809-16 standard as a vehicle to track how management policies and practices are doing relative to sustainability targets

As well, the SFM Plan provides a structure that allows the forest manager to link strategic goals and objectives to tactical strategies that apply to changing values and conditions. The SFM Plan provides the forest manager with a process to implement these strategies, measures the response, and initiates needed changes to practices to continually improve on decisions, practices and on the ground results for a wide range of values.

The SFM Plan will provide direction and links to government policy and licensee operational plans. Some of the expected outcomes of the implementation of the SFM Plan include:

1. Marketplace recognition,
2. A foundation for a range of certification approaches,
3. The provision of credible information for requesting unit specific management objectives to improve economic efficiencies,
4. Engaging the First Nations in ways that reflect their preferences and readiness for information exchange relationship building,
5. Rigorous, science based approaches and information allows government decision makers to accept innovative, cost-effective practices, and corporate managers to implement practices with a minimum of conflict,
6. Engaging stakeholders efficiently, in ways that reflect their interests and capacity,
7. Improved marketplace acceptance, government approval of innovative approaches, reduced conflict, increased certainty and effective information management will reduce costs and;
8. Improved implementation of the Forest Range and Practices Act.

2.0 SFM Planning Process

The Preamble provides the SFM commitments for Canfor and BCTS captured in the respective SFM Policy statements. Section 1.0 provides the background and purpose of this plan. This section discusses the SFM Planning process as well as outlining the format for the balance of the SFM Plan.

Section 2.0 outlines the structure and responsibility of the groups and the processes involved in the development, implementation and maintenance of the SFM Plan. As well, this section provides a listing and brief description of the forest management initiatives and documents that support the Plan for the DFA. It is important that these initiatives and documents be considered a part of the SFM Plan.

The biophysical and socio-economic descriptions of the DFA are provided in Section 3.0. Discussions about the natural disturbance current conditions are also described in this section. The foundation for SFM planning is captured in Section 4.0, through the identification and analysis of current strategic issues, inventories, stakeholders, practices, decision support tools and identified knowledge gaps.

Following this base information, SFM goals are described through Elements and indicators in Section 5.0 – Strategic Planning. As well, Section 5.0 summarizes the current state of the DFA's elements. The transition of these goals to operational implementation occurs in the Tactical and Operational Planning levels, Section 6.0 and 7.0, respectively. Section 8.0 describes the "continuous improvement" ("adaptive management") approach, which includes monitoring and reporting of progress towards achieving sustainable forest management. Section 9.0 provides a description of the current and proposed information management strategy in the DFA. The appendices provide the relevant background information satisfying certification requirements, as well as providing additional DFA specific content which supports SFM and this SFM Plan.

2.1 Plan Development, Implementation & Maintenance

The first step in implementing the SFM Plan for the Fort Nelson DFA was to clearly define the geographic area of the unit, and as much as possible, identify areas adjacent to the unit that may affect achievement of elements (i.e. parks, regional service communities, etc.). A number of key activities were undertaken before the formal planning process began:

Forest managers identified key issues that may affect (or be affected by) the achievement of elements and that need to be addressed in the local SFM Plan.

Available information was collated, including:

1. resource inventories for the criteria and elements identified in the SFM Framework
2. reports, datasets and analysis tools from previous planning processes
3. information about new forecasting and analysis tools that may be relevant, and
4. a stakeholder analysis for the unit.

Appropriate First Nations, stakeholder and public involvement processes were determined and/or considered.

2.1.1 SFM Plan Development

SFM planning is hierarchical in nature. There are three main levels, each with activities and outcomes that are interrelated and required for continuous improvement. The three levels are: strategic, tactical, and operational.

The following text briefly outlines the flow of activities shown in Figure 1. The descriptions refer to the main steps that occurred at each hierarchical level of the planning process but do not necessarily represent the specific sequence of events. Although many of the individual components and activities flow from one to the next, the process is not entirely linear and some hierarchical planning activities occur at parallel times.

The outcome of the Strategic Level of planning is an approved SFM Plan. The SFM Plan directs tactical and operational plans and practices within the Fort Nelson DFA, either within or outside of a forest products certification context. The critical step, at this planning level was to localize the core set of Criteria, Indicators and Measures developed under the Framework. This was accomplished through a combination of expert and technical input, stakeholder input. The desired future conditions for criteria and elements were determined through the articulation of measures and thresholds by the public advisory group. These Criteria have now become the CSA standard Criteria and the SFM framework Indicators have become Elements. The SFM Framework measures have become indicators under the revised SFMP.

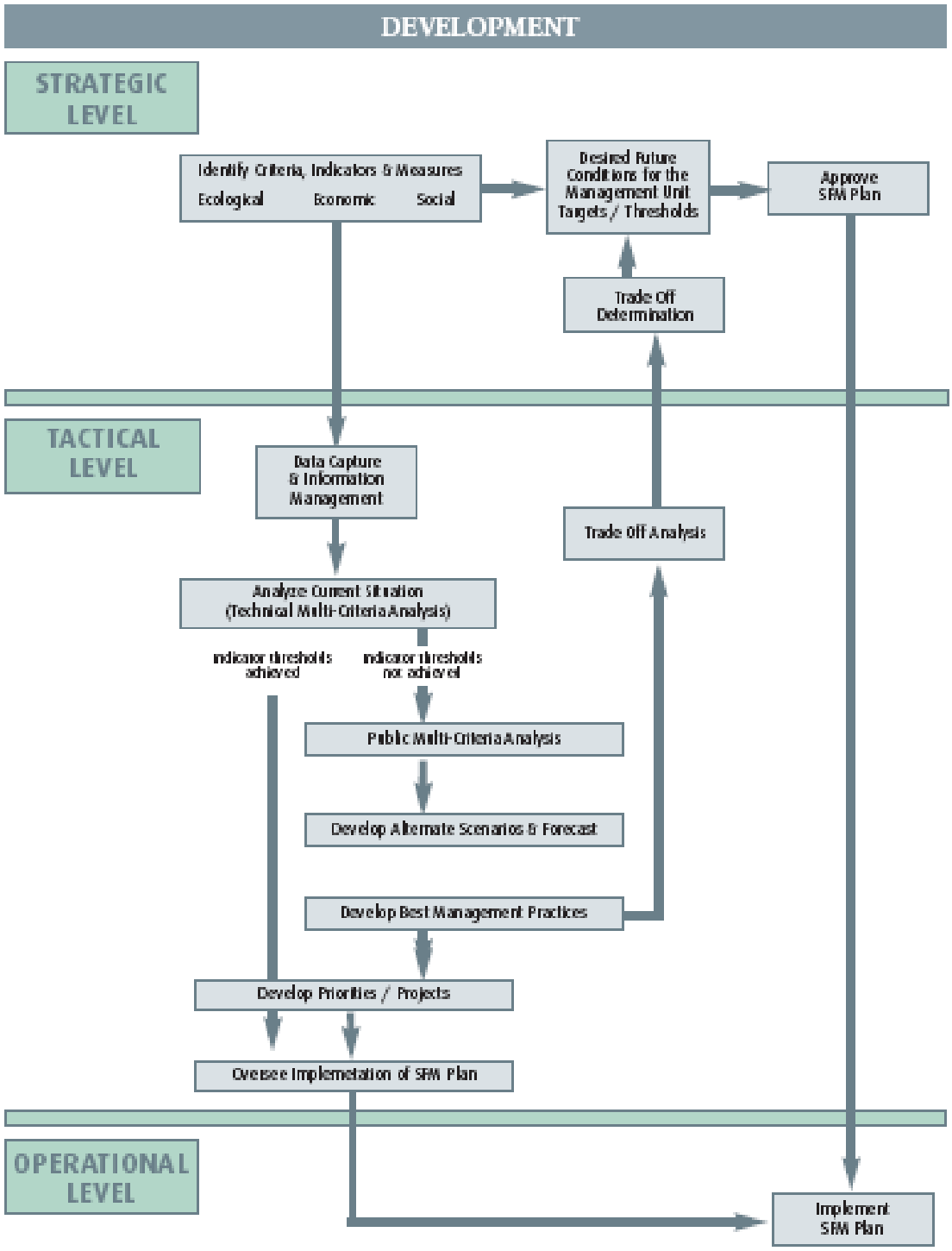
In the Tactical Level of planning, analysis focused on expected areas of operations over the next 20 years, which is a planning horizon that resource managers are familiar with through previous harvesting planning approaches. This level also analyzed data for longer time periods to ensure that practices are still within sustainable thresholds. The main components completed at the tactical level included:

1. Data capture and information management – all relevant/available ecological, economic and social data to be used for analysis, scenario design and forecasting;
2. Analysis of current practice;
3. Determination of decision support tools;
4. Multi-criteria analysis – used to feed into scenario design, forecasting and the development of practices;
5. Development of alternative scenarios and forecasting – focused on achievement of priority Elements, and overcoming the deficiencies in current practice that were identified in the current situational analysis;
6. First Nations, stakeholder and public input in scenario design & selection of preferred strategy

At the Operational Level, site- and treatment- specific planning such as logging and reforestation site plans articulate the practices needed to achieve the preferred strategy while remaining consistent with legislative and corporate practices, unless the strategic or tactical plans included adjustments to these practices. Section 7.0 Operational Level Planning provides the details on this planning level. Given the chosen preferred strategy for this SFM Plan, the operational level of planning has not changed for the Fort Nelson DFA.

The result of the SFM Plan development phase is this SFM Plan. The SFM Plan reflects a status quo management as a result of the chosen preferred strategy.

Figure 3: SFM Plan Development Flowchart



2.1.2 SFM Plan Implementation & Maintenance

This following text briefly outlines the flow of activities shown in Figure 2. The descriptions refer to the main steps.

Once government has approved strategic and tactical plans, and operating plans are in place, the development phase of the SFM Plan is completed. From this, the resource managers begin implementing operational activities and collecting monitoring data. As the operational level begins to gather data and assess the impacts of implementing the plan, the tactical level undertakes analysis of the information and the linkage between the levels continues.

At the Operational Level, operational practices will be implemented consistent with the SFM Plan and the Forest Stewardship Plan through the implementation of current or revised operating procedures.

The key tasks at the operational level are monitoring data collection and reporting, as part of an operationally feasible continuous improvement plan. Monitoring responsibilities are defined in the indicator descriptions of the SFMP and in the Responsibility Action Matrix (RAM). Monitoring information derived at the operational level will be available to the public, which is crucial to maintaining public support for SFM.

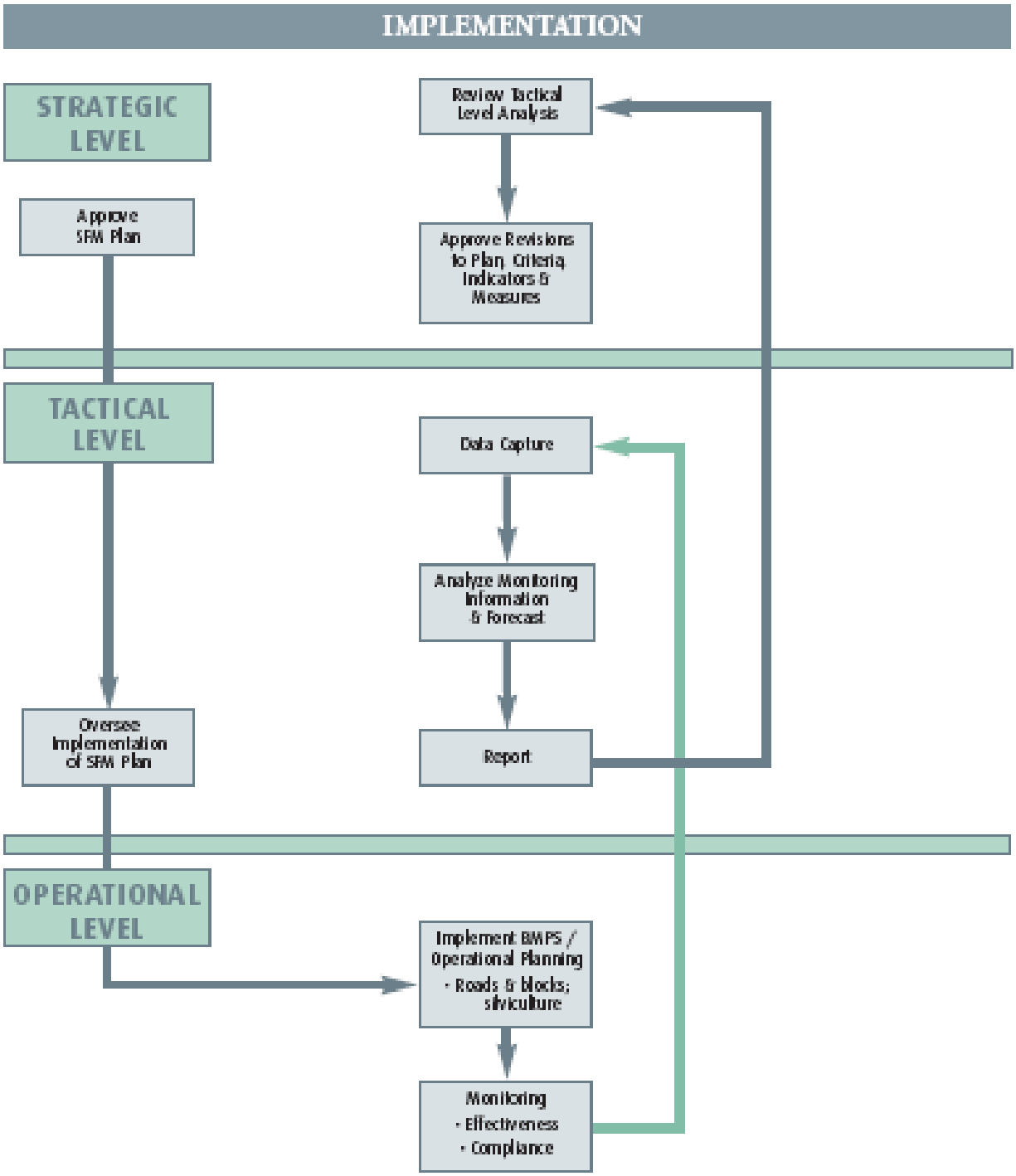
Within the Tactical Level, several of the steps identified in the SFM Plan development phase will be repeated in the implementation phase. The following steps, in conjunction with the operational level monitoring, make up a portion of the continual improvement program for the SFM Plan.

1. Data capture – Monitoring and other new data will be coming into the information management system on a regular or periodic basis. This information will have to be captured in a consistent format in order to be used in analysis and forecasting.
2. Analysis and forecasting – As new information comes in, the status of Elements will have to be analyzed and forecast on a periodic basis. Timing of the steps will be contingent on the risk of elements becoming unsustainable.
3. Reporting – If the analysis of the new data shows that an Element is potentially going to become unsustainable, options for actions will have to be explored and a recommendation will be given to the strategic level for decision. Depending on the situation, the public may be involved in determining options and the recommendation.

If changes are recommended, then the Strategic Level completes the continual improvement loop through the following steps.

1. Review tactical-level analysis
2. Approve revisions to Indicators and Elements
3. Approval of the SFM Plan

Figure 4: SFM Plan Implementation Flowchart



2.2 Structure and Responsibility

The organizational structure for the development and maintenance of the SFM Plan consists of representatives from the forest industry, government, as well as First Nations and the public. The two main groups are a working group and a public advisory group (PAG).

The SFMP Working Group has been formed to assist in the development of the SFM Plan - for ease of naming; they have been called the SFM Area Participants. This group consists of representatives from the signatories of this plan (Canfor and BCTS). The SFMP Working Group is responsible for the development, implementation and maintenance of the SFM Plan. The Fort Nelson Forest District office provides technical expertise to the SFMP Working Group. Details on the SFMP Working Group are outlined in the Roles & Responsibility Matrix

First Nations and public participation is a keystone for sustainable forest management. First Nations are active participants on the public advisory group. Valuable input is a result of informed, inclusive and fair consultative processes with local people, who are directly affected or who have an interest in resource management in the DFA. The group, formed in December, 2003, is called the Public Response for Integrated Sustainable Management (PRISM) and is active in the Fort Nelson DFA. Details on the PRISM can be found in the sections below.

The SFMP Working Group is aware that the PRISM is only one strategy for public involvement; a variety of strategies have been employed on the DFA during the development and implementation of the SFMP.

2.2.1 Signatories Involvement

The signatories to the SFM Plan are committed to the development, implementation and maintenance of this SFM Plan within the DFA. The signatories to this plan are as follows:

1. Canadian Forest Products Ltd. (Canfor) – North Operations
2. BC Timber Sales (BCTS) – Peace-Liard Business Area

On publicly owned land, the responsibility and accountability of forest stewardship ultimately rests with the BC Ministry Natural Resource Operations, however, the signatories to this plan are held responsible for forest management under legislative and contractual agreement through their respective tenure agreements. In light of the Forest & Range Practices Act (FPRA), there is a movement towards a form of joint stewardship. The results of this SFM Plan will help facilitate that process.

The signatories acknowledge that the defined forest area (DFA) includes the collective areas under which they operate and have legal rights and responsibilities. For those parties within the area not signatory to this plan, Canfor and BCTS have considered and respected their legal rights and responsibilities.

Individual initiatives that are currently a part of each signatory's operation will be important for implementation of the overall SFM Plan. However, the signatories have agreed to work collaboratively on this innovative plan – working towards the same criteria, elements, indicators and targets of SFM. While this SFM Plan is the primary document that will be used to guide implementation of SFM, other existing management systems, operating procedures and internal policies will also play a role. These components have been considered during the development of this plan.

In order to implement the SFM Plan, it is important that roles and responsibilities are identified. The following table outlines the general duties for each of the three main groups for each of Canfor and BCTS: Senior Managers; SFM Representatives; and operational staff. These roles and responsibilities are in addition to those identified within each signatory's Environmental Management System (EMS)

Table 4: Roles & Responsibilities

Senior Management – Canfor & BCTS
• Develop, implement and maintain commitments to SFM • Assign appropriate level of resources to implement SFM Plan • Define, document and communicate the roles, responsibilities and authority to implement and maintain the SFM Plan • Conduct management review of SFM – including the SFM Plan, monitoring results, annual report, internal/external audits • Implement appropriate changes to SFM due to the results of the management review
SFM Representative – Canfor & BCTS
• Coordinate the development, implementation and maintenance of an effective public advisory group (PAG) • Participate within the PAG following the agreed Terms of Reference for the group • Respect the roles, responsibilities, rights and ownership of all parties, both those involved and those not actively involved • Provide/receive information to affected or interested parties concerning all aspect of SFM • Track internal and external communication concerning SFM • Develop, implement and maintain the SFM Plan – including participation in the development of local Criteria, Elements, Measures & Targets • Develop/deliver appropriate training for staff to implement and maintain SFM • Develop/deliver appropriate training for contractors to implement and maintain SFM • Develop, implement and maintain appropriate procedures (operational controls, monitoring, checking and corrective actions) to ensure effective delivery of the SFM Plan • Develop, implement and maintain an effective continuous improvement process to ensure continual improvement of the SFM Plan
Operational Staff – Canfor & BCTS
• Develop operational plans that reflect SFM Plan • Implement operational plans • Implement inspections, monitoring and corrective actions as per the specific requirements outlined in the respective plans & operational controls • Attend applicable training session to ensure effective implementation of SFM Plan • Knowledge, understanding and access to SFM Plan and applicable supporting documents • Follow applicable operational controls and procedures to ensure effective delivery of SFM Plan

2.2.2 Public Involvement

The Fort Nelson DFA previously and currently adheres to the legislative review and comment process for public input. Based on the concepts and practices of the SFMP, the DFA Participants continue to work to develop a more thorough and meaningful information sharing process with the people and groups of the local area (i.e. First Nations, general public, and other stakeholders). This information sharing and public involvement process will continue to provide input, evaluation and feedback into the SFM Plan and therefore, into SFM for the DFA.

The process includes broad public consultation during the development of the elements and measures of sustainability and allows for open discussion and decision to occur, based on information being available and understood by all parties.

The SFMP Working Group have engaged participation of directly affected and interested parties in the planning process for the DFA based on the results of Section 4.2 Stakeholder Analysis. The Stakeholder Analysis is the basis for the public involvement process addressing the public's varied knowledge of SFM, its different level of interests, involvement, as well as differing social, cultural and economic ties with the forest.

Utilizing results from the Stakeholder Analysis, a balanced and representative mix of persons affected by, or interested in forest management were invited to be members of a public advisory group (PAG). Details about the Stakeholder Analysis process can be found in Section 4.2 Stakeholder Analysis. Details on the establishment of the PAG can be found inAppendix 2.3: Public Involvement Process. For privacy reasons, people's names or contact information are not presented in this SFM Plan, however, the table below provides the interests groups that were invited to participate on the PAG. Some of those (people/groups) invited chose not to be involved in the process at this time. The groups with active representation are indicated by an asterisk (*) in the table below.

Table 5: Potential Interested Groups

Government	First Nation
Ministry of Agriculture Ministry of Energy, Mines and Petroleum Resources Ministry of Forests, Lands, Natural Resource Operations & Rural Development (MFLNRORD) * Ministry of Environment and Climate Change Strategy Ministry of Indigenous Relations and Reconciliation Ministry of Tourism, Arts and Culture	Fort Nelson First Nation Dene Tsaa Tse K'Nai First Nation* Dena Tha' First Nation Lower Post First Nation Fort Liard First Nation
Oil, Gas & Mineral Exploration	**Local Government**
BC and Yukon Chamber of Mines Spectra Energy EnCana Energy Oil and Gas Commission	Fort Nelson Northern Rockies Regional Municipality* Fort Nelson Town Council* Town of Fort Nelson*
ENGO's	**Interest Groups**
Northeastern BC Wildlife Fund Wildlife Conservation Society Canadian Wildlife Federation	Fort Nelson Trappers Association Northeastern Lodge Owners Association Northern Guides Association – Fort St. John Northern Guides Association – Toad River Toad River Area Club

Workers	**Miscellaneous**
ISW Canada Silviculture Consultants*	Muskwa Kechika Office Tourism, Non-commercial recreation*

The public advisory group in the Fort Nelson DFA has since been called the Public Response for Informed Sustainable Management (PRISM). The structure of the PRISM is outlined in the Terms of Reference (TOR) for the Fort Nelson DFA. The TOR provides the organizational structure used for the assignment of the duties of team members, advisors and reviewers. The TOR also outlines the schedule for the development of the SFM Plan, including the public consultation schedule, communications, and the basic operating rules for the public involvement process. PRISM and the Participants use an unbiased third party meeting facilitator. The use of a meeting facilitator not only ensures that PRISM meetings remain on time and on topic (agenda), and that assigned actions are followed through to completion, but also that meetings and related communications are conducted in an open, honest and respectful manner. Anonymous PRISM member surveys and interviews (conducted by the facilitator) are two other methods used by the Area Participants to collect information and input from the PRISM group, and provide anonymous input regarding the effectiveness and functionality of the PRISM group. The survey also provides an assessment of PAG member satisfaction with the public participation process. It should be noted that documentation on the establishment, assembly and running of meetings, as well as the TOR can be found in the Stakeholder and First Nations Appendix (Appendix 2.3: Public Involvement Process).

This public involvement process contributed to the identification of local values, objectives and indicators (Section 5.0). It has been an effective process, involving a wide variety of people. This process allows stakeholders the opportunity for continual input, and learning, as well as ongoing influence on decisions, and the potential resolution of issues.

The going forward scenario for public participation is to solicit additional membership on the PAG. Data and information derived from the previously completed stakeholder analysis (Revised in February 2011) has been incorporated into Canfor’s newly implemented stakeholder data management systems, termed; Creating Opportunities for Public Involvement or COPI. As information regarding stakeholder contact information, correspondence, and activities are input into the COPI database on an ongoing basis, the need for an additional full scale stakeholder analysis in the near term is not anticipated. Should this circumstance change or a need be identified, the undertaking of a stakeholder analysis will be considered at that time. The Participants will seek the PRISM's input in an effort to continually improve feedback mechanisms and communications with the public. The Participants will review the current public review process of operational plans and identify and implement opportunities to enhance the process.

2.2.3 First Nations Involvement

First Nations hold a unique position in Canada and as such, have a legally protected right to participate in the development and review of resource management strategies or plans in areas they assert to be traditional territories, including Crown lands outside areas where treaties apply. Signatories of this plan recognize and respect the Aboriginal and/or Treaty Rights, and will work to involve Aboriginal peoples and/or First Nation communities in the SFM Plan. As much as possible, First Nations participation is a part of the overall public involvement process.

Through the PRISM, First Nations have contributed to the development of local values, Elements and Indicators (Section 5.0), particularly those that are of cultural and spiritual importance.

Details specific to the involvement process with First Nations, including the Terms of Reference (TOR) can be found in Appendix 2.3: Public Involvement Process.

2.2.4 Oil & Gas

Oil and gas (O&G) exploration and development have occurred throughout most of the DFA. Activity in this resource sector continues to increase. The Oil and Gas Commission (OGC) is responsible for authorizing petroleum industry activities on crown land. Activities include seismic lines, pipelines and road construction and well site development. Discussions regarding coordination of activities between the O&G and forest industries are ongoing.

Oil and gas industry activities consist of development of access, seismic lines, pipelines and well sites. There is potential for both industries to affect each other. Canfor and BCTS must consider O&G needs when determining "set asides" for other resource values (e.g. biodiversity; recreation) and the O&G industry must take into account the need for "set asides" as required by law and this SFM Plan to ensure that targets are still being met. Section 6.1.1 describes the interaction between the two industries in more detail.

2.3 SFM Plan Links to Other Initiatives

The SFM Plan describes the SFM system for the DFA. The management direction within the SFM Plan, and the process used to develop the management direction, is consistent with provincial government policy for land use planning, as well as all other government policies. The SFM Plan is a comprehensive planning document that integrates legislative requirements, as well as many previously implemented forestry or land use initiatives. Applicable legislation and the most influential initiatives are described below, providing a listing and description of the linkages to the SFM Plan. Table 6 provides information on how the SFM Plan addresses the listed initiative.

Table 6: SFM Plan Links to Other Forest Management Initiatives

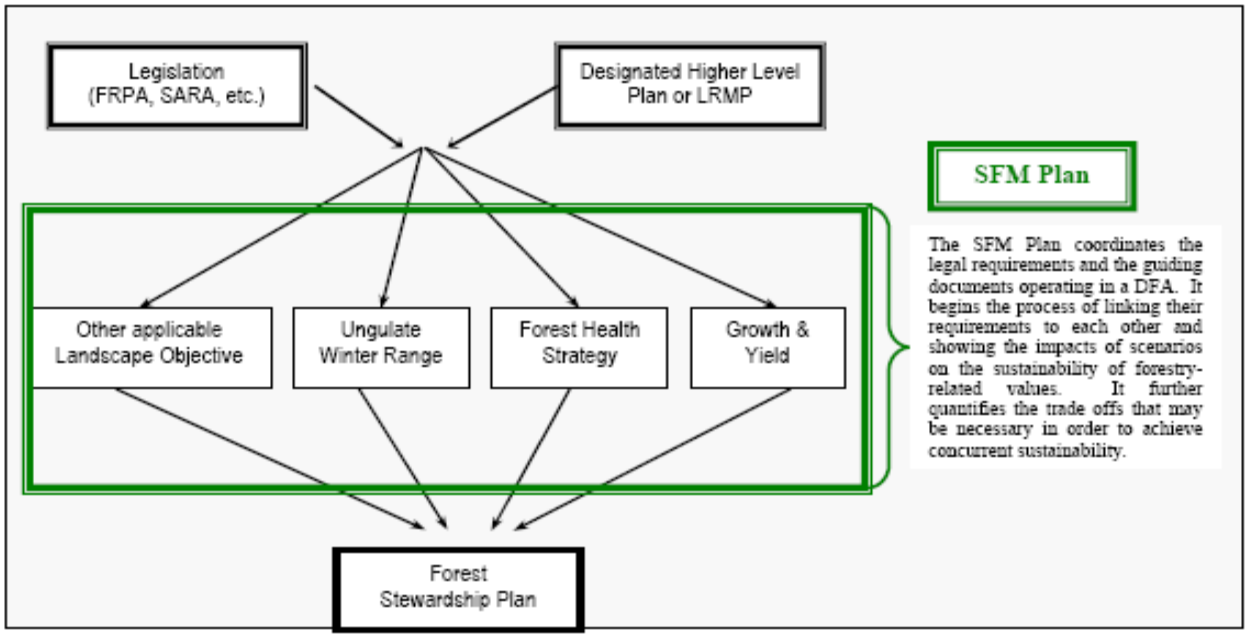
Forest Management or Sustainability Initiative	Linkage to SFM Plan
Forest and Range Practices Act (FRPA)	FRPA provides forest managers with a "results-based" structure upon which to develop and deliver forest management. The SFM Plan is also "results-based". The SFM Plan provides the signatories the context to develop, implement and report on achievement of objectives either those set by government or by PRISM and the participants. At a minimum, the SFM Plan must meet or exceed the requirements of FRPA. However, the documentation for the SFM Plan may provide the rationales to support any proposed changes to objectives identified in FRPA.
Land and Resource Management Plan (LRMP)	Community-based processes for land use planning were completed throughout the province of BC. The resultant plans provide strategic direction and objectives for identified resource management areas. Some of these plans are legislative, while others fall under government policy. The SFM Plan provides further refinement to the setting of strategic direction, as well as providing a process to encourage and accept change, following the concepts of SFM.
Timber Supply Review for Timber Supply Area	The main objectives of the Timber Supply Review (TSR) are to: 1) Identify the economic, environmental and social information that reflects the current forest management practices— including their effects on the short- and long-term timber supply; 2) Identify where improved information is required for future timber supply forecasts; and 3) Provide the Chief Forester with information to make any necessary adjustments to the allowable annual cuts. Following the concept of "Sustainability", the SFM Plan currently addresses the first and second objectives.
Canadian Standards Association (CSA)	The CSA Z809-16 Standard outlines the use of Canadian Council of Forest Ministers (CCFM) SFM criteria and elements. It requires public involvement in the process of setting locally appropriate values, objectives, indicators and targets. This SFM Plan is the document that supports the SFM Requirements of the CSA Z809-16 Standard.
ISO 14001 Environmental	ISO 14001 provides organizations with the elements of an effective management system. This system was developed in a manner that is

Forest Management or Sustainability Initiative	Linkage to SFM Plan
Management System (EMS)[2]	easily integrated with other management systems. EMS provides the management system framework required for the CSA Z809-16 Standard. Compliance with all regulatory requirements is described within the EMS. The EMS provides the foundation for the management system of the SFM Plan. The primary linkage between the EMS and the SFM Plan will be in the areas of roles & responsibilities, tracking, monitoring, corrective actions, internal/external audits and reporting of performance, as well as regulatory compliance.
Land Based Investment Strategy (LBIS)	LBIS provides 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. LBIS and previously Forest Investment Account (FIA) funding has been the financial support for many of the projects for testing SFM concepts including the resultant SFM Plan.

Figure 3 depicts the intent and purpose of the SFM Plan in terms of addressing the current range of other decision-making processes relevant to forest management in BC, i.e. legislation, policy and guidelines.

[2] ISO 14001 EMS for Canfor is called the Forest Management System (FMS)

Figure 5 SFM Plan Linkage to Strategic Initiatives



2.3.1 Strategic Plans, Policies & Supporting Documents

In addition to the SFM policies developed for the Fort Nelson DFA, addressing strategic policies/plans developed through other initiatives and legislation is essential for a complete understanding of SFM applicable to Fort Nelson DFA. These external, yet related documents are categorized into Strategic Plans, Policies or Supporting Documents and are listed below. Some of these requirements are in addition to being compliant with legislative and regulatory requirements established by federal, provincial or local levels of authority. The following contains a list of all DFA applicable strategic plans and/or policies.

Table 7: SFM Plan Linkages to Strategic Plans/Policy

Strategic Plan / Policy	Linkages to SFM Plan
Fort Nelson Land and Resource Management Plan (LRMP), October, 1997	No higher level plans have been established for the Fort Nelson Forest District. The Fort Nelson LRMP has identified areas of enhanced resource development, general resource development and special management. Canfor North Operations and BCTS – Peace-Liard Business Area have no operations within this plan in the special management zones. All operations are within the enhanced and general resource management zones. The LRMP has identified wildlife, recreation, access, agriculture, biodiversity, First Nations and other tenure holders as the key considerations ensuring that all levels are integrated into resource development plans. areas in the special management zones. The Muskwa-Kechika Management Area (MKMA) was

Strategic Plan / Policy	Linkages to SFM Plan
	established as a result of the approval of the Fort Nelson (and Fort. St. John) LRMPs. Under the Muskwa-Kechika Management Area Act Landscape Unit objectives must be established before any forest development activity can occur in the MKMA. To date of development of this SFMP no landscape unit objectives have been identified for the MKMA. The LRMP was considered in the development of this SFM Plan.
Fort Nelson TSA Timber Supply Review Documentation	TSR3 Data Package Submission (July 9, 2004) provides the inventory base and analysis rigor used to assess SFM strategies as identified within the SFM Plan tactical planning section of this plan. The MFLNRORD prepared a data package to support the TSR4 process. The TSR4 data package was released February 2017. The MLNERORD has yet to release a Timber Supply Review Discussion paper.
Fort Nelson TSA AAC Determination, November, 2006 & Supporting documents. Apportionment Letter, February 26, 2009	All TSR reports are important for SFM Planning given the mandate and scope of TSR. These reports provide DFA specific information for the analysis process. SFM Plans will build on this process.
Forest Stewardship Plan (FSP), Canfor – March 5, 2007 BCTS – May 30, 2008	FSPs link government objectives to practices on the ground through various results and strategies. Under FRPA legislation, the FSP is the only operational plan that is submitted to government for approval. The FSP is a landscape level plan and is the driver of site-specific operational plans, following the requirements of the SFM Plan. It is the operational plan that contains management strategies to achieve the SFM objectives. It is the responsibility of the individual licensees to ensure that SFM principles are upheld through implementation of this and other operational plans.
Fort Nelson TSA Silviculture Strategy (Type I), March, 2000	The Type I Silviculture Strategy identifies the critical issues in timber supply, derives objectives with respect to those issues, specifies regimes to meet those issues, and identifies the regime activities that can be implemented in the next five years. The SFM Plan works to resolve these types of issues.
FIA – Land Based Investment Strategy (LBIS), 2010	The LBIS identifies land-based resource management issues and projects based on biological needs and local forest management priorities through collaboration between government, licensees and key stakeholders. This initiative is to provide managers information required to support informed

Strategic Plan / Policy	Linkages to SFM Plan
	resource management investment decisions. FIA funding has been the financial support to many of the solutions and/or testing of SFM thinking, as well as the resultant SFM Plan.
ILMB Data Exchange Agreement, January, 2001	Data sharing agreement between the Integrated Land Management Bureau and Canfor North Operations will assist with the development, implementation and maintenance of the SFM Plan.
Protected Areas Strategy (PAS)	The PAS was developed by government to put aside 12% of British Columbia as Parks and Protected Areas by the year 2000 in order to protect representative ecosystems around the province. Protected Areas within the DFA were developed through the LRMP process in order to preclude timber harvest in these areas and to protect high value, critical habitat or unique landscape areas. The Fort Nelson SFM Plan will respect the Protected Areas that have been identified within the DFA. As part of SFM, these areas will not be included in harvest management strategies in order to preserve the landscape features within each area.

The table below contains a list of supporting documents or systems applicable to all or parts of the DFA.

Table 8: SFM Plan – Supporting Documents/Systems

Supporting Document(s), Date	Ownership
Canfor Fort Nelson Operations, Forest Stewardship Plan, March 5, 2007.	Canfor
Canfor Peace Fort Nelson Operations, FMS – ISO 14001, July 29, 2001	Canfor
BCTS, Forest Stewardship Plan, May 30, 2008	BCTS
BCTS, EMS – ISO 14001, certification audit early December, 2004	BCTS

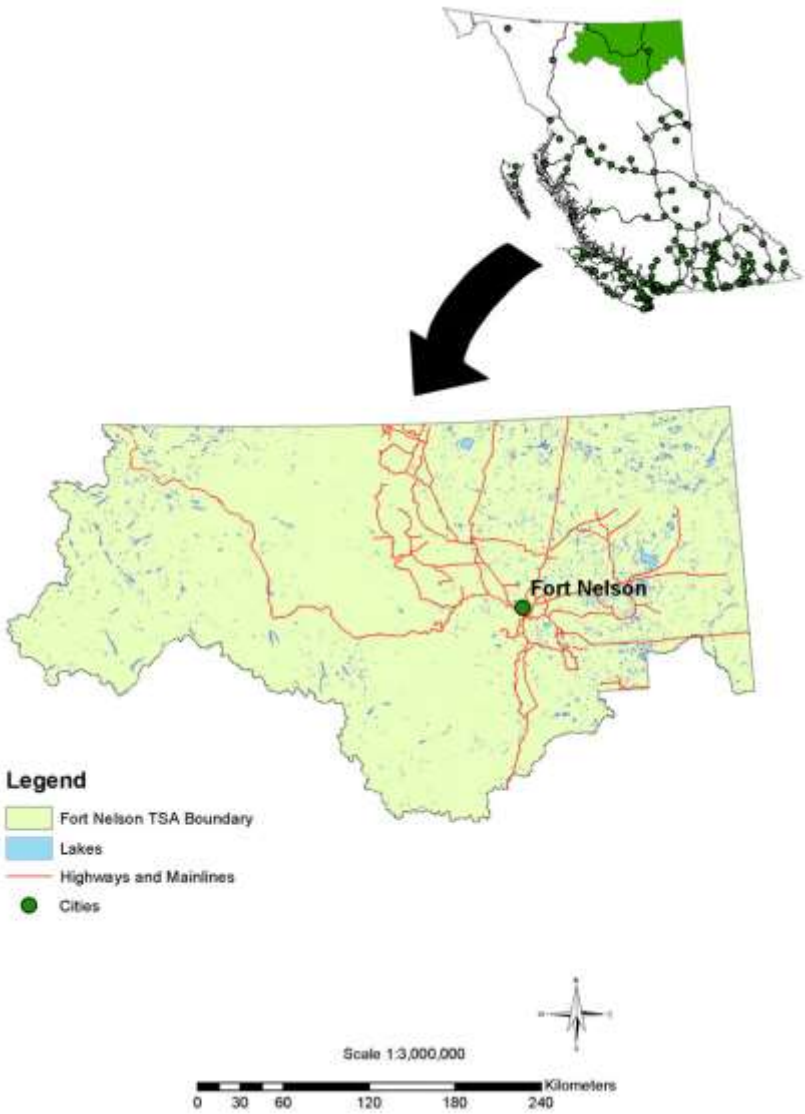
3.0 Description of the Defined Forest Area (DFA)

Section 3.0 describes the defined forest area (DFA) – geographically, ecologically, socially and economically. As well, the natural disturbance current condition is described.

3.1 Geographical Description

The Defined Forest Area (DFA) of this SFM Plan is the Fort Nelson Timber Supply Area (TSA) as described for TSR 3[3] Appendix 1.1: Maps.

Figure 6 Fort Nelson TSA



The TSA is approximately 9.8 million hectares and is located in the north-eastern corner of B.C. It includes approximately 1.5 million hectares transferred in 1999 from the Bulkley – Cassiar Forest District, referred to as the Kechika Addition. The Yukon/Northwest Territories and the Alberta borders bound the area to the north and east, respectively. The Mackenzie and Fort St.

[3] As defined by the Timber Supply Review 3 Analysis Process, March 2005

John Timber Supply Areas are to the south. The Cassiar-Stikine area and the Rocky Mountains are adjacent to the west.

The Fort Nelson Defined Forest Area (DFA) [4] is considered part of the forested land base owned by the Crown which is available for harvest. Analysis for some Elements will take place on the DFA and will take place on both the THLB and NHLB for others. CSA certification requires that an SFM Plan be developed for the areas that Canfor and BCTS have some measure of control over through management practices. Analysis for some aspects of overall sustainability must take into account areas that Canfor and BCTS do not have any control over the aspect.

The total land base exclusive of any reductions is 9.8 million hectares. Of this total, 34,480 hectares are removed due to First Nations, private, federal and military reserves land, which are not part of the Crown land base. A further reduction of 3.8 million hectares is removed due to non-forest or non-productive conditions such as alpine, roads and non-commercial cover. At this point there is approximately 5.9 million hectares remaining, which are considered productive Crown forest land. The Crown Forest Management Land Base (CFLB) is the area of productive forest under crown ownership. This is the total area that contributes to landscape level objectives for biodiversity and resource management. Forest stand and landscape level management strategies will apply within the CFLB (e.g. seral stage and VQOs).

The land base available for operational forestry is called the timber harvesting land base (THLB). It is determined by further removing specific land conditions which are forested but may not be eligible or are only partially eligible for harvesting. This would include areas such as low productivity areas, riparian reserve zones, physically or economically inoperable areas. These areas are collectively referred to as the non-harvestable land base (NHLB). In Fort Nelson, the NHLB represents a significant area totalling 4.3 million hectares, which leaves approximately 1.4 million hectares for industrial forest operations (THLB). While harvesting is focused in the THLB, it is expected to still contribute to forest landscape and stand level requirements (seral stage, VQOs, wildlife habitat).

A portion of the plan area overlaps with the Muskwa-Kechika, which covers some five million hectares in the western region of the Forest District. The Muskwa-Kechika is a remote and relatively undeveloped area of significant natural resources (oil, natural gas, minerals and timber). It is also regarded as a significant wildlife area that supports a diverse range and sizeable populations of large mammals. [Note: Muskwa-Kechika will refer to that portion of the Muskwa-Kechika that lies within the Fort Nelson DFA in this SFM Plan].

Areas adjacent to the DFA have an important role to play in protecting the ecosystems of the area. At the time of TSR3 (2005), the Fort Nelson Forest District included 25 parks and 10 protected areas. This includes the eleven new parks (totalling 842,271 hectares) designated in June 1999 as part of the Fort Nelson Land and Resource Plan (LRMP) process. These areas are managed under the Park Act and managed by Integrated Land Management Bureau (ILMB). These areas are not included within the THLB for this SFM Plan. However, where the parks contribute to the planning processes or contribute to measures, they will be identified and the involvement of the measure will be described within this plan. These parks provide wilderness experiences, scenic and wildlife viewing, water based activities, and other outdoor recreation opportunities.

[4] DFA description agreed by PRISM, December 18, 2003 Meeting Minutes

Table 9: Timber Harvesting Land Base[5]

Classification	Total Area (ha)	Net Area Removed (ha)	Percent of Total TSA area (%)	Percent of CFLB (%)
Total area on inventory file (Fort Nelson Forest District)	**9,868,067**	**9,868,067**		
Land not managed by MOF (e.g.. private, woodlots, federal, Indian, military reserves)	29,927	29,927		
Total TSA area		**9,838,140**	**100.00**	
Reductions to TSA:				
Non-forest, non-productive, no typing	3,712,709	3,705,856	37.62	
Alpine (not previously accounted for)	3,006	3,006	0.03	
Non-commercial cover (brush)	350,671	350,671	3.55	
Existing roads, trails and landings	46,686	37,395	0.38	
Total productive Crown forest land base (CFLB)		**5,741,212**	**58.18**	**100**
Parks, UREPs and Ecological Reserves	1,059,861	371,322	3.76	6.47
NSR from wildfire, non-productive or misclassified	86,106	76,632	0.78	1.33
Non merchantable	301,193	250,253	2.54	4.36
Low timber productivity	4,416,007	2,729,564	27.66	47.54
Riparian reserve (stream, wetland and lake)	543,340	190,667	1.93	3.32
Environmentally sensitive areas	708,018	122,878	1.25	2.14
Unstable terrain	19,112	9,197	0.09	0.16
Wildlife range burn areas	354,999	27,109	0.27	0.47
Stand-level biodiversity (existing wildlife tree patches)	434	367	0.004	0.01
Seismic areas	111,957	26,026	0.26	0.45
Inoperable areas	7,419,049	361,670	3.67	6.30
Black spruce leading stands	1,215,896	143,258	1.45	2.50
total reductions to the CFLB:		**4,308,943**	**43.67**	**75.05**
Current Timber Harvesting Land Base		**1,432,269**	**14.51**	**24.95**
Future Reductions:				
Future roads, trails and landing		29,825	0.30	0.52
Future stand-level biodiversity (WTP)		6,272	0.06	0.11
Future Timber Harvesting Land Base		**1,396,172**	**14.15**	**24.32**

[5] Data Source: Fort Nelson TSA TSR3 Data Package, July 9, 2004 (Will be re-run with 2018 TSR4 analysis package). As of May 9 2018 the TSR4 Timber Supply Analysis had not been completed.

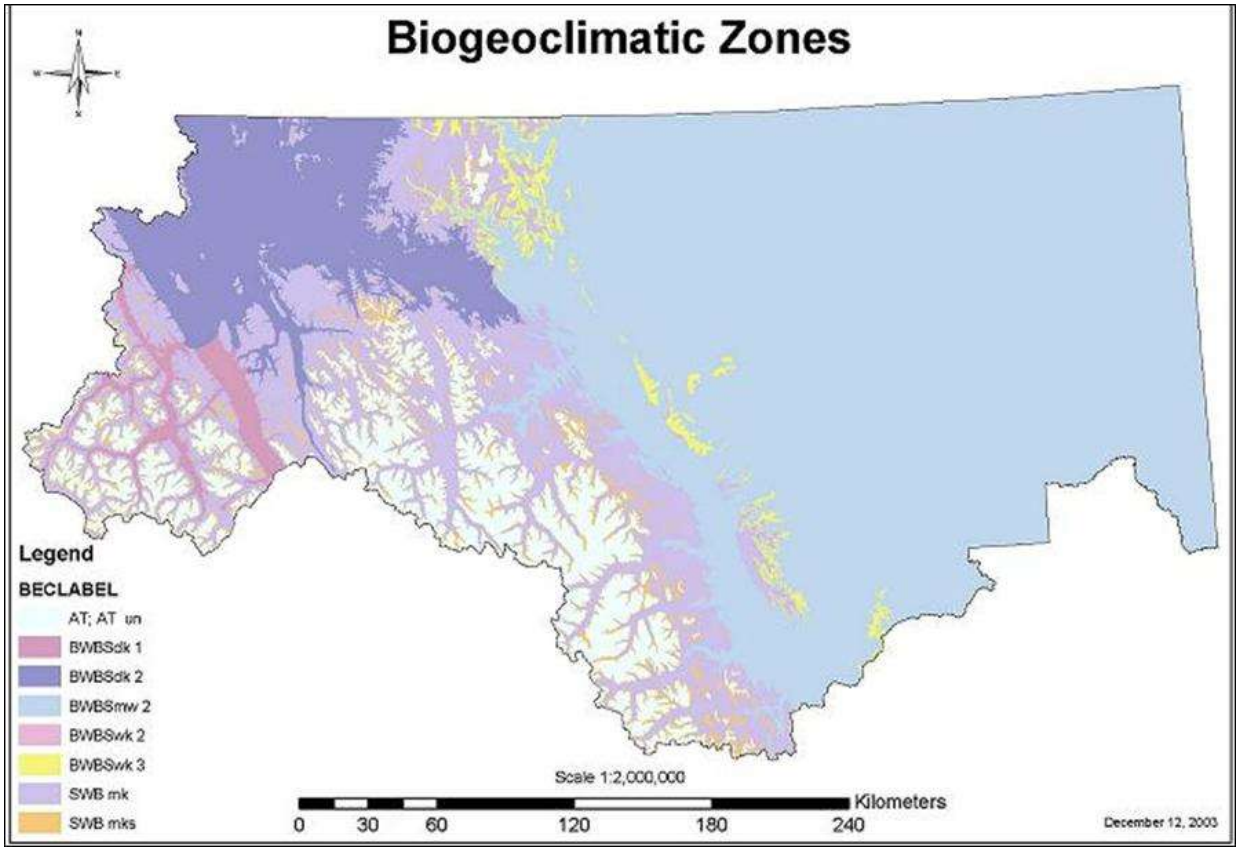
3.2 Ecological Description

The TSA encompasses parts of the Alberta plateau, the Rocky Mountain Foothills, the Liard Plateau, the Liard Plain, the Kechika River Valley and a portion of the Cassiar Mountains. This entire region is within the Arctic watershed and is largely drained by the Liard River and its major tributaries, including the Fort Nelson, Prophet, Muskwa, Toad, Kechika and Petitot rivers. The topography forms a gradient of increasing relief from east to west.

The province of B.C. has been subdivided into 116 ecosections[6], 10 of which occur in the Fort Nelson Planning Area. These 10 ecosections are: Cassiar Ranges, Eastern Muskwa Ranges, Etsho Plateau, Fort Nelson Lowland, Hyland Highland, Kechika Mountains, Liard Plain, Muskwa Foothills, Muskwa Plateau and Petitot Plain.

The Fort Nelson TSA contains three biogeoclimatic zones: Boreal white and black spruce (BWBS); Spruce Willow Birch (SWB); and Alpine Tundra (AT). White and black spruce are the dominant species, covering about two-thirds of the DFA land base. The figure below illustrates the three biogeoclimatic zones within the Fort Nelson DFA, whereas the table below summarizes the zones and locations, major tree species present, and other considerations such as climate and wildlife values.

Figure 7 Fort Nelson Biogeoclimatic Zones



[6] Ecosystems in British Columbia are broadly classified into geographical zones with similar landforms, vegetation and climate called eco-sections (Demarchi 1993).

Table 10: Biogeoclimatic Zones, Major Tree Species, Climate and Wildlife Values[7]

Zone	Location	Tree Species	Other
Boreal White and Black Spruce	Covers most of the eastern portion of the timber supply area, to an elevation of 1300 metres. Occupies 68% of TSA land base.	Dominant: white spruce, lodgepole pine, trembling aspen. Minor: black spruce, balsam poplar, tamarack, subalpine fir, common paper birch and Alaska paper birch.	Long, very cold winters and short growing seasons. Rich in wildlife.
Spruce Willow Birch	On middle elevations of northern Rocky Mountains and much of the Liard Plateau (1300 m to 1500 m). Occupies 19% of TSA land base.	Lower elevations Dominant: white spruce and subalpine fir. Minor: black spruce, lodgepole pine and trembling aspen. Upper elevations Dominated by tall deciduous shrubs (birch, willow species).	Harshest climate of all forested zones in BC. Winters long and cold, summers brief and cool. Major wildlife use in summer months.
Alpine Tundra	Above 1500 m. Occupies 13% of TSA land base.	Trees generally absent. Plants are small, close to ground, and often widely separated by bare soil or rock.	Harshest climate of all BC zones. Wildlife diversity and density are low.

The TSA contains vast tracts of relatively undeveloped land that support abundant diverse wildlife populations. Large nomadic mammals such as moose, black bear, grizzly bear and stone sheep are common. Furbearers such as wolverine, wolf, lynx, weasel, mink, river otter, beaver and coyote are prevalent. Regionally significant species include mountain goat, caribou, marten, thinhorn sheep, elk, harlequin duck and northern goshawk.

The Boreal White and Black Spruce Zone has the least snowfall of all the northern BC zones and consequently are very important for wintering ungulates. Also in that zone, frequent forest fires have formed a mosaic of upland forests of different ages, providing a variety of habitats. The extensive deciduous forests frequently achieve older age classes and are important for ungulates, birds and small mammals.[8]

This area contains a unique range of bird species (i.e. Bay-breasted Warbler, Black-throated Green Warbler, Cape May Warbler, Connecticut warblers, Nelson's sharp-tailed sparrow, trumpeter swan, etc.); many of which are not found elsewhere in BC. Conversely, many birds found in other parts of the province do not occur within this north-eastern portion of BC. The abundant rivers, lakes, ponds and marshes provide important staging grounds during the migration of water birds such as pintails, widgeons, geese and teal. There are few species of reptiles and amphibians.

[7] Data Source: Fort Nelson TSA Resource Management Plan, 2001
[8] Data Source: Type I – Silviculture Strategy, 2000

The water bodies in this area support many important game fish species. These include some trout species, whitefish, Burbot, Arctic grayling, northern pike and walleye. The rare occurrence of some salmon species has also been noted in some of the major rivers. Approximately 15 game and non-game fish species occur only in this part of the province.

3.2.1 Natural Disturbance Description

Natural disturbance is defined in this SFM Plan as the historic process of fire, insects, and other natural events in an area that were not caused by humans. As mentioned earlier, the boreal forest in the Fort Nelson DFA consists of three biogeoclimatic zones including: boreal white and black spruce (as the majority of the area); spruce-willow-birch; and alpine tundra. The first two zones are both susceptible to attack by the majority of the natural disturbance agents found in this area and further described below.

Historic

Floods: Stand initiating events for the alluvial floodplain topography such as those associated with the Prophet, Muskwa and Liard Rivers tend to be after a catastrophic flooding event.

Fire: The ecosystems in the Fort Nelson DFA are characterized by historically infrequent, mixed severity to stand-replacement fire regimes. Historic fire regime information is limited in the Fort Nelson DFA. The primary BEC subzone is BWBSmw2 and there is no known fire history analysis data associated with this subzone. Most fires in the Fort Nelson DFA have been lightning caused and of moderate frequency. Generally, fire does not play a significant role in initiating stands on the alluvial floodplains topography that are prominent in the DFA (Prophet, Muskwa and Liard Rivers). Person-caused fires are common along the few all weather roads in the DFA.

Insects and Disease: Insects and diseases contribute to patch and landscape level processes, with variability in spatial and temporal patterns between pests. The insects and diseases prevalent in the Fort Nelson area are:

> Eastern spruce budworm: causes significant damage to susceptible stands in the Fort Nelson TSA. Alfaro et al (2001) described this defoliator as a significant disturbance agent of northern ecosystems.
>
> Three deciduous defoliators: are found in the DFA: Large aspen tortrix, forest tent caterpillar, and Bruce spanworm. Tortrix is commonly found in the trembling aspen stands throughout the Prince George Region. In 1996 an extensive outbreak of forest tent caterpillar occurred which defoliated aspen stands along the Liard, Fort Nelson and Muskwa rivers. Bruce spanworm, a leaf roller and defoliator, was reported near Fort Nelson in 1958.
>
> Larch sawfly: has periodically defoliated stands of eastern larch.
>
> Bark beetles: particularly mountain pine beetle, have played a less significant role in forests of the Boreal White and Black Spruce biogeoclimatic zone, than elsewhere in British Columbia. Western balsam bark beetle was recorded in 2000 near Toad River and Mountain Pine Beetle as been noted encroaching upon the southern border of the district in the Trutch Creek area. Other major bark beetles have not been of significant concern in the Fort Nelson TSA.

Tomentosus root disease: is the most significant pathogen of mature forests in the Fort Nelson DFA. It has been noted that tomentosus root disease is often associated with spruce beetle, however root disease is not currently considered an important pest in the DFA.[9]

Present

The 2011 overview survey identified that the following forest health agents/damage were observed in the Fort Nelson TSA:

Table 11: Forest Health Damaging Agents

Damaging Agent	Conifer/Deciduous	Priority Ranking	Hectares Affected
Eastern Spruce Budworm	Conifer	Low	0
Forest Tent Caterpillar	Deciduous	Low	0
Bruce Spanworm	Deciduous	TBD	546,642
Large Aspen Tortrix	Deciduous	Low	0
Aspen Leaf Miner	Deciduous	Medium	4874
Willow Leaf Miner	Deciduous	Medium	Entire TSA
Unknown Defoliators	Both	Medium	17,181
Mountain Pine Beetle	Conifer	Medium	1894
Engraver Beetle	Conifer	Low	0
Spruce Beetle	Conifer	Low	0
Western Balsam Bark Beetle	Conifer	Low	8835
Lodgepole Pine Beetle	Conifer	Low	0
White Pine Weevil (spruce)	Conifer	Low	N/A
Venturia spp.	Deciduous	High	0
Fire	Both	N/A	3393
Birch Decline	Deciduous	N/A	128
Wind Throw	Both	N/A	43
Flood	Both	N/A	3015
Red Belt	Conifer	N/A	880

Eastern Spruce budworm was the dominant defoliator in the TSA in the past. No new incidences were recorded in the 2010 forest health flight

[9] DFAM Forest Health Strategy, Fort Nelson, TSA, December, 2003

Bruce Spanworm is the new major defoliator in the TSA with damage mostly in the major river drainages. It runs all the way north to the territories borders in the District.

Although Willow is not a commercial species, it is worth noting that the willow leaf miner has been a significant defoliator of this shrub in the DFA.

Mountain pine beetle in the TSA was confirmed for the first time in 2010. It has shown in several scattered small attacks less that 1hectare in size, and has been noted in young pine stands.

Spruce beetle populations have completely collapsed from the 2003-2004 infestation and no new occurrences were noted in the 2010 forest health flight.

Western balsam bark beetle has been noted as continuing to increase in area affected. As balsam is not a significant commercial species in the Fort Nelson TSA, it is considered a low priority.

No new incidence of Venturia was detected during the 2010 flight. However due to very high levels of damage to stands in 2008 and 2009 it has and will likely remain to be a high priority in the district for the next several years

Fire has been a significant abiotic forest health issue in the district with spikes in areas burned in 2004, 2006 and 2009.

Redbelt has been on the increase within the DFA, fuelled mainly by weather patterns

Flooding has been on the rise since 2007. 2010 was a particularly bad year for flooding with the most damage sustained near Klua Lakes and Little Beaver Creek.

Strategies for dealing with the forest health factor noted above can be found in the 2011 Fort Nelson Forest Health Strategy (Wilkie, 2011).[10]

The MFLNRO develops aerial overview incidence survey maps for a variety of potentially damaging agents and shares the information with Canfor and BCTS. MFLNRO provides information on fires and that information is updated annually on the forest cover maps. This information is considered by the Participants in the development of harvesting plans. Harvesting is the primary management tool utilized by the participants to deal with large scale forest health damaging agents.

3.3 Socio-Economic Description

Communities in the Fort Nelson DFA include the town of Fort Nelson and smaller unincorporated areas such as Prophet River, Toad River, Muncho Lake and Coal River.

There are five First Nations that are resident or have traditional territory within the TSA — Fort Nelson First Nation, Dene Tsaa Tse K'Nai First Nation, Dena Tha' First Nation, Fort Liard First Nations and Lower Post First Nation. The first three First Nations, listed above, are signatories to Treaty 8, which covers the Fort Nelson TSA. The Fort Liard First Nation is a part of Treaty 11 in NWT. The Lower Post First Nation is currently not signatory to any treaty process. Some First Nations members are employed directly or indirectly in the forestry, and oil and gas industries. A listing of the First Nation community and population, as well as a description of their geographic location is provided in the table below.

[10] DFN Forest Health Strategy 2011, Stephanie Wilkie

Table 12: Local First Nation Communities and General Locations[11]

First Nation Community	Geographic Location	Population
Fort Nelson First Nation	The majority community is on the Fort Nelson Indian Reserve #2, 6 kilometres south of the Town of Fort Nelson. The other reserves being Fontas River, Snake River, Moose Lake, Sandy Creek and Khantah. There are also four small reserves at Maxhamish Lake.	Approximately 949 members (2018)
Dene Tsaa Tse K'Nai First Nations (Prophet River First Nation)	The community is located just off the Alaska Highway, approximately 100 kilometres south of the Town of Fort Nelson.	Approximately 279 members (2018)
Lower Liard Indian Band #3, (also referred to as the Lower Post First Nations)	The main community, 65 hectares in size, is located 1 kilometre off of the Alaska Highway approximately 27 kilometres south of Watson Lake, Yukon, or 500 kilometres (6.5 hours) northwest of the Town of Fort Nelson with smaller communities located at Fireside and Muncho Lake. The Lower Post First Nations headquarters is in Lower Post, BC, and is a sub-group of the larger Kaska Nation which includes all Kaska in BC and the Yukon.	Approximately 1,213 members (2018)
Fort Liard First Nation	No allocated reserve, the Hamlet of Fort Liard is a mixture of Treaty First Nations, Metis and non-native people. Fort Liard is located 1 kilometre off of the Liard Highway, 207 kilometres (2.5 hours) north of the Town of Fort Nelson.	Approximate population of entire community is 1030 (2005)
Dene Tha' First Nations	There are seven reserves numbering from 207 to 214; #207 is Bushe River, #209 is Hay Lakes, #210 is Zama Lake, #211 is Amber River, #212 is Upper Hay (Meander River), #213 is Jackfish Point and #214 is Bistcho Lake. Presently #207, #209 and #212 are occupied. The total area in the reserves is 19,000 hectares.	Approximately 75% of the population live on reserve; a population of 3,126. (2018)

Communities in the Fort Nelson TSA include the town of Fort Nelson and smaller unincorporated areas such as Prophet River, Toad River, and Muncho Lake. Unlike population growth in the early 1990's, the late 1990's and 2000s showed a decline in population. According to the 2011 Census, the population of the Northern Rockies Regional Municipality (NRRM) was 5,290, reflecting a decrease of 11% from the 2001 levels of 5,969. The Fort Nelson municipal population also decreased by 5% between 2001 and 2011 to 3,902 from 4,603. The current population as of 2008 was 4664.

Forestry was the largest sectoral employer in the Fort Nelson TSA up until 2007, accounting for 27% of all employment, followed by the public sector (22%), mining (19%), and tourism (16%). Forestry was also the highest paying sector with workers earning an average of $41,276, followed by mining ($33,818) and construction ($32,432). The majority (83%) of the jobs in the forest sector were from wood manufacturing in the three mills operating in the TSA. The remaining jobs include those in harvesting, transportation, planning, and silvicultural operations.[12] This data is from the 2004 TSR 3 data package and is expected to be re-run for the 2018 TSR 4. The forest economy fell on hard economic times in 2008. Currently due to poor economic conditions in the forest industry, forestry work has ceased to be a major source of employment. The DFA currently has only one operational sawmill (Trans-North Timber), with both Tackama and Polarboard being shut down indefinitely. Both of Canfor's manufacturing facilities are being maintained in a "ready to go" state so that they may be restarted when economic conditions allow.

The Fort Nelson TSA covers 9.8 million hectares, of which 1.4 million ha is considered available for harvesting.[13] Forests include pure and mixed stands of spruce, pine and deciduous, primarily aspen. Smaller areas also consist of cottonwood and balsam-fir species. The species profile of the Fort Nelson TSA is: 43% spruce, 29% aspen, 20% pine, 5% birch and 3% cottonwood.[14] The site class profile of the timber harvesting land base is: 35% poor, 54% medium, 9% good site, and 1% low productive site.

The current Fort Nelson TSA Annual Allowable Cut (AAC) is set at 1,625,000 cubic metres. Unlike other TSAs in the province, the timber supply in this TSA is the largest and most important source of timber to local mills. Approximately 85% of timber processed locally at Fort Nelson mills was harvested from within the Fort Nelson TSA. [15]

The Fort Nelson TSA AAC can support a provincial total of approximately 1,200 person-years of direct employment if fully harvested and processed. Residents of the Fort Nelson TSA account for approximately 70% of this direct employment. The Fort Nelson TSA forestry sector supports a further 1,425 person-years of indirect and induced employment across the province.[16]

Forestry employment exists in the form of silviculture activities, harvesting operations, planning and management, as well as mill-related employment, including a major portion of primary and value-added manufacturing. Considerable indirect forest industry employment is also generated through trucking, machinery repair and other support services.

Canfor is the dominant industry Participant and forest industry employer in the area. Canfor owns two facilities in the area: a veneer/plywood mill and an oriented strand board mill. Canfor acquires timber through Forest License A17007, Pulpwood Agreement 14 and sales from BCTS. When operating both mills, Canfor purchases approximately 170,000 cubic metres annually from BCTS sales, seismic activity on crown land and timber from private lands.

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[12] TSR3 data, the most current socio-economic data available for this SFM Plan

[13]Fort Nelson Timber Supply Area – Rationale for Annual Allowable Cut Determination**, November 10, 2006** – Ministry of Forests and Range

[14] Fort Nelson TSA Silviculture Strategy (Type 1); March, 2000, Cortex Consultants Inc.

[15] Fort Nelson Timber Supply Area – Rationale for Annual Allowable Cut Determination**, November 10, 2006** – Ministry of Forests and Range

[16] Fort Nelson Timber Supply Area – Rationale for Annual Allowable Cut Determination**, November 10, 2006** – Ministry of Forests and Range

Canfor also purchases coniferous and deciduous wood harvested by Oil and Gas companies (O&G). This wood does not contribute to Canfor's AAC under FL17007 and PA#14 (i.e. it is wood over and above the AAC associated with these licenses).

BC Timber Sales (BCTS) is the second largest forestry operations in the area. It is an independent division within the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO), with financial independence from MFLNRO regional and district offices. The organization sells timber competitively through auction. All cutting licences in the program are awarded to the highest bidder. Auction rules are amended to provide a clear, consistent administrative framework.

BCTS currently provides access to 20% of the provincial allowable annual cut (AAC). Within the Fort Nelson TSA, BCTS harvests approximately 300,000 cubic metres annually and sells the timber primarily to Canfor.

Currently Canfor and BCTS are the only certified forest tenure holders within the Fort Nelson DFA.

The AAC apportionment for the TSA is provided in the table below.

Table 13: Apportionment – Fort Nelson TSA[17]

Apportionment by Licensee	AAC (m^3/ha)	Percent of Total AAC	Conventional
Canfor (Fort Nelson) replaceable Forest Licence A17007	553,716	34.07%	553,716
Canfor – Non replaceable Pulpwood Agreement 14	610,000	37.54%	610,000
BCTS – Timber Sale License/License to Cut	299,668	18.44%	299,668
CFA (community forest agreement)	18,000	1.11	18,000
Forest Service Reserve	60,616	3.73%	60,616
Non Replaceable FL's	83,000	5.11	83,000
TOTAL	**1,625,000**	**100.0%**	**1,625,000 (100%)**

Note: Fort Nelson TSA AAC 1,625,000 m3 Effective date 2006-11-10. No partition. The Ministerial Apportionment Letter, February 26, 2009. The apportionment numbers for the Forest Service Reserve and NRFL's have been estimated to meet the total 40-60% conifer deciduous split. They are not officially apportioned this way by the Ministers' Apportionment Letter, dated February 26, 2009

Tourism in the Fort Nelson DFA is a growing industry as the Alaska Highway is becoming increasingly popular for tourists destined for Alaska. Visual quality is an important value for the Alaska Highway touring traffic and to wilderness experience markets. This area is increasingly being promoted as a backcountry wilderness destination. The 25 parks, and 10 protected areas in the Fort Nelson Forest District provide wilderness experiences, scenic and wildlife viewing,

[17] Fort Nelson Timber Supply Area – Rationale for Allowable Annual Cut Determination **November 10, 2006** – Ministry of Forests and Range

water based activities, and other outdoor recreation opportunities. The largest component of the tourism sector is the service industry: food, accommodation and trade. Tourists are also drawn to the area's guide outfitting and large-game hunting opportunities.

4.0 Establishing the Foundation for SFM Planning

This section provides the foundation for sustainable forest management planning primarily the collation and assessment of information required to design this SFM Plan. This includes the identification and analysis of inventories, stakeholders and practices that directly influence the management of the DFA. The results of the analyses assist with the determination of locally appropriate decision support tools. The selected decision support tools are listed in this section. The results of the analyses also help identify data and knowledge gaps. The identification of potential gaps is captured in the final portion of this section, with the listing of the gaps in the appendix. The processes and protocols around updating the inventories and improving the quality of data are addressed in Section 8.0 Adaptive Management ("Continuous Improvement").

4.1 Inventory Analysis

Within the Fort Nelson DFA, a number of inventories on the land base have been completed over the last number of years. Inventories include, but are not limited to: forest health, forest cover inventory, rehabilitation, general management, growth and productivity, biodiversity, wildlife, watershed management, and archaeological inventory. These inventories provide a portion of the foundation needed to make management decisions in SFM.

There are two components of an Inventory Analysis:

1) the collation or assembly of the required data available for developing an SFM Plan; and
2) the assessment of the quality and appropriateness of the data with respect to its end use.

Timberline Forestry Consultants Ltd. completed the first component of an inventory analysis for the Fort Nelson DFA, in March, 2003. The listing of the inventories and the details are found in Appendix 1.2: Inventory & Stakeholder Analysis

Baseline data used for the first version of the SFM Plan was completed using TSR3 forest cover (VRI) inventory datasets, which had been compiled by Forest Ecosystem Solutions Ltd. (FESL). Since the implementation of GENUS, Canfor uses the Woodlands Information Management team (WIM) to provide and analyse data, and produce related reports for internal use. Canfor's current inventory dataset has been updated since the completion of TSR3, with several map sheet revisions made based on updated VRI information.

Knowledge and information management gaps that exist are summarized in the Knowledge Gap section of the SFM Plan including a strategy provided to resolve the variance.

4.2 Stakeholder Analysis

An objective and transparent identification of stakeholders' interests was completed through the Stakeholder Analysis for the Fort Nelson DFA.

Individuals and groups were selected for inclusion in the Stakeholder Analysis database based on their participation in past planning processes (LRMP, FDP and FSP Review & Comment), their status as tenure holders (guiding, trapping, range, etc.), or their identification as affected individuals (First Nations, property owners, government officials, etc.). Once a group or individual was selected for inclusion in the database, a description was compiled of their involvement in potential forest planning/ development activities under the categories of Interest

(e.g. Commercial tourism, Forestry, government, outdoor recreation, etc), Involvement, Affectedness, Influence and Contact Priority.

Table 14: Stakeholder Information

STAKEHOLDER INFORMATION				
Group Information	Name Group, License Number or Individual			
	Number of Members			
	Source of Contact			
	Primary Interest			
	Secondary Interest			
	Geographic Area of Interst			
	Landscape Unit			
	Capacity			
Contact Information	Contact Person	Last Name	First Name	Title
	Phone Number			
	E-mail Address			

The results of this analysis are identified in a Microsoft Access database (SFM-Stakeholder Analysis Database) but have not been presented in this SFM Plan to respect privacy rights. Since the time of the original stakeholder analysis, Canfor has since introduced and implemented a new web based data management system for the collection, storage and tracking of stakeholder information and communications. This system is called "Creating Opportunities for Public Involvement" or COPI. This new system has been uploaded with the previously collected stakeholder and First Nations information, and continues to be updated on an ongoing basis as new stakeholders are identified; existing entries change or as information becomes irrelevant. Tenures, First Nations' chiefs, presidents of organizations, and other individuals in the planning process are constantly changing. These changes are reflected in COPI, maintaining its usefulness for future forest management planning activities. The original Stakeholder analysis was updated in February 2011.

The selection of representatives for identified interests allows for a balanced and representative mix of interests within the DFA. This enables more focused discussions to occur, when appropriate. The summary of the newly updated Stakeholder Analysis describes the methods and results of the original compilation of data and can be found in Appendix 1.2: Inventory & Stakeholder Analysis.

4.3 Practices Analysis

A Practices Analysis was completed by the SFMP Area Participants and appended to Appendix 1.3: Practices Analysis. The analysis resulted in a matrix for each of Canfor and BCTS operations that summarize common practices that take place on the DFA. Practices include harvesting, road building/maintenance/rehabilitation, and silviculture practices. These practices form a set of inputs that a simulation model may use to forecast the outcome of current management strategies both spatially and temporally under 6.1 Assessment of Current Conditions of this SFM Plan.

4.4 Decision Support Tools

The appropriate decision support tools for each level of planning depends on the ecological, social and economic characteristics of the unit, the management issues, the types of information available, and the information required by corporate and government decision makers. Each of these tools is discussed in various sections of this SFM Plan.

The SFMP Working Group has identified specific simulation/forecasting and analysis tools that are required to support the spatial and temporal analyses for sustainable forest management for the DFA. The following decision support tools were utilized within Section 6.1 Assessment of Current Conditions, 6.2 Multi-Criteria Analysis – Assessment of Sustainability and 6.3 Design of Sustainability Scenarios

Stakeholder analysis (COPI)	Scenario design
Priority Element identification	Multi-criteria analysis
Element mapping	Trade-off analysis
Forecasting	Natural Disturbance Assumptions

4.5 Knowledge Gaps

Given that the SFM Plan is a living document, it is understood that there will be changes over time. In a proficient management system, this change is considered to be continual improvement. Identification of gaps in data or information is the first step to enable change. Following the identification, it is important to develop a strategy with timelines to fill those gaps.

A number of sources of information were used to assist in the original identification of data / information gaps for the Fort Nelson DFA. It is acknowledged that potential gaps may be identified in the future. However, the continuous improvement process built into the SFM Plan will ensure that any such gaps will be addressed appropriately.

There are many sections of the plan where the data used was taken from the 2004 TSR 3 data package, and will not be updated until the next iteration of the timber supply review expected to be completed in 2018. It is recognised that the age of the data and the long refresh period are reflective of the current poor economic situation in the forest sector at the time of revision of this SFM plan. It is not however considered a knowledge gap as there is a set time for updates.

The original Knowledge Gap Matrix served as a comprehensive list of SFMP related knowledge deficiencies, and was used primarily as a means in which to track action items that required additional time and/or process to complete. With the successful migration to the CSA Z809-08 standard, the original Knowledge Gap and Action Plan Matrices are considered as completed.

5.0 Strategic Level Planning

The strategic level for SFM establishes broad management objectives or sustainability criteria over as large an area as possible over a long time frame (from 100 to 300 years). At this level, the overall strategy for the DFA is defined. The Canadian Council of Forest Ministers Criteria and Elements (C&E) guided the development of the SFM Framework's C&E which were used as a starting point for the Fort Nelson DFA's C&E and indicators.

One of the main purposes of the 2018 SFMP re-fresh was to update the SFMP to align with the CSA Z809-16 standard. As Such, the SFM Frameworks Criteria, Elements, Measures and Targets have been replaced with the Canadian Council of Forest Ministers Criteria and CSA Z809-16 Elements, Indicators and Targets.

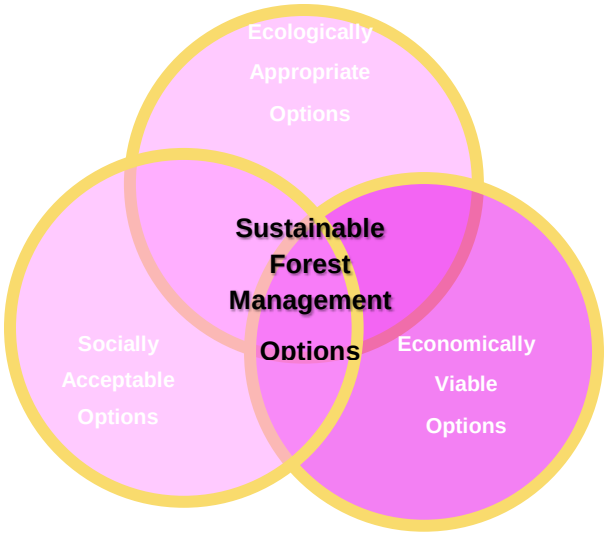
The tactical level scenario design and forecasting process completed for the first iteration of this plan analyzed potential strategies for the DFA. This information was used to pick a preferred strategy that aims to meet all or as many as possible, of the Elements and Indicators set by the CSA Z809-16 standard and those locally developed. The management strategy selected for the first iteration of the SFM plan has carried over to this revised iteration of the SFMP. Consequently the forecasting previously completed was not revised. The preferred strategy for this iteration of the SFM Plan is to continue to use the assumptions and the management strategy outlined in the CSA base case scenario developed for the first iteration of this plan (described in Section 6.4 Preferred Strategy). This includes the current management strategy and practices, including harvest levels as set by the Chief Forester, the Land Use Planning Guide (LUPG) and Non Spatial Landscape Biodiversity Objectives for the Fort Nelson Forest District (2010). The preferred management strategy was reviewed with PRISM at the November 15, 2004 meeting and again at the March 10, 2011 meeting.

5.1 Values, Criteria, Elements, Indicators, Targets

Criteria and Elements form the basis of a framework that assesses progress toward achieving the goal of sustainable forest management, where SFM is defined as:

"The balanced and concurrent sustainability of forestry-related ecological, economic and social values for a defined area over a defined time frame."

Figure 8 SFM Options



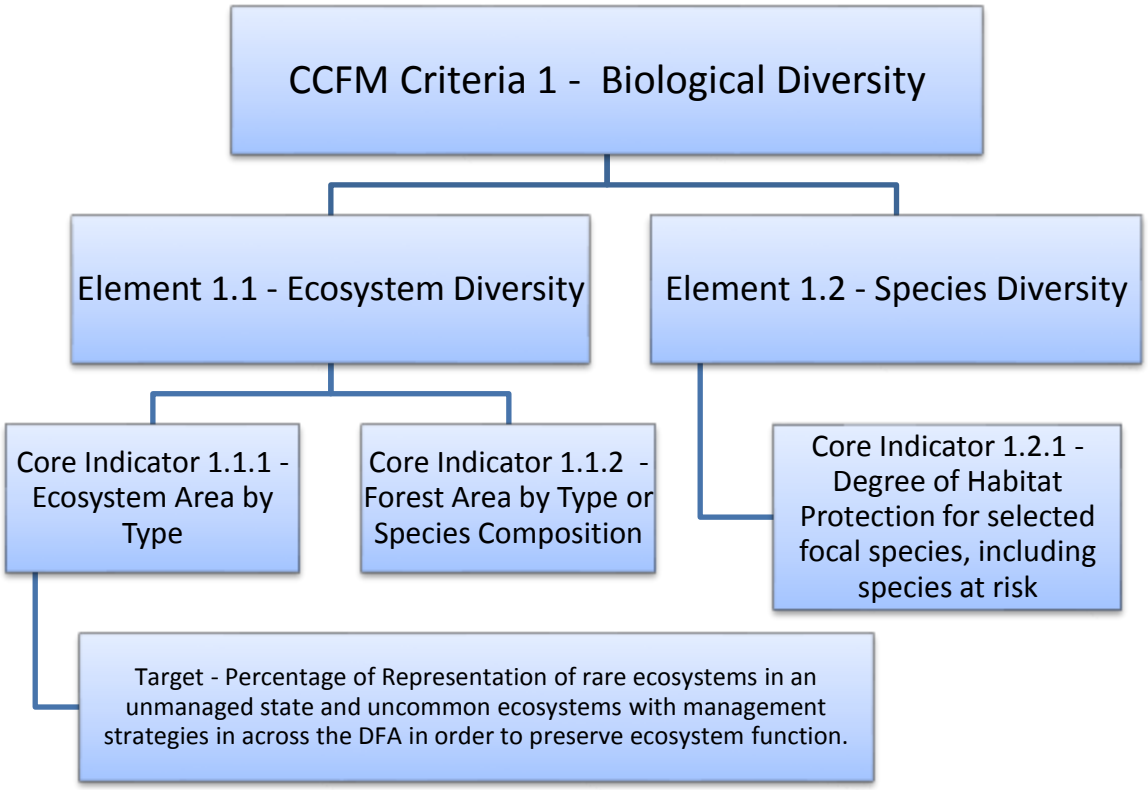
Criteria are meant to be broad management statements describing a desired state or condition. Criteria are validated through the repeated, long-term measurement of associated elements. They include vital ecological functions and attributes, as well as socio-economic benefits.

Elements help to assess the success of meeting criteria of SFM by providing ways to assess or describe a criterion. All elements provide information about present conditions of forest ecosystems and their use and, over time, will establish the direction of change in these variables.

The SFM Framework developed an initial set of Criteria and Indicators (C&I) that measure and demonstrate the sustainability of social, ecological and economic values at the forest management unit level. This initial set was used as "seed" information to assist with the development of a local level set of C&I. These local C&I have been adapted to reflect the ecological and socio-economic conditions of the Fort Nelson DFA as determined by the stakeholder input through the PRISM. The PRISM has provided input into the development of measures and targets for each indicator. Summaries from each PRISM meeting capture the decision made following discussions between Canfor, BCTS and the PRISM (Appendix 2.3: Public Involvement Process) in developing the C&I Matrix. **These Criteria and Indicators have now been migrated into the new Z809-16 standard Criteria and Elements.**

The figure below provides a schematic sample of the hierarchy of criteria, elements, indicators and targets.

Figure 9 Criteria and Element Hierarchy



Appendix 1.5: SFM Criteria & Elements Matrix contains the criteria, elements, core indicators and targets specific to the Fort Nelson DFA. The table below provides a summary listing of the criteria and elements.

Table 15 Criteria, Elements and Core Indicators

- Criteria 1 – Biological Diversity
  - Element 1.1 Ecosystem Diversity
    - 1 – Ecosystem area by type
    - 2 – Forest area by type or species
    - 3 – Forest area by seral stage or age class
    - 4 – Degree of within stand structural retention – WTP percentage
    - 5 – Degree of Within stand structural retention – Dispersed retention
    - 6 – Degree of within stand structural retention – Riparian management
    - 7 – Shrub Habitat across the DFA
  - Element 1.2 Species Diversity
    - 8 – Degree of habitat protection for selected focal species including species at risk
    - 9 – Degree of suitable habitat in the long term for selected focal species including species at risk
    - 10 – Proportion of regeneration comprised of native species
  - Element 1.3 Genetic Diversity
    - 11 – Percentage of stands reforestation programs free of genetically modified organisms
  - Element 1.4 Protected Areas and Sites of Special Biological and Cultural Significance
    - 12 – Proportion of identified sites with implemented management strategies
    - 13 – Protection of identified sacred and culturally important sites
- Criteria 2 – Ecosystem Condition and Productivity
  - Element 2.1 Forest Ecosystem Condition and Productivity
    - 14 – Reforestation success – Regen delay
    - 15 – Reforestation success – Free Growing
    - 16 – Percentage of silviculture obligation areas with significant detected forest health damaging agents which have treatment plans
    - 17 – Evidence of efforts being made to manage known significant forest health damaging agents
    - 10 – Proportion of regeneration comprised of native species
    - 18 – Additions or deletions to the forest area
    - 19 – Proportion of the calculated long term sustainable harvest level that is

actually harvested

Criteria 3 – Soil and Water

Element 3.1 Soil Quality and Quantity

20 – Level of soil disturbance

21 – Level of downed woody material

Element 3.2 Water Quality and Quantity

22 – Proportion of watershed or water management areas with recent stand replacing events - Watersheds

23 – Proportion of watershed or water management areas with recent stand replacing events - Roads

Criteria 4 – Role in Global Ecological Cycles

Element 4.1 Carbon Uptake and Storage

24 – Net Carbon Uptake – Total carbon storage

25 – Net Carbon Uptake – Carbon sequestration rate

14 – Reforestation Success

Element 4.2 Forest Land Conversion

18 – Additions and deletions to the forest area

26 – Evidence of best efforts to coordinate forest management activities with the oil and gas industry

Criteria 5 – Economic and Social Benefits

Element 5.1 Timber and Non-Timber Benefits

19 – Proportion of long term sustainable harvest level that is actually harvested

27 – Conformance with strategies for non-timber benefits identified in plans

28 – Participants forest management activities will not negatively impact established recreational sites and trails

29 – Forest Management Activities will be consistent with Visual Quality Objectives (VQO's)

30 – Evidence that the organization has cooperated with other forest-dependant businesses, forest users and local community to strengthen and diversify the local economy

31 – Evidence of communication and consideration of non-timber resources into forest management planning

Element 5.2 Communities and Sustainability

32 – Level of participation and support in initiatives that contribute to community sustainability

33 – Amount of Stumpage paid in the Fort Nelson DFA

34 – Level of participation and support in training and skills development

35 – Level of direct and indirect employment

Criteria 6 – Society's Responsibilities

Element 6.1 Fair and Effective Decision Making

36 – Level of participant and PRISM member satisfaction with the public participation process

37 – Evidence of efforts to promote capacity development and meaningful participation in general

38 – Availability of summary information on issues of concern to the public

Element 6.2 Safety

39 – Evidence of cooperation with DFA-Related workers to improve and enhance safety standards, procedures and outcomes in all DFA-related workplaces and affected communities

40 – Evidence that a worker safety program has been implemented and is periodically reviewed and improved

Criteria 7 – Aboriginal Relations

Element 7.1 Aboriginal and Treaty Rights

41 – Evidence of a good understanding of the nature of Aboriginal title and rights

42 – Evidence of ongoing communication with Aboriginal communities and consideration of information gained

Element 7.2 Respect for Aboriginal Forest Values, Knowledge and Uses

43 – Level of Aboriginal participation in the forest economy

44 – Evidence of best efforts to obtain acceptance of management plans based on Aboriginal communities having a clear understanding of the plans

45 – Evidence of understanding and use of Aboriginal knowledge through the engagement of willing Aboriginal communities, using a process that identifies and manages culturally important resources and values

46 – Level of management and/or protection of areas where culturally important practices and activities occur

CRITERION 1.0 BIOLOGICAL DIVERSITY

Given the complexity associated with attempting to manage for biodiversity, species richness is used as a credible interim surrogate for a criterion intended to maintain biological diversity (Bunnell 1998[18]). Species richness meets the requirements for SFM criteria; it is measurable, cost effective and scientifically credible.

Criterion 1 uses a multi-filter approach to sustaining biological richness in forested landscapes. Element 1.1 (Ecosystem area by type) uses a "coarse filter" approach to maintaining even poorly understood species and ecosystem functions by ensuring that common, uncommon and rare species are maintained in their un-managed state across the NHLB. Element 1.2 uses a "medium filter" approach based on the principle of managing for forest structures that are impacted by forestry practices. These two elements work in unison, with 1.1 providing for a diversity of habitats, while element 1.2 providing different structures within the forest types. Element 1.3 addresses concerns over maintaining ecosystems with naturally occurring species. Element1.4 addresses the social concern over identifying and managing for sites of unique biological and spiritual significance.

All the elements within this criterion have been assembled by the CSA certification in order to ensure the preservation of biodiversity within a DFA.

ELEMENT 1.1 ECOSYSTEM DIVERSITY

Value – Ecosystem Diversity

SFM Objective

Conserving ecosystem diversity at the stand and landscape levels by maintaining the variety of communities and ecosystems that naturally occur in the DFA. Establish forest plantations only in afforestation projects.[19]

1 – Ecosystem area by type

Core Indicator

Background Information

Ecosystem conservation represents a coarse-filter approach to biodiversity conservation. It assumes that by maintaining the structure and diversity of ecosystems, the habitat needs of various species will be provided. For many species, if the habitat is suitable, populations will be maintained.

Ecosystem area by type can be influenced by managers, and many foresters/ecologists prefer to characterize the forest in terms of ecosystem types (according to forest ecosystem classifications such as Biogeoclimatic Ecosystem Classification – BEC or Predictive Ecosystem Mapping – PEM) rather than by age and type of structures as derived from classic forest inventories. Most ecosystem classification systems use an integrated hierarchical classification scheme that combines climate, vegetation and site classifications. This mapping is used in such applications

[18] Bunnell, F.L. 1998. Overcoming paralysis by complexity when establishing operational goals for biodiversity. Journal of Sustainable Forestry 7: 145-164.
[19] Z809-16 CSA Sustainable Forest Management Standard

as:

a. Seed zones
b. Protected area planning
c. Land management planning
d. Forest pest risk assessment
e. Natural disturbance type mapping
f. Wildlife habitat management

Rare ecosystems are frequently identified as focal points for conservation concern. Provincially, ecosystems are listed based largely on frequency of occurrence or rarity. There are at least three broad reasons for creating local lists:

- to help assess the status of an ecosystem throughout a planning area;
- to focus attention and tracking on ecosystems that merit conservation concern; and
- to help rank allocation of resources to conservation efforts, such as parks, Wildlife Habitat Areas, Old Growth Management Areas (OGMA's) or Wildlife Tree Patches (WTPs)

Target and Variance

Based on a percent representation of ecosystem groups in the non harvestable land base across the DFA

A) 100% of rare and uncommon ecosystems will have special management strategies associated with them (variance of 0%)

B) 100% of the strategies for rare and uncommon ecosystems will be followed (variance of 5%)

Current condition

For the purposes of this indicator, based on expert advice provided by Ralph Wells and John Day, we have chosen the following characteristics to define the abundance of each ecosystem: Common (>4000ha), Uncommon (1500-4000ha) and rare (<1500ha). We have also chosen to measure these on the NHLB as it represents a significantly greater area than the THLB (4.3 million ha in the NHLB versus 1.4 million ha in the THLB). If the ecosystems are present in the NHLB in sufficient amounts then intensive management will not be required within the THLB.

For uncommon ecosystems, the management strategies will specify a greater amount of retention of stand level biodiversity attributes such as a higher target for WTP's, higher CWD retention and/or more Snags/stubs/live tree retention per ha. Management strategies will specify no harvesting in rare ecosystems. Management strategies will be specified in Site Plans for proposed harvest blocks containing rare or uncommon ecosystems.

Table 16 Rare and Uncommon Ecosystems in the Fort Nelson DFA[20]

Rare Ecosystems in the NHLB by Group #	Productive Area (ha)
7 - BWBS dk1/ (02),SBS mk1 (03), SBS mk2 (02)	532
71 - BWBS dk1 (07)	704
73 – BWBS dk1 (06)	2,397
74 – BWBS dk1 (08)	74
69 – SWB mk (09)	346
Uncommon Ecosystems in the NHLB by Group #	**Ecosystem Area (ha)**
3 – SWB mk (02)	5,695
36 – ESSF mc (05)	8,158

Since the implementation of the first iteration of the Fort Nelson SFM plan there have been no instances of harvesting in rare or uncommon ecosystems by the participants.

Forecasting

A diversity of ecosystems while maintaining "rare" attributes, enabling a diversity and abundance of naturally occurring plants, animals and their habitats. When a mappable (typically >= 2. 0 ha that are not part of complexes) unit of the above ecosystems are identified in the field they will be reserved from harvest. By implementing the indicator strategy, it is forecast that rare and uncommon ecosystems that are >= 2.0 ha and are not a part of site complexes will be conserved from harvest and, therefore, will continue at present levels into the future. The current conditions for this indicator were established via the Ecosystem Representation Analysis (Jan. 2012). The methodology and assumptions followed for the ecosystem analysis are clearly outlined in the report.

Methods and Assumptions - Target of 0 hectares logged in rare and uncommon ecosystems. Past performance and ingrained strategy has resulted in this result and it is reasonable to forecast this result into the foreseeable future.

Monitoring and reporting

Reporting will take place on an annual basis and will focus on the identified ecosystem types that are uncommon/rare.

Although ecosystems are theoretically static, the results of an ecosystem representation analysis can change over time with the availability of new PEM or TEM site series mapping and/or a new land base net down. As a form of continuous improvement, the ecological representation analysis may be redone whenever the inventory database or predictive ecosystem mapping for the Fort Nelson DFA are significantly revised.

[20] From 2012 Ecosystem Representation Analysis report compiled by Canfor.

Monitoring will include a comparison of the Forest Stewardship Plan recently harvested blocks with the predicted and known locations of designated rare and uncommon ecosystems noted within both the non-harvesting land base and timber harvesting landbase to determine if any harvesting took place within the rare and uncommon ecosystems. If this occurred, then potential impacts on representation (and particularly on poorly-represented habitat types) will be assessed for conformance with the management strategies identified in Site Plans.

This indicator will be considered to have been met for target A when all rare and uncommon ecosystems included in the management area (areas of harvesting, road building or silviculture activities) scheduled for the reporting year have a management strategy associated with them. Target B will be considered to have been met when, upon completion of scheduled activities for reporting year, all strategies associated with rare and uncommon ecosystems have been complied with.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Matrix.

2 – Forest area by type or species

Core Indicator

Background Information

Forest area by type is a refinement of the previous Measure – ecosystem area. Tree species composition, stand age, and stand structure are important variables that affect the biological diversity of a forest ecosystem - providing structure and habitat for other organisms. Ensuring a diversity of tree species within their natural range of variation, improves ecosystem resilience and productivity and positively influences forest health. Reporting on this indicator provides high level overview information on: area covered by broad forest type, forest succession and management practices that might alter species composition.

Ensuring a diversity of tree species is maintained improves ecosystem resilience and productivity and positively influences forest health. Forests in Canada are classified according to an Ecosystem Classification System, which identifies the tree species that are most suited ecologically for regeneration in any particular site. This guides forest managers in maintaining the natural forest composition in an area and lends itself to promoting long term forest health and productive forests that uptake carbon.

The BC government FREP report #16 on Tree Species Composition and Diversity in British Columbia (August 2009) concluded that the amount of deciduous mixed stands at free growing in the Northern Forest Interior Region has increased significantly, from 2,811 hectares before harvest to 55,614 hectares at free growing. This is expected to continue in the short term in both BC and Alberta as recently harvested areas regenerate naturally with ingress from early successional broadleaf species. While adding to the overall diversity of the DFA, many of these forests will revert back to coniferous mixed forests over time. To remove some of this short term variation in the reporting of the indicator, forests less than 20 years of age will not be included in the reporting structure.

Provincially, treed conifer forests are those where conifers dominate the species mix (at least 75 percent of trees are conifer), treed broad leaf forests are those where mostly deciduous trees dominate the species mix (at least 75 percent of trees are broad leaf) and mixed forests are those that fall within the middle range where neither conifer or broad leaf trees dominate the species mix.

Target and Variance

Percent distribution of Forest Type (treed conifer, treed broadleaf, treed mixed) >20 years old across the DFA. Target is to maintain baseline ranges and distribution into the future (variance of 5 percent of the CFLB).

Current condition

Maintaining the distribution of the pure conifer, pure hardwood and mixed species stands across the DFA is very important to maintenance of biodiversity. Each stand type offers a different range of structure and habitat for organisms to exist in.

This indicator addresses the availability of certain habitat elements that are important to the continued maintenance of forest-dwelling vertebrate and invertebrate species within the DFA. Because more detailed habitat data are not yet available, the interim targets rely on the baseline

data provided by the Vegetation Resources Inventory and forest cover databases. These targets will be modified to reflect improved data as it becomes available

Especially important is the hardwood leading area. Hardwoods (also called deciduous) provide three broad resources to forest-dwelling organisms: foraging sites, places to rear young (including cavity sites), and substrate for non-vertebrates. They provide these resources differently than do conifers because of differences in their leaves, bark, and wood. Hardwood stands provide an abundant insect fauna and numerous cavity sites, and have been reported to have greater vertebrate richness than conifer stands. Birds are the richest vertebrate group of both insectivores and cavity users, so trends in species richness should be most apparent among birds (Bunnell 2000).

Pure hardwood stands are defined based on stand volume ≥ 80 percent of deciduous species, whereas hardwood leading mixed stands are defined as ≥50 percent deciduous volume. The same assumption would be applied to pure conifer and leading conifer mixed wood stands.

Table 17: Cover Type*

Cover Type	CFLB (ha)	THLB (ha)	NHLB (ha)	Baseline % of CFLB
Pure hardwoods	1,071,994	657,375	414,619	19.0%
Hardwood-leading mixed	452,116	205,060	247,055	8.0%
Pure conifers	3,583,672	1,123,399	2,460,273	63.6%
Conifer-leading mixed	532,327	302,898	229,428	9.4%
Total Area	5,640,109	2,288,732	3,351,375	100.00%

*From 2011 analysis using TSR3 THLB database.

Table 18: Cover Type**

Cover Type	CFLB (ha)	THLB (ha)	NHLB (ha)	Baseline % of CFLB
Pure hardwoods	1,017,415	493,102	524,312	17.8%
Hardwood-leading mixed	452,291	175,449	276,841	7.9%
Pure conifers	1,559,604	639,747	919,858	27.4%
Conifer-leading mixed	279,076	138,773	140,303	4.9%
Immature	43,995	39,442	4553	0.8%
NP	2,348,187	70,041	2,278,146	41.2%
Total Area	5,700,568	1,556,554	4,144,013	100%

**From 2018 SFM analysis using updated TSR3 THLB database.

The tables above illustrate the cover type current condition for the Fort Nelson DFA by crown forest land base. The 2011 THLB dataset did not remove immature and NP areas from the species area calculations. The THLB dataset used in the 2018 analysis has removed immature and NP area from the species area calculations. Unfortunately as a result, a direct comparison of the results of the 2 analyses cannot be made. As shown, pure conifers continue to comprise the most of the land base. These distributions are not expected to change as the regeneration

assumptions in Fort Nelson will maintain the same cover type distribution as currently exists. Of note no timber harvesting has been conducted in Fort Nelson since 2008.

Forecasting

By implementing the SFMP strategy, it is forecast that forest composition will be within the target ranges. Current state calculations show that composition is consistent with target ranges. Current state composition is noted in SFMP Table 17 Cover Type. Healthy ecosystems with a diversity of native broadleaf and coniferous species are maintained at endemic and sustainable levels. Species composition information is utilized in the Provincial Timber Supply Review. It is forecast that the forest type composition will be within the target ranges at the next Timber Supply Review.

FSOS model used to calculate current state and expected future state of the DFA forest types in 2004 forecast, which is still applicable. Localized Canfor model used to update current condition expressed in 2018 SFMP.

Monitoring and reporting

This indicator will be reported on a 5 year basis. The different stand types will be run using GIS analysis and VRI data. The baseline data was revised in 2010 (see the table above). Subsequent analysis will be done every 5 years in an effort to eliminate any bias from short term trends on the land-base, and to allow for the periodic updating of data sources. The indicator will be considered to have been met if the area for the 5 year reporting window maintains its area spread within 5 percent of baseline areas.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

3 – Forest Area by Seral Stage or Age Class

Core Indicator

Background Information

The northern interior forest ecosystems have been historically influenced by the presence or absence of fire as a dominant form of natural disturbance. The similarities in fire return intervals, and disturbance sizes and patterns form the basis for categorizing each of the ecosystems into natural disturbance types (NDT), which in turn is used to provide guidance for maintaining biodiversity.

Biodiversity can be affected by the disruption of natural processes. Future maintenance of biodiversity is in part dependent upon the maintenance of representative habitats and seral stages at the landscape level.

Forests in their late seral stage offer unique habitat to certain plant and animal communities. Maintenance of a component of late seral stage forests – within a natural range of variation will contribute to an appropriate balance of forest age classes.

Target and Variance

Percent of late seral stage (old growth) distribution by natural disturbance unit (NDU) across the DFA is maintained at the legal target for old growth as set out by the Non Spatial Landscape Biodiversity Objectives of the Fort Nelson Forest District Order (NSLBOO) and spatially established OGMA's or to trend positive each year towards meeting the legal target

Current condition

The Non Spatial Landscape Biodiversity Objectives of the Fort Nelson Forest District order (NSLBOO) legalizes the non spatial old seral targets recommended in the Natural Disturbance Unit work completed by the MFLNRO for the Natural Disturbance Units (NDUs) within the Fort Nelson DFA. Eventually the non spatial old forest targets identified in the NSLBOO will be replaced by spatially identified old growth management areas. By committing to show a positive trend toward achieving the non-spatial NDU target for old forest retention Canfor and BCTS are effectively managing for an important landscape level component of biodiversity through seral stage maintenance.

The target for this indicator is to show a positive trend towards meeting the legally established old forest retention target, this reflects the fact that harvesting took place in many landscape units without regard to old seral retention management prior to the inception of the current NSLBOO and the preceding non spatial old growth order (NSOGO) coming into force.

Measuring the trend recognizes that the initial condition of the LUs comprising an NDU may be outside the target simply because older management regimes were not required to manage for this value. Harvesting may continue to occur in an NDU that is deficient in old forest provided that an acceptable recruitment strategy is in place. As spatial OGMAS are identified the focus for this indicator will be to demonstrate respect for the spatial OGMAs by not completing harvesting within an OGMA, unless authorized to do so.

For conifer leading stands this means a minimum age of 140 years and for deciduous leading stands a minimum age of 100 years. For the Northern Boreal Mountains NDU the old forest

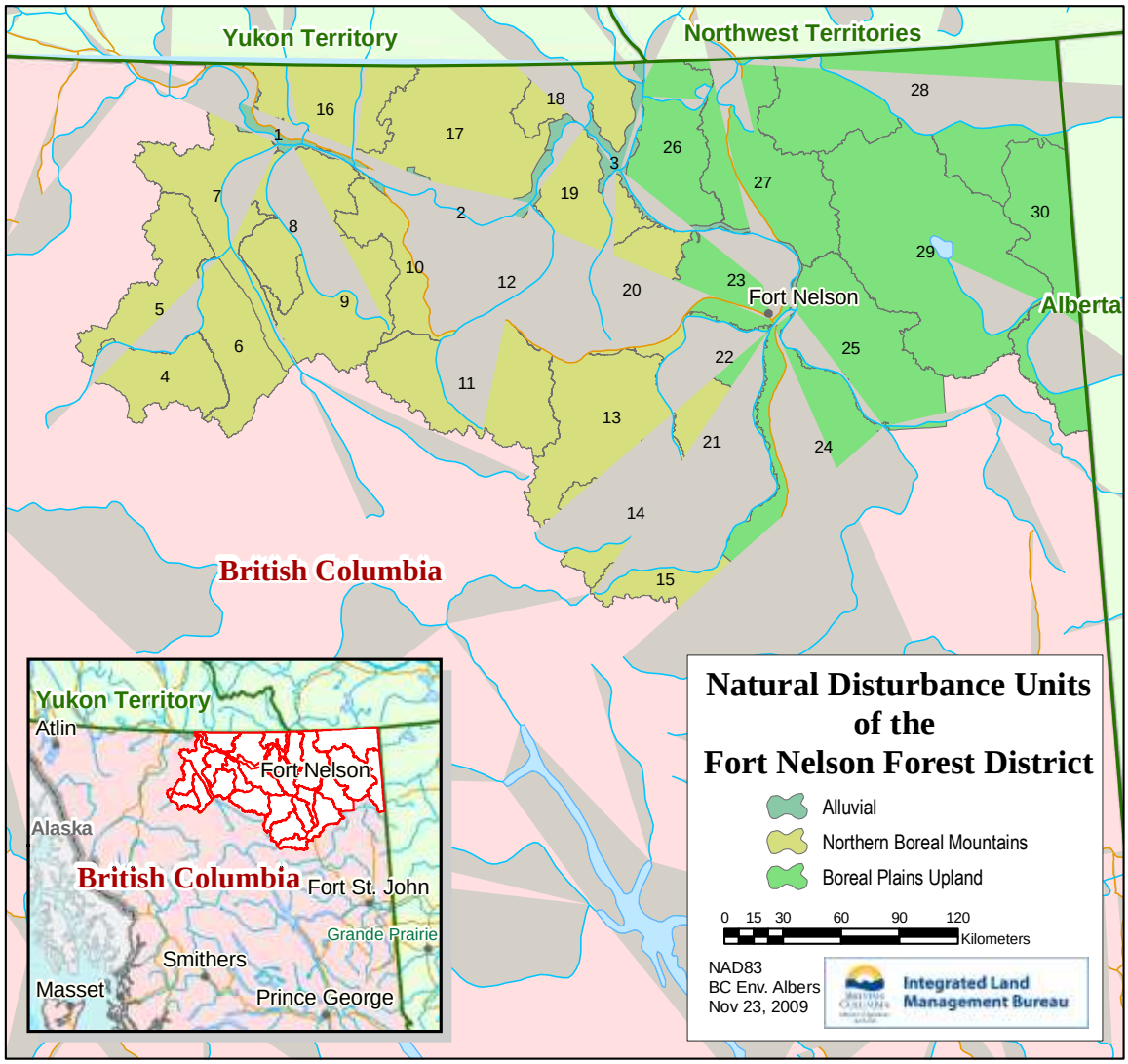
Natural Disturbance Unit	Landscape Units	Age of old	Minimum % of CFLB retained as Old Forest
Alluvial	1 Liard River 2 Liard River Corridor Park 3 Nelson Forks	Conifer 140 Deciduous 100	44
Northern Boreal Mountains	4 Sharktooth 5 Major Hart 6 Boreal 7 Kechika 8 Rabbit 9 Netson 10 Muncho 11 Churchill 12 Sulpher/8 Mile 13 Tuchodi 14 Gathto 15 Prophet 16 Smith 17 Hyland 18 Beaver 19 Irene 20 Kledo 21 Holden	140	37
Boreal Plains Uplands	22 Klowee 23 Cridland 24 Klua 25 Clarke 26 Sandy 27 Kiwigana 28 Petitot 29 Kotcho 30 Shekilie	Conifer 140 Deciduous 100	17

retention target makes no distinction between conifer and deciduous, with a minimum age for old growth of 140 years.

Table 19: Required percentage of retention in the DFA

Following is a depiction of the Natural Disturbance Units (NDU) and Landscape Units (LU) within the Fort Nelson Timber Supply Area (TSA).

Figure 10 Natural Disturbance Units of the Fort Nelson Forest District[21]



The current condition of this indicator is summarized in the following table:

[21] From Ministerial Order – Non-spatial Landscape Biodiversity Objectives of the Fort Nelson Forest District, 2010

Table 20 Current percentage of Old Seral Stage by NDU[22]

NDU & LU	< 40yrs		40-100yrs		100-140yrs		>140yrs		Target	Surplus / Deficit	Total Forested area
	(ha)	%	(ha)	%	(ha)	%	(ha)	%	%	(ha)	(ha)
Conifer & Deciduous											
Northern Boreal Mountains NDU											
Beaver	9,952	9%	16,878	16%	8,097	8%	71,952	67%	37%	32,407	106,879
Boreal	0	0%	13,625	28%	18	0%	35,647	72%	37%	17,410	49,290
Churchill	66	0%	15,880	37%	449	1%	27,029	62%	37%	10,962	43,424
Gathto	1,574	1%	62,748	57%	2,734	2%	42,790	39%	37%	2,147	109,846
Holden	9,484	6%	98,416	67%	3,930	3%	36,084	24%	37%	-18,645	147,915
Hyland	12,833	6%	115,199	50%	8,087	4%	94,372	41%	37%	9,090	230,491
Irene	1,033	1%	12,217	12%	9,569	9%	82,983	78%	37%	43,836	105,801
Kechika	35,821	13%	82,785	30%	5,689	2%	147,665	54%	37%	47,040	271,959
Kledo	4,651	4%	39,306	30%	12,173	9%	73,173	57%	37%	25,331	129,303
Major Hart	1,843	2%	31,597	34%	1,212	1%	59,194	63%	37%	24,471	93,847
Muncho	120	0%	45,031	70%	161	0%	19,383	30%	37%	-4,554	64,695
Netson	1,492	1%	15,983	15%	1,165	1%	90,210	83%	37%	49,935	108,851
Prophet	0	0%	8,743	24%	563	2%	27,819	75%	37%	14,082	37,125
Rabbit	6,098	3%	143,722	68%	300	0%	60,785	29%	37%	-17,250	210,905
Sharktooth	627	2%	4,073	14%	54	0%	24,647	84%	37%	13,769	29,401
Smith	42,920	19%	116,683	52%	14	0%	64,399	29%	37%	-18,487	224,017
Sulpher/8mile	7,972	5%	54,968	35%	5,182	3%	89,933	57%	37%	31,453	158,054
Tuchodi	833	1%	45,995	53%	1,923	2%	38,446	44%	37%	6,183	87,197
Northern Boreal Mountains Total	**137,320**	**6%**	**923,849**	**42%**	**61,321**	**3%**	**1,086,511**	**49%**	37%	**269,181**	**2,209,001**
Coniferous											
Alluvial NDU											
Liard River	26,161	43%	14,707	24%	0	0%	19,649	32%	44%	-6,979	60,518
Liard River Corridor Park	371	1%	14,097	47%	0	0%	15,499	52%	44%	2,314	29,967
Nelson Forks	6,073	16%	4,645	12%	0	0%	26,647	71%	44%	10,206	37,365
Alluvial Conifer Total	**32,606**	**26%**	**33,449**	**26%**	**0**	**0%**	**61,795**	**48%**	44%	**5,541**	**127,850**
Deciduous											

[22] Seral analysis completed by Canfor, 2016.

NDU & LU	< 40yrs		40-100yrs		100-140yrs		>140yrs		Target	Surplus / Deficit	Total Forested area
	(ha)	%	(ha)	%	(ha)	%	(ha)	%	%	(ha)	(ha)
Alluvial NDU											
Liard River	8,700	75%	421	4%	0	0%	2,549	22%	44%	-2,586	11,670
Liard River Corridor Park	1,893	6%	11,960	37%	0	0%	18,857	58%	44%	4,465	32,710
Nelson Forks	4,971	11%	10,610	22%	0	0%	31,592	67%	44%	10,836	47,174
Alluvial Deciduous Total	**15,564**	**17%**	**22,991**	**25%**	**0**	**0%**	**52,998**	**58%**	**44%**	**12,715**	**91,553**
Coniferous											
Boreal Plains NDU											
Clark	1,107	2%	25,497	53%	0	0%	21,610	45%	17%	13,414	48,214
Cridland	7,151	19%	10,619	29%	0	0%	19,484	52%	17%	13,151	37,254
Kiwigana	1,224	2%	42,590	60%	0	0%	27,134	38%	17%	15,073	70,949
Klowee	10,555	23%	13,823	30%	0	0%	22,272	48%	17%	14,341	46,650
Klua	2,402	3%	40,324	48%	0	0%	41,608	49%	17%	27,271	84,334
Kotcho	4,119	3%	86,465	67%	0	0%	37,706	29%	17%	15,897	128,290
Petitot	289	0%	70,388	75%	0	0%	22,647	24%	17%	6,782	93,324
Sandy	2,578	6%	23,109	53%	0	0%	17,950	41%	17%	10,532	43,638
Shekilie	2,331	4%	41,513	64%	0	0%	21,253	33%	17%	10,187	65,097
Boreal Plains Conifer Total	**31,757**	**5%**	**354,329**	**57%**	**0**	**0%**	**231,664**	**38%**	17%	**126,647**	**617,750**
Deciduous											
Boreal Plains NDU											
Clark	3,270	3%	77,337	72%	0	0%	26,086	24%	17%	7,948	106,692
Cridland	5,279	6%	28,731	35%	0	0%	47,935	58%	17%	34,004	81,945
Kiwigana	1,742	1%	72,538	61%	0	0%	44,461	37%	17%	24,275	118,742
Klowee	10,961	17%	17,841	28%	0	0%	34,978	55%	17%	24,135	63,780
Klua	4,909	5%	60,836	58%	0	0%	39,643	38%	17%	21,727	105,388
Kotcho	9,001	5%	145,822	86%	0	0%	15,637	9%	17%	-13,341	170,461
Petitot	616	1%	59,168	84%	0	0%	11,024	16%	17%	-1,013	70,808
Sandy	2,405	3%	36,368	50%	0	0%	34,650	47%	17%	22,168	73,423
Shekilie	17,176	15%	94,243	83%	0	0%	2,371	2%	17%	-16,973	113,790
Boreal Plains Deciduous Total	55,360	6%	592,884	66%	0	0%	256,785	28%	17%	102,930	905,029

*From 2016 seral analysis.

Forecasting and Probably trends of Indicator

Seral stage is a measure that can be modelled, and has been forecasted through the Forest Simulation Optimization System (FSOS) model as part of the management scenario design completed in the first iteration of this SFMP.

Protected Area, Riparian Reserve, and Wildlife Tree Patch Strategies, together with inoperable or inaccessible areas, ensure retention of old growth to sustain biodiversity and ecosystem objectives. Carbon stored within these reserve areas are an important part of the entire carbon cycle. It is forecasted that the amount of old growth will be within the target ranges or recruitment strategies will be developed and implemented as described in applicable Operational Plans (Forest Stewardship Plans). Current state is identified in Table 19 Current percentage of Old Seral Stage by NDU in the SFMP. This indicator and the resulting targets are a legal requirement and at a minimum, will be met.

By implementing the SFMP strategy, it is forecast that the amount of late seral forests across the DFA will be above target for select NDUs (as per Table 19 of the SFMP and the "Scenario Design and Indicator Forecasting Report" for the Fort Nelson DFA). Targets are achieved in all of the NDU areas. Of note, there is very little harvest history within the Northern Boreal Mountains NDU, the majority of disturbance in this unit has been wildfire. This indicator and the resulting target is a legal requirement at the Natural Disturbance Unit level and the participants strive to meet these targets.

Instead of relying on modelling, it is proposed that this indicator be measured using GIS tools. Every year spatial data gets updated to include the latest harvesting and oil and gas activity data as well as large natural disturbances like wild fire.

Monitoring and Reporting

This measure will be reported out on every 5 years for the entire DFA. An analysis will be completed on an annual basis for Natural Disturbance Units and landscape units where harvesting has taken place or where significant natural disturbance has taken place, in order to maintain awareness of the state of old seral retention. Assessment of the participant's performance to meet the indicator target will be completed every 5 years.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

4 – Degree of within stand structural retention – WTP Percentage

Core Indicator

Background Information

Complexity of stand structure is a key component of an operational strategy to sustain biodiversity in forested ecosystems (Bunnell et al 1999)[23]. Structural complexity helps to mitigate the potential deleterious effects of large scale stand and landscape simplification associated with intensive short-rotation forest management. It can be provided by the adoption of retention silvicultural systems, a practice broadly applied in interior BC (Bunnell et al. 1999).

Wildlife tree patches (WTPs) are a retention tool recommended for use in stand and landscape planning to help sustain biodiversity and ecological processes. They are used to provide protection for known wildlife habitat features (including standing dead and dying trees), to provide attributes important to key ecological processes (including woody debris accumulation, tree species diversity, and understory vegetation diversity), to protect small, local sites of special biological significance (i.e. unclassified riparian or wetlands, rock outcrops or rare plants or ecosystems), or to provide stand level complexity (vertical and horizontal) to harvest areas under even-aged, short rotation management. At the landscape level WTPs can be used with other protected areas such as riparian reserves, old gowth areas and provincial parks to provide landscape structure to help keep landscape complexity more consistent with natural disturbance regimes. All of the above values should be considered when considering where to locate (anchor) WTPs.

Target and Variance

Percent of Within Stand Structure retained across the DFA in harvested areas

A) 100 percent conformance with Landscape Level (LU) target of 7 percent set by FRPA for all new harvesting (variance of 0 percent)

B) Positive trend toward the FRPA baseline 7 percent in LU's where the current level of retention is deficient

Current condition

This indicator is measuring the retention of standing timber within harvested areas, usually in the form of wildlife tree patches (WTP's), riparian reserves as well as dispersed individual wildlife trees. These areas have been identified as one of the 6 key habitat elements for terrestrial vertebrates by Bunnell et al. (1999[24], Bunnell 2000[25]). The target and current condition is reflective of the fact that prior to the revision of the SFMP in 2011, the Fort Nelson Forest District Landscape Unit targets for WTP retention ranged from 2 to 11% depending upon the amount of prior harvesting and the biodiversity emphasis option identified for each LU by the process identified in the provincial Landscape Unit Planning Guide.

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[23] Bunnell, F.L., Kremsater, L.L. and E. Wind. 1999. Managing to sustain vertebrate richness in forests of the Pacific Northwest: relationships within stands. Environmental Review 7: 97-146.
[24] Bunnell, F.L., Kremsater, L.L. and E. Wind. 1999. Managing to sustain vertebrate richness in forests of the Pacific Northwest: relationships within stands. Environmental Review 7: 97-146.
[25] Bunnell, F.L. 2000. Report to the Arrow IFPA on criteria and indicators of sustainable forest management. Centre for Applied Conservation Research, University of British Columbia, Vancouver, BC. Prepared for Arrow IFPA, Slocan, BC.

Table 19 reflects the current condition of WTP retention by LU. The retention targets noted in the table were derived for the mix of LUs present in the Fort Nelson TSA prior to the coming into force of the NSLBOO, which amalgamated a number of the pre-existing LUs and reduced the total number of LUs from 84 to 30. The process to establish WTP retention targets for the new LUs based on biodiversity emphasis option (BEO) and previous harvest intensity has not been initiated. It is recommended that the target identified above should be considered an interim target until new WTP retention targets based on BEO and previous harvest intensity are derived for the Fort Nelson TSA.

The results include all harvesting dating back to winter 1995 .This is reflective of the advent of the requirement for WTP retention, which became a practice requirement with the introduction of the Forest Practices Code in late 1995. The participants have achieved the WTP retention targets in most all LUs.

Table 21:Current Stand Level Retention Percentages

Canfor			BCTS		
LU #	**% THLB in WTP**	**FSP Retention Target %**	**LU #**	**% THLB in WTP**	**FSP Retention Target %**
4	5.6	3	9	9.30	3
9	5.4	3	12	4.56	3
10	12.36	4	14	5.05	5
11	10.3	5	15	6.73	6
12	10.4	3	16	8.71	4
14	8.8	5	17	4.38	2
15	9.1	6	19	5.03	4
16	7.8	4	20	9.47	6
18	8.0	3	22	5.50	7
19	8.5	4	23	12.34	6
20	12.4	6	38	4.23	6
21	5.0	5	39	3.09	4
22	8.4	7	66	8.00	10
23	8.6	6			
24	14.1	5			
25	12.8	4			
34	6.3	3			
36	5.0	2			
37	5.8	2			
38	11.0	6			
39	3.3	4			

65	10.0	7			
68	13	11			
69	2.7	8			
All LUs combined retention	8.1				

Forecasting

Achievement of the indicator will result in healthy ecosystems with a diversity and abundance of native species and habitats, harvested areas with habitat attributes that will help to sustain biological and ecological processes and properly functioning riparian systems leading to the conservation of fish habitat and maintenance of water quality. It is anticipated that the amount of in-block retention will trend towards the target levels over time as stand structure retention is a legal requirement of the FRPA and the BCTS and Canfor FSPs.

By implementing the SFMP strategy, it is forecast that the percent of stand structure retained across the DFA will meet the minimum target of 7% across the DFA. Current status described in Table 20 of the SFMP show that more than the minimum stand structure is generally being met across the DFA currently and this forecast trend is expected to continue with the implementation of the identified strategy.

Monitoring and Reporting

Monitoring of stand level retention at the landscape level will be based on all harvesting that has taken place since 1995, which is the first year the Forest Practices Code came in, giving meaningful guidance on WTP retention. Because this is measuring trend and that harvesting does not take place on every LU ever year, this will be analysed and reported every 5 years, starting with analysis in 2010.

Calculation for indicator:

%WTP retention, $_{licensee}$ = (WTR, $_{licensee}$ / Total Area Harvested, $_{licensee}$) / 100

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

5 – Degree of within stand structural retention – Dispersed Retention

Core Indicator

Background Information

Operationally, harvest plans often include retention of dispersed trees such as snags, large live trees, deciduous trees, stub trees and understory trees. Dispersed retention provides stand level complexity and long term recruitment of coarse woody debris. Harvest value and ecological value can be optimized by selecting the variety of tree types (e.g., species, size, live and dead, etc.) that have high ecological value and low economic value, and through the number of trees retained.

Target and Variance

Percent of blocks meeting dispersed retention levels as prescribed in the site/logging plan. Target of 100 percent of blocks meeting prescribed levels (variance of 0 percent).

Current Condition

Targets are established by the prescribing forester based on what is felt appropriate for the site. Failing that, the minimum prescribed scattered retention agreed upon by the PRISM in the last SFMP was ≥7 combined stub and mature retention trees per hectare outside of the roadside work areas and landings.

This indicator will report out on all within stand *dispersed* retention, meaning prescribed levels of scattered individual mature tree retention and/or stub tree retention.

The prescribed levels have been set at the default level decided by the PRISM (i.e. ≥7 mature trees and/or stub trees).

Forecasting

The forecasting statement for Indicator 1.1.4.1 applies here.

Monitoring and Reporting

Monitoring and reporting will be done on an annual basis for this indicator. It will be based upon results of post harvest inspections as entered into Genus.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

6 – Degree of within stand structural retention – Riparian Management

Core Indicator

Background Information

Riparian management areas, including wetlands, provide opportunities for connectivity of forested cover along waterways, which are generally areas with high value for wildlife habitat and movement. Operational plans influenced by riparian areas contain site specific commitments that range from 100 percent protection to 100 percent removal of merchantable trees, generally with efforts to manage existing understory trees and shrubs.

Target and Variance

Number of Non-conformances where forest operations are not consistent with riparian management requirements as identified in operational plans - target of 0 non-conformances (variance of 0)

Current condition

For the purpose of this indicator, operational plans are road or cut block site plans as well as any other forest management activity plans that identify riparian management strategies. The prescribed management requirements are laid out in both the Canfor and BCTS Forest Stewardship Plans, Pest Management plans Peace Stream Crossing Guidelines as well as any other plans pertaining to riparian activities.

Forecasting

Implementing the SFMP strategy is forecast to result in: Healthy ecosystems with a diversity and abundance of native species and habitats, harvested areas with habitat attributes that will help to sustain biological and ecological processes and properly functioning riparian systems, including important wetlands leading to the conservation of fish habitat and maintenance of water quality. It is anticipated that the amount of in-block retention will trend towards the target levels over time. .

Monitoring and Reporting

Monitoring and reporting will be done on an annual basis for this indicator. It will be based upon results of interim and post harvest or post treatment inspections as entered into Genus. Inspections conducted by participants' staff will record any non-conformances to riparian management strategies specified in operational plans. These non-conformances will be recorded in the participants' forest data tracking system – Genus incident tracking system.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

7 – Shrub Habitat

Local Indicator

Background Information

Shrubs are common in riparian areas, and readily enter larger forest openings, especially on moist sites. As a stand closes, shrubs are suppressed by the taller trees, and remain uncommon until the stand naturally opens. Many vertebrates respond positively to shrub abundance, and shrub abundance is influenced by forest practices (Bunnell 2000).[26] In general, as forest canopy increases and understory decreases, the abundance of understory foragers declines (Bunnell et al 1999)[27]

Target and Variance

A) Sustain current baseline shrub habitat percentage in the THLB (variance of 1 percent of CFLB)

B) Monitor shrub habitat percentage in the NHLB

Current condition

There is no information locally as to what adequate levels of shrub habitat should be. The target reflects that Canfor and BCTS can impact the amount of shrub habitat in the THLB (i.e. creating habitat through openings or preserving it in riparian areas) but they do not control the natural succession in the NHLB. The target was set in order to ensure that at least the current baseline amount of shrub habitat is retained in the THLB. The target also includes tracking the trend for shrub habitat in the NHLB using forest cover updates in order to have a complete picture for the DFA.

A surrogate for shrub area is the area of stands less than 20 years old, as most shrubs occur in early seral stands. This assumption has been used in other jurisdictions and was accepted by PRISM. Based on current condition (see table below), approximately 4.0 percent of the Crown forested land base is < 20 years old or is expected to have a high predominance of shrub cover. A project to define the linkages between shrub and species requirements was undertaken since the development of the previous SFMP. The results of this project recommend that the baseline be set based on current conditions at the time of SFMP development, with the intent being to maintain the balance that exists in nature; bird monitoring is ongoing, providing further related information regarding the use of shrub and forest habitat by songbirds.

Table 21 reflects the current CFLB area of stands less than 20 years old – considered to be shrub habitat. The forest inventory dataset also includes a description of polygons that are labelled as brush or shrub habitat. The area of these polygons is shown Table 21.

[26] Bunnell, F. L. 2000. Vertebrates and stand structure in the Arrow IFPA. Report. Arrow IFPA, Nelson.

[27] Bunnell, F.L., Kremsater, L.L. and E. Wind. 1999. Managing to sustain vertebrate richness in forests of the Pacific Northwest: relationships within stands. Environmental Review 7: 97-146.

Table 22: Area in Stands Less than 20 years old and polygons labelled as shrub area (TSR 3 VRI dataset)[28]

Stands Less Than 20 Years TSR3			
TSA	Area of THLB (Ha)	Area of NHLB (Ha)	Area of GHLB (Ha)
Fort Nelson	38,413.06	9,001.73	47,414.80
Shrub Stands (VRI - Shrub Low & Shrub Tall) TSR3			
TSA	Area of THLB (Ha)	Area of NHLB (Ha)	Area of GHLB (Ha)
Fort Nelson	18,267.55	168,441.28	186,708.83
Total Shrub Area	**56,680.61**	**177,443.01**	**234,123.62**
%	24%	76%	100%

GHLB represents Gross Harvest landbase.

Shrub area of 234,123.6 ha represents 4% of the CFLB of 5,700,568 ha. This is the baseline shrub area to be used for monitoring purposes.

In 2011 total shrub area represented 5% of the CFLB. This reduction in shrub area can be attributed primarily to the shutdown in timber harvesting, the aging of previously harvested stands beyond 20 years of age and differences in the rate of natural disturbance over the period.

Forecasting

Shrub areas can be estimated and forecasted in a spatial model. Dynamic modelling of shrubs is currently not available. An interim surrogate was used, where stands < 20 years old are assumed to represent shrub presence. This includes natural and anthropocentric disturbances (harvested cutblocks, pipelines, utilities and seismic lines). To evaluate such an assumption, a comparison of the < 20 year stand age assumption of shrub presence showed that approximately 45% of the polygons with shrub presence in VRI were less than 20 years old but that there was shrub presence noted throughout all age classes. The shrub areas will also include all forest types with the "shrub low and shrub tall type labels as these are areas of naturally occurring brush identified in the vegetation resource inventory database.

Since the surrogate is based on an early seral age, the amount of shrubs identified will be directly related to the amount of area harvested in the THLB and the amount of natural disturbance in the NHLB. The predicted trend for shrub areas is that they will meet targets, provided that harvesting resumes and continues at or near AAC levels established by the MFLNRO. Natural disturbance can significantly impact the production of shrub habitat through wildfire.

By implementing the SFMP strategy, it is forecast that the baseline shrub habitat target will be achieved. The 2004 forecast is applicable, a new forecast is not needed at this time.

Monitoring and Reporting

Shrub habitat will be monitored through forest cover updates. As new data become available, changes in shrub cover will be tracked via comparisons between the previous and the latest

[28] A surrogate for shrub area. Updated in 2018.

version of the VRI and forest cover database. Shrub habitat summaries will also be updated once additional areas of the Fort Nelson TSA are re-inventoried to the VRI standard. Currently, approximately 40% of the Fort Nelson TSA has been inventoried to the VRI standard.

The data from stands that are <20 years old will be updated on an annual basis with the data from natural disturbance and non-productive brush types being updated every 5 years starting from 2010. Reporting of the status of this indicator will be conducted on a periodic basis - every 5 years the status of the indicator will analyzed and reported upon. The indicator specifies a target variance of 1% of the CFLB, to account for the effects of natural disturbance (wildfire) which can significantly shift the proportion of shrub habitat on the landbase.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

ELEMENT 1.2 SPECIES DIVERSITY

Value – Species richness

SFM Objective

Maintain suitable habitat elements and a range of variability in ecosystem function, composition and structure.

The CSA Element 1.2 deals with conserving "species diversity by ensuring that habitats for the native species found in the DFA are maintained through time, including habitats for known occurrences of species at risk.[29]

[29] Z809-16 CSA Sustainable Forest management standard

8 – Degree of habitat protection for selected focal species including species at risk

9 – Degree of suitable habitat in the long term for selected focal species including species at risk

Core Indicators

Background Information

While ecosystem conservation is the coarse-filter approach to biodiversity management, species diversity is the fine-filter approach. For most species, forest managers can influence habitat only, not species populations. To account for the degree of habitat protection for selected focal species, including at risk species, this indicator looks at the proper execution of operational plans where those plans contain conservation measures for Species of Mangement Concern.

Government's policy and legally established framework for the protection of biodiversity values and species at risk under provincial and federal legislation includes the establishment of parks and protected areas, the protection of biodiversity, riparian and aquatic habitats, old-growth forests, ungulate winter range, specific wildlife features and the habitat for listed species at risk.

For some of these species, specific habitat conservation targets have been established that identify the amount, distribution and attributes of desireable habitat. For the remaining species, desirable habitat conditions have been identified for each species. The participating licencees' manage spatial information that identifies the broad habitat types and locations for each of the Species of Management Concern. Where applicable, this information is brought forward into operational plans to manage for the desired habitat conditions.

Target and Variance

Percentage of forest management activities consistent with management strategies for species of management concern. Target - 100 percent conformance with management strategies (variance of 0).

Current Condition

This indicator ensures commitment to the development and implementation of management strategies for SARA Schedule One Species at Risk within the Fort Nelson DFA. The management and monitoring of endangered, threatened and special concern species reflects the commitment of this plan and its signatories to the SFM process. By following the recommended strategies, management can contribute to the long-term persistence of these species and their required habitats across the land base.

SARA Schedule One Species at Risk management strategies are a legal requirement and 100% of strategies will be followed. The Fort Nelson DFA also has a report "Management Guidelines for Species and Plant Communities at risk in the Fort Nelson Forest District"[30] outlining the species of concern and recommended management strategies to be prescribed for each.

A caribou habitat use study has been undertaken in the DFA. Results of the study were used to identify the current mix of UWR and WHA areas for boreal caribou in the Fort Nelson TSA. Compliance with management strategies is dependent on the previous three measures being completed and implemented. Management Guidelines for Species and Plant Communities at

[30] Proulx, et al, November 2005

Risk in the Fort Nelson Forest District were developed by Gilbert Proulx in 2005, with the related Field Guide developed and implemented shortly thereafter. In addition a SOP has been developed and implemented by Canfor and BCTS to further support its commitment to protecting Species at Risk (SOP dated Dec. 5th, 2007).

Forecasting

It is anticipated that short- and long-term supply of desirable habitat for all Species of Management Concern will be maintained on the DFA. By implementing the SFMP strategy, it is forecast that the habitat target will be achieved.

Canfor and BCTS, in conjunction with Dr. Fred Bunnell are currently working on development of an alternative process of managing for species of management concern; the Species Accounting Project, will assign species to various groups based on sensitivity to forest management activities and will list the array of species of greatest concern for which identified special management activities in the Fort Nelson area is required. Implementation of the management strategies for species of special concern noted in the Species Accounting project will eventually replace the current paradigm of implementing specified management procedures for SARA Schedule One Species at Risk.

Monitoring and Reporting

The data required to monitor this indicator is established through quantifying the number of Schedule One Species at Risk management strategies that are established and the number of management strategies that are being followed by Canfor and BCTS.

All activities will be consistent with SARA Schedule 1 species at risk management strategies, Government Actions Regulations (GAR) orders and legal requirements of the Wildlife Act or Migratory Bird Act.

This will be measured out and reported on a block by block basis as well as any new road building projects undertaken in the reporting year. ***For areas where forest activities occurred during the annual reporting period that contained operational plan commitments to mange for a Species of Management Concern, report the number of non conformances to plans occurring during the reporting year as compared to the total number of areas having operational plan commitments.***

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

10 – Proportion of regeneration comprised of native species

Core Indicator

Background Information

One of the primary management objectives for sustainability is to conserve the diversity and abundance of native species and their habitats. Silviculture practices that promote regeneration of native species, either through planting or other natural programs assist in meeting these objectives. The well-being and productivity of future forests are dependent upon the structure and dynamics of their genetic foundation.

Seed used in Crown land reforestation that is consistent with provincial regulations and standards ensure regenerated stands are genetically diverse, adapted, healthy and productive, now and in the future. Suitable seed and vegetative lots must also be of a high quality and available in sufficient quantities to meet the specific stocking and forest health needs of a given planting site.

Target and Variance

Regeneration will be consistent with provincial regulation and standards for seed and vegetative material use. Target - 100% conformance with the standards (0 percent variance).

The Chief Forester's Standards for seed use allows for up to 5 percent of the seedlings planted in a year to be outside the seed transfer guidelines. This built in variance in the standard is why there is no acceptable variance in the target of the SFMP indicator.

Current Condition

Genetic diversity of seedlings used for reforestation in BC is ensured through the MFLNRO's seedlot registration and use policies and standards. Cones and seed obtained from wild forest stands must be collected from a minimum of 10 trees. As well, the MFLNRO licenses tree seed orchards to ensure their orchard seed sources maintain a recognized standard for genetic diversity. These rules are in place to ensure that the seed collected and subsequent planted forests are appropriate for local conditions and that they contain sufficient genetic diversity to withstand natural disturbance events (including climate change to some degree).

"Transfer guidelines minimize risks of mal-adaptation or growth loss associated with moving seed or vegetative material from its source to another location. Exceeding the transfer limits may decrease productivity or increase susceptibility to frost, insects or disease. Poor survival or outright mortality may occur when seed is transferred past its ecological tolerance; however, losses in productivity can be substantial even over relatively short distances, particularly where elevation is concerned" (Ministry of Forests and Range Tree Improvement Branch publication). Transfer guidelines will be followed when prescribing reforestation measures in operational plans.

Canfor and BCTS have been in 100% compliance with this indicator. Monitoring results in the past years showed that CFP and BCTS met targets within the allowable 5% variance of the seed transfer guidelines and that the current 100% target of the SFMP is reflective of the current situation.

Forecasting

By following The Chief Forester's Standards for seed use, it is anticipated that healthy, productive and genetically diverse forests that are ecologically suited to the site will be maintained. The indicator target is a legal requirement, therefore it is reasonable to assume that the target will be achieved and hence the forecast achieved.

Monitoring and Reporting

All reforestation activities are tracked in Genus. Non conformances to the Chief Forester's Standards for seed use are tracked in the Participants incident tracking system. Seedlots are tracked and recorded when they are ordered and again when they are planted. For the reporting period, licensees will report the number of incidents where trees were planted with species and seedlots inappropriate to the Chief Forester's Standards for seed use.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

ELEMENT 1.3 GENETIC DIVERSITY

Value – Genetic diversity

SFM Objective

Element 1.3 deals with conserving "genetic diversity by maintaining the variation of genes within species and ensuring that reforestation programs are free from genetically engineered trees.[31] Conserve genetic diversity of tree stock. There are currently no core indicators associated with this measure.

11 – Percentage of stands artificially regenerated that are free of genetically modified organisms (GMO's)

Local Indicator

Background Information

This is a completely new local indicator developed for this iteration of the SFM plan and outside of the core indicator requirements of the CSA Z809-08 standard.

Target and Variance

100 percent of stands artificially reforested by the participants will be free of GMO's (variance of 0 percent).

Current Conditions

Concern over GMO's stems mostly from the food industry, but it is an important part of the CSA standard that the variation of genes within species be maintained. The target for this indicator was established as an interim measure meant to protect the artificial regeneration programs of the participants from the addition of GMO's. It is meant to provide maximum protection to the genetic diversity of planting programs implemented by the participants.

Currently no known GMO's have been used in any Canfor or BCTS planting programs.

Forecasting

The Chief Forester's Standards for seed use are designed to prevent the introduction of genetically modified trees in the artificial reforestation of British Columbia's forests. Indicator 1.2.3 commits to following the requirements of the Chief Forester's Standards for seed use. It is therefore expected that GMO's will not be introduced by the participants' artificial reforestation programs.

Monitoring and Reporting

This indicator will be tracked using the GENUS database and will be reported out on an annual basis. For the reporting period, licensees will report the number of incidents where trees were planted with species and seedlots inappropriate to the Chief Forester's Standards for seed use.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

[31] Z809-16 CSA Sustainable Forest management standard

ELEMENT 1.4 PROTECTED AREAS AND SITES OF SPECIAL BIOLOGICAL, GEOLOGICAL, HERITAGE AND CULTURAL IMPORTANCE

Value – Protected areas and sites of special biological, geological, heritage and cultural significance

SFM Objective

Respect protected areas identified through government processes. Co-operate in broader landscape management related to protected areas and sites of special biological and cultural significance. Identify sites of special geological, biological or cultural significance within the DFA and implement management strategies appropriate to their long term maintenance.[32] To have representative areas of naturally occurring and important ecosystems and rare physical environments protected within and adjacent to the DFA.

12 – Proportion of identified sites with implemented management strategies

Core Indicator

Background Information

The forest licencees participate in higher level and strategic planning that has delineated a series of protected areas (i.e. parks, ecological reserves (including geological sites)) and old growth management areas within the DFA. This achieved the geographic and ecological goals of provincial Protected Areas Strategies, providing representation of the cross-section of ecosystems and of old forest attributes. Ecosystems of special biological significance have generally been given a high priority for inclusion in the protected area strategy. Timber harvesting, mining and hydroelectric development are usually not permitted within protected areas and other resource development activities such as grazing and commercial tourism development, are permitted only in specified areas and under strict guidelines. Incursions into OGMAs are generally tolerated when participating licencees replace that area with other areas of suitable attributes.

At the stand level, protected areas include wildlife habitat areas (wildlife tree retention patches or important wetlands), wildlife tree features (such as a nest tree or mineral lick) and other geological. Unique areas of biological significance are identified in the field during the planning phase and are managed through avoidance (either by relocating the road and/or harvest area or by protecting it with a wildlife tree patch or riparian management area) or using an appropriate conservation management strategy.

Participating licencees include commitments in site/logging plans or other operational plans to ensure activities do not comprimise these protected areas or sites of biological or geological significance.

Target and Variance

100 percent of forest management activities consistent with management strategies for protected areas and sites of biological and geological significance (variance of 0 percent).

[32] Z809-16 CSA Sustainable Forest management standard

Current Condition

This indicator is established to show that Canfor and BCTS will not be operating in DFA Class A parks, ecological reserves, LRMP designated protected areas or sites of special biological significance unless authorized to so and in accordance with management strategies designed to protect the site or feature. Sites of biological significance are defined as sites that support red/blue, uncommon or rare listed plant communities, protected areas (protected by legislation, regulation, or land-use policy), including national & provincial parks, wildlife reserves and multiple use management areas, as well biological features that are deemed significant because they have been identified by the Ministry of Environment as "Wildlife Habitat Features". The Muskwa-Kechika Management area (MKMA) is included as a multiple use management area. The participants will not conduct harvest operations in the MKMA until landscape objectives regarding timber harvesting are identified for the MKMA. Also included under this element are officially designated Wildlife Habitat Areas (WHA) and Ungulate Winter Range (UWR).

Currently Canfor and BCTS are 100 percent compliant with this indicator. There have been no operations within national or provincial parks, ecological reserves, LRMP designated protected areas, or the Muskwa-Kechika management area. The WHA's and UWR's within the DFA have now been identified spatially and in legislation. As such, BCTS and Canfor will follow the management practices identified in the associated General Wildlife Measures. Canfor and BCTS also have management strategies in place for wildlife habitat features such as stick nests and bear dens, which will be followed in situations where these features are found within proposed harvest operations.

Forecasting

By following the SFMP strategy, it is anticipated that protected areas and sites of special biological and cultural significance will be maintained. The forecast completed for the 2004 indicator 1-4.1 is still applicable to the revised indicator, for additional detail see the "Forecasting Report for the Fort Nelson DFA, November, 2004".

Monitoring and Reporting

This indicator will be tracked using the GENUS database and will be reported out on an annual basis.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

13 – Protection of identified sacred and culturally important sites

Core Indicator

Background Information

Meaningful relationships and open communication with local Aboriginal communities help ensure that areas of cultural importance are managed in a way that retains their traditions and values. This indicator recognizes the importance of managing and protecting culturally important practices and activities during forestry operations. First Nations, with the benefit of local and traditional knowledge may provide valuable information concerning the specific location and use of these sites as well as the specific forest characteristics requiring protection or management. The outcome of these discussions and the means to manage/protect values and uses are included in operational plans. The intent of the indicator statement is to manage and/or protect those truly important sites, thus there is a degree of reasonableness inherent in identifying the sites. The target verifies that consideration was given in plans, then follows through with assessing plan execution.

Target and Variance

100 percent of identified Aboriginal forest values, knowledge and uses considered in forestry planning processes (variance of 0 percent). Where mitigating activities are not implemented a rationale must be provided.

Current Condition

Forest management strategies and practices can impact resource attributes that are culturally significant to First Nations. Thus identifying and addressing these sites in advance of active forest management activities is critically important. This indicator ensures that culturally important sites (confirmed sites) identified by First Nation's are identified during the planning phase, and that these sites are addressed in a diligent manner, respecting any relevant Aboriginal and/or Treaty Rights, as well as other legal obligations.

Canfor and BCTS are developing Aboriginal Memoranda of Understanding (MoU) with individual First Nations that provide a context and tools that the participants can use to strengthen relations with First Nations. As well, forest management plans will contain indirect strategies to ensure that treaty and aboriginal rights are not infringed upon, such as managing for the retention of a range of seral conditions and forest types and protecting stream and lake water quality to ensure that a range of wildlife habitats are maintained on the landbase in order to support the ability to exercise the treaty rights to hunt fish and trap.

BCTS currently has in place an MoU with Prophet River First Nations. Canfor has an MoU in place with Prophet River, which is currently on hold pending resumption of harvesting and milling activities in the Fort Nelson DFA.

Forest management plans are shared with Aboriginal communities. Open communication with First Nations that includes a sharing of information and enables forest Licensees to understand and incorporate traditional knowledge into operational plans. Licensees are aware of culturally important, sacred and spiritual sites leading to their appropriate management or and protection.

Forecasting

It is anticipated that building open and meaningful relationships with local Aboriginals will lead to trust in sharing sensitive information and will allow forest plans to incorporate culturally sensitive sites. These plans will contain information on how these sites will be managed or protected, while respecting the sensitive and often-times confidential nature of the shared information.

Monitoring and reporting

This indicator will be evaluated by determining the percentage of confirmed significant sites (identified to Canfor or BCTS by First Nations), that have been addressed during the planning stages of forest management (strategy or mitigative measure employed).

The frequency of monitoring will be annual. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent analysis of the data will be contained within the SFMP Annual Report.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

CRITERION 2.0 ECOSYSTEM CONDITION AND PRODUCTIVITY

Both disturbance and forest harvesting can have effects on resources associated with the productive capability of temperate forest ecosystems. Large amounts of nutrients can be lost from an ecosystem in the smoke and hot gasses created within a fire. Destruction of the living biomass can also lead to increased erosion further contributing to nutrient losses. If, however, a fire event is not too severe and the interval between successive fires is of sufficient duration, this depletion is temporary. As the new plant community develops after a fire, nutrient pools are replenished when ecosystem processes (nutrient cycling, for example) and favourable soil attributes (litter and its associated micro- and meso-faunal populations) are re-established. The process of renewal restores productive capability between disturbance events. Fire can also have important implications for biodiversity. When dominant vegetation is consumed by fire, more light reaches the forest floor and species intolerant of shade can proliferate. Hence, community composition after disturbance is often changed radically until such time as the trees again dominate the site.

With clear-cut harvesting, for example, a substantial proportion of organic material (and associated nutrients) are removed from the site. Forest practices that minimize nutrient losses from erosion, with rotation lengths (time between successive harvests) of sufficient duration that nutrients pools are replenished, can mimic the natural cycle of fire disturbance and renewal. Protecting soil resources and planting of locally adapted tree species will ensure that ecosystem develop at a rate and trajectory appropriate to site conditions

The crux of Criterion 2 is to maintain the capability of the timber harvesting land base to supply forest products in perpetuity, without compromising its capacity to also supply a range of additional values (such as habitat provision and non-timber benefits). In this respect, Criterion 2 quantifies biomass production by measuring the growing stock (both commercially useable and non-commercial biomass) in the THLB as well as the site resources essential for ecosystem function. The approach maintains long-term productive capability by ensuring that processes critical to ecosystem production are not compromised irreparably and that a stable base of forest is available for timber production within a defined landscape. Reduction in productive capability could be a signal of inappropriate forest practices or the negative effect of natural disturbance agents, and reduces the supply of ecosystem services.

The assessment is made on the land base designated for wood production since SFM is concerned with maintaining ecosystem productivity on land impacted by anthropogenic activities. This implicitly assumes that the processes responsible for maintaining ecosystem productivity are functioning appropriately in the non-harvesting land base.

ELEMENT 2.1 FOREST ECOSYSTEM CONDITION AND PRODUCTIVITY

Value – Ecosystem resilience to disturbance

SFM Objective

Conserve forest ecosystem productivity and productive capacity by maintaining ecosystem conditions that are capable of supporting naturally occurring species. Reforest promptly and use tree species ecologically suited to the site.[33] Maintain a natural range of variability in ecosystem function, composition and structure to facilitate recovery from disturbance.

14 – Reforestation Success – Regen Delay

Core Indicator

Background Information

Ensuring a diversity of tree species is maintained improves ecosystem resilience and productivity and positively influences forest health. Prompt reforestation ensures that the productive capacity of forest land base to grow trees is maintained. Forests in Canada are classified according to an Ecosystem Classification System, which identifies the tree species that are most suited ecologically for regeneration in any particular site. This not only helps to maintain the natural forest composition in an area, but it also lends itself to promotion of long term forest health and productive forests that uptake carbon.

Prompt reforestation ensures that the productive capacity of the forest landbase to grow trees is maintained. Promptness also aids in providing young trees a head start against competing vegetation, helping to reduce the need for manual or chemical brushing treatments.

Target and Variance

100 percent of stands established annually will have an average regeneration delay of 3 years or less (variance will be site plan specific).

Current Condition

Both Canfor and BCTS have specified regeneration delay limits in their respective Forest Stewardship Plans of 4 and 5 years respectively, to establish a new stand after harvesting, whether by natural regeneration, used for deciduous stands or artificial regeneration practiced for conifer stands. This target promotes prompt reforestation and exceeds legal requirements. Early establishment of a viable crop of trees reduces the need for subsequent interventions (re-planting, brushing) and positively contributes to carbon sequestration.

Forecasting

It is anticipated that prompt reforestation will ensure that: the productive capacity of forest land base to grow trees is maintained and that actively growing, healthy forests will best contribute to carbon uptake and storage. It is also anticipated that healthy ecosystems with a diversity of native broadleaf and coniferous species will be maintained at endemic and sustainable levels and that forests that uptake carbon will positively contribute to a reduction in carbon emissions.

Monitoring and Reporting

[33] Z809-16 CSA Sustainable Forest management standard

This indicator will be tracked using the GENUS database and will be reported out on an annual basis. ***Report the average time (weighted by area) for regeneration establishment on areas where*** stand establishment (***regeneration delay*** achievement) ***was declared during the reporting period.*** C***ommencement of the regeneration delay period is based on harvest start date***. Regeneration delay achievement is considered to be met upon completion of planting on sites prescribed for artificial regeneration or completion of stocking assessment on areas prescribed for natural regeneration.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

15 – Reforestation success – Free Growing

Local Indicator

Background Information

This indicator tracks the harvested blocks that meet free growing obligations across the DFA, thereby ensuring sustained productive capability of forest ecosystems. A free growing stand is defined as 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. The free growing dates are established based on the biogeoclimatic classification of the site and the tree species prescribed for planting or left for natural regeneration after harvest.

The free growing survey assesses the fulfilment of licensees' obligations to the Crown for reforestation and ensures that the productive capability of the forest land base to grow trees is maintained. The principle of free growing is a component in ensuring continued ecosystem function and productivity.

The legal requirements set out in FRPA represent the target for this indicator. This strategy is supported by the PRISM. The target must be met by block, therefore a summary of all blocks for both Canfor and BCTS will be used for this indicator. The target is meant to be reported annually as blocks become eligible for free growing status.

Target and Variance

100 percent compliance with free growing time frames prescribed in site plans (variance of 0 percent).

Current Condition

BCTS and Canfor both make every effort possible to meet or exceed this indicator. However, sometimes the target dates get missed due to unforeseen issues cropping up in individual blocks. Examples of this would be mortality due to disease, animal damage (browsing), beaver dam or other flooding, snow press damage and other general misfortune.

In the 2009-2010 reporting year, out of 3,265.07 ha harvested by Canfor required to be declared as having achieved free growing status, 324.31 ha did not achieve the free growing requirements. The following openings were not declared free growing at time of preparation of the 2009 annual report:
CP 544 Block 500B: an amendment has been submitted to the MFLNRO and it was requested to declare the block as is;
CP 89 Block 437 was in fact free growing, but had not yet been declared due to an administrative backlog. The opening was declared free growing in 2010.
A56837 P356A and A56837 P815: action plans for both blocks have been submitted to the MFLNRO;
A61535 Block P811: A Site Plan amendment was prepared and submitted to the MFLNRO. The performance in meeting free growing standards has improved significantly since the 2008-2009 reporting period.

Where the requirement for establishing a free growing stand has not been met, the Participants must submit an action plan acceptable to the MFLNRO district staff outlining how the shortcoming will be rectified.

Forecasting

Achievement of the target is a legal requirement of FRPA. Failure to meet the prescribed requirements on or before their free growing dates could put the sustainability of the timber resource within the DFA in peril. Free growing stands are considered to have 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.

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 blocks meet their free growing date 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 Nelson DFA, trends for the immediate future will likely show that 100% of blocks will meet the prescribed free growing requirements as identified in site plans. As the indicator target is a legal requirement, it is anticipated that the target and forecast will be achieved.

Monitoring and Reporting

This indicator will be reported out on an annual basis with the information being stored in Genus at the Canfor and BCTS respective offices. The population of blocks that are scheduled to achieve free growing status during the reporting year will be assessed to determine the percent of harvested blocks in the population that achieved free growing status.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

16 – Percentage of silviculture obligation areas with significant detected forest health damaging agents which have treatment plans

Local Indicator

Background Information

This indicator measures the attempts at assessing the potential impact of natural disturbance on the local ecosystem resiliency. The Ministry of Forests often uses the term "Forest Health" when discussing certain natural disturbance events or agents. Natural disturbance from agents or events such as fire, disease or insects is a natural part of ecosystem function. Forest managers have options available to them to assess and manage natural disturbance agents or events before they impact the DFA negatively.

Once assessments of potentially damaging natural disturbance events or agents in silviculture obligation areas (harvested cutblocks) are in place, this indicator ensures that management strategies are put in place to deal with any events or agents which threaten the likelihood of achievement of free growing status. Endemic levels of damaging agents are expected in the DFA. Strategies will be developed for damaging agents that begin to exceed historic endemic levels and put the silviculture obligation areas survival and eventual achievement of free growing requirements at risk. Damaging events or agents which threaten the survival and achievement of free growing requirements of the young forests on silviculture obligation areas will be considered significant for the purposes of this indicator, and will be addressed through the development and implementation of treatment plans.

Target and Variance

100 percent of sites with significant forest health damaging agents will have a treatment plan developed and initiated within one year of detection (variance of 0 percent).

Current Condition

Canfor and BCTS implement a survey program that covers the blocks that are coming up on their free growing dates and regeneration delay dates. In the course of completing these surveys, a summary of damaging agents found within the block is generated. The definition of "significant" for the purposes of this indicator will be based on the potential impact to the stand by the damaging agent and any agent whose presence places the declaration being surveyed (regen delay, or free growing) in danger of being missed. There are a great many different damaging agents, the impact of which will vary in severity. The overall impact will also depend on the state of the stand (overall numbers of stems, and preferred or acceptable species numbers). The following table ranks the most common local plantation pests and their potential severity:

Table 23: Plantation pest severity ranking

Plantation Pests	Code	Potential Severity Ranking
Eastern spruce budworm	IDE	Very High
White pine weevil	IWS	Low-Medium

Venturia spp.	DLV	Low
Harwood Truck Rot	DDH	Very low
Red ring rot	DDP	Very low
Aspen Truck Rot	DDT	Very low
Tomentosus root rot	DRT	Very low
Stem Disease	DS	Very low
Warren's root collar weevil	IWW	Very low (due to small % of planted PL)

Forecasting

Action plans implemented to deal with damaging forest health agents will improve likelihood of ahieving of regen delay or free growing requirements. Failure to prioritize areas with stand damaging agents for treatment means forest managers are allowing significant areas to either lose economic value, or to allow existing problems to become much worse. For example, by choosing to harvest green, un-infested pine stands while other stands are beetle infested or dead, the opportunity to prevent further spread would be lost. Dead, unsalvaged stands will start to decay, losing economic value that could have been realized if they were prioritized for harvesting. In addition to economic losses, there could be ecological costs to failing to treat stands with damaging agents. As these stands die and decay, they will release carbon dioxide into the atmosphere, thereby contributing to global climate change. Prioritizing these stands for harvesting will not only improve economic values but will allow a healthy, young, carbon-sequestering plantation to become established.

Monitoring and Reporting:

This will be reported out on an annual basis, with the information stored in Genus at the Canfor and BCTS respective offices. Silviculture Obligation areas are monitored by way of a combination of various assessments conducted at periodic intervals prior to declaration of free growing status. These assessments may range from a simple walkthrough assessment to a formal stocking or free growing survey. The results of assessments are noted in the participants Genus forest data management system. Assessments will note the presence of significant damaging agents and will make recommendations for treatment plans. The participants will record the percentage of silviculture obligation areas which are assessed as having been significantly negatively affected by a forest health damaging agent and for which a treatment plan has been developed and implemented within one year of detection. Action plans may prescribe varying forms of treatment ranging from monitoring through fill planting, site preparation and/or re-planting.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

17 – Evidence of efforts being made to manage known significant forest health damaging agents

Local Indicator

Background Information

Insect and disease disturbances have the potential to cause significant economic, social and ecological impacts. The economic impacts can be measured in terms of volume losses. These are often referred to as un-salvaged losses for disturbances, which lead to mortality, but incremental losses may also occur due to a variety of insects and diseases resulting in loss of tree growth. Attempts are made to capture un-salvaged losses in Timber Supply Reviews, but often insufficient background material is available to accurately define these losses. By participating in the planning process and tailoring harvesting activities for salvage of damaged timber, or removal of stands at risk of or undergoing infestation, the impact and spread of damaging agents may be reduced.

Target and Variance

a) Annually report out on percentage of harvest activity that is focussed on the treatment of stands damaged by or susceptible to damage by natural events or damaging agents.

b) Annually report out on participation in management efforts within the DFA (committees, Task Forces, Etc.) for significant forest health damaging agents.

Current Condition

There has been no industrial scale harvesting of timber in the Fort Nelson DFA since the winter of 2007. As such no forest health threatened or damaged stands have been harvested. However, both Canfor and BCTS have been a part of the Fort Nelson Mountain Pine Beetle task force since its inception in 2009. This demonstrates the commitment of the Participants to managing forest health issues within the DFA.

Forecasting

The forecast for indicator 2.1.1.3 is applicable here.

Monitoring and Reporting

This will be reported out on an annual basis, with the information stored in Genus at the Canfor and BCTS respective offices.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

18 – Additions and deletions to the forest area

Core Indicator

Background Information

Given the Crown tenure situation in Canada forest companies generally have little influence on any additions or deletions to the forest area, which generally are a result of government land use objectives. Where companies can have an influence is through their practices, particularly as it pertains to permanent access structures such as roads, landings and borrow pits. Unless rehabilitated, these access structures may occupy otherwise productive land suitable for forests. The target is focused on those activities where forest companies have management responsibility (i.e. excludes other permanent losses resulting from other industries sharing the overall forest estate).

Conversion of the CFLB to non forest land also has implications for carbon sequestration and storage. A permanent reduction in forest land means that the removal of carbon from the atmosphere and carbon storage will correspondingly be reduced. Ideally there would be no conversion of forest land to non-forest use, however the vast majority of the Fort Nelson DFA is un-roaded, therefore development of the timber resource will require a certain amount of permanent access creation. Actual performance against the 3 percent target is anticipated to increase over time until the timber harvesting landbase is fully accessed.

Target and Variance

Report out the percentage of gross forested landbase (CFLB) in the DFA converted to non-forest land use through forest management activities. Target of less than 3 percent of gross forested landbase at any given time (variance of 0 percent).

Current Condition

This indicator currently includes the sum total area removed from productive forest use including roads, landings, pits, quarries, landslides, camps, and SUP's minus the areas of lands that are successfully rehabilitated and reforested.

No harvest activities or road construction has been completed in the DFA by the participants since the winter of 2007. During the period 2007 – to the date of writing of this SFMP (March 2011), there has been no conversion of forest land to non forest land through the forest management activities of the participants**.**

Table 24 Deletions from the landbase

Total deletions from the forested landbase – 2017 baseline data[34]

Category of deletion	Hectares
Permanent roads, landings and trails	32,181
Range burns	12,080
Landslides resulting from forest management activities	0
Wells, pipelines & seismic lines	16,328
GRAND TOTAL	**60,589**
CFLB	**5,700,568**
% of CFLB deleted from all industrial activities	**1.06%**
% of CFLB deleted from forest management activities	**0.49%**

Baseline percentage of landbase deleted from production = Grand total deletions / CFLB

It is assumed that 50% of the roads, trails and landings were created by forest management activities and the remainder by oil and gas. Of note there was no harvesting and no road construction completed by forest management activities since 2008. The disturbance noted in the table represents historical disturbance on the land base.

Forecasting

By implementing the SFMP strategy, it is anticipated that productive forest soils with minimized losses in forest productivity will be maintained and that the forest productive area lost resulting from the construction and maintenance of permanent access structures will be minimized. Permanent access structure area (percent non-productive unnatural) is utilized in the provincial Timber Supply Review..

Monitoring and Reporting

Due to the variability of operations in any given year, it is more meaningful for this indicator to be reported out in 5 year intervals from the 2011 baseline information. This indicator will be tracked via the GENUS database and using Arcview GIS.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

[34] Baseline data taken from Fort Nelson TSR4 Data Package, February 2017

19 – Proportion of long term sustainable harvest level that is actually harvested

Core Indicator

Background Information

For many, sustainability involves limiting actual timber harvest to levels within the long-term capability of the forest to grow wood. To track this, managers need data on both harvest levels and long-term production capability to make proportional calculations. In many locations it also requires an understanding of the nature of the transition of forests from harvesting old growth to harvesting second growth. In practice, only the actual harvest level can be physically measured. The amount of wood that can be produced in perpetuity from a forest is a theoretical calculation that depends not only on the inherent wood-growing capacity of the forest ecosystem but also on the kinds and intensities of management inputs (e.g., silvicultural treatments).

Because the latter inputs are under human control, a forest can have a wide range of potential long-term sustainable wood harvest levels. One strategy to ensure the wood growing capacity of forests is fully recognized is to retain it in a productive state. Other core indicators that directly measure this are 2.2.1 (additions and deletions to the forest area by cause) and 2.1.1 (reforestation success).

Timber supply is usually considered within the context of three relative timeframes — short term, medium term and long term. The short term is typically represented by the first two decades of the harvest forecast and reflects the period in which the scheduled harvest level is defined by immediate concerns of achieving socio-economic objectives and maintaining non-timber values. The medium term corresponds to the transition from harvesting mostly old growth to harvesting managed stands. The long term is the period that begins approximately when the harvest reaches the long term harvest level.

Guidance in developing harvest flow objectives is taken from the current economic and social objectives of the Crown. In the short term, there is often a desire by government to retain the continued availability of good forest jobs and the long-term stability of communities that rely on forests. At the same time, harvest levels in the short term must not compromise long term sustainability.

In general, a reasonable flow pattern provides for a managed and gradual transition from short-term to medium- and long-term harvest levels, and avoids large and abrupt disruptions in timber supply. A reasonable flow has a medium-term level that drops below the long-term level to the minimum extent and only if justified. The long-term level should provide an even level of growing stock over the long term.

Initial harvest levels are used by government decision makers in determining the allowable annual cut (AAC). The harvest level is set using a rigorous process that considers social, economic and biological criteria.

Target and Variance

Percentage of volume harvested compared to the long term harvest level (AAC) with a target of 100 percent over 5 years (variance of 10 percent). The PRISM has agreed that reporting of the participants performance for this indicator will be waived pending the resumption of timber harvesting by the participants in the Fort Nelson DFA.

Current Condition

The total annual allowable cut (AAC) total for the Fort Nelson DFA is 1,625,000 cubic meters making the 5 year total 8,125,000 cubic meters. Table 12 identifies the AAC associated with the tenures held by the participants. The cut control period for legislated reporting is 5 years to allow for short term fluctuations in cut in either strong or weak markets. This indicator has been tied to the same reporting requirements as it has already been determined that this reporting regime is effective for maintaining a sustainable cut. No harvest activities have been completed by the participants since winter 2007.

Forecasting

It is anticipated that the forecast of future harvesting levels will be within the target range identified by the indicator. Harvesting within the target range will sustain harvest opportunities into the long term and will result in economic benefits flowing to forest workers, local communities and the provincial government.

Monitoring and Reporting

This will be reported out every 5 years starting from the date of resumption of harvesting operations in the Fort Nelson DFA by the participants. This will be tracked in the GENUS database.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

CRITERION 3.0 SOIL AND WATER

This criterion emphasises the importance of maintaining two of the fundamental building blocks of sustainable forestry; Soil and Water. The core indicators are designed to maintain the quantity and quality of forest soils and water resources. This criterion uses preservation of soil structure and processes as a measurement for successful soil conservation. It also uses protection of water quantity and quality as a measurement for successful water conservation.

ELEMENT 3.1 SOIL QUALITY AND QUANTITY

Value – Soil productivity

SFM Objective

Conserve soil resources by maintaining soil quantity and quality.[35] Protect soil resources to sustain productive forests.

20 – Level of soil disturbance

Core Indicator

Background Information

Soil disturbance can have positive (mineral soil exposure for seed germination) or negative (soil compaction, erosion) impacts. Managing detrimental soil disturbance levels will help to retain the productive capacity of ecosystems. Soil compaction, displacement and erosion are components of potentially detrimental soil disturbance. These targets seek to manage soil disturbance levels caused by harvest operations.

Soil disturbance objectives are written into plans often by committing to the maximum planned levels of soil disturbance assigned to a harvest area based on related field data. Harvest operations are conducted in a way that ensures commitments can be achieved. Post harvest evaluations and other inspections assess plan conformance.

Target and Variance

Percentage of harvested blocks meeting soil disturbance objectives identified in plans. Target of 100 percent (variance of 0 percent).

Current Condition

Currently both Canfor and BCTS have identified levels of allowable soil disturbance set out within their respective forest stewardship plans. These are the levels which will be applied in all new operational level plans.

BCTS FSP Information:

5.1 Objectives Set by Government for Soils

Legal Reference: FPPR, Section 5, and Section 12.2

[35] Z809-16 CSA Sustainable Forest management standard

For all FDUs covered by this FSP, the holder of this FSP will undertake to comply with the practice requirements of FPPR, Sections 35 and 36.

Scale of Measurement: Cutblock and Standards Unit

LINK:
http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/12_14_2004#part4_division1

Canfor FSP Information:

The Canfor FSP also commits to managing forest operations to be compliant with sections 35 and 36 of the Forest Planning and Practices Regulation, as it was written at the time of submission of the FSP to government for approval. This effectively means that Canfor and BCTS have committed to the default soil disturbance and permanent access structure limits specified within the Forest Planning and Practices Regulation (*FPPR*).

Forecasting

By following the SFMP strategy and FSP specified result, it is anticipated that productive forest soils with minimized losses from forest operations will be maintained.

Monitoring and Reporting

This measure will be reported out annually, with compliance being based on the results of in-house and government (compliance and enforcement) inspections. The reporting will be based on the following calculation:

Percentage of blocks meeting objectives = (# blocks meeting objectives / #Total blocks harvested) x 100

The participants track all instances of non conformance to the soil disturbance limits prescribed in their respective FSPs. Canfor tracks these incidents in the Genus Incident Tracking Database. Annually, a query of the ITS or similar tracking database will be conducted by the participants to determine the number of instances of non conformance to the soil disturbance limits.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

21 – Level of downed woody debris

Core Indicator

Background Information

This indicator and target addresses the need to maintain structural features of forest ecosystems at the stand level. Strategies include direction for basic levels of coarse woody debris (CWD), creation of stub trees, and guidelines for enhanced levels of CWD in landscape units with high biodiversity emphasis options**.** The indicator is complimented by Indicator 1.1.4: Degree of within-stand structural retention.

Coarse woody debris (i.e., downed wood) plays an important role in forest ecosystems including provision of food and shelter for invertebrates and smaller wildlife, growing sites for trees, nutrients for soils, and structure in streams to maintain channel stability.

Excessive removal of coarse woody debris (CWD) may affect habitat needs for some wildlife species (e.g., pine marten, fisher, grizzly bear, small mammals, snakes, some amphibians and numerous invertebrates).

The main ecological principles guiding a CWD management strategy are:

- CWD immediately after harvest is rarely a concern in the DFA (except in twilight mature sites, or those with intensive site preparation). The predicted shortfall in managed stands is low CWD levels 50-80 years after harvest, particularly larger pieces.
- Leaving more downed wood at harvest does not help CWD levels later in the rotation. Retained snags and live trees, and mortality of regenerating trees are required.
- Distribution of CWD across managed stands is important, particularly maintaining some CWD through time in the harvested areas (outside of retention patches).
- Variability in CWD levels and types among stands is high and important ecologically.
- Landscape context matters: cutblocks with low CWD levels are of less concern where most stands in the Non-THLB have natural CWD levels, and occurrence of Non-THLB is significant.

The Fort Nelson DFA is best characterized as a sea of NHLB interspersed with small islands of THLB. This is quite the opposite to the makeup of the remainder of the forested areas of the province of BC. In the Fort Nelson DFA, the NHLB accounts for 73% of the productive area of the DFA. Consequently, as per bullet 5 above, retention of low levels of CWD on cutblocks in the Fort Nelson DFA is mitigated by the sheer abundance of NHLB area.

Through the *FPPR* Government has set an objective for soils – to conserve its productivity and hydrologic function, meaning that companies will have results and strategies in their Forest Stewardship Plan to meet those objectives. Additionally, there are forest practices requirements to retain wildlife trees and for coarse woody debris.

Target and Variance

Percent of cutblocks reviewed where post harvest coarse woody debris (CWD) levels are within the targets contained in plans. Target of 100 percent (variance of 10 percent).

Current Condition

The interim target in site plan prescriptions for coarse woody debris (CWD) is set as per the current FRPA Forest Planning and Practices Regulation default requirements. Although the PRISM members felt that this number was inadequate, they recognized that documented information does not currently exist on either the amount of CWD left behind after harvesting, or on the amount of CWD that occurs in natural pre-harvest stands. It was also recognized that Canfor and BCTS do not simply manage down to this target, and that it is likely that significantly more CWD is currently retained after harvest. Canfor and BCTS have committed to developing a more comprehensive CWD strategy after harvest operations of the participants resume in the DFA.

The FRPA default level is currently ≥ 4 logs (2 m or greater length; 7.5 cm or greater top diameter)/ha after harvesting.

The Ministry of Forests and Range Coarse Woody Debris Database contains some baseline information for the province. Unfortunately there are a limited number of samples within the DFA and none within the BWBSmw2, the DFA's largest BEC variant in the THLB.

Coarse woody debris (CWD) is not operationally monitored within the Fort Nelson DFA and there is limited information locally on CWD retention post-harvest in cutblocks or on CWD levels that currently exists in natural, pre-harvest stands.

Currently, some of the newer Site Plans (SP's) being developed are prescribing a level of CWD to be retained based on a percentage of the CWD originally occurring on the site pre-harvest. It is anticipated that this will become the norm going forward and will make reporting on this indicator more standardized.

Forecasting

Forecasting of this measure is possible using models. Preliminary forecasts have highlighted that there is currently a limited amount of data available for use in modelling. (E.g. data from the provincial CWD database) Canfor has developed a monitoring strategy and SOP for CWD which BCTS will also follow. The data gathered during monitoring ensures that more accurate forecasts are available. It is anticipated that the level of CWD in the THLB will meet targets.

By following the SFMP strategy, it is anticipated that upon completion of harvesting, piling and site preparation activities, areas will contain a range of standing and downed CWD sizes in a range of decay classes that will deliver a supply of CWD in the short through to the long-term. Retention of standing and downed CWD will provide habitat benefits to fur bearers, birds and insects, which contributes to biodiversity conservation.

Monitoring and Reporting

Post-harvest CWD levels will be measured and recorded through post harvest inspections or through silviculture surveys on a representative sample of the blocks harvested annually. This measurement will provide a block average value that will be tracked by cutblock. The average amount of CWD present in blocks throughout the DFA will be monitored annually from reports generated by each participant.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

ELEMENT 3.2 Water Quality and Quantity

Value – Protect water quality and quality

SFM Objective

Conserve water resources by maintaining water quality and quantity.[36]

22 – Proportion of watershed or water management areas with recent stand replacing disturbance – Watersheds

Core Indicator

Background Information

Forest ecosystem conditions at the watershed level can have a strong influence on water quality and quantity in rivers, lakes, and wetland systems. Water quality and quantity can be affected by stand-replacing disturbances (human and natural-caused). The effects are normally highest in the initial post-disturbance years and diminish over time as regenerating forest cover is established. The critical threshold at which the disturbance begins to effect water values varies according to topography, soil properties, vegetation types, and climate. Certain watersheds can be classified as more sensitive to the impacts of disturbance either because their environmental and climatic attributes or because of their inherent value to aquatic life and communities that are dependent on the water. The peak flow of a watershed is directly influenced by the amount of area that is recently harvested or otherwise recently disturbed (Equivalent Clearcut Area or ECA). These disturbed areas accumulate more snow and subsequently can deliver more water as the snow melts more rapidly in the spring.

Forest management activities including infrastructure construction (roads, bridges, landings, etc.) may affect water quality and quantity (possibly, immediate or long-term effects). Direct measurements of water quality and quantity are largely unfeasible across entire working forests. Regulations and guidelines, based on research, have established to minimize effects on water quality and quantity during forest management activities. Regulations and guidelines address topics such as fish habitat, stream crossings, and riparian areas. Forest planning, operational strategies and site prescriptions are implemented to minimize and mitigate impacts to water quality and quantity.

This indicator takes a measure of a select group of watersheds within the DFA that have been identified as sensitive. These watersheds will have an assigned target for peak flow (such as ECA or peak flow hazard). Any harvest activity that is planned in these sensitive watersheds will require a more detailed assessment that will evaluate potential impacts and provide recommendations to mitigate those impacts.

Target and Variance

Sensitive watershed that are found to be above the peak flow targets will have further assessment done and strategies created for water management prior to harvest within the watershed. Target of 100 percent (variance 0 percent).

[36] Z809-16 CSA Sustainable Forest management standard

Current Condition

Sensitive watersheds are a subset of total watersheds defined on a DFA basis. In the absence of a sensitive watershed list, the default will be described within FRPA/GAR orders. Usual indicators of Sensitivity would be high fisheries value, high terrain sensitivity or percentage of (ECA / Peak Flow) over and identified target. Currently the Fort Nelson DFA has no watersheds that would be assessed as sensitive. For further guidance on this Canfor and BCTS will default to the "Interior Watershed Assessment Guidebook", version 2.1, April 1999, Appendix 2.

Forecasting

Peak flow analysis will have to be completed on any watersheds that are designated as "sensitive" in the future. Major watersheds would also have to have peak flow analysis to ensure they do not meet a "sensitive" designation. Analysis for non-sensitive watersheds will be completed prior to the resumption of harvesting activities by the participants in the DFA.

By following the SFMP strategy it is anticipated that there will be acceptable levels of water quality and quantity maintained on the DFA. Riparian systems, including important wetlands functioning will be maintained, supporting human and ecological communities and aquatic life. Introduction of sedimentation into watercourses' will be minimized.

Monitoring and Reporting

ECA/peak flow will be calculated annually in sensitive watersheds where harvesting takes place in the reporting year. The water quantity measurement will be calculated as: the equivalent clearcut area (ECA) in the watershed divided by the total area of the watershed = peak flow index. Where targets for peak flow are exceeded strategies will be recommended varying from, nothing needed, grass seeding/prompt reforestation, larger culverts on streams or wait for target flow to drop below a specified level. All sensitive watersheds will be reported on annually with the ones where no harvesting occurred simply stating "no harvest occurred".

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

23 – Proportion of watershed or water management areas with recent stand replacing disturbance – Roads and Road Structures

Core Indicator

Background Information

Roads and stream crossings in particular can have a large impact on water quality in a watershed. In general, steps are taken on all drainage structures to minimize the risk of sediment delivery into watercourses. Within sensitive watersheds local conditions such as soil type, topography, road grade, road construction history and structure type will determine how great a risk a drainage structure is to negatively impacting water quality.

This indicator recognizes the importance of identifying high risk drainage structures in those watersheds that were determined to be sensitive. In order to manage the risks to water quality, the target requires that a mitigation strategy be in place for each of the identified structures and that it is being followed. Strategies could range from structure replacement to periodic monitoring.

Target and Variance

Percentage of high risk drainage structures on Road Permits in sensitive watersheds with identified water quality concerns that have mitigative strategies implemented. Target of 100 percent (variance of 0 percent).

Current Condition

Currently there are no identified "sensitive watersheds" within the Fort Nelson DFA. To reduce its road maintenance liabilities, Canfor has surrendered most all of the road permits issued to Canfor back to the MFLNRO. The BC MFLNRO and Oil and Gas Commission have re-tenured these roads as petroleum development roads (PDRs). When harvest activities resume by the participants, the participants will enter into road use agreements with the holders of the PDRs. Consequently, at the time of the development of this SFMP there are no road permits issued to Canfor and therefore the requirements of the indicator will not apply to Canfor's forest operations.

Forecasting

The forecast in indicator 22 applies here.

Monitoring and Reporting

A monitoring plan for structures on road permit roads managed by the participants (road permits issued to the participants) in sensitive watershed will be developed and the crossings assessed using Stream Crossing Quality Index (SCQI). For structures found to have a high water quality concern rating, as determined by the SQCI assessment, a mitigative strategy would then be developed with actions ranging from replace or repair structure, add settling ponds or hay bales with filter fabric to schedule a replacement in a set amount of time or simply to monitor. For the purpose of this indicator, a structure is to be considered either a culvert or bridge.

This measure will be reported on an annual basis with actions tracked in the GENUS database. Where no road permits are issued to the participants, the report will indicate "No road permits held by participants". Where no sensitive watersheds exist or no structures are present in a

watershed the report would read “No sensitive watersheds” or “No structures within sensitive watershed”.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

CRITERION 4.0 ROLE IN GLOBAL ECOLOGICAL CYCLES

Forest ecosystems are an integral part of the global carbon cycle as trees and soils absorb and release carbon dioxide (CO_2) through carbon uptake and decomposition. Trees can store carbon in their plant tissues through the process of photosynthesis and could potentially exist as a significant carbon pool, particularly old forests. When trees are harvested or when a natural disturbance such as fire occurs, however, the carbon is released back into the atmosphere. The recognition that forests are a carbon sink, and that land-use, land-use change and forest activities can have an effect on this sink requires consideration of forest carbon values in sustainable forest management planning.

ELEMENT 4.1 CARBON UPTAKE AND STORAGE

Value – Carbon uptake and storage

SFM Objective

Maintenance of the processes providing for Carbon uptake and storage.

Concern around forest carbon cycles has been spawned by initiatives such as the Montréal Process, carbon requirements for forest certification, and the ratification of the Kyoto Protocol by Canada, which will mean that Canada will have to meet its greenhouse gas emission (GHG) reduction targets of 6 percent from 1990 levels by the year 2012. With current trends of increasing GHG emissions, it is predicted this will be an approximate 33 percent reduction from current (2002) level emissions or approximately 240 Mt of carbon (Government of Canada 2002). Forests and agricultural soils in Canada are projected to provide a carbon sink of 30 Mt of carbon by continuing with current management practices, and could be increased by additional activities (Government of Canada 2002). Although the targets set out in the Kyoto Protocol are considered national level objectives by policymakers, local forest managers will have the opportunity to support it on the ground.

The criterion and associated elements for Global Carbon Cycles under the Sustainable Forest Management CSA Z809-08 standard considers the potential influence of the Kyoto Protocol and its implications to forest managers, Canada's capacity for forest carbon budgeting, and highlights considerations for operational carbon management.

24 – Net Carbon Uptake – Total Carbon Storage

Core Indicator

Background Information

Forests have great potential to sequester and store carbon from the atmosphere. Given this, managers should recognize the imperative of keeping forest lands in vigorous tree growth at all times. This often means understanding any age class imbalances and strategies for correction. It also includes ensuring prompt tree regeneration following disturbances such as timber harvests and converting the smallest possible amount of forest land to non-forest land during forest operations (e.g., minimizing roads and landings).

In their 2009 summary of carbon management in BC's forests[37] Mike Greig and Gary Bull report a need for additional guidance for forest managers and practitioners. "The interest in managing British Columbia's forests for climate control and CO2 offsetting projects has built to the point where forest managers are seeking guidance. Equally important is the public's desire to understand the potential of provincial forests in mitigating climate change and to have this clearly communicated. Some work has taken place in assembling carbon yield curves, researching local carbon storage (Kranabetter and Macadam 2006), and undertaking carbon accounting projects. However, no published handbooks or policies exist to guide forest managers, practitioners, or the public."

Recent timber supply reviews in the province have included carbon sequestration in the analysis such as that for the Lillooet TSA (May 2009). This trend is expected to continue. In his rationale for the Allowable Annual Cut determination for the Lillooet TSA, the Chief Forester reported "as government and society address the important considerations related to carbon management and climate change mitigation, and reach decisions on how all of the potential uses of forest land should be balanced with carbon management, those decisions will be reflected in future AAC determinations." Also in his rationale, the Chief Forester recognizes the need for government to take an active role in understanding carbon budgets: "No doubt governments will be called on to analyse and prioritise the many alternative potential uses of the forest, from which to derive and provide a range of socially acceptable management objectives. Analysis of the carbon implications of forest management alternatives will be important information for consideration in the making of such decisions on society's behalf by our elected representatives."

Target and Variance

Maintain or increase the CFS-CBM derived baseline of 1,75 mega tones total ecosystem carbon on the productive CFLB (Variance of 10 percent).

Current Forest Carbon Conditions - FESL report

Forest carbon is a key SFM value, especially in view of Canada's international commitment to lower its net carbon outputs to the atmosphere as part of the Kyoto Protocol. Forest ecosystems are an integral part of the global carbon cycle. Trees and vegetation sequester carbon from the atmosphere through the process of photosynthesis and carbon is stored in several components of forests including tree biomass, plant biomass, coarse woody debris, forest floor litter and soil. Forest soils are a large but relatively stable reservoir of carbon with minimal changes over time.

[37] Carbon Management in British Columbia's Forests: Opportunities and Challenges. Forrex Series 24. 2009

In contrast, variations in carbon storage in tree biomass are the dominant factor regulating temporal patterns in total ecosystem storage. Timber harvesting results in biomass carbon being transferred for use in forest products or the production of bioenergy while breakage and waste from timber harvesting can contribute to the detritus carbon pool. Discarded forest products are recycled, burned, or stored in landfills, hence, with each activity resulting in different rates and forms of carbon release.[38]

The establishment and maintenance of forests is an important aspect of the terrestrial carbon sink. This measure allows managers to assess and track changes in forest related carbon pools contained in the growing stock within the DFA. It is beneficial for forest managers to have a rough idea of the current and potential future amount of carbon stored by trees as it will prepare licensees for the time when policies on carbon reporting are implemented.

Determining carbon amounts in biomass of forests has been undertaken mostly for research purposes. A surrogate to more detailed field surveys is to use calculations or rudimentary models to determine if a forest is expected to be a net carbon source or sink under a given management scenario. For example existing forest inventory data with published volume to biomass factors and biomass to carbon factors, allow for above ground biomass to be estimated and projected.

This component of the forest carbon pool is likely to consistently act as a carbon sink over the course of a harvest rotation and across the DFA (i.e. not for a specific cutblock) whereas the tree component will act as both a sink and a source, depending on the silvicultural stage of the forest.

Targets will be developed with provincial and possibly national input, however, the current target has been based on the recommendation from Canfor/BCTS arising from the body of work already existing; accepted by PRISM as being the most practical option for measurability. The target for this indicator has been established as the baseline condition with further qualification that the current condition is maintained or that the trend increases. Trends will show periodic net change in carbon pool in trees.

Even without harvesting, but with natural disturbance, future carbon storage may be less than current condition. The baseline will have to be dynamic and not static over time (i.e. a baseline with current harvesting levels and assumptions on future natural disturbance).

The 2004 carbon budget analysis completed by Forest Ecosystems Solutions for the Fort Nelson DFA participants indicates there is approximately 1,752 megatonnes (MT) of total ecosystem carbon currently stored in the 5,741,212 hectares of forested land in the Fort Nelson DFA (Table 2 of FESL report). Approximately 27 percent of the total ecosystem carbon is from trees (aboveground biomass and roots), 15 percent from dead wood, and 51 percent is from soil and forest floor litter.

Prior to the completion of the Fort Nelson DFA carbon budget analysis by FESL, a preliminary carbon study completed for the province in 2002 estimated that in the year 2000 the Fort Nelson DFA contained an approximate average of 25-50 tC/ha of aboveground biomass[39]. This means that with a total CFLB area of 5,634,280 ha, there is an estimated 140,857,000 to 281,714,000

[38] Canadian Forest Service, Forest Carbon Accounting: http://carbon.cfs.nrcan.gc.ca

[39] Kurz, W.A., S.J. Beukema, and D.C.E. Robinson. 2002. Analysis of forest carbon stock changes in British Columbia (2000-2032) using provincial forest inventory information. Prepared by ESSA Technologies Ltd., Vancouver, BC for Terrestrial Information Branch, MSRM, Victoria, BC, 41 pp.

tC/ha (140.8 to 281.7 mtC/ha). It is expected that carbon storage in biomass will naturally fluctuate with the combination of management practices, natural disturbance, and time. The participants will manage to maintain or increase the carbon storage in the DFA in relation to the carbon storage baseline over time that would have otherwise occurred with current practices.

The preliminary carbon study completed for the province in 2002 estimated that in the year 2000 the Fort Nelson DFA contained an approximate average of 25-50 t C/ha of aboveground biomass.[40] This means that with a total TSA area of 9.8 million ha, there is an estimated 245,564,775 to 491,129,550 tC/ha (245.6 to 491.1 mtC/ha). Since the total TSA and CFLB area for the DFA has remained constant (excluding the hectares resulting from the Cassiar addition), harvesting has not exceeded AAC levels which are set well below the theoretical long term sustained yield for the TSA and the amount of timber lost to natural disturbance has remained constant, it can be concluded that the current condition has been maintained in relation to the established target.

Forecasting and Probable Trends of Measures:

The shutdown in harvesting since 2008 is expected to have contributed to a slow down in the rate of carbon removal from forest management activities. Forecasting of this indicator was completed as an adjunct to the 2004 TSR. Refer to the 2004 carbon budget analysis completed by Forest Ecosystems Solutions for the Fort Nelson DFA.

A timber supply model, Forest Simulation and Optimization System (FSOS), and a forest carbon model, Carbon Budget Model-Canadian Forest Service 3 (CBM-CFS3), were used to estimate total ecosystem carbon storage and sequestration rates for the Fort Nelson DFA. Current forest inventory data and management assumptions as identified in the first iteration of this SFMP were applied to both models.

The results of the analysis provided some initial estimates of the current forest carbon conditions in the Fort Nelson DFA. The current total ecosystem carbon storage is 1,752 MT and under the “Base Case” scenario, it is predicted to fluctuate between 1,752 MT and 2,005 MT over a 250-year, forecast horizon. The sequestration rate in the “Base Case” also fluctuates between a net loss of 6.87 MT C/year and a positive sequestration of 4.20 MT C/year.

Through an understanding of forest carbon dynamics, current management practices and impacts of harvesting and natural disturbance on the total ecosystem carbon, forest managers can begin to establish forest carbon objectives regarding targets, variance and the development of a suitable monitoring plan. The overall carbon objective in the Fort Nelson Sustainable Forest Management Plan is to sustain forest carbon storage and sequestration contributions to the global carbon cycle.

Researchers at the Canadian Forest Service are designing an operational forest carbon account tool to aid forest managers in the assessment of carbon budgets. The Carbon Budget Model (CBM) can be used to monitor and account for past changes (e.g. from 1990 to the present) using actual data on forest management actions and natural disturbances, or to explore how natural disturbance, forest management, growth, and decomposition rates might affect forest carbon stocks by conducting scenario analysis of future carbon stock changes. The model will be

[40] Kurz, W.A., S.J. Beukema, and D.C.E. Robinson. 2002. Analysis of forest carbon stock changes in British Columbia (2000-2032) using provincial forest inventory information. Prepared by ESSA Technologies Ltd., Vancouver, BC for Terrestrial Information Branch, MSRM, Victoria, BC, 41 pp.

consistent with national accounting procedures.[41] A release version of the model will be implemented according to guidelines from Natural Resources Canada and the Canadian Forest Service.

Monitoring and Reporting:

The data required to monitor this indicator is megatonnes (Mt) or Mt/year of biomass for the DFA. Based on this estimate of biomass through DFA volume estimates, monitoring data will be generated by the TSR processes. The frequency of monitoring and analysis therefore will be at the same time as timber supply review periods. The most recent analysis of the data will be reported in the SFMP Annual Report. It is anticipated that this information will also be reported as part of the National Carbon Reporting requirements under the Kyoto Protocol which requires Canada to account for changes in forest carbon stocks resulting from afforestation, reforestation, and deforestation activities that have occurred since 1990. .

Where available, update the carbon balance data as reported by the next Timber Supply Review which is anticipated to include a carbon storage analysis for the management unit.

Records to satisfy this indicator will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

[41] Kurz, W.A, M. Apps, E. Banfield, and G. Stinson. 2002. Forest carbon accounting at the operational scale. The Forestry Chronicle. 78 (5): 672-679.

25 – Net Carbon Uptake – Sequestration Rate

Core Indicator

Background Information

The level of carbon budget analysis in Canada relies largely on the forest inventory (species and growth rates) and underlying assumptions of the forest management regime and what makes up the timber harvesting land base. Because of some of the uncertainty surrounding the data inputs, it can be difficult to tease out changes in carbon sequestration modeling that are strictly as a result of changes to a particular management regime. This creates difficulties for forest managers who are trying to understand the carbon balance implications of various management regimes.

The participants will continue to monitor developments in carbon sequestration modeling both at the provincial and regional level and will utilize this information within the SFM Plan where appropriate.

Target and Variance

Maintain or increase the CFS- CBM derived baseline sequestration rate of 0.93 MT carbon per year in the THLB and 0.55 MT carbon per year in the NHLB (variance of 10 percent).

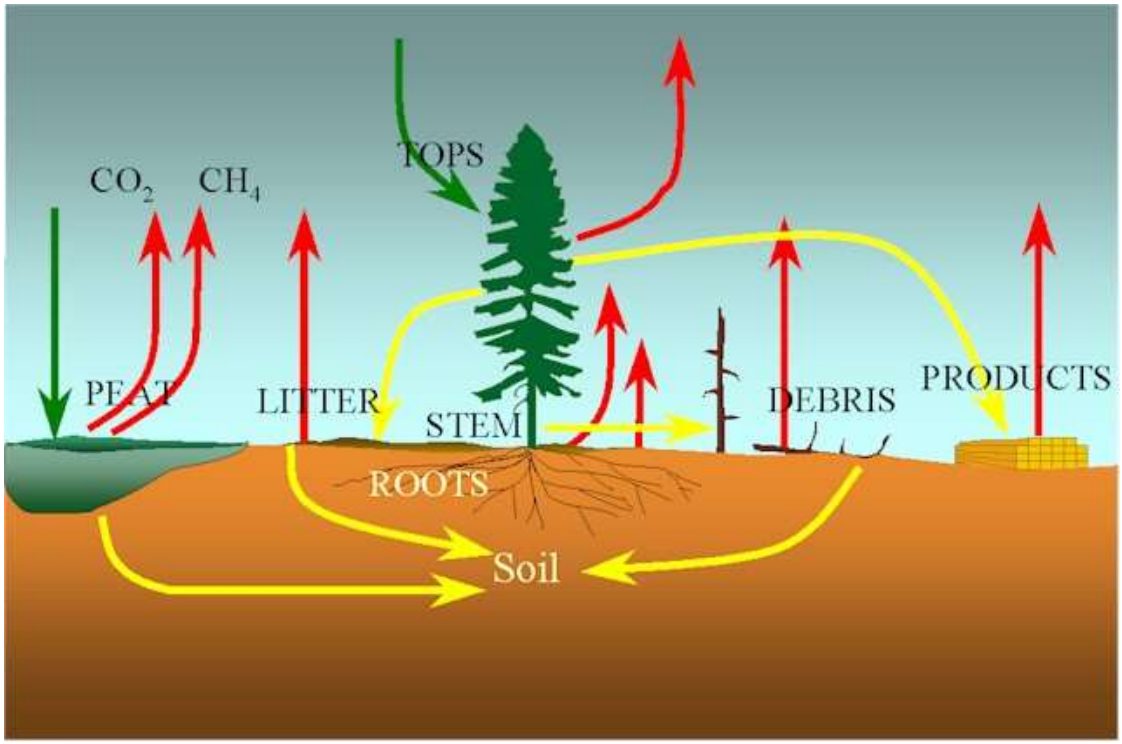
Current Condition:

The process that takes carbon from the atmosphere and stores it in forest ecosystems is termed carbon sequestration. The calculation of average net carbon sequestration rates within the timber supply area allows for a long-term evaluation of effects of management activities and/or natural disturbance on the rate at which the forested landscape is sequestering carbon. Average sequestration rates are based on changes in ecosystem carbon storage over time without accounting for carbon removed in harvested biomass. The rationale is that the carbon in harvested materials will be stored in wood products following harvest. An assessment of the sequestration rate provides a measure of the rate and direction of carbon exchange between the forest ecosystem and the atmosphere.

Indicator 4.1.1.2 assesses the net changes in forest ecosystem carbon pools (including live and dead organic matter and forest products). Carbon pools, and their changes over time, indicate whether the processes responsible for carbon sequestration are being maintained. A net increase in the carbon pool is a result of increased sequestration.

Forest practices directly related to this indicator have to do with ensuring that harvested stands are promptly reforested to maximize the carbon sequestration process.

Figure 11 Carbon flow in the Forest Ecosystem



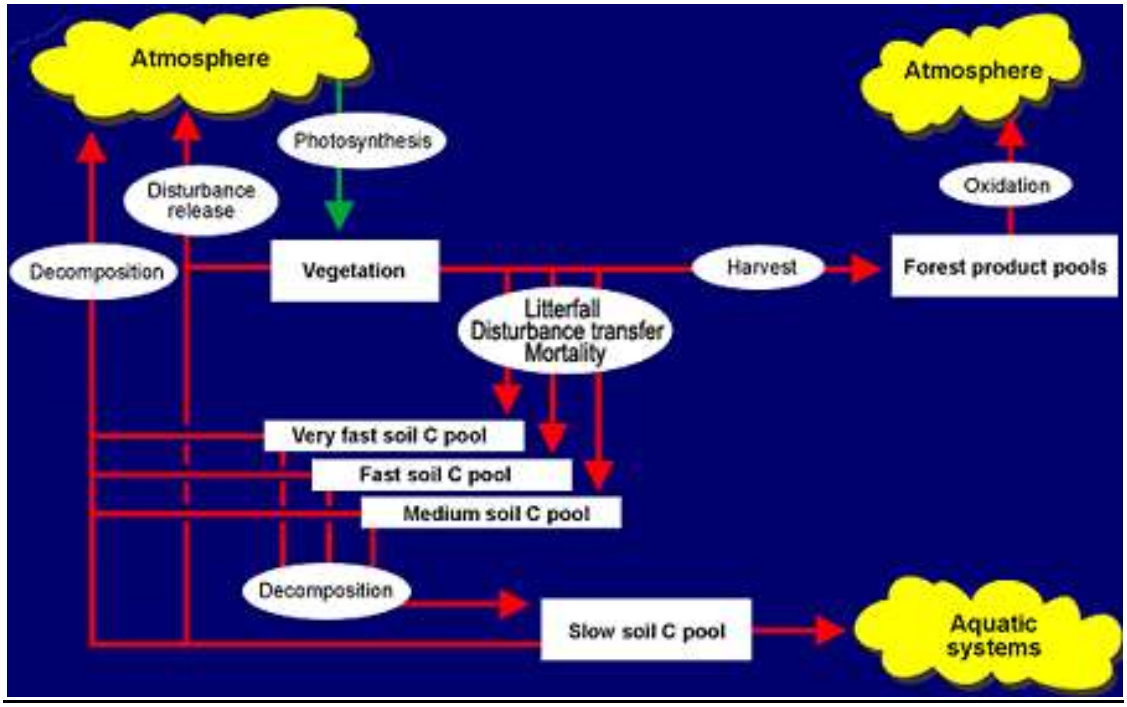
Source: (http://www.carbon.cfs.nrcan.gc.ca/cbm-cfs2_e.html)

A timber supply model, Forest Simulation and Optimization System (FSOS), and a forest carbon model, Carbon Budget Model-Canadian Forest Service 3 (CBM-CFS3), were used to estimate total ecosystem carbon storage and sequestration rates for the Fort Nelson DFA. Current forest inventory data and management assumptions as identified in the first iteration of this SFMP were applied to both models.

The results of the analysis provided some initial estimates of the current forest carbon conditions in the Fort Nelson DFA. The current total ecosystem carbon storage is 1,752 MT and under the "Base Case" scenario, it is predicted to fluctuate between 1,752 MT and 2,005 MT over a 250-year, forecast horizon. The sequestration rate in the "Base Case" also fluctuates between a net loss of 6.87 MT C/year and a positive sequestration of 4.20 MT C/year.

In terms of refinement of future targets specific to this indicator, there are currently several forest level decision support tools available for assessing carbon sequestration rates. One such tool is the Canadian Forest Service's Carbon Budget Model (CBM-CFS2). An overview of this model is presented on the CFS website at http://www.carbon.cfs.nrcan.gc.ca/cbm-cfs2_e.html. Canfor and BCTS may use this model in conjunction with timber supply analyses to refine estimates of carbon storage and sequestration, as it meets many of the fundamental requirements necessary to achieve SFM objectives identified through this measure. The basic components of the CFS model are summarized in the figure below. (Source: CFS website at http://www.carbon.cfs.nrcan.gc.ca/cbm-cfs2_e.html)

Figure 12 Canadian Forest Service Carbon Budget Model Structural Overview



Forecasting and Probable Trends of Measures:

Forecasting of this indicator was completed as an adjunct to the 2004 TSR. Refer to the 2004 carbon budget analysis completed by Forest Ecosystems Solutions for the Fort Nelson DFA. The results of the analysis provided some initial estimates of the current forest carbon conditions in the Fort Nelson DFA. The current total ecosystem carbon storage is 1,752 MT and under the "Base Case" scenario, it is predicted to fluctuate between 1,752 MT and 2,005 MT over a 250-year, forecast horizon. The sequestration rate in the "Base Case" also fluctuates between a net loss of 6.87 MT C/year and a positive sequestration of 4.20 MT C/year. It is anticipated that prompt reforestation will lead to vigourously growing young forests which will positively contribute to carbon sequestration thereby having a positive impact on carbon budgets.

Monitoring and Reporting:

Monitoring and reporting for the indicator will be linked to the TSR process, with the next run of the TSR data analysis scheduled for 2016. Monitoring data will be generated by the TSR processes. The frequency of monitoring and analysis therefore will be at the same time as timber supply review periods. The most recent analysis of the data will be reported in the SFMP Annual Report. In the future, carbon sequestration rate (total tC/year or tC/ha/year) will be determined by calculating the average incremental change in carbon storage from one time period to the next. Carbon sequestration will depend on the entire forest (young and old).

Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

4.2 ELEMENT 4.2 FOREST LAND CONVERSION

Value – Forest land base

SFM Objective

Protect forest lands within our control from deforestation or conversion to non-forests, where ecologically appropriate.

26 – Evidence of best efforts to coordinate forest management activities with the oil and gas industry

Local Indicator

Background Information

This is a locally developed measure designed to try and demonstrate some level of co-planning with the oil and gas industry operating within the Fort Nelson DFA. Forestry and oil and gas generally operate on completely different planning horizons, with forestry having more planning for long term sustainability and oil and gas planning for short term operations horizons governed by the price of natural gas. PRISM members have repeatedly requested measures (now indicators) to try and assess or mitigate the actions of the oil and gas industry on the landbase. This indicator is the result of the Participants addressing this request to the best of their abilities.

Target and Variance

A) Share 100 percent of annual planned block and road construction with the Oil and Gas Commission (variance of 0 percent).

B) Report out the number of oil and gas referrals for the Fort Nelson DFA responded to by each of the Participants (variance not applicable as this is a "report out" indicator)

Current Condition

The sharing of planned activities generally takes place with the release of the Canfor's and BCTS's annual operating plans at the beginning of each operating year. This information is released to First Nations and stakeholders and prior to development of this SFM plan was shared, by request with oil and gas companies operating in the same area. Large oil and gas companies such as Encana and Petro Canada routinely met with the participants to review planned operations and attempt to minimize infrastructure development. Infrastructure development was minimized by agreeing to utilize each others roads where feasible, rather than construct duplicate roads.

Specific information sharing takes place when the oil and gas companies send out comment sheets for their activities that may impact forestry operations and when the participants provide a copy of planned harvesting and road building operations to specific oil and gas companies and / or the Oil and Gas Commission. Given the multitude of oil and gas companies operating in the Fort Nelson DFA, many Oil and Gas activities can be planned and executed in such a short timeframe as to not allow for any joint planning to take place.

Submitting the participants harvesting and road construction plans to the Oil and Gas Commission (OGC) prior to the start of the following years activities will allow every oil and gas company that submits a plan to the OGC to see where there are opportunities to share access and development costs, increase safety on roads being used and reduce overall footprint on the landbase.

The Participants will also report out here the number of oil and gas referrals they receive and respond to from companies in the DFA. This demonstrates the Participants are responsive to the information provided to them by the oil and gas industry. It is worth noting that the Participants periodically download shapefiles from the oil and gas commission containing the most up to date spatial data to assist in the planning of forestry activities as pertains to meeting our SFM objectives.

In the past, activities that have been coordinated with oil and gas have included road and seismic use and log purchase. This indicator will provide a measure of participants' efforts to coordinate activities with the oil and gas sector.

Forecasting

It is anticipated that sharing plans with the oil and gas industry will lead to minimal duplication of road access structures, which will minimize overall area deleted from forest production.

Monitoring and Reporting

Monitoring of this will be tracked by Canfor in their COPI database and in the BCTS stakeholder comment database. This indicator will reported out on an annual basis.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

CRITERION 5.0 ECONOMIC AND SOCIAL BENEFITS

For many rural communities in British Columbia, timber harvesting, milling and management provides the largest local economic benefit within a management unit. SFM plans and practices have the potential to substantially impact the economic value of timber products from an area, and thus this issue warrants its own criterion. This criterion measures the direct economic benefits derived from timber products for a management unit. Sustaining the economic benefits that come from the forest industry is one of the keys to community stability in rural British Columbia.

The concept of "flow" is used to highlight that there are a number of different types of economic benefits for different groups. The primary emphasis for this criterion is on the management of forests to produce economic and social benefits arising from the production of wood products. Provision of non timber benefits arises from the sustainable management of forest resources (forest habitat, timber, water, range, etc) in the development of timber products.

In order to determine if the economic benefits from the forest industry are sustained or not, indicators must be chosen that reflect what the benefits are and where they are going. An indicator for the portion of the economic value that is distributed to 'corporate' interests is not included because this information (profit and depreciation) is not publicly available.

In some cases the indicators are not in the control of the forest industry but are included in this plan due to their importance to the community. The resilience of the community to sustain itself outside of the forest industry is still an important indicator for the forest industry in terms of its ability to attract and maintain a skilled workforce. Targets for such indicators have not been set.

ELEMENT 5.1 TIMBER AND NON TIMBER BENEFITS

Value – Timber and non-timber forest resource benefits

SFM Objective

Provide opportunities for a feasible mix of timber resource use, recreational activities and non-timber resource use.

In the absence of readily available information about non-timber resource values, this element requires only an assessment of forest management activities on marketed non-timber forest products. Cooperative efforts with the commercial interests marketing non-timber resources are needed to accurately define the units, values, distribution and resilience factors for each interest.

A project to review non timber forest product marketing and use in the Fort Nelson DFA was completed in 2006 by Sandra Thomson (MSc) and Kerri Brownie (RPF) at Royal Roads College. It was found that although the potential for harvest and marketing of non-timber forest products exists in the Fort Nelson DFA, little if any evidence exists to substantiate that it is happening within the DFA to a measurable degree.

Therefore further work to accurately define the units, values, distribution and resiliency factors for each interest marketing non-timber forest products in the Fort Nelson DFA has not been completed.

27 – Conformance with strategies for non-timber benefits identified in plans

Core Indicator

Background Information

During the development of forest management plans, it is important to consider a variety of social and ecological non-timber benefits produced in the DFA. For the purpose of this indicator a non-timber forest benefit (NTFB) refers to a specific identified benefit with a spatially definable area that has the potential to be positively or negatively impacted through forestry related activities. This indicator refers to both tenured and non-tenured NTFBs. Non-tenured that are derived from the forest such as botanicals and non-commercial recreation, as well historic and spiritual values. Non-tenured NTFBs are not exchanged in a marketplace, but they are often dearly held by both those who directly benefit from these values, and by those who benefit by knowing these values exist. This differs from tenured NTFBs, which are issued by the government. The following is a listing of non-timber forest benefits:

Tenured	**Non-tenured**
- trapping	- hunting
- guiding	- fishing
- range	- clubs
- mining	- non-commercial recreation
- Lodge owners	- cultural and heritage resources
- Commercial Recreation/Ecotourism	- gathering (i.e. mushroom, berries, ornamentals)

Non-timber benefits can be assessed on a harvest unit specific basis by assessing operational plan commitments designed to reduce any potential impact of the operation on other forest users and stakeholders. These plan commitments could include specific actions to assist ranchers, trappers, guides, resort owners, mineral rights holders, etc. manage their licensed obligations on shared public forest land. Actions within plans could also involve public expectations related to forest access, visual quality or specific recreational or ecotourism opportunities. Plan commitments could also include actions to manage or protect sites that are culturally important, sacred or spiritual to local First Nations.

Target and Variance

Conformance with strategies for non-timber benefits identified in plans. Target of 100 percent compliance (0 percent variance).

Current Condition

Currently the only non-timber forest products that have been brought to Canfor's and BCTS' attention are trapping for furs and berry picking for personal use. Where these resources have been brought to the attention of forest managers, efforts are made to accommodate the other forest users. This takes place at the timber development stage or at the operating plan stage. Strategies to protect non-timber forest products (NTFP's) are then formulated with input from the NTFP user and then either written or amended into Site plans to deal with these issues prior

to logging. Post logging, NTFP's are dealt with in response to letters received during notification of forestry activities, chiefly herbicide use.

In addition, by ensuring that a range of habitat and seral conditions exist through time and space within the DFA, the participants are ensuring that opportunities for the harvest of NTFPs will continue to be available.

Forecasting

It is anticipated that forest operations will respect and reflect the interests of non-timber resource users, local public and Aboriginals, and short and long-term harvest flows will reflect forest conditions, forest practices, and the socio-economic objectives of the Crown (see indicator 19 for more detail on forecast).

Monitoring and Reporting

Monitoring of this will be completed during the post harvest inspection with data being stored in the GENUS database for BCTS GENUS ITS database for Canfor. Reporting will take place on an annual basis and will report out on performance against all site level plans where strategies were developed to manage for NTFP benefits.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

28 – Participants forest management activities will not negatively impact established recreational sites and trails

Local Indicator

Background Information

Outdoor recreation in British Columbia is increasing, both on Crown land and in protected areas.[42] Within the Fort Nelson DFA, outdoor recreation activities are not only diverse but also increasing in popularity and economic growth by tourists and residents.

Outdoor recreation is often the interface through which the public has contact with forestry and can provide an opportunity to demonstrate sustainable forest management. A wide variety of recreation users and activities need to be accommodated in BC's forests. Within the Fort Nelson DFA, highway and community tourism as well as outdoor/nature-based tourism and recreation are most likely influenced by forest management activities.

Forested landscapes provide local communities, area residents and tourists the opportunity for outdoor recreation activities. These activities include summer and winter pursuits both on land and on water. They range from hiking, camping, hunting, trail riding, wildlife viewing, fishing, canoeing, jet boating to cross country skiing and snowmobiling. The activities rely on one or a number of combinations of the following: a remote wilderness experience, undisturbed setting, scenic areas, and access to fish, wildlife, and water.

Extensive work has already been completed within the Fort Nelson area through the LRMP process, particularly with defining outdoor recreation opportunities. This SFM Plan builds on that process – utilizing the previously collected information. .

This indicator deals with sustaining the current of level forested areas (quality and quantity) utilized for outdoor recreation. It captures the recreation resources thereby giving assurance that they will be available for future generations. This indicator is important because it monitors that the landbase used for outdoor recreation is sustained.

Target and Variance

100 percent of Participants road building and harvesting activities will take place outside of established recreation sites and trails. A variance is allowed in the event there is a compelling forest health or safety concern, and that appropriate permissions are obtained.

Current Condition

Both BCTS and Canfor have not allowed their activities to negatively impact existing recreation sites, trails or other recreational facilities. No harvesting or road building activities have occurred within the recreation sites and trails noted in Table 24. The following is a list of recreation sites and trails identified in the Fort Nelson DFA

[42] BCMELP 2001; The Legacy Panel 1999; BC MoF 1995

Table 25: Recreation sites and trails in the Fort Nelson DFA

Recreation Sites	Recreation Trails
West Lake	Teetering Rock trail
Muskwa Boat Launch	Tetsa Bridge #1 trail
Tuchodi River	Stone Mountain Park trails
Gathto Creek	MacDonald Creek trail
Beaver Lake	Babba Creek Trail
	Wokpash trail
Recreational Motorised Routes	Peterson Canyon trail
Wokpash Corridor	Muncho Lake trails
Yedhe Trail	Mineral Lick trail
West Toad Corridor	Teeter Creek trail
Nonda Creek Corridor	Smith River Falls trail
Liard River Corridor	Tsimeh Lakes trail
Mould Creek Tower Road	Fort Nelson Community Forest trails
Smith River Road	Dunedin trail
	Summit Ridge trail
	Summit Peak trail
	Erosion Pillar trail
	"The Cutt" trail
	Red Rock Canyon trail
	Old Alaska Highway trail
	Stone's Sheep trail
	Boulder Canyon trail

Forecasting

It is anticipated that forest operations will respect and reflect the interests of non-timber resource users, local public and Aboriginals, resulting in the maintenance of existing recreation opportunities offered by the established recreational sites and trails in the Fort Nelson DFA.

Monitoring and Reporting

Monitoring of this will be tracked by Canfor and BCTS in their Genus database. This indicator will reported out on an annual basis. Annual harvest and road construction activities will be compared to a GIS overlay of the recognised recreation sites and trails with the Fort Nelson DFA to determine if any unauthorised harvesting or road construction activities occurred within the recognised recreation sites or trails.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

29 – Forest management activities will be consistent with Visual Quality Objectives (VQO's)

Local Indicator

Background Information

Visual quality has been demonstrated to be a significant social value in its own right. It also potentially contributes significantly to the tourism economy[43]. Recent research has also demonstrated links between visual quality and the social acceptability of forest harvesting practice.[44]

This indicator measures the degree of visual impact on the landscape and the level of aesthetic satisfaction in viewers of public lands. The indicator address outcomes by means of expert methods of analysis by trained landscape specialists, as well as public perceptions gathered from representative area users. It is believed that development in the forestry sector can occur while managing for visual quality associated with scenic areas, important recreational areas, rivers and streams and important natural features. This is addressed by compliance with visual quality objectives.

Target and Variance

100 Percent of Participants forest operations will be consistent with the established VQO's for the Fort Nelson DFA. A variance is allowed in the event there is a compelling forest health or safety concern, and that appropriate permissions are obtained.

Current Condition

The broad Visual Landscape Inventory was made known in 1997, which identifies the visual sensitivity ratings and the recommended visual quality classes (RVQCs) for all visually sensitive areas. A partial update of this broad mapping was completed in 2002 to reflect the Cassiar addition to the Fort Nelson Forest District. Also released in 1997 were detailed visual landscape inventories for the Alaska Highway and Klua Lakes, for which visual quality objectives (VQO's) were established.

There are approximately 142 unique VQO's areas within the Fort Nelson TSA. The Fort Nelson Visual Quality Objectives as used in TSR 3 are presented in the figure below.

For each unique area there is a rating (maximum modification or partial retention), which directs the level of disturbance that would be allowed within that area. The number of hectares for both Established VQO and Recommended VQO is provided in the table below. Scenic areas with established VQO's are captured spatially.

[43] BC MoF, 2003
[44] Shindler et al., 2002; Sheppard, 2001a; Sheppard 2001b

Figure 13: Fort Nelson Visual Quality Objectives

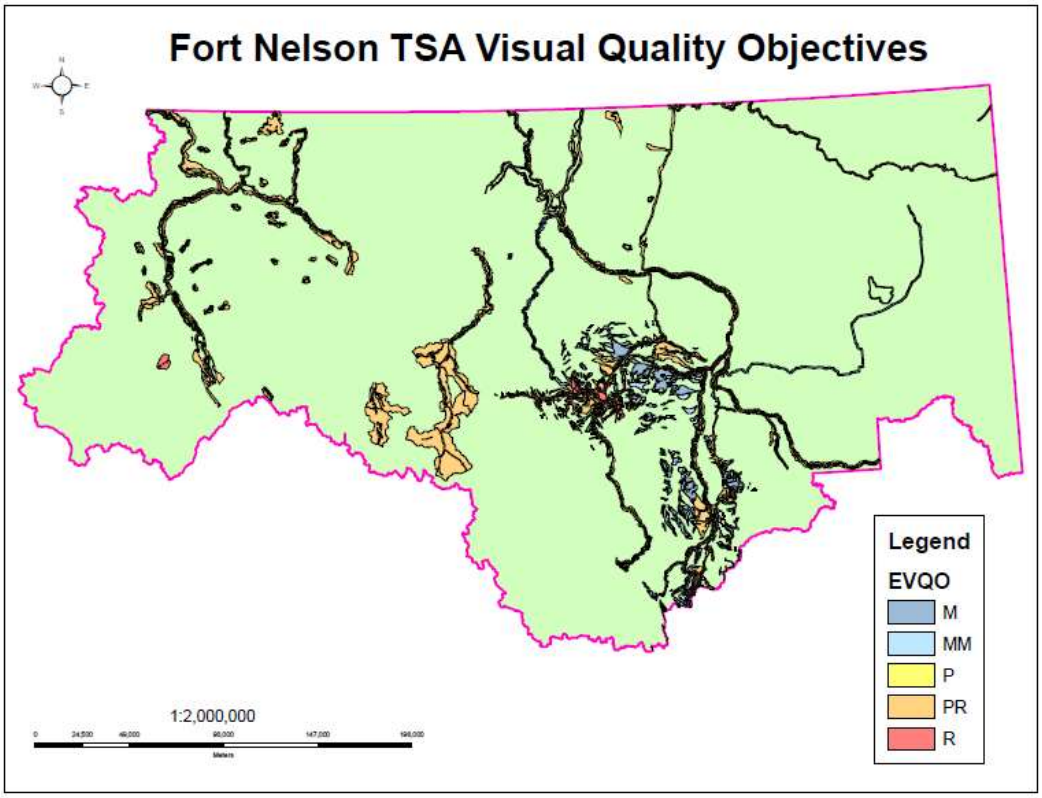


Table 26: Visual Quality Objective Class

Visual Quality Objective Class	TSA Area (ha)*	Crown Forested Land Base Area (ha)	Timber Harvesting Land Base Area (ha)
Established Preservation VQO	879	814	99
Established Retention VQO	32,518	25,470	6483
Established Partial retention VQO	502,325	357,716	113,431
Established Modification VQO	127,342	105,816	38,080
Established Maximum modification VQO	14,028	11,661	4,410
Subtotal:	**677,090**	**501,477**	**162,503**
Recommended Preservation VQO	0	0	0
Recommended Retention VQO	19,528	7,268	113
Recommended Partial retention VQO	8,246	5,172	2,083
Recommended Modification VQO	168,037	87,778	15,056
Recommended Maximum modification VQO	31,625	14,151	7,242
Subtotal:	**195,811**	**100,219**	**17,252**
Total:	**872,902**	**601,696**	**179,755**

Forecasting

The table below provides the Maximum Allowable disturbance percentage according to the *Procedures for Factoring Visual Resources into Timber Supply Analyses*.

Table 27: Maximum allowable disturbance percentage

Resource Emphasis Zone	Total Crown forest area (ha)	Timber harvesting land base (ha)	Maximum allowable disturbance (%)	Applies to:
Established Preservation VQO	879	814	0	CFLB
Established Retention VQO	32,518	25,470	1.1 – 5	CFLB
Established Partial retention VQO	502,325	357,716	5.1 – 15	CFLB
Established Modification VQO	127,342	105,816	15.1 – 25	CFLB
Established Maximum modification VQO	14,028	11,661	25.1 – 40	CFLB
Recommended Preservation VQO	0	0	0	CFLB
Recommended Retention VQO	19,528	7,268	1.1 – 5	CFLB
Recommended Partial retention VQO	8,246	5,172	5.1 – 15	CFLB
Recommended Modification VQO	168,037	87,778	15.1 – 25	CFLB
Recommended Maximum modification VQO	31,625	14,151	25.1 – 40	CFLB

Percent denudation for Established VQO's based on its Visual Absorption Capacity (VAC) (% shown below) was modelled for original indicator 9-2.1 in 2004 and remains applicable to this updated indicator. For Recommended VQO's, the percent denudation was that corresponding to the medium VAC.

Table 28: Percent denudation for established VQO's

VQO Category	Percent Denudation Range	Low VAC	Medium VAC	High VAC
Preservation	0 – 1	0.25	0.5	0.75
Retention	1.1 – 5	2.07	3.05	4.02
Partial Retention	5.1 – 15	7.57	10.05	12.52
Modification	15.1 – 25	17.57	20.05	22.52
Maximum Modification	25.1 – 40	28.82	32.55	36.27

No minimum VEG height was modelled for each VQO category, instead; a slope was calculated for each VQO polygon, in which the slope corresponded to a minimum height as outlined in the Procedures [45]. Therefore, each VQO polygon had its own minimum height criteria in which the % denudation was applied to (i.e. VQO polygon 191 is an established R (retention) with a

[45] B.C. Ministry of Forests and Range, Forest Practices Branch. 1998. Procedures for factoring visual resources in timber supply analyses. Victoria, B.C. REC-029

medium VAC and an area-weighted slope of 14 percent or a corresponding VEG height of 4m. Hence, in VQO 191, the maximum allowable disturbance that can be less than 4m VEG height is 3.05 percent).

No harvesting has been completed by the participants in the DFA since winter 2008. The harvesting completed by the participants in winter 2008 was in conformance with the established visual quality objectives for the Fort Nelson DFA. It is anticipated that the target will be achieved and will result in maintenance of visual quality in scenic areas of the DFA.

Monitoring and Reporting

The data required to report out on this indicator will be tracked via Canfor's FMS incident tracking system (ITS) and BCTS's EMS ITS as well as their respective Genus systems. This is where the Participants will record any harvesting that occurred in contravention of the established VQO's.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

30 – Evidence that the organization has co-operated with other forest dependant businesses, forest users and the local community to strengthen and diversify the local economy

Core Indicator

Background Information

An economically and socially diverse community is often more sustainable in the long term because of its ability to weather market downturns of a particular sector. Support of efforts to increase diversity, the establishment of other enterprises and co-operation with other forest-dependent businesses and forest users is desirable.

Support for local communities through business relationships (defined for this indicator as purchases, sales, and trading of primary forest products and forest by-products) provides employment diversification and increased local revenue. For the purposes of this target, a local contractor or supplier is defined as one that resides within the DFA.

Target and Variance

Report out the number of purchase/sale/trade relationships with local forest dependant businesses where primary forest products and by products are bought sold or traded (variance not applicable).

Current Condition

At the time of SFMP updating, the economic conditions in the forest industry are such that Canfor has indefinitely shut its mills in Fort Nelson, and as such previously active trade relationships have been curtailed. Likewise, with no active mills in Fort Nelson, BCTS has no active trade relationships in place with Canfor. Prior to the downturn in the forest products industry and the global recession, Canfor and BCTS maintained an active trade relationship with BCTS, private suppliers and the oil and gas sector – purchasing timber from these suppliers. Canfor also provided oversize logs to local specialty mills for sawing into timbers used for bridge construction.

Forecasting

It is anticipated that achievement of the target will result in support for local communities through business relationships providing employment diversification and increased local revenue.

Monitoring and Reporting

This is a report out indicator, with no targets or variances associated with it. Reporting out will take place on an annual basis. Primary products will be considered un-harvested cut blocks, logs, either tree length or cut to length and dimensional lumber. By products shall be considered as wood chips, peeler cores and biomass left over after primary harvesting has taken place. Trade relationships will be considered as either external (i.e. trade relationships with businesses outside of Canfor) or internal (trading within the company). The trade relationships shall take the form of Memorandum of Understanding, Contracts, Letters of agreement or other informal agreements. The indicator will be considered to have been met as long as these agreements are in place between the Participants and other forest dependant businesses. Success is not

dependent upon such agreements being active, only that they are in place to help with economic diversity in the community when the Participants are active in the forests.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

31 – Evidence of communication and consideration of non-timber resources into forest management planning

Core Indicator

Background Information

Canfor maintains a list of interested and directly affected stakeholders (both tenured and non-tenured) who have expressed an interest in forest planning. These stakeholders are notified when forestry operations/ developments are to occur.

This indicator was designed to assess the licensee's performance relative to providing stakeholders effective opportunities to be proactively involved in forest management activities and provide input on proposed development activities. This will ensure that when forestry activities are planned, information is exchanged in an effective and timely manner, so as to resolve potential land use conflicts before they occur. This process will help to identify interests and non-timber values that require consideration within the planning framework. Resulting stakeholder input could include the identification of interest areas, detail as to the nature of the interest on the land base and site level detail regarding potential impacts resulting from proposed development activities.

The intent of the indicator is to plan forest management activities with consideration given to concerns brought forward by stakeholders.

When significant disagreement occurs, efforts towards conflict resolution are documented. For the purposes of this indicator, 'significant disagreement' requires the complaint to be submitted to Canfor in writing.

Target and Variance

100% of non-timber resource values, identified through communication, have been responded to and considered and/or accommodated in forest management planning. (Variance are permissible only on reaching mutual agreement between the affected stakeholder and the participant.)

Current Condition

The following table displays the number and variety of effective opportunities provided to identified tenure holders, stakeholders and residents to be proactively involved in planning processes and provide input on forest values, knowledge and uses considered in the forestry planning processes Baseline data regarding opportunities provided for input on forest planning will be collected as planning for resumption of forest harvesting in the Fort Nelson TSA begins.

Description of Opportunity	Opportunities (Responses)
emails / phone calls / letters	TBD

Forecasting

Continued effective communication between Canfor and affected stakeholders.

Monitoring and Reporting

The number and type of Canfor opportunities provided for interested and directly affected stakeholders to be pro-actively involved in forest management activities and provide input

regarding proposed development will be tracked by planning staff. Canfor will be required to review and summarize this information annually for collating and reporting purposes.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

ELEMENT 5.2 COMMUNITIES AND SUSTAINABILITY

Value – Sustainable, viable communities

SFM Objective

Contribute to the sustainability of communities by providing diverse opportunities to derive benefits from forests and by supporting local community economies.[46]

32 – Level of participation and support in initiatives that contribute to community sustainability

Core Indicator

Background Information

In addition to the many biological and ecological benefits provided by forests, they also contribute social and economic benefits. Forests represent not only a return on investment (measured, for example, in dollar value, person-days, donations, etc.) for the organization but also a source of income and non-financial benefits for DFA-related workers, contractors, and others; stability and opportunities for communities; and revenue for local, provincial, and federal governments.

In the same way that larger forest organizations depend on a secure flow of resources to justify investment in an area, small businesses depend on a sustained flow of opportunities to develop and invest in their local community. As the majority of forest workers are hired locally, communities benefit by forest planning and operations.

Target and Variance

Percent of total budget spent in local communities on a 5 year rolling average. This will be a report out measure until the PRISM decides on an acceptable target and variance.

Annual expenditure totals will also be reported in this measure.

Current Condition

This indicator is meant to track all spending for goods and services in the local community where the primary milling facility is located. This local area for the participants Fort Nelson operations will include all of the communities within the Fort Nelson Forest District. This includes all of the settlements and First Nations reserves in the DFA as Fort Nelson is considered the economic hub for most of these smaller communities. The indicator will apply to the woodlands budget prepared for forest management activities to support all local divisions of Canfor: Tackama and Polarboard and for the field office for BCTS. It is believed that focusing spending for the

[46] Z809-16 CSA Sustainable Forest management standard

acquisition of goods and services on local providers will directly and indirectly contribute to the sustainability of the community.

Forecasting

It is anticipated that achievement of the target will support resilient and stable communities within and adjacent of the DFA. Localized spending may also provide better management through development of local contracting expertise and the utilization of local knowledge.

Monitoring and Reporting

The values considered spent locally will include the following: Staff dollars, monies paid out to supply businesses with a local addresses, monies paid out to service contractors with a local address and donations (monetary or in product) to organizations and events locally based. Also included would be services supplied by and taxes paid to the municipality. Utilities could also be charged out to local costs if power for running the primary milling facilities and offices is generated locally.

The calculation used for reporting this indicator will be as follows:

Percent of total budget spent locally = sum (all locally billed costs) / Total combined budget

This indicator will be reported out on an annual basis on a 5 year rolling average basis.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

33 – Amount of Stumpage paid in the Fort Nelson TSA

Local Indicator

Background Information

This indicator is meant to measure the 'distribution' of the economic value of timber harvesting to municipal, regional and provincial governments through stumpage, taxes and other fees.

The stumpage paid by the forest industry is an important component of both local and provincial economies. Understanding what the contribution of the forest industry to the economy is an important aspect of economic sustainability.

Target and Variance

This is a report out indicator requested by the Public Advisory Group to show what revenues are being generated by the forest resource (timber extraction) in the Defined Forest Area (Fort Nelson Forest District. As such, there is no set target and no variance associated with it.

Current Condition

Stumpage is the revenue collected based on the amount and quality of timber harvested and adjusted for the current market conditions. Currently Canfor has indefinitely suspended their operations in Fort Nelson and as such are not harvesting or encumbering stumpage. BCTS is selling no timber sales and as such its licensees are paying no stumpage. The main source of stumpage revenue is from the harvesting of areas for oil and gas activities. Market conditions are predicted to rebound by the 2012/2013 fiscal year.

Forecasting

Achievement of the indicator will support resilient and stable communities within the DFA as a result of government investments in the community based in part on stumpage revenue received by government.

Monitoring and Reporting

This indicator will be reported out annually based on information provided by Forest District revenue personnel.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

34 – Level of participation and support in training and skills development

Core Indicator

Background Information

Sustainable forest management provides training and awareness opportunities for forest workers as organizations seek continual improvement in their practices. Investments in training and skill development generally pay dividends to forest organizations by way of a safer and more environmentally conscious work environment. Assessing whether forest contractors have received both safety and environmental training is a direct way of measuring this investment. Additionally, training plans should be in place for employees of the forest organizations who work in the forest. Measuring whether the training occurred in accordance with these plans will confirm an organizations commitment to training and skills development.

Target and Variance

Training in environmental and safety procedures in compliance with company training plans. Target of 100 percent of company employees and contractors will have both environmental and safety training. (Variance of 5 percent).

Current Condition

Currently it is the policy of both Canfor and BCTS to ensure their employees are trained in company approved levels of environmental management (EMS or FMS) and safety (SAFE company certification. These are considered to contribute to the sustainability of communities by protecting the environment in which we harvest resources and ensuring that workers continue to be able to work safely and not be sidelined by injury or industrial illness.

A trained workforce is critical to safe and proper execution of plans. The participants have developed a matrix of required safety and environmental training by position that is used as the basis for determining the training requirements by each woodlands position. This training is to be provided to the participants' woodlands staff on a periodic basis as outlined in each participants' training matrix. The training matrix is reviewed on a periodic basis to update training needs as required. The variance allows for some discretion to account for changes in government and company policy, legislation, organizational structure and staff changes.

Forecasting

It is anticipated that forest planning and operations will be conducted with a genuine focus on worker safety and environmental stewardship. Forest contractors and employees will have adequate knowledge and tools to conduct their jobs safely, performing well even under upset conditions.

Monitoring and Reporting

This indicator will be applied to all directly employed woodlands staff and field contractors of Canfor and BCTS who require specific environmental and Safety training. In the case of contracted employees, it will apply to the company that is hired and to those contracted employees actually working for Canfor or BCTS only and not every employee of the company.

This target will be reported out annually with the information being stored in the training plans of both Canfor and BCTS. Reporting will be based on the information supplied by company records.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

35 – Level of direct and indirect employment

Core Indicator

Background Information

Forests represent not only a return on investment (measured, for example, in dollar value, person-days, donations, etc.) for the organization but also a source of income and non-financial benefits for DFA-related workers, local communities and governments.

While employment levels have been declining in many manufacturing industries including the forest industry, there remains a very direct relationship between direct and indirect employment and annual harvest levels. Using 2008 harvest data and 2009 employment data acquired from the Natural Resources Canada website (http://canadaforests.nrcan.gc.ca/rpt/indicators) the multiplier is approximately 4.4 direct and indirect jobs per 1000 m3 of harvest.

Organizations that harvest at sustainable harvest levels in relation to the allocated supply levels determined by government authorities continue to provide direct and indirect employment opportunities. The harvest level is set using a rigorous process that considers social, economic and biological criteria.

Target and Variance

Maintain the current level of direct and indirect employment expressed as a factor of current harvest level: cut control volume harvested * employment multiplier (4.4) (variance of 10 percent to account for swings in harvest level due to economic factors beyond the control of the Participants).

Current condition

The economic health and stability of a community is largely dependent on steady employment for area residents. When harvesting and milling operations are active, both Canfor and BCTS provide employment to a significant number of people in the local community and beyond. Knowing the amount of employment can help highlight the economic benefit(s) provided to the people and communities within the DFA as a result of employment opportunities created by the forest industry. As any industry continues to improve efficiencies and as new technology comes on stream, the numbers and types of workers fluctuate. This indicator is meant to track local trends against provincial trends to determine if they are similar. This will deal with directly employed full time equivalent jobs and indirect jobs as calculated using the employment multiplier from the TSR 3. As contracted silviculture and logging jobs tend to fluctuate significantly on an annual basis, they will not be considered as a stand alone indicator. Rather, contracted silviculture and logging jobs are captured in the employment multiplier used in the TSR analysis process.

Currently Canfor has indefinitely suspended their operations in Fort Nelson and as such are not conducting any harvesting. The main employment opportunities created in the Fort Nelson DFA currently are of an administrative and silviculture nature. During the current indefinite shutdown of the Canfor mills and timber harvest in Fort Nelson reliance upon the NRCAN and TSR harvest volume based employment multipliers is not recommended. Rather, until harvesting resumes a harvest based employment multiplier will not be used and only direct employment will be reported.

Table 29 Current level of direct and indirect jobs in the DFA (to the nearest whole number)

Canfor Direct jobs (full time jobs on payroll)	4.0
BCTS Direct jobs	2
TOTAL JOBS FOR THE FORT NELSON DFA	**6.0**

*Note that because there has not been any harvesting completed in the DFA by the participants since winter 2008, an estimate of the direct and indirect number of jobs is strictly limited to the number of woodlands staff and Mill Jobs for Canfor and Forestry staff for BCTS.

Forecasting

It is anticipated that forest organizations that harvest in relation to their allocation of the allowable annual cut provide employment and taxation revenue to local communities. Although the absolute results in terms of income, employment and provincial revenue noted in the 2004 forecast analysis of original indicator 4-2.3 are no longer applicable, the general concepts and trends between the various strategies modelled remain applicable to this revised indicator.

Monitoring and Reporting

Employment level reported by this indicator will be comprised of the number of direct and indirect jobs created by the participant's activities. Participants will report the number of direct jobs represented by staff on each participants payroll. The number of direct jobs reported for this indicator will be the number of jobs currently on the payroll as of March 31 of the reporting year. Participants will also report the combined number of direct and indirect jobs created by their activities using the employment multiplier (4.4 direct and indirect jobs for every 1000 m3 of timber harvested) developed by Natural Resources Canada (NRCan). The indirect jobs will be calculated using the NRCan employment multiplier until a local employment multiplier is updated in the next timber supply review.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

CRITERION 6.0 SOCIETY'S RESPONSIBILITIES

There is a long history of stakeholder and public involvement in forestry related planning in British Columbia. However, involvement processes have not always been satisfactory, either for the Participants or the planners. Key stakeholders are sometimes overlooked, and participation approaches are sometimes inappropriate for the time, resources, and interests of stakeholders. As well, decision makers are seldom provided with information outlining the number of stakeholders with particular interests when deciding on forest management plans. This criteria attempts to address this with elements measuring the forest community well-being and resilience, fair and effective decision making, and information for decision making.

ELEMENT 6.1 FAIR AND EFFECTIVE DECISION MAKING

Value – Fair and effective decision-making

SFM Objective

Demonstrate that the SFM public participation process is designed and functioning to the satisfaction the participants and that there is general public awareness of the process and its progress.[47]

36 – Level of Participant and PRISM member satisfaction with the public participation process

Core Indicator

Background Information

The SFM Public Advisory Group (PRISM) was established to assist the participating licensees in developing the SFM Plan in part by identifying local values, objectives, indicators and targets. The SFM Plan is an evolving document that will be reviewed for effectiveness and revised as needed with the assistance of PRISM to address changes in forest condition and local community values.

Ensuring the continuing interest and participation of this Group is an integral part of a dynamic and responsive SFM Plan. The ability of people to share information, discuss and solve problems, and set and meet objectives is key to achieving and maintaining meaningful participation.

Target and Variance

80 percent or greater level of satisfaction indicated by a PRISM established and maintained satisfaction survey (variance of 10 percent).

Current Condition

Satisfaction surveys have been done at least once per year with the active PAG members. In the previous years the acceptable success for satisfaction was 60% for 80% of those members who chose to respond.

Forecasting

[47] Z809-16 CSA Sustainable Forest management standard

It is anticipated that achievement of the target will result in an active and engaged Public Advisory Group, resulting in meaningful public participation and information exchange.

Monitoring and reporting.

This indicator will be reported out on an annual basis, based on the results of the PRISM satisfaction survey (administered annually). The target will be considered to have been met if the average overall satisfaction for the satisfaction survey is equal to or greater than 80 percent. The survey would only be applicable to active PAG members.

Surveys will be sent to PRISM members who have attended one or more PAG meetings in the preceding 12 months. The surveys will be administered annually in the spring prior to development of the annual report.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

37 – Evidence of efforts to promote capacity development and meaningful participation in general

Core Indicator

Background Information

The participating licensees are committed to working with stakeholders on forest management issues and have a well-established history of participation in community meetings, including local planning processes. This indicator recognizes the importance of exchanging information, knowledge and/or training opportunities for members of the public advisory group, as well as directly interested and affected stakeholders.

The sharing of knowledge with affected stakeholders and PAG contributes to informed, balanced decisions and plans acceptable to the majority of those involved. When informed and engaged, members of the public can provide local knowledge and support that contributes to socially and environmentally responsible forest management within the DFA.

The ability of people to share information, discuss and solve problems, and set and meet objectives is key to achieving and maintaining meaningful participation. Many types of capacity development initiatives can be used to help promote meaningful participation. Examples of capacity development through informational/educational opportunities and initiatives include:

- Maintaining an open and active public advisory group,
- Field tours, and open houses,
- Notification/referrals to stakeholders,
- School classroom visits,
- Continual improvement projects,
- Knowledge transfer sessions,
- Participation in trade shows,
- Regional District presentations, and
- Forestry tours.

The participating licensees will work with the PAG, as well as directly interested and affected stakeholders to identify more opportunities to promote capacity development and meaningful participation over time.

Target and Variance

1 or more educational opportunities for information/training are delivered to the PAG annually (variance 0).

2 or more educational opportunities for information/training are delivered in the community annually (variance 0).

Current Condition

BCTS and Canfor make every effort to schedule at least one educational session for the PAG members over the course of a year's meetings. These usually take the form of a presentation during a PAG meeting by a contracted expert, a PAG advisor or a Participant representative. The participants also provide the opportunity to educate the PAG and public by holding field trips to review and discuss various aspects of sustainable forest management. The subject of

these presentations is either based upon reporting upon a project with bearing on the SFMP indicators (formerly measures) or on subjects where the PAG has requested information.

BCTS and Canfor staff provide many educational opportunities both at the request of their employer and of members of educational community in Fort Nelson. The Participants hold open houses for all major management plan releases. Many staff also provide field tours and in class presentations for local elementary and secondary schools.

Forecasting

It is anticipated that achievement of the target will result in informed public participation in forest planning and operations that is open, inclusive and responsive to public concerns and grounded in science.

Monitoring and reporting

This indicator will be reported out on an annual basis for educational opportunities provided to both the PAG and the community over the previous year.

For the PAG target, reporting will be based upon opportunities for information/training that are delivered to the PAG and or public either during the PAG meetings that take place in the reporting year, or during field tours or educational events put on by the Participants to which the PAG members are invited. The target will be considered to have been met if the Participants are able to provide one or more educational/training opportunities, as described above, to the PAG members in a reporting year.

For the communities, reporting will be based upon number of educations opportunities presented and the numbers of people attending each event as confirmed by attendance records, signup sheets or best estimates of numbers by the presenter. The indicator will be considered to have been met when the number learning opportunities has equalled or exceeded 2 in the reporting year.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

38 – Availability of summary information on issues of concern to the public

Core Indicator

Background Information

This target recognizes the importance of keeping members of the public informed on forestry strategies being developed and planning occurring in their area. Issues of concern brought forward by the public are part of the discussions occurring at public advisory group meetings and often work their way into a reporting requirement of the SFM Plan. Annual reporting of the Plan's performance measures to the advisory group and to the broader public provides an open and transparent means of demonstrating how issues of concern are being managed and an opportunity for the public to respond. Members of the public can provide local knowledge that contributes to socially and environmentally responsible forest management.

Target and Variance

Previous years' Annual Report must be made available to the public via the web prior to March 31st of the current reporting year (no variance).

Current Condition

BCTS and Canfor make every effort to have their SFMP Annual Report Completed and posted in as timely a manner possible. Both Participants have experienced challenges in completing the reports.

These difficulties have been the result of many issues confronting both Participants. Canfor experienced significant scaling back in both personnel and in time allotted for the completion of documentation in Fort Nelson. These were economically strategic moves decided at a corporate level and as such were unavoidable. BCTS also had a reduction in staff, and due to insufficient resources to do some of the joint reporting analysis has also had unavoidable hurdles to report completion.

The Participants are currently working together to remedy some of the challenges slowing our reporting processes. The 2008 and 2009 reports for both companies are complete as of July 31, 2010.

Forecasting

It is anticipated that achievement of the target will result in public awareness and understanding of the SFM Plan and annual performance relative to the Plan's targets. This will contribute to a continuously improving SFM Plan that has openly informed, included and responded to the public.

Monitoring and Reporting

This indicator will be reported out on an annual basis. Reporting will be based upon the previous years' Annual Report being posted on the web in each Participant's specified website prior to the end of the current reporting year. The measure will be considered met if the previous years' report is posted prior to March 31 of the current reporting year.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

ELEMENT 6.2 SAFETY

Value – Safety

SFM Objective

Demonstrate that the organization is providing and promoting safe working conditions for its employees and contractors. [48]

39 – Evidence of co-operation with DFA related workers to improve and enhance safety standards, procedures and outcomes in all DFA workplaces and affected communities

Core Indicator

Background Information

Canfor and BCTS implement their safety programs by assigning responsibilities to managers, supervisors and to employees as follows:

Management:

- Develop and maintain a comprehensive occupational health and safety program
- Conduct regular health and safety audits and implement appropriate action steps
- Facilitate active employee participation in health and safety initiatives and programs
- Provide the necessary education and training in safe work practices and procedures for supervisors, OH&S committee members, and all employees

Supervisors:

- Ensure that all employees under their direction receive proper training and instruction and that all work is performed safely
- Ensure that employees are made aware of all known or reasonably foreseeable health or safety hazards in the areas where they work
- Initiate actions and follow-up in order to maintain a healthy and safe working environment within their areas of responsibility

Employees:

- Take responsibility for avoiding risk to themselves and others and following all known safe work rules, procedures and instructions
- Eliminate all accidents by working together to identify any potential hazards in the workplace and to take the appropriate corrective action

All of Canfor's and BCTS's forest operations are third party certified to a safety program that meets or exceeds provincial safety program requirements through SAFE Company.

Target and Variance

100 percent of Participants and their contractors and licensees (in the case of BCTS) will implement and maintain a certified safety program (variance of 10 percent).

[48] Z809-16 CSA Sustainable Forest management standard

Current Condition

Both BCTS and Canfor hold certified safety programs under the SAFE company certification standard. All Forestry contractors working in the bush for Canfor are also required to hold some level of safety certification (SAFE Company, ENFORM, Etc.). BCTS has the requirement that either the licensee holding a timber sale license or the contractor harvesting the TSL must hold SAFE Company certification as well.

Forecasting

From 1998 to 2005, WorkSafe BC accepted an average of nearly 22 harvesting fatality claims each year — the worst in 2005 with 34 claims. But the industry averaged fewer than 14 fatalities from 2006 to 2008. In Alberta, companies who have joined PIR and obtained a Certificate of Recognition have 20% fewer WCB lost time claims. Companies who conduct work that meet their certified safety program requirements demonstrate the efforts to make safety integral to each worker's life, and that unsafe work is unacceptable. It is anticipated that implementation of certified safety programs will result in increased awareness of safety issues and should result in fewer safety incidents.

Monitoring and Reporting

Monitoring and reporting will take place on an annual basis for this indicator. The indicator will be considered met for each Participant if they are able to successfully maintain their certification during the reporting year. The indicator shall be considered met for contractors and licensees if they are able to maintain their certification for the duration of their contract or license completed within the reporting year. The 10% variance was added to take into account new employees who have not had opportunity to run through the safety program during the reporting year, new contractors and licensees who have just enrolled in safety certification and contracts for which safety certification is not required (non-field related contracts). Maintaining the safety certification covers off the fact that the businesses and workers are jointly adhering to and improving their safety standards, procedures and outcomes within their workplaces.

The position/person responsible for ensuring the information needed is gathered and placed in the in Appendix 1.6: Responsibility Action Matrix Appendix 1.6: Responsibility Action Matrix.

40 – Evidence that a worker safety program has been implemented and is periodically reviewed and improved

Core Indicator

Background Information

Both BCTS and Canfor submit to the rigorous auditing of SAFE company auditors on an annual basis to ensure their safety programs are working effectively to ensure the safety of all workers. In addition to this both companies maintain an internal auditing protocol to ensure that any shortcomings in the programs are dealt with in a timely manner before they have an opportunity to develop into hazards.

Target and Variance

a) 100 percent of non-conformities found during external audits will have an action plan developed and implemented in a manner and timeframe acceptable to the auditor (variance of 0 percent).

b) An annual management review of the safety program will be completed (variance of 0).

Current Condition

BCTS and Canfor both have SAFE Company Certification which calls for external auditors to come in and assess the effectiveness of the safety programs.

Forecasting

It is anticipated that implementation of certified safety programs will result in increased awareness of safety issues and should result in fewer safety incidents.

Monitoring and Reporting

This indicator will be reported out on an annual basis. By having a target set at 100 percent of non-conformities will be addressed in a manner and time frame acceptable to the auditor, emphasis is put on having an effectively implemented program. Completion of the Management review of the program will meet the conditions of periodic review and program improvement. The target will be considered having been met if the Annual review has been completed, and the non-conformances with the safety program have been addressed. This Indicator will apply to the Participants only.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

CRITERION 7.0 ABORIGINAL RELATIONS

As discussed in Criterion 6, there is a long history of stakeholder involvement in forestry related planning in British Columbia. There is also a responsibility on the part of the Participants to include First Nations in sustainable forest management in a meaningful way. Broadly defined goals such as secure access to resources, the equitable sharing of benefits, and participation in decision-making are found to be important in almost every forest context where there are aboriginal interests involved. This criteria recognizes the importance of the physical and economic dependence of indigenous people on forest resources, as well as the normative and spiritual elements. The proposed indicators represent a blend of legal commitments and the obligations resource managers have in ensuring that First Nations unique cultural, spiritual and economic needs are addressed.

ELEMENT 7.1 ABORIGINAL AND TREATY RIGHTS

Value – Respect and understanding of aboriginal and treaty rights

SFM Objective

Recognize and respect Aboriginal title and rights, and treaty rights. Understand and comply with current legal requirements related to Aboriginal title and rights and treaty rights.[49] Recognition and respect of Treaty 8 rights and aboriginal rights in development and implementation of forest plans.

41 – Evidence of good understanding of the nature of Aboriginal title and rights

Core Indicator

Background Information

Section 35 of the *Constitution Act* states "The existing aboriginal and treaty rights of Aboriginal Peoples of Canada are hereby recognized and affirmed". Some examples of the rights that Section 35 has been found to protect include hunting, fishing, trapping, gathering, sacred and spiritual practices, and title. SFM requirements are not in any way intended to define, limit, interpret, or prejudice ongoing or future discussions and negotiations regarding these legal rights and do not stipulate how to deal with Aboriginal title and rights, and treaty rights.

The first step toward respecting Aboriginal title and rights, and treaty rights is compliance with the law. Section 7.3.3 of the CSA Z809 Standard reinforces legal requirements for many reasons, including the reality that demonstrating respect for Aboriginal title and rights, and treaty rights can be challenging in Canada's fluid legislative landscape and therefore it is important to identify these legal requirements as a starting point. It is important for companies to have an understanding of applicable Aboriginal title and rights, and treaty rights, as well as the Aboriginal interests that relate to the DFA.

Both the desire of licensees to comply with laws and open communication with local First Nations requires that company staff members have a good understanding of Aboriginal title and rights and treaty rights.

[49] Z809-16 CSA Sustainable Forest management standard

Target and Variance

100 percent of Canfor Forest Management Group (Fort Nelson Woodlands) employees and all BCTS Fort Nelson field team staff will receive First Nations awareness training (variance of 0 percent).

Current Condition

All forestry staff are given some level of First Nations awareness training as a part of on the job training or via a formal course like "Working Effectively with Aboriginal People". As Aboriginal peoples are given a greater role in providing input with regard to development of forest development plans and the managing of forest resources, the need to formalize the training requirement to meet the intent of the CSA Z809-08 standard becomes more important.

Forecasting

It is anticipated that achievement of the target will result in forest operations that respect Aboriginal title and rights and reflect the timber and non-timber interests of local Aboriginals.

Monitoring and Reporting

This indicator will be reported out on an annual basis and will apply to all full time and temporary staff employed during the reporting year. Acceptable training for meeting this indicator will be determined by the Participants varied by what level of understanding is required for the position being assessed. Report the number of active employees working within the DFA for each participant that have received the training within the past five years compared to the total number of employees working for each participant.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

42 – Evidence of ongoing communication with Aboriginal communities and consideration of information gained

Core Indicator

Background Information

Canfor maintains a list of Aboriginal Communities that are notified when forestry operations/ developments are to occur.

The intent of the indicator is to plan forest management activities with consideration given to concerns brought forward by Aboriginal communities. This indicator measures the Participants' implementation success in addressing these actions.

When significant disagreement occurs, efforts towards conflict resolution are documented. For the purposes of this indicator, 'significant disagreement' requires the complaint to be submitted to the respective participant in writing. This indicator and target demonstrates the Participants' commitment to track and follow actions through to completion to mutually agreed actions.

Target and Variance

100% of information on aboriginal titles and rights, identified through on-going communication with aboriginal communities, has been responded to and considered and/or accommodated in forest management planning.

Current Condition

The following table displays the number and variety of effective opportunities provided to Aboriginal Communities to be proactively involved in planning processes and provide input on forest values, knowledge and uses considered in the forestry planning processes. This information is in addition to the effective communications described within Indicators 41, 43, 44, 45, and 46. (Baseline data – TBD).

Description of Opportunity	Opportunities (Responses)
emails / phone calls / letters	TBD

Forecasting

Continued effective communication between the Participants and Aboriginal Communities. It is anticipated that forest operations will respect and reflect the interests made known from Aboriginal communities, resulting in the maintenance of Aboriginal values and opportunities to practice treaty rights.

Monitoring and Reporting

The number and type of opportunities provided by the Participants to Aboriginal communities to be pro-actively involved in forest management planning activities and provide input regarding proposed development will be tracked by planning staff. The Participant's will be required to review and summarize this information annually for collating and reporting purposes. Contact types will include referrals, general inquiries, educational, etc. Reporting will include, but is not limited too the number of attempts to contact, actual number of contacts and number of responses with information, the number of actions actually completed, and the number of actions not completed as scheduled, to determine the percentage of consistency with action plans. An

annual review of action plans will be completed, and a summary of conformance to action plans will be prepared and reported in annual reports

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

ELEMENT 7.2 RESPECT FOR ABORIGINAL FOREST VALUES, KNOWLEDGE AND USES

Value – Respect and understanding of aboriginal forest values, knowledge and uses

SFM Objective

Respect traditional Aboriginal forest values, knowledge and uses as identified through the Aboriginal input process.[50]

43 – Level of Aboriginal participation in the forest economy

Core Indicator

Background Information

This indicator and related target looks specifically at First Nation participation in the forest economy, evaluating Licensees' efforts to build capacity within First Nations on matters related to the forest industry. The target recognizes that there are occasions when First Nations after being giving the opportunity, elect not to participate and is respectful of those decisions.

Target and Variance

Number of opportunities compared to the 3 year rolling average. There will be no set target for this indicator as the objective is to ensure that some opportunities are being made available to first nations within the plan area. The indicator recognizes that there are occasions when First Nations after being giving the opportunity, elect not to participate and is respectful of those decisions. The number of opportunities can vary widely based on current priorities and economic factors. As such there is no variance associated with this indicator.

Current Condition

A summary of the data for the last 3 years (2007 to 2009) is contained in table 23.

Table 30 Baseline data for Number of Opportunities offered to First Nations

Participant	Year	Opportunities offered	3 Year Average
Canfor	2007	4 contracts, 1 MOU	3 opportunities baseline
	2008	3 contracts, 1 MOU	
	2009	0 contracts, 1 MOU	
BCTS	2007	2 contracts, 1 MOU	4 opportunities baseline
	2008	6 contracts, 1 MOU	
	2009	1 contract, 2 MOU	

The need for the Participants to try and maintain or increase the baseline of opportunities available to First Nations is of great importance as First Nations are traditional users of the land

[50] Z809-16 CSA Sustainable Forest management standard

base. BCTS and Canfor operate on lands claimed as traditional territories by the First Nations within the DFA.

Forecasting

It is anticipated that achievement of the target will result in operational activities and plans that recognize and manage for known Aboriginal rights and duly established title and provide support to Aboriginals to build organizational capacity to engage in the forest economy.

Monitoring and Reporting

This measure will be assessed on an annual basis. Given the different contracting rules and corporate constraints of each Participant, BCTS and Canfor will report this indicator separately. This allows for a more accurate baseline reflecting what each Participant can realistically offer.

For the purposes of this indicator, an opportunity shall be considered, but not limited to, the following options: Partnerships, Joint Ventures, Cooperative Agreements, Memorandum of Understanding and Business Contracts. Performance shall be reported and assessed based on a **three year rolling average.**

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

44 – Evidence of best efforts to obtain acceptance of management plans based on Aboriginal communities having a clear understanding of the plans

Core Indicator

Background Information

Open, respectful communication with local First Nations includes not only the organization understanding the First Nations rights and interests but for First Nations to understand the forest management plans of organizations. With this open dialogue, the two parties can then best work towards plans and operations that are mutually agreeable.

Target and Variance

100 percent of management plans exhibit evidence of best efforts to obtain acceptance by Aboriginal communities (variance of 0 percent).

Current condition

All major management plans require an effort to be made to show accommodation of first nations concerns. This indicator goes beyond accommodation to show that extra effort is being made to give first nations all the tools and information necessary to make an informed decision regarding acceptance of management plans.

Forecasting

It is anticipated that achievement of the target will result in forest management and operations that respect Aboriginal title and rights and reflect the timber and non-timber interests of local Aboriginals.

Monitoring and Reporting

This indicator will report out for all major management plans released during the reporting year. Reporting will rely upon meetings held, materials provided for consideration, evidence of effort to provide time and resources, formal training opportunities and responses to requests for input. Report the number of forest management plans pertaining to Crown tenures held by the participants within the DFA and the number of those where open communication to describe and obtain acceptance occurred

Management plans considered are Forest Stewardship Plans (FSP), Pest management plans (PMP), and Sustainable Forest Management Plans (SFMP). Also considered would be information sharing on site level plans. The indicator will be considered to have been met where at least two initiatives to exchange information and obtain acceptance have been made for a given plan.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

45 – Evidence of understanding and use of Aboriginal knowledge through the engagement of willing Aboriginal communities, using a process that identifies and manages culturally important resources and values

Core Indicator

Background Information

Efforts have been made to understand which First Nation traditional territories fall within the Plan area and company Defined Forest Areas. Information sharing agreements are made with willing First Nation communities to promote the use and protection of sensitive information.

Forest management plans are shared with Aboriginal communities. Open communication with First Nations that includes a sharing of information and enables the participants to understand and incorporate traditional knowledge into forest management options is the means to achieve the objective of the indicator.

The objective will be achieved as the participants become aware of culturally important, sacred and spiritual sites leading to appropriate management or and protection by specifying measures in operational plans. The proper execution of plans will provide desired results of accomodation of First Nations culturally important values and resources. Post harvest evaluations and other inspections will assess plan conformance.

Target and Variance

100 percent of identified Aboriginal forest values, knowledge and uses considered in the forestry planning process (variance of 0 percent).

Current condition

BCTS and Canfor have dealt with the recognition and management of culturally important Aboriginal forest values and resources as identified through the information sharing/consultation process, via completion of: Archaeological Impact Assessments, Traditional use studies and various other methods. Consideration usually takes the form of enhanced protection of identified resources or values or full protection where the value at stake is of great importance.

Forecasting

It is anticipated that achievement of the target will result in open and meaningful relationships with local Aboriginals leading to a trust in sharing sensitive information and development of mitigation strategies that will conserve cultural heritage features and opportunities to practice treaty rights. Operational plans will contain information on how these sites will be managed or protected.

Monitoring and Reporting

This indicator will be reported out annually and will be based upon all plans (FSP, SFMP, PMP) released in the reporting year. Reporting will be based upon all plans which received input from Aboriginal communities regarding forest values and resources and whether there were any actions taken or responses to that input. Indicator will be considered to have been met for a plan where the input on an Aboriginal forest value, knowledge or use has been addressed by the Participant receiving it. This consideration may take the form of a response letter, partial or

complete protection or any other modification of the plan from its original form made to accommodate the input given.

The participants will record all site specific information provided by First Nations through the information sharing and consultation process regarding cultural resources and values. The Participants will document any mitigating actions taken (revision of forest operational plans) to accommodate the cultural resources or values identified by First Nation as being important. Canfor will store the information specific to their operations in the COPI database.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

46 – Level of management and/or protection of areas where culturally important practices and activities occur

Core Indicator

Background Information

Meaningful relationships and open communication with local Aboriginal communities help ensure that areas of cultural importance are managed in a way that retains their traditions and values. This indicator recognizes the importance of managing and protecting culturally important practices and activities during forestry operations. First Nations, with the benefit of local and traditional knowledge may provide valuable information concerning the specific location and use of these sites as well as the specific forest characteristics requiring protection or management. The outcome of these discussions and the means to manage/protect values and uses are included in operational plans. The intent of the indicator statement is to manage and/or protect those truly important sites, thus there is a degree of reasonableness in identifying the sites. The targets verify that consideration was given in plans, then follows through with assessing plan execution.

Target and Variance

100 percent of forest operations in conformance with operational/site plans developed to address Aboriginal forest values, knowledge and uses. (variance of 0)

Current Condition

All operational and site plans that are in use will have had efforts made to address Aboriginal forest values in every case where meaningful input has been received by the SFM plan Participants. Both Canfor and BCTS make an effort to accommodate Aboriginal forest uses when specific, actionable data is received from first nations regarding traditional land use.

Forecasting

It is anticipated that achievement of the target will result in open and meaningful relationships with local Aboriginals leading to a trust in sharing sensitive information. Meaningful relationships and open communication with local Aboriginal communities will provide insight to help ensure that areas of cultural importance are managed in a way that provides opportunity to retains aboriginal traditions and values.

Monitoring and Reporting

This indicator will report out for all operational and site plans released during the reporting year. The reporting will be based upon the percentage of conformance with plans where input from Aboriginal communities was given and the plan was changed to accommodate the input. The measure will be considered met for a plan only if the accommodating measures have been followed during the implementation phase.

Specifically, the participants will report the number of roads constructed or cutblocks harvested where operational plans had specific content requirements to manage or protect Aboriginal forest values, knowledge and uses and the number of roads constructed or cutblocks harvested referenced above where the plan requirements were followed.

The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

6.0 Tactical Level Planning

This section describes the aspects of SFM Planning that occur at the tactical planning level for the DFA. The objective of the tactical level is to establish a detailed forest management strategy or scenario that is sustainable for a range of forestry related values. This level localizes planning to meet the broad goals developed in the strategic planning level.

At this level of planning, inventories are prepared and future forest conditions are forecasted. If current conditions do not meet the goals of sustainability, alternative strategies and/or scenarios are designed and forecast to assess their effectiveness in meeting sustainability targets and goals. The strategy that best meets the goals of sustainability is selected in consultation with the stakeholders.

It is at this level that the DFA specific decision support tools for planning are implemented. The decision support tools include: indicator mapping, scenario design, forecasting, natural disturbance strategies, multi-criteria analysis (MCA), and potentially trade-off analysis. The results of the implementation of these tools are used to assess the sustainability of current conditions and to design an alternative sustainability scenario, if necessary.

Tactical level assessments and planning will identify strategies and potential management practices that are considered sustainable. The operational level is the place where those practices are described and implemented to meet sustainability targets. Operational level plans such as Forest Stewardship Plans (FSP) and internal site plans are currently used for this purpose in the DFA. The indicators and targets detailed in Section 5.0 are meant to compliment the development of future FSPs.

The process by which tactical level planning is undertaken includes:

- identifying/describing current practices;
- linking the practices to indicators and targets;
- identify external impact (such as Oil & Gas);
- incorporating natural disturbance;
- assessing MCA;
- forecasting out current conditions; and
- assessing the outcome against sustainability targets in an adaptive management framework.

6.1 Assessment of Current Conditions

The following provides an assessment of the current conditions for the Fort Nelson DFA.

6.1.1.1 Oil and Gas Industry

Oil and gas (O&G) exploration and development have the potential to have an impact on SFM planning and practices throughout most of the DFA. Activity in this resource sector continues to increase. Activities include seismic lines, pipelines and road construction and well site development all of which potentially remove productive land from the landbase, either permanently or temporarily. Conversely, set asides negotiated between Canfor/BCTS and government agencies can impact O&G's ability to be sustainable as well.

Canfor and BCTS continue efforts to interact with the oil and gas industry in a meaningful way within the DFA. In the past, Canfor and OGC have jointly funded a project that researches caribou in the DFA. Currently, Canfor and BCTS strive to comment on all proposed oil and gas activity to the individual companies and through the OGC. Comments centre on minimizing disturbance in harvested blocks and utilizing existing access (i.e. roads seismic lines), where possible. Canfor has a good working relationship with the larger companies such as EnCana, and they attempt to utilize the same access corridors and discuss plans for accessing new areas. BCTS staff receive oil and gas referrals directly from O&G companies or from the O&G Liaison person located in the MFLNRO office. The referrals typically pertain to access, seismic or well site development in BCTS operating areas.

Canfor and BCTS continue to share their FSP block and road data with the major exploration companies and the major survey companies hired by O&G. The major O&G companies are diligent in sharing their access data with Canfor, though the smaller companies currently do not share their data as willingly. Where ever possible Canfor and BCTS recommend that access be shared (i.e. if forestry has built access in an area they recommend that it be used by oil and gas operators, as well allow O&G operators to use their active haul roads). At the request of a number of oil and gas companies, Canfor has surrendered the majority of its main line road permits to government for re-tenuring to the oil and gas industry as petroleum development roads. In so doing, Canfor has effected agreements with the new road permit holders that will allow Canfor to continue to use the roads when harvesting operations resume. This will reduce the cumulative footprint of the forestry and oil and gas industries on the landbase. Canfor and BCTS also try to plan operations for future blocks in areas that will be developed by O&G. In this way forestry can utilize the access (seismic and roads) that O&G builds. Canfor and BCTS also recommend that disturbance to plantations be minimized.

The larger O&G companies use seismic companies that do not do jobs on speculation, therefore most of their projects are completed and Canfor/BCTS get referrals from these Companies. Some of the smaller O&G companies complete speculation seismic jobs and do not always advise Canfor/BCTS when projects are started or completed. Canfor and BCTS do not necessarily know if a lease development or seismic job will be started or not. Very few small O&G companies currently operate on the DFA. However the MFLNRO is updated by OGC regarding the actual areas disturbed by O&G activity. This information eventually is updated on the forest cover maps and inventory data used by Canfor and BCTS. Canfor and BCTS have asked for this information to be provided to them when they are completing the referral process for all O&G projects they are asked to provide comment.

6.1.1.2 Accounting for Oil and Gas Sector Activity

Impacts of the oil and gas sector are captured in the participants' indicator monitoring and reporting by the following processes:

The Oil and Gas Commission (OGC) provides oil and gas sector clients with harvest authority to conduct the removal of timber from crown land. The OGC issues clients a master licence to cut and cutting permits which are recorded in Government's Forest Tenure Admin System (FTAS). These are issued for clearing for seismic operations, well sites, pipelines, etc. FTAS is used by government to record and track all tenures issued on crown forest land. This produces a record of all potential disturbances on the forest land base from oil and gas activities.

Permits for road construction are issued by the OGC to oil and gas clients under the Land act. Along with the cutting permits, the road permits are also recorded and tracked in government's crown tenures registry known as Tantalus, which is accessed by the MFLNRO on government's Land Resources Data Warehouse. This information is accessible to the participants (Canfor & BCTS).

Oil and gas sector clients provide the OGC with "As Built Plans" depicting the location and extent of their facility development on crown land. This reporting provides the Government with verification of what facilities are actually built and the amount of area cleared. This information is accessed by the MFLNRO when completing regular updates of the vegetation resources inventory (VRI).

The Oil and Gas commission posts spatial data regarding the extent of oil and gas activities to its website for use by interested parties such as Canfor and BCTS. Canfor has automated the regular downloading of this spatial data and incorporation of the data into Canfor's spatial data layers. These spatial data are used to analyze and report on many of the indicators in the SFMP.

When conducting a timber supply review (TSR) to determine a new AAC for a management unit, the MFLNRO will access information from the records held by the OGC indicating the extent of oil and gas development on crown land. This information is then considered during the TSR analysis to augment the VRI info regarding the extent of oil and gas disturbance on crown forest land. By this means the oil and gas impact on the land base is captured in TSR calculation of AAC and in regular updates to the VRI. By these means the participants account for the impact of the oil and gas sector activities in our monitoring and reporting of the following indicators:

- 1 – Ecosystem area by type
- 7 – Shrub Habitat
- 18 – Additions and deletions to the forest area
- 19 – Proportion of long term sustainable harvest level that is actually harvested

The VRI and TSR inventory datasets are the main sources of information to be used by Canfor and BCTS when reporting on the above indicators.

The OGC requires that their clients who propose activities overlapping the participants existing or proposed timber harvest or road development areas must refer these plans to the Participants. This provides the participants with a record of proposed oil and gas activities which may impact our management activities including our management of the following indicators:

- 4 – Degree of within stand structural retention – WTP Percentage
- 6 – Degree of within stand structural retention – Riparian Management
- 8 – Degree of habitat protection for selected focal species including species at risk
- 9 – Degree of suitable habitat in the long term for selected focal species including species at risk
- 12 – Proportion of identified sites with implemented management strategies.

The participants also have access to the Governments crown tenures registry and are able to include the information regarding the extent of oil and gas development when reporting on these indicators. This information is available to the participants via the Mapview application through Geo BC.

The Participants have no control over the activities of the oil and gas sector, however the participants do coordinate activities such as road construction with oil and gas companies in an effort to reduce the overall impact of the activities of both sectors on the land base.

These indicators have targets which are designed to assess the participant's performance in achieving a strategy designed to promote the target. The participants will report if our activities were successful in managing for the indicator. By reviewing proposed oil and gas activity referrals, the participants are able to determine if the proposed activities of the oil and gas sector will impact the continued achievement of the targets for these indicators and adjust our plans if required. For example – WTP retention monitoring is completed at the LU level and considers all harvesting since 1995. Oil and gas impacts to WTP areas will be reflected in VRI information, used by the Participants to generate the WTP retention analysis.

To date Canfor has surrendered only those road permits for which interest in assuming the maintenance responsibilities was expressed by oil and gas companies. All of the surrendered road permits have been re-issued by government to oil and gas companies, who have assumed the responsibility for road maintenance.

When the road permits surrendered by Canfor are re-tenured as petroleum development roads, the new road permit holder is required to assume responsibility for maintenance of the road. When Canfor and BCTS resume harvest operations, the participants will request road use agreements appropriate to their needs, from the road permit holders. The road use agreements will transfer a proportion of the responsibility for maintenance of the road from the road permit holder to the road use agreement holder (either Canfor or BCTS licensee) depending upon the parties level of use of the road. This will result in Canfor or BCTS licensee assuming the maintenance responsibilities for the roads that Canfor or BCTS licensee will be using under road use agreement entered into with the road permit holder.

Any road permits that are surrendered to government, which are not subject to being re-tenured to other users must be deactivated prior to surrender. The deactivation requirement is intended to result in the surrendered road being placed in a state that requires little or no maintenance because of the road being impassable to vehicle traffic. In this instance, the government would assume responsibility for the road.

As mentioned, Canfor has only surrendered those road permits for which interest in assuming the maintenance responsibilities was expressed by oil and gas companies. All of the surrendered road permits have been re-issued by government to oil and gas companies, who have assumed the responsibility for road maintenance.

Therefore the road permits surrendered by Canfor will continue to be maintained throughout the indefinite shutdown of Canfor's Fort Nelson harvesting operations as well as during the future resumption of those operations.

6.1.2 Current Forest Management Practices/Strategy

The assessment of current management practices is two-fold:

1. an articulation of the current management strategy by describing the standard operating practices and regulations followed in the Fort Nelson DFA; and
2. the determination of how these practices impact the sustainability of forestry related values in the management area.

A summary of the current management practices undertaken by Canfor and BCTS in the DFA are presented in Appendix 1.3: Practices Analysis. The current management practices are used to form a baseline management scenario. This scenario is compared against alternative scenarios to test strategies and to determine if the baseline is meeting the targets set out in Section 5.0. Linking current practices to the indicators of each element through the element mapping project provides information as to how practices are affecting sustainability targets through time and space.

The development of scenarios, including a potential uplift (that was a possibility through the TSR3 process scenario) was used to review the current management strategy with the PRISM. Modelling of certain indicators was used to hypothetically assess how differing management strategies may impact certain indicators over a specified time frame. The scenarios do not represent a true reality. The chosen scenarios are limited in their scope and are meant to show the key interactions between some of the model-able Elements. The scenarios look at the interactions between each of the chosen Elements under different management conditions to look at the likely interactions among key indicators. Inputs for modelling come from the indicators and targets that were established for each element. During this exercise some targets were modelled, but not all.

Forecasting is necessary as part of the evaluation and identification of sustainable forest management (SFM) strategies and practices that will help achieve the desired future forest condition. It is a component of continual learning and improvement. "Forecasting allows the organization to specify the SFM strategy and forest practices that will achieve the desired result in the context of adaptive management."[51]

The preferred SFM strategy chosen to fulfil the chosen scenario is articulated throughout Section 5.0 of this SFM Plan. This strategy uses the TSR2 AAC, existing LUPG[52] and NSOGO[53] biodiversity targets scenario as a baseline. Additional targets for indicators that are not currently included or modelled under TSR3 have been added to the strategy and include such targets as number of snags per hectare (core indicator 1.1.4.2), the strategy to develop a representation analysis, and economic and social indicators and targets. The resultant preferred strategy is an amalgamation of Criterion level strategies which are discussed in Section 6.4 Preferred Strategy.

6.1.3 Element Mapping

Element mapping is a tool that assesses the current levels of resources to be sustained in the DFA and shows how those resources are spatially contributing to meeting sustainability targets.

It is assumed that the entire land base (whether managed or unmanaged) contributes to meeting ecological, economic and social goals of sustainability. Where possible, indicators/targets will be spatially mapped demonstrating current levels of resources as represented by the elements/indicators. The land base is delineated into THLB and NHLB (Appendix 1.1: Maps) designations to assess the contribution of both managed and unmanaged areas to meeting sustainability targets. The intention is to assess how much of the targets are met by the NHLB and determine what level of contribution is required from the THLB.

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[51] CSA Z809-02 Sustainable Forest Management: Requirements and Guidance, December 2002
[52] LUPG – BC Ministry of Forests and Range and Ministry of Environment, Lands and Parks 2000. Landscape Unit Planning Guide. Forest Practices Code of British Columbia. Victoria: Province of British Columbia
[53] NSOGO – Non-Spatial Old Growth Order (http://srmwww.gov.bc.ca/rmd/oldgrowth/)

Element mapping is ongoing. Findings are incorporated into forest management planning and operational activities as appropriate to support SFM indicator implementation. Once elements have been mapped, their linkage to current practices will be reviewed and summarized. Success in achieving targets for the THLB are summarized and reported out in the SFMP Annual Report.

6.1.4 Natural Disturbance Regime

Natural disturbance plays an important role on all forest values at the stand and landscape level, and is considered an input to forest management, not a driver. In order to understand the effects of natural disturbance on the DFA, the first step is to identify natural disturbance agents that have historically, and currently affect the ecosystems being managed by the signatories of this SFM Plan.

Natural disturbance agents such as fire, insects and disease, are summarized in 3.2.1 Natural Disturbance Description. The specific details on natural disturbance agents can be found in the Development of a Natural Disturbance Strategy for Sustainable Forest Management report [54] which describes the historic fire trends and data gaps as well as historic trends in insect and disease activity.

Natural disturbances affect areas managed by the licensees, as well as areas outside their operating area; therefore, it is critical to assess how natural disturbance affects the forest conditions (indicators) over time. In scenario design, natural disturbance is considered in the forecasting of each scenario because of its positive and negative role in achieving various measures and its impact on forest management practices. It also allows for evaluation of the role of natural disturbance in non-timber harvesting areas where licensees have no control over how natural disturbance may affect various measures.

Natural disturbance is modelled in three ways:

1) as a volume reduction based on non-recoverable losses in the TSA,
2) as a reduction to each stand to account for small disturbances and
3) as a modelled assumption whereby stands within the non-harvestable land base would be "disturbed".

For more details on the modelling assumptions of natural disturbance, please refer to the Forecasting Report.[55] The general result of applying natural disturbance into the scenarios is that there may be times where a target (i.e. % of area in old) is achieved prior to a disturbance but after a 'modelled' disturbance event, the target may no longer be met. In the forecast model, if harvesting limits a target from being met, it will not be harvested. Following the example above, harvesting may occur when the % old target has been met but if natural disturbance occurs and the target is no longer met, harvesting will also cease in this area so that the forest be allowed to grow old to achieve the target again.

6.2 Multi-Criteria Analysis – Assessment of Sustainability

A Multi Criteria Analysis (MCA) can be undertaken to solicit input from stakeholders, the public and technical specialists in to the development of scenarios. Section 6.3 describes the development of scenarios and their use. MCA can also be undertaken as an assessment of how

[54] Forest Ecosystem Solutions Ltd, 2003. Development of a Natural Disturbance Strategy for Sustainable Forest Management.
[55] Forest Ecosystem Solutions Ltd. 2004. Preparation for Canadian Standards Association Forest Certification: Scenario Design and Indicator/Measure Forecasting for the Fort Nelson Defined Forest Area. Prepared for the Fort Nelson PRISM.

well the current management strategy meets the targets identified for the elements/indicators of sustainability. A formal MCA process can consist of two components: technical and public. It assists in determining if current conditions, assumptions, and practices as forecasted over time, are sustainable for the range and balance of values. If the assessment shows that current conditions are sustainable, then an operational plan is developed/modified for the DFA highlighting any required changes as a result of strategies described in the SFM Plan. FSPs are required, and must be consistent with the strategies outlined in this SFM Plan. If the assessment shows that the current management scenario is not fully sustainable, alternative scenarios may be developed in order to meet sustainability objectives. MCA provides input into the development of alternative scenarios.

The MCA used for this plan is the original technical one done for the creation of the 2004 plan.

6.2.1 Technical MCA

The technical MCA requires that the most up to date data on each of the indicators and on management practices be used. Technical specialists use this information, as summarized in management scenarios, to determine one of the following for each measure:

1. if sustainability levels are clearly sustainable,
2. if sustainability levels are clearly unsustainable or
3. if sustainability levels are marginal and if that state is improving, relatively steady or declining over the forecast period.

For the purposes of this SFM Plan, the technical analysis has been undertaken by Canfor and BCTS, as well as by contractors and subcontractors hired for specific FIA projects. The technical analysis used is the same one done for the completion of the 2004 plan.

6.2.2 Public MCA

A public MCA was not done for this plan as the Criteria, Elements and Indicators to be used are laid out in the CSA standard to which the plan is migrating to. Public input into the plan has been done in the Fall 2010 PRISM meetings where input was collected regarding the possible addition of local indicators into the plan to address areas of concern.

Alternative management scenarios may be required if the initial baseline forecast shows that key indicators are not being met under current operational practices. They can also be used to test the sustainability of the current management regime. If the alternative scenarios and innovative design still do not lead to sustainability across the indicators, trade-offs may have to be considered. Input from the public on their tolerance for trade-offs of indicators would be solicited in addition to the MCA. Ultimately, the decision makers for a management unit take the input from the MCA and the Trade-off Analysis (ToA), if applicable, as part of the decision making process. Understanding the public's priorities and their tolerance for risk and the use of input from technical specialists can assist managers in refining targets, practices and/or the overall management scenario. The assessment of risk has been done through the fall 2010 meetings discussing the CSA indicators and targets to bring this plan to approval.

6.3 Design of Sustainability Scenarios

Alternative scenarios were undertaken as part of this SFM Plan process. They have been used to test the current management strategy for how sustainable it is, to test alternative approaches and as part of forecasting some of the indicators. The process of evaluating a scenario involves examining forecasts for each model able indicator's response to the implementation of the strategy, and determining the degree to which targets are met. This process requires that DFA resource managers understand the interactions and linkages between the elements in order to understand when changing a strategy to improve one particular element may then improve or negatively impact another. This information is contained within the Fort Nelson Forecasting report.[56]

In some cases, changing a practice may lead to sustainability and in others changing a target or threshold for a particular indicator may be required. The analysis may lead to trade-offs amongst indicators. As new data is available and as the public and managers gain more insight into resource management, more robust scenarios will be developed for future iterations of the SFM Plan.

The sustainability scenarios used for this plan are the ones developed for the 2004 plan.

6.3.1 Forecasting

Forecasting is an explicit statement of the expected future condition, through time, of an element/indicator. It is a critical step in assessing SFM. Input layers (i.e. indicator maps, natural disturbance regimes, etc.), along with rule-sets (i.e. current management practices), are used to forecast forest conditions over time using a simulation model. The projections are used to compare the elements/indicators to sustainability targets using current practices over time in order to assess the level of risk for each element.

Local level elements and indicators and their targets have been reviewed by the PRISM, as well as by technical experts for their suitability and credibility for measuring and forecasting. As described in Section 5.0 of this SFM Plan, a forecasting strategy for each indicator has been described ranging from minimal forecasting for some process indicators and other indicators where the target is a legal requirement to full modelling for others. In these cases where the target may be a legal/other requirement or the result of current/past analysis to derive a forward projected forecast which becomes the target, the forecasts are implicit and achieving the target assumes achievement of the forecasted future condition in the same way FRPA assumes achievement of a practice requirement achieves government's objective that the practice requirement relates to. Forecasted indicators are listed in section 6.3.2 Design of Alternative Scenarios. The full forecasting completed for a subset of the indicators in the 2004 SFMP is still applicable, as the overall management strategy has not changed. See the 2011 Fort Nelson SFMP Indicator Forecast Matrix for a list of the current indicators to which the 2004 forecasts still apply.

Forecasting, undertaken for each scenario, allows the forest manager and the public advisory group to analyse various strategies based on the projected future forest conditions. Input for the development of the scenarios came from the following sources:

[56] Forest Ecosystem Solutions Ltd. 2004. Preparation for Canadian Standards Association Forest Certification: Scenario Design and Indicator/Measure Forecasting for the Fort Nelson Defined Forest Area. Prepared for the Fort Nelson PRISM.

1. PRISM C&I matrix from the 2004 plan
2. Current management practices and assumptions
3. MCA questionnaire from the 2004 plan
4. Canfor and BCTS
5. Consultant (specializing in analysis and forecasting)

Details process and results of the forecasting project completed for this SFM Plan can be reviewed within the report "Forecasting Report for the Fort Nelson DFA, November, 2004".

6.3.2 Design of Alternative Scenarios

Although the preferred strategy described in Section 6.4 meets initial targets for sustainability, other scenarios were tested to confirm assumptions and to highlight areas that could be improved. The development of alternative scenarios has included the influence of natural disturbance, where appropriate for both the NHLB and the THLB.

The scenarios listed below describe quantitative outputs utilizing model-able indicators. The preferred strategy takes into account the projected forecast for these measures from the 2004 plan. A new analysis may be completed when data from the TSR 4 comes available in 2016, if the AAC for the DFA is significantly changed (increase or decrease of more 20% or more.

1a. No Harvest with natural disturbance

1b. No Harvest without natural disturbance

2. No Constraints

3. CSA base case

4. NDU biodiversity

5. Potential uplift

6. Preserve all visually sensitive areas (recommended and established VQO's)

No harvest

Objective: to provide a "book end" type scenario based on the exclusion of harvest. Two scenarios were initially prepared including a "with natural disturbance" and "without natural disturbance". Only the "with natural disturbance" will be presented in future discussion.

No Constraints

Objective: to provide a "book end" type scenario based on the 'Constraints Off' that could be achieved within the Fort Nelson DFA if no rules, constraints or targets other than harvesting were applied.

CSA base case

Objective: to present a forecast that approximates current forest management by which all other scenarios can be compared. The intent is to apply the current AAC and exclude the Cassiar area addition to the TSA. Note that all other assumptions in this forecast are based on TSR3 assumptions and therefore, should not be considered an exact re-creation of TSR2.

NDU based biodiversity management

Objective: to test an initial forecast of biodiversity management based on Natural Disturbance Units (NDU) as compared to the Landscape Unit Planning Guide (LUPG) and the Non-Spatial Old Growth Order (NSOGO). NDU modelling assumptions are based on the guidance from the NDU Implementation committee and Delong's report.[57]

Potential Uplift

Objective: to illustrate the potential base case harvest level for the TSR3 process based on the assumptions in the approved data package. This only represents a potential forecast of what the future AAC could be, given the stated assumptions and analysis. The Chief Forester has recently set the AAC for the Fort Nelson TSA at 1,625,000 m3 (November 10, 2006), which is significantly below the potential level that is modelled in this scenario.

Preserve All Visually Sensitive Areas

Objective: to test the harvest impact if all (recommended and established) VQO's were excluded for harvest.

The following two tables provide a summary the scenario inputs and a listing of the forecasted measures from the 2004 plan, respectively.

Table 31 Scenario Inputs – For reference only

Scenario	Area (000's ha)	Harvest (million m³/yr) Short term/Long term	Cassiar Area Included (yes/no)	Biodiversity	VQOs (000's ha/VEG ht m)	Natural Disturbance	Differences from CSA Base Case
TSR 2 AAC	Total: 8 200 CFLB: 4 200 THLB: 924	1.5/1.5	No	LU/BEC variant/45% L, 45% I, 10% H	358 5	63,766 NRL OAF 2 No disturb NTHLB	- Landscape biodiversity - VQO total area/VEG ht - NRL/no disturb NTHLB
CSA base case	Total: 8 173 CFLB: 4 762 THLB: 1 251	1.5/1.5	No	LU/BEC variant based on BEO designation	480 variable	106,355 NRL OAF 2 Disturb NTHLB	-
No constraints	Total: 9 838 CFLB: 5 740 THLB: 1 432	4.3/3.4	Yes	none	none	106,355 NRL OAF 2 Disturb NTHLB	- total /CFLB/THLB higher - ST/LT harvest level higher - Cassiar included - No biodiversity rules - No VQOs
No harvest	Total: 9 838 CFLB: 5 740 THLB: 0	0	Yes	LU/BEC variant based on BEO designation	480 variable	106,355 NRL OAF 2 Disturb entire	- total /CFLB higher - THLB lower - no harvest - Cassiar included - apply natural dist to CFLB
Potential Uplift	Total: 9 838 CFLB: 5 740 THLB: 1 432	3.3/2.9	Yes	LU/BEC variant based on BEO designation	480 variable	106,355 NRL OAF 2 Disturb NTHLB	- total /CFLB/THLB higher - ST/LT harvest level higher - Cassiar included
NDU biodiversity	Total: 9 838 CFLB: 5 740 THLB: 1 432	2.5/1.9	Yes	NDU/Amalgamated LU/BEC variant designation –	480 variable	106,355 NRL OAF 2 Disturb NTHLB	- total /CFLB/THLB higher - ST/LT harvest level higher - Cassiar included - NDU biodiversity rules
Preserve VQOs	Total: 9 838 CFLB: 5 740 THLB: 1 295	3.0/2.7	Yes	LU/BEC variant based on BEO designation	480 none	106,355 NRL OAF 2 Disturb NTHLB	- total /CFLB/THLB higher - ST/LT harvest level higher - Cassiar included - no harvest in VQOs

[57] Delong, C., Natural Disturbance Units of the Prince George Forest Region: Guidance for Sustainable Forest Management, 2002

Table 32 Forecasted Measures from the 2004 plan - For reference only

Type	#	Measures	Included in Scenarios	General Report	Detailed Report	Modeled Target
Ecological	1-1.3	An interim measure was developed – percent area by old seral stage defined by Landscape Unit/BEC variant	yes	BEC variant for the entire DFA by NHLB/THLB	Table of LU/BEC variant by CFLB	yes min. % old seral by LU/BEC variant (LUPG and NSOGO)
Ecological	1-2.1	Number, spatial distribution, characteristics, rank and type of significant habitat features and species in each habitat type in the THLB and NHLB				
	1-2.1a	Riparian areas	yes	Static reduction		**no**
	1-2.1b	Shrub areas	yes	% of DFA in shrub habitat (< 20 years) in NHLB/THLB		**no**
	1-2.1c	Hardwoods (and other cover type)	yes	area of DFA in cover type		**no**
	1-2.1d	Seral stages		% of BEC variant for the entire DFA by CFLB	LU/BEC variant by CFLB	yes – only for old and mature + old in NDT3 Int/High BEOs based on LUPG and NSOGO **no** – for early
	1-2.1e	Patch size	yes	% patch size NDT for entire DFA	% patch size by NDT/LU	**no – only report on current condition**
Ecological	1-4.1	List and percentage of government designated protected areas	yes	Static area reduction		**no**
Ecological	2-1.1	Site index by inventory type group for harvested areas	yes	Area weighted average SI for last 5 years harvest		**no**
Ecological	2-2.1	Area of forest converted to non-forest land use	yes	Static area reduction		**no**
Ecological	2-2.2	Percent of forested area having road/landing construction	yes	Static area reduction		**no**
Economic	4-1.3	Timber supply certainty – AAC	yes	Harvest level chart		yes – ≥ current AAC
Economic	4-2.3	Indirect/Induced employment and income estimates	yes	Employment and income based on harvest level		yes - ≥ current employment and income
Social	9-2.1	Forest Management compliance with existing Visual Quality Objectives (VQOs) established by the BC Ministry of Forests for the area	yes		% disturbance within each VQO polygon in DFA	yes – based on max. allowable % disturbance

A summary of the differences between scenarios as compared to the CSA base case (current condition) is provided in the table below.

Table 33 Forecasted Results using 2004 plan measures Summary Table - For reference only

Type	#	Measures	No Constraints	No Harvest	Potential Uplift	NDU Biodiversity	Preserve VQO
Ecological	1-1.3	Percent area by old seral stage defined by Landscape Unit/BEC variant	-59%	5%	-41%	-25%	not reported
Ecological	1-2.1a	Riparian areas	No change	No change	No change	No change	No change
	1-2.1b	Shrub areas (base case 10%)	13%	7%	12%	11%	not reported
	1-2.1c	Hardwoods (and other cover type)	No change	No change	No change	No change	No change
	1-2.1d	Seral stages	-47%	16%	-32%	-21%	not reported
	1-2.1e	Patch size	Only current condition	Only current condition	Only current condition	Only current condition	Only current condition
	1-4.1	List and percentage of government designated protected areas	No change	No change	No change	No change	No change
Ecological	2-1.1	Site indexby inventory type group for harvested areas	Only current condition	Only current condition	Only current condition	Only current condition	Only current condition
Ecological	2-2.1	Area of forest converted to non-forest land use	No change	No change	No change	No change	No change
Ecological	2-2.2	Percent of forested area having road/landing construction	No change (although potentially -)	No change	No change (although potentially -)	No change	No change
Ecological	4-1.3	Timber supply certainty – AAC (CSA Base Case)					
		Short term	186%	-100%	126%	66%	106%
		Long term	126%	-100%	93%	26%	80%
Ecological	4-1.3	Timber supply certainty – AAC (Potential Uplift)			n/a		
		Short term	26%	-100%		-26%	-9%
		Long term	17%	-100%		-34%	-7%
Economic	4-2.3	Annual TSA Employment	+ 2324 py	- 1245 py	+ 1577 py	+ 830 py	+ 1245 py
		Annual Employment Income	+$192.7 MM	-$103.3 MM	+$130.8 MM	+$68.8 MM	+$103.2 MM
		Annual Provincial Revenue	+ $73.3 MM	- $39.3 MM	+ $73.3 MM	+ $26.2 MM	+ $39.3MM
Economic	9-2.1	Forest Management compliance with existing Visual Quality Objectives (VQOs) established by the BC Ministry of Forests for the area	-32%	11%	-13%	-7%	11%

Interpretation of this summary must consider that in some cases, numerous results were generated for some measures due to the large (85) numbers of landscape units at the time of the analysis. These results were reviewed with the PRISM. Fort Nelson Forecasting report[58] contains the presentation made to the PRISM and goes into more detail for each of the measures modelled. As well, this report contains a comparison of each of the scenarios and the quantitative or qualitative impact on each measure.

A comparison matrix of all scenarios and the impacts to the SFM measures (as per the 2004 plan) is presented in Appendix 1.8: Scenario Alternatives. This data is drawn directly from the 2004 SFM plan and is not scheduled to be updated until the data comes available from TSR 4 in 2016, if the AAC recommended by the Chief Forrester of the MFLNRO is revised by 20% or more.

[58] Forest Ecosystem Solutions Ltd. 2004. Preparation for Canadian Standards Association Forest Certification: Scenario Design and Indicator/Measure Forecasting for the Fort Nelson Defined Forest Area. Prepared for the Fort Nelson PRISM.

6.3.3 Trade-off Analysis

Analysis of the 2004 preferred strategy did not highlight any major conflicts between indicators and so a formal trade-off analysis was not undertaken for that SFM Plan. The 2004 preferred management strategy has been chosen to carry over to the 2011 SFM plan. Therefore no new forecasting analysis was completed for the 2011 plan. A new forecasting analysis and trade off analysis may be planned after the release of the TSR 4 data and the revision of the AAC for the DFA. The decision to undertake a new forecasting and trade-off analysis will be discussed with PRISM at that time.

6.4 Preferred Strategy

The preferred strategy for this iteration of the SFM Plan is to use the assumptions outlined in the CSA base case scenario (described above) from the 2004 plan. This includes the current management strategy and practices including harvest levels as set by the Chief Forester, the LUPG and NSLBOO biodiversity targets. For the majority of the indicators, this means using current management strategies for operations. For others it means altering how Canfor and BCTS do business. The choice for the preferred strategy by Canfor and BCTS was reviewed with the PRISM in 2004.

Given the results of the preferred strategy, the current FSPs, in addition to LUPG and NSLBOO requirements, will address sustainability.

Strategies for each indicator are described in Section 5.0 under each indicator summary. The following summarizes the impact and effect of the preferred strategy for each criterion of sustainable forest management in the Fort Nelson DFA.

C1. Biological Diversity

A key objective under the 2004 strategy was the design and implementation of an Ecosystem Representation Analysis. This was completed and is still considered in indicator 1.1.1. The methodology for the representation analysis included:

1. The Net down: determining the Non-Harvestable Land Base (NHLB), this is the system of reserves to be evaluated in this study.

2a. Classification: classifying the forested land base into coarse-filter ecosystem groups.

2b. Representation Analysis: evaluating how the coarse-filter ecosystem groups are distributed within the NHLB.

3. Patch Size Analysis: determining the patch size distribution of the NHLB and the ecosystem groups.

4. Interior NHLB analysis: determining how much of each ecosystem group is within 50m, 200m, or greater than 200m distance of Timber Harvesting Land Base (THLB) areas.

5. Attribute Comparisons: comparing the attributes of the ecosystem groups within the NHLB and the THLB.

New measures were developed based on the quantitative outcomes of the representation analysis in consultation with the PRISM in 2006. These measures have now been super-ceded by the

CSA Z809-08 standard Core indicators. Due to the new suite of indicators, many of the datasets will just be starting to collect their baseline data.

C 2. Ecosystem condition and Productivity

This criterion has been much simplified from the original criterion from the 2004 plan. The three indicators are measured by reporting out the reforestation success, additions and deletions to the forest area and proportion of the AAC that is harvested on an annual basis. The new reporting structure should be unaffected by the adoption of the preferred strategy.

C 3. Soil and Water

This criterion has also been much simplified from the original criterion in the 2004 plan. The three indicators for this are very straightforward and easy to report so no additional analysis is required to meet the preferred strategy.

C 4. Role in Global Ecological Cycles

This criterion relies on two indicators from Criterion 2 (2.1.1 reforestation success and 2.2.1 additions and deletions to the forest area). The remaining two indicators are derived from an analysis done by Forest Ecosystem Solutions Limited for the 2004 report. These are large scale reporting measures (total carbon stored in the THLB and NHLB at current AAC and Average carbon sequestration rate in the THLB and NHLB at the current AAC. The strategy for this criterion is to tie the reporting of the large scale indicators to the data produced with each TSR, the next one being scheduled for 2016. At that time the analysis would be re-run to assess whether changes to forest management strategies will need to be made.

C 5. Economic and social benefits

Implementing this criterion does not change the current management strategy for operations. The approach to monitoring economic benefits and needs has changed significantly from the 2004 plan. As new data is collected and analyzed, this information could be used in any trade-off discussions and could highlight where opportunities or impacts exist.

This criterion does not represent a change in the existing management strategy from the 2004 plan. The indicators 5.2.1 through to 5.2.4 will be used to track the resilience of the community and should be of value to community governments and representatives.

C 6 Society's Responsibility

The inclusion of indicators 6.1.1 through 6.2.1 solidifies a formal structure to interactions with First Nations in the DFA. Documentation and formal communication and First Nations input into decision making are mechanisms that will be undertaken as part of sustainable forest management in the Fort Nelson DFA.

The indicators 6.3.1 through 6.3.3 have also formalised efforts by BCTS and Canfor to contribute to the well being of the local forest community by working with other businesses, workers and unions for economic diversity and worker safety.

The way that Canfor and BCTS interact with local citizens, First Nations and stakeholders has changed significantly as a result of the initial implementation of the 2004 SFM Plan in the DFA. The development of a public advisory group, the requirement for a publicly available SFM Plan and Annual Report and the associated monitoring information has contributed to a more transparent and inclusive approach to forest management. Canfor and BCTS have committed to ensuring that the process of information exchange is effective for all parties. Continuous

improvement is a guiding principle in sustainable forest management in the DFA. Canfor and BCTS are committed to developing and implementing a continual improvement approach to forest management that is informed by and responsive to the public. Indicators 6.4.1 though 6.4.3 formalize these commitments.

7.0 Operational Level Planning

The operational planning level reflects the "on-the-ground" imprint of the implementation of the strategies identified through the tactical level activities. The operational level plan essentially translates these strategies into site-specific practices and forest management activities such as harvesting, silviculture and road building to be implemented and adjusted in order to meet sustainability targets.

The preferred strategy includes the current management strategy and practices including harvest levels as set by the Chief Forester, the LUPG and NSLBOO biodiversity targets (CSA Base Case from Section 6.3 Scenario Design). For some of the indicators, this means using current management strategies for operations.

Operational plans can span from a 1 to 20-year time period. Annual scheduling of operations is completed, usually covering a five-year planning horizon. The operational planning level adheres to all required legislation and can act as both a reporting function as well as a mechanism to approve current operations. The FSP is informed by the LRMP and the SFM Plan. The FSP is where the legislative requirements are articulated. The FSP will address the requirements outlined in the SFM Plan. The FSP has a public component and can be vetted through the PRISM as well as the general public.

The collection of the data to satisfy the majority of specific monitoring plans is also completed at this level. The assessment of monitoring information is described in the Adaptive Management Section (8.0) of this SFM Plan.

7.1 Sustainability Practices

The challenge for operational plans is to provide unambiguous instructions for forest practices. Vague statements often lead to unintended misinterpretation. However, highly prescriptive plans tend to constrain the flexibility and professional judgment that is often necessary to achieve desired outcomes, particularly when one considers the diversity of social, economic and ecological values across this province. Plans need to be an appropriate mix of unambiguous, yet flexible, prescriptions and guidelines, and still be easily assessable and enforceable. The Forest Stewardship Plan needs be reflective of this mix. Recently approved and implemented FSPs (Canfor and BCTS) integrate the requirements of the SFM Plan. Sustainability practices for forest management, applicable at the local level, will provide the guidance for the specific site conditions and assist in designing plans and procedures to contribute to meeting sustainability targets.

Sustainability practices are developed at the tactical level but implemented at the operational level. The development of sustainability practices at the tactical level provides a longer-term plan that clearly links strategic planning with operational options. The operational level is where the results of the practices are evaluated (via monitoring programs) against the strategic goals.

Resource professionals and managers need to develop sustainability practices that reflect the requirements set out at the strategic and tactical levels. These practices include:

1. Harvesting
2. Silviculture
3. Roads & Road Building
4. Rehabilitation/Restoration

The current management strategy has been assessed for sustainability, both through the TSR3 process and through the public advisory process. Once the analysis of monitoring data for each indicator has taken place, practices can be re-evaluated to determine if any changes are required. Current practices are identified in the appropriate FSP but have been summarized in Appendix 1.3: Practices Analysis.

7.2 Operating Plans/Schedules

Canfor FSP Summary

The Canfor-Fort Nelson Forest Stewardship Plan (FSP) was created for the Fort Nelson TSA in 2006 to meet the requirements of the Forest and Range Practices Act (FRPA). The FSP has been prepared to provide direction for forest management practices over a five- year term.

The FRPA requires that the Forest Stewardship Plan exhibit the planned areas of intended forest management activities. This is similar to the previous Forest Development Plans that were developed under the Forest Practice Code, but the Forest Stewardship Plan does not show specific locations of proposed cutblocks and roads. Instead the Forest Stewardship Plan identifies larger areas of intent that are known as Forest Development Units (FDU's), within which harvesting and road activities may occur over the five-year period.

The Forest Stewardship Plan specifies that for each of the Forest Development Units there is a set of results or strategies for objectives aimed at conserving and protecting timber and non-timber resources. These objectives include; soil, timber, visual quality, plant communities, water, fish, wildlife, biodiversity, cultural heritage resources, and recreational resources. These results and strategies must be measurable and verifiable, and be consistent with legally established objectives set by government under FRPA.

Throughout the course of the five-year term of the Forest Stewardship Plan, effort will be made to continually update the plan to allow for adaptations to address changing priorities, as well as changing strategies. As new information is made available, amendments will be made to reflect the changes in results needed. The Forest Stewardship Plan is designed to have continuous communication with the general public, resource stakeholders, and First Nations groups to make sure that their concerns and comments are addressed.

BCTS FSP Summary

The BCTS Fort Nelson Forest Stewardship Plan (FSP) was approved on May 30, 2008 covering a five (5) year period ending May 29, 2013). The FSP describes results and/or strategies that address the government objectives for forest resource management (i.e. timber and non-timber resources) that are established by the Forest and Range Practices Act (FRPA). These results and/or strategies as they relate to a particular resource objective define the expected outcomes (or strategies aimed at achieving those outcomes) that govern BCTS' forest management activities on the landbase. Integral to the FSP are four (4) forest development units (FDUs) that define the area where BCTS may harvest timber and construct roads. The FDU area includes all BCTS defined operating areas where both deciduous and conifer timber may be harvested as well as those areas outside of these operating areas where BCTS is restricted to harvesting deciduous timber only. BCTS has exclusive rights to harvest conifer timber within its operating areas for the purposes of government's market pricing system.

A more detailed description of Canfor's and BCTS' practices found within the FSP is contained in Appendix 1.3: Practices Analysis.

8.0 Adaptive Management

Adaptive Management (AM) recognizes change as a constant factor in forest management, and it is necessary to understand the root causes of what has, and may be changing. To do so requires learning how the economic, social and ecological systems change and reconfigure in response to human attempts to manage them.

The desired concept of sustainability is described through management goals and objectives, with the associated uncertainties and risks translated into learning objectives. A structured monitoring process is used to generate results, which are then evaluated in terms of their validity, relevance and significance. Through the evaluation process, monitoring information is combined with values, experience, training and intuitive thinking in order to achieve shared knowledge and derive meaning that is useful in developing recommendations for adaptations to management practices, the overall plan, etc.

To be successful, AM also requires decision-makers to acknowledge that uncertainty is a given.

Therefore, SFM plans need to recognize that reality and work within it, rather than planning to eliminate uncertainty. This has implications for not only how the problems are defined, but also the mandate given to those who are responsible for addressing the problems.

A comprehensive AM approach has been developed to address the needs of a corporate forest company in relation to SFM. The resultant AM framework consists of:

1. Program level approaches for incorporating AM principles into strategic, tactical and operational planning processes to create the necessary context for successful use of AM at the project-level. For example, training and the development of operational plans that work with this SFM Plan.
2. Project level assessment of opportunities/benefits/costs for implementing AM approaches on a project-by-project basis.

Continuous improvement, as exemplified in an AM Framework, is built into the SFM system. The initial steps include:

1. Monitoring
2. Evaluation and analysis
3. Reporting
4. Adjustment

The following sections will detail how the steps will work together to instigate the continuous improvement loop of the SFM Planning process.

8.1 Monitoring Plan

Monitoring is a requirement for each indicator. However, some indicators are process indicators and neither trend nor effectiveness monitoring is relevant. These indicators are not so much monitored as reported out within the SFMP Annual Report. For non-process indicators, status and trend monitoring plans have been developed. Status monitoring provides managers and the PRISM with a snapshot of how the indicator currently is doing. These measurements over time provide managers and the PRISM with the trend of the indicator. Trend analysis can be used to assess how well forest practices are helping in meeting targets.

Effectiveness monitoring tests assumptions that are made about elements (e.g. do the elements under C2 really measure ecosystem condition and productivity?) It can assist in determining:

- What the relationship between the trend of an element and practices is, and
- When or how to change a practice?

The following steps summarize the process to develop local monitoring plans:

1. Review of Scientific Reports
2. Consultation with Specialists/Experts
3. Monitoring rationales for each indicator
4. Rationales adapted to local area consultation with local PAG/Experts/Managers
5. Localized Monitoring Plan (unit/frequency/data source) for local area

The monitoring plan for each indicator is included as part of the detailed discussion by element and indicator in Section 5.0. For the purposes of this SFM Plan, the current status for each indicator will be the starting point for trend monitoring and the basis from which analysis will take place in subsequent SFMP Annual Reports and updates to the SFM Plan.

The position/person responsible for the monitoring plan for each indicator is identified in Appendix 1.6: Responsibility Action Matrix

8.2 Evaluation & Analysis and Reporting

As monitoring information is warehoused in the Information Management System, it will be evaluated for completeness and accuracy and then analyzed against the targets and thresholds developed for the DFA. Analysis takes place at the tactical levels and is reported out as part of the SFMP Annual Report. The PRISM will be involved in the review of the SFMP Annual Report.

8.3 Adjustment

As part of the continual improvement loop, the analysis and reporting steps may lead to adjustments in management strategies, the target or the indicator itself. As well, new information (locally or from outside the area) and changes to policy and legislation may require changes to a component of the SFM Plan. Adjustments may be proposed through the PRISM process or through current government processes. The following process will be undertaken to propose changes to the SFM Plan's components:

1. Analysis of monitoring data reviewed by Canfor Planning Forester and BCTS Area Forester
2. Recommendations for changes put forward as a result of the review
3. Review of recommendations by Canfor and BCTS top management
4. Review of recommendations with the PRISM
5. Further evaluation if required
6. Alternatives explored
7. Changes made to the SFM Plan
8. SFMP Annual Report reflects the above

As part of the certification process, non-compliances or non-conformances may be found. Canfor and BCTS will address these through the following process:

1. Canfor SFM Representative and BCTS Area Forester will be responsible for identifying and investigating non-conformance;
2. Canfor SFM Representative and BCTS Area Forester take action to mitigate any impacts caused; and
3. Initiating, completing and documenting corrective and preventive action and expected results

Any corrective or preventive action taken to eliminate the causes of actual and potential non-conformances shall be appropriate to the magnitude of the problem and commensurate with the impact encountered.

8.3.1 Strategic Management Review

Management Review of plans, policies or strategies is not a new component of forest management. The use of this SFM Plan, including the indicators and targets, is a new approach to resource management. Annual management reviews will be necessary at strategic, tactical and operational levels as this SFMP is implemented. Annual management reviews will be undertaken by Canfor and BCTS top management and the staff identified as responsible for various components of the SFM Plan. The strategic review will consist of reviewing the data from monitoring, comparing the status and trend against the target, updating knowledge gaps filled in through monitoring data as well as analysing the effectiveness of strategies used to achieve targets. Findings will be summarized and reported out through the SFMP Annual Report. As well, recommendations for changes to the SFM Plan will be summarized in management review summary and in the SFMP Annual Report. SFMP Management Reviews are summarized within Appendix 2.4: Results of Management Review – 2008, 2009, 2010.

8.4 Integration with the Canfor Woodlands FMS and BCTS EMS

Canfor has implemented a companywide forest management system (FMS) for all its woodlands operations. The implementation of this FMS by Canfor at Fort Nelson has been audited by an independent third party and found to conform to the requirements of the ISO 14001 Standard. The FMS provides a system for the continual improvement of performance that supports the continuous improvement process within this SFM Plan in the following ways:

- The provision of mechanisms for the periodic reporting of performance, including environmental indicators within the FMS and relevant indicators within this SFM Plan;
- An annual internal audit program that assesses the implementation and maintenance of the FMS and this SFM Plan; and
- A management review process that ensures top management is aware of performance and is able to provide guidance and direction for the continual improvement of the FMS and this SFM Plan.

In addition, the FMS provides the assignment of roles and responsibilities, and the tracking of related training, to ensure the consistent implementation of these processes. The SFM Plan also

makes use of the FMS document control and record keeping system to provide evidence of conformance to these procedures where relevant.

BCTS has developed and implemented an environmental management systems (EMS) and have obtained ISO 14001 certification. The principles and implementation of the EMS system is virtually the same as the Canfor FMS, and provides for the same reporting, auditing and continuous improvement provisions.

9.0 Information Management

Over time, information management has become an increasingly essential component of resource management. A variety of information needs to be warehoused in easily accessible formats including scientific background data and reports, resource inventory data, forecasting results, key uncertainties, risks, implementation reports and monitoring/evaluation outcomes. Canfor and BCTS planning and operations staff and, in some cases, personnel from several levels of government and stakeholders need access to the system to input and extract information. A cooperative, multi-user information management system (IMS) supports the shared learning and resultant knowledge approach of continuous improvement.

The development of new data and the amalgamation of existing data into the SFM hierarchical planning framework and operational implementation require time and effort. IMS standards are outlined to reflect the unique characteristics of the data, analysis and reporting needs of the SFM Plan, and the IMS partners in the DFA.

An effective IMS includes the following characteristics:

- Standardized data formats for existing and new data;
- Multi-agency and corporate management through a designated group; and
- A powerful data warehouse structure

Currently, Canfor has recently completed a change from a variety of information capture and management approaches to one that is coordinated under the Genus software system. BCTS has also recently moved toward a Genus system. Canfor and BCTS representatives have worked cooperatively to standardize a number of reports, develop a protocol for information management data exchange and to develop a plan to involve other government agencies. Canfor has developed protocols for exchanging SFM related information in an effort to improve past referral processes. The current system includes the following components:

- The SFM Plan is housed on Canfor's corporate website (www.canfor.ca)
- Canfor and BCTS currently use Genus software to capture and track silviculture activities
- Canfor and BCTS currently use Genus software to track road and harvesting activities
- Excel spreadsheets are used by staff to track other activities

Canfor's and BCTS's FSP Maps and spatial analysis are handled using ESRI Arc Software (ArcMap, etc)

Templates for reports have been designed and are currently used for the SFMP Annual Report.

Current baseline data sources include the following for most indicators:

- Forest Cover
- Trim
- In-house data from Canfor and BCTS
- SFM Plan Criteria and Element rationales
- SFM developed reports
- TSR3 data package
- Terrain Stability
- Statistics Canada
- Local strategy/guide documents (LRMP, MK Recreation Plan, ROS, Northern Rockies Fort Nelson Hiking & Motorized Trail Guide, individual Park Management Strategies; Northern Rockies Recreation Map, etc.)

Planning and operations staff and, in some cases, personnel from several orders of government and stakeholders will need access to the system to input and extract information for individual MUs. As such, Canfor and BCTS have developed and implemented a data sharing agreement processes to help facilitate the exchange of information between organizations.

10.0 APPENDICES

Appendix 1: SFM Plan Background

Appendix 1, with all the sub-appendices, provides support documents for SFM in the DFA.

Appendix 1.1: Maps

This appendix contains maps for the DFA area, supporting SFM.

1. Fort Nelson Defined Forest Area
2. Fort Nelson: THLB/NHLB
3. Fort Nelson TSA Visual Quality Objectives
4. Canfor Fort Nelson Input Covers: Landscape Units
5. Canfor Fort Nelson Input Covers: Protected Area Strategies
6. Canfor Fort Nelson Input Covers: Vegetation Resource Inventory
7. Biogeoclimatic Zones

Appendix 1.2: Inventory & Stakeholder Analysis

This appendix contains the Inventory & Stakeholder Analysis completed for the DFA. Names and personal information of the stakeholder analysis have not been included in the appendix to ensure privacy. All information is maintained by Canfor.

1. Inventory and Stakeholder Analysis Report (Stakeholder analysis report spreadsheet February 2011)
2. Inventory and Information Data (Same data as 2004 report)

Appendix 1.3: Practices Analysis

This appendix provides the resulting Practices Matrix for the DFA.

1. Canfor Practices Analysis
2. BCTS Practices Matrix
3. Canfor 2006 Forest Stewardship Plan
4. BCTS 2008 Forest Stewardship Plan

Appendix 1.4: Data / Knowledge Gaps Matrix

This appendix is a summary table listing the knowledge/information gaps (beyond data gaps) to support the Criteria & Indicators for the DFA.

1. 2011 Knowledge gap matrix

Appendix 1.5: SFM Criteria & Elements Matrix

This appendix is the set of matrices that list the localized Criteria & Elements for the DFA. The matrices include a listing of the criteria, Elements, Indicators and targets.

1. Criteria, element, indicator and target matrix

Appendix 1.6: Responsibility Action Matrix

This appendix provides the responsibility matrix for achieving or moving towards targets for each measure. The person or group responsible for each action is identified.

1. 2011 Responsibility action matrix

Appendix 1.7: Ecological Baseline Data – Supporting Tables

This appendix contains supporting tables of baseline data for ecological measures.

1. Current Percentage of Old and Mature + Old in the Defined Forest Area by Landscape Unit-BEC variant (25 pages)
2. Current condition of young patch size by LU/NDT

Appendix 1.8: Scenario Alternatives

This appendix contains a matrix that compares the various scenarios and the impact on SFM measures. From the 2004 plan. For reference only.

1. Scenario/Measure comparison matrix

Appendix 2: Certification Support Documents

Appendix 2, with all the sub-appendices, provides support documents for Certification (in this case CSA) initiatives for the DFA.

Appendix 2.1: Translation Information between SFM C&I vs. CSA

This appendix contains documents that provide the translation of SFM C&I to CSA requirement of the CSA Standards Z809-02.

1. CSA Z809-08 standard
2. 2004 SFM Plan vs. CSA Z809-08 Requirements Cross Reference Matrix
    a. Table 2: Summary of changes from 2004 Measures to the 2011 SFMP
    b. Table 3: Dropped Measures from the Amended 2004 SFMP

Appendix 2.2: Signatory Roles & Responsibilities

This appendix provides the details for the roles and responsibilities for those participating (developing, implementing, maintaining) in the SFM Plan as well as the CSA application. The primary documentation for this appendix is EMS information on Roles & Responsibilities.

1. Canfor FMS roles and responsibility matrix
2. BCTS EMS Manual, Chapter 7 – Structure and responsibilities

Appendix 2.3: Public Involvement Process

This appendix provides all the information for the public involvement process. This may include (depending on the public process): terms of reference (TOR), surveys, minutes from meetings, First Nations Agreements, etc.

1. PRISM Terms of Reference (ToR)
2. Meeting Minutes from PRISM meeting pertaining to the SFMP
    a. March 11, 2010
    b. September 16, 2010
    c. October 14, 2010
    d. November 18, 2010
    e. December 16, 2010
    f. March 10, 2011

Appendix 2.4: Results of Management Review – 2008, 2009, 2010

This appendix is a summary of the management review for the DFA.

1. Canfor Management Reviews
    a. 2008 FMS/SFM Management Review
    b. 2009 Fort Nelson SFM/FMS Management Review
    c. 2010 North Operations Management Review
2. BCTS Management Reviews
    a. 2009 Fort Nelson CSA Management Review
    b. 2010 Management Review of the 2008 Annual Report

Appendix 3: Miscellaneous

Appendix 3, with all the sub-appendices, provides additional information to support the SFM Plan for the DFA.

Appendix 3.1: Cross Reference Matrices

This appendix contains a number of matrices comparing CIMT to other initiatives: i.e. LRMP, FRPA, etc (beyond CSA)

1. Fort Nelson C&I vs. LRMP Matrix
2. Fort Nelson C&I vs. FRPA Matrix

Appendix 3.2: Glossary & Acronym List

This appendix contains a glossary for the SFM Plan. This glossary was generated from the PRISM process.

1. Glossary & Acronym List – April 26, 2011

Appendix 3.3: Citations

This appendix contains a listing of citations made throughout the SFM Plan.

1. Citation listing