SUSTAINABLE FOREST MANAGEMENT PLAN 5

for Tree Farm Licence 48

held by Canadian Forest Products Ltd.

(Plan Effective October 15, 2006)

by

Canadian Forest Products Ltd.
Chetwynd Division
Chetwynd, BC
V0C 1J0

January 30, 2015
Version 2.6

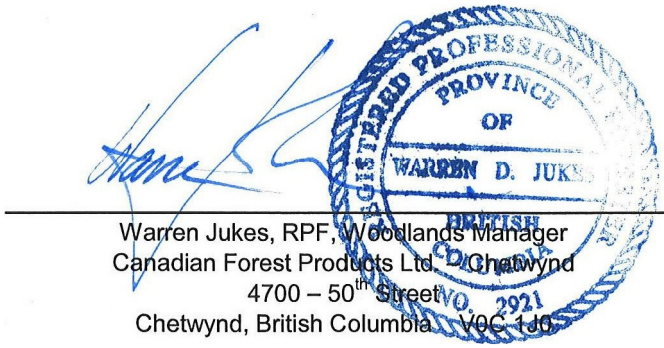
SUSTAINABLE FOREST MANAGEMENT PLAN 5

for Tree Farm Licence 48

Preparation of this plan was coordinated by:

Don Rosen, Strategic Planning Coordinator
Canadian Forest Products Ltd. - Chetwynd
4700 - 50th Street
Chetwynd, British Columbia V0C 1J0

Under the supervision of and
submitted on behalf of Canadian Forest Products Ltd.:



Warren Jukes, RPF, Woodlands Manager
Canadian Forest Products Ltd. - Chetwynd
4700 – 50th Street
Chetwynd, British Columbia V0C 1J0

ACKNOWLEDGEMENTS

Several authors, researchers and reviewers contributed in developing key components of this plan. Accordingly, Canfor-Chetwynd gratefully acknowledges these individuals for their diligence and effort in assisting with the preparation of this document:

BEALE, Jeff
BEAULAC, Ben
BERLINGER, Liz
BRANDT, Loren
BUNNEL, Fred
BURBEE, Jeremy
CAMPBELL, Wayne
CODERRE, Marc
COFFEY, Erin
DEAL, John
EASON, Jamie
ERICKSON, Jon
HILLTON, Crystal
JOHNSTON, Colin
JUKES, Warren
MCCORMACK, Jim
MILLER, Mike
NELSON, Marie
NEUMEIER, Wes
NEWBERY, Alison
NORRIS, Carol
PHIPPS, Bob
SAUGSTAD, Evan
SCHUETZ, Rob
SROCHENSKI, Jeremy
VAN TASSEL, Mark
WALLIN, Gail
WELLS, Ralph
WOODING, Paul
REGIMBALD, Darrell
FELLHAUER, Jolene

Cover Photo:
Photo by Jon Erickson from Thunder Mountain looking west towards TFL 48 Block 5 in the background

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

1.1 Purpose

The purpose of the Sustainable Forest Management Plan 5 (also referred to as 'SFMP 5' or 'the plan') document is to define the objectives, goals, commitments, and strategies for TFL 48 for the period January 30, 2015 to the replacement of this SFM Plan with SFMP6. Overall, SFMP 5 uses past performance towards predetermined milestones to measure success, involves the public to establish future performance, and provides commitments and strategies to ensure those objectives are met. SFMP 5 represents a suite of tools that we can use to develop broad resource objectives to meet explicit site-specific expectations on TFL 48.

SFMP 5 is organized into the following sections:

- Section 1 describes TFL 48 and SFMP 5.
- Section 2 describes Canfor's management principles and vision for TFL 48. It also explores existing certifications, external relationships, strategic plans and inventories.
- Section 3 specifically articulates the objectives, indicators and targets for TFL 48.
- Section 4 Links identifies linkage between the SFMP SFM objectives and resource management on TFL 48.
- Section 5 describes public review of the SFMP.
- Section 6 provides a list of references and literature cited.
- Section 7 outlines abbreviations and definitions for technical terms used in the plan.
- Section 8 is a series of appendices provide background and support for the initiatives, standards and procedures discussed in the plan.

1.2 Description of the Licence/Defined Forest Area

1.2.1 Description of the TFL

TFL 48, also known as the Chetwynd TFL, is held by Canadian Forest Products Ltd. (Canfor) and comprises five supply blocks in the western half of the Dawson Creek Forest District in the Prince George Forest Region. The blocks are clustered around the communities of Chetwynd, Hudson's Hope and Tumbler Ridge and cover approximately 643,239 hectares. For the most part, the blocks border the Dawson Creek Timber Supply Area (TSA), but they also share boundaries with the Mackenzie, Fort St. John and (for a very short distance) Prince George TSA's. Additionally, a substantial portion of the TFL (67%) overlaps the operating area of Pulpwood Agreement (PA) 13, issued to CMP.

The TFL ranges from 54^0 to 56^0 longitude and 120^0 to 122^0 latitude with the eastern portions of the TFL located in the Alberta Plateau while the western portion is within the Rocky Mountains. The northeastern parts of the TFL lie on flat or gently rolling terrain in the Boreal White and Black Spruce biogeoclimatic zone. Further west and south the licence area enters the lee side of the Rocky Mountains, and the more rugged terrain there falls in the Engelmann Spruce-Subalpine Fir, Sub-Boreal Spruce and Alpine Tundra biogeoclimatic zones. This diversity of terrain and climate has led to considerable variation in tree species and productivity. The principal commercial species are white spruce and aspen in the northeast, and white spruce, lodgepole pine, subalpine fir, aspen and cottonwood in the mountainous areas to the west and south.

The communities in the area are Chetwynd (over 3000), Tumbler Ridge (over 2300), Hudson's Hope (over 1,100), Saulteau (over 180), West Moberly (approximately 70) and Moberly Lake (over 100). Of these, Chetwynd, the site of Canfor's sawmill, is the most economically dependent upon harvesting operations in TFL 48. Other economic activities in the area include oil and gas, mining, hydroelectric power generation, agriculture, trapping, outdoor recreation and public

service. A requirement of the CSA standard CAN/CSA-Z809-08 (CSA 2008) is to define "a specific area of forest, land and water delineated for the purposes of registration of the Sustainable Forest Management System". Canfor has chosen to define TFL 48 as the Defined Forest Area (DFA) for the purposes of certification. The terms DFA and TFL will be used interchangeably throughout this document.

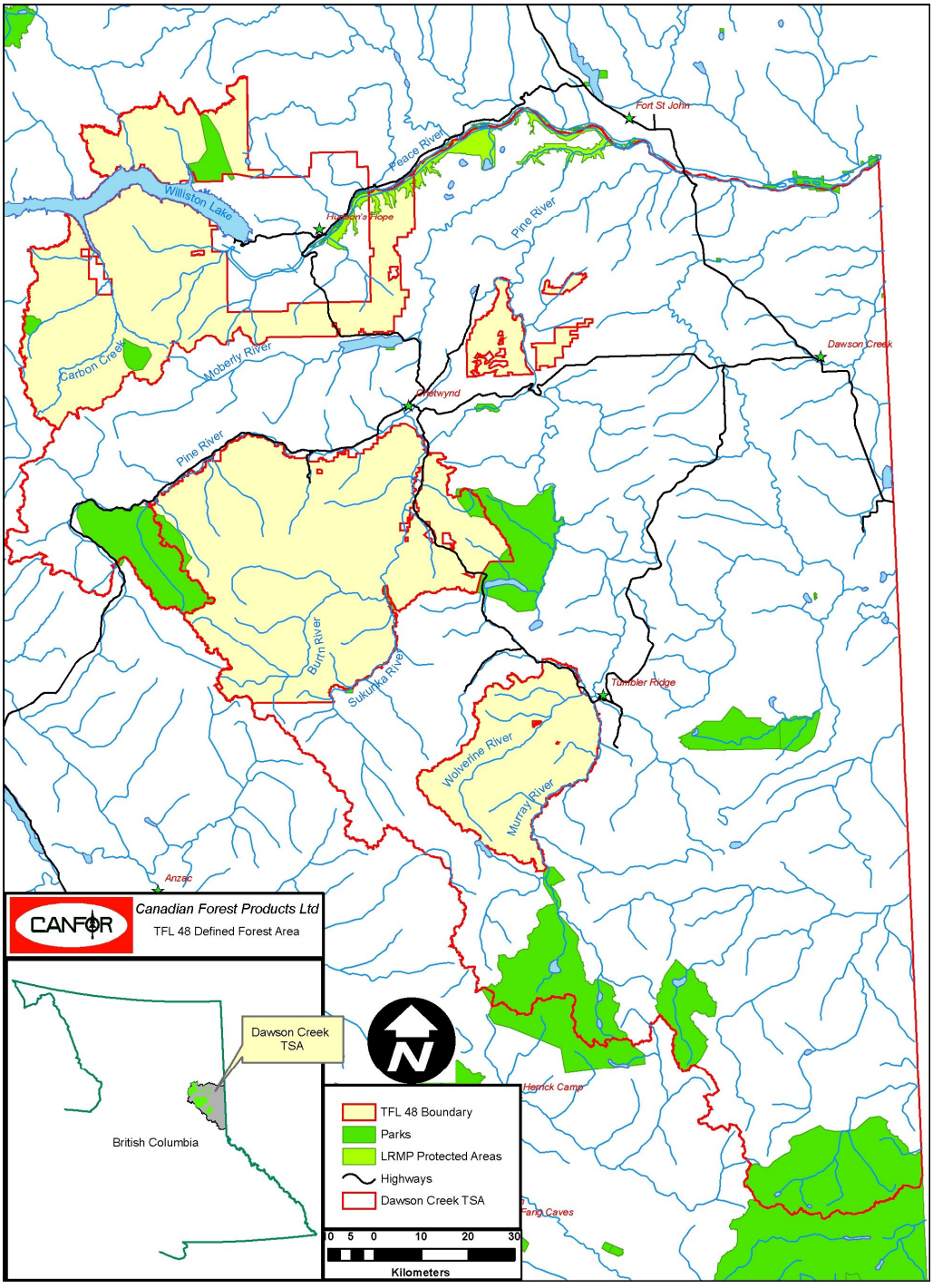


Figure 1: Tree Farm Licence 48 Defined Forest Area

1.2.2 History

TFL 48 was first awarded to Canfor on December 1, 1988. It was first replaced 10 years later on December 1, 1998. The most recent replacement Tree Farm Licence (TFL) 48 agreement came into effect on December 1, 2008. The document has been amended over time through Instruments 4 and 5. Instrument 4 came into effect on April 1, 2000 to reflect changing government policy. Instrument 5 came into effect on July 27, 2004 to remove some fields in the Rice property, and add some forested land in the Stewart Lake area, north of the Rice property.

As part of the granting of TFL 48 to Canfor, Canfor committed to eliminating specified pre-1982 backlog NSR areas on the TFL no later than November 30, 2008.

Canfor manages the area according to a long term strategic plan. Our continuous improvement approach allows us to periodically revisit regulatory changes, determine new resource needs, identify information deficiencies, review our management goals and objectives, and develop a forecast that sustains the harvest level over several rotations. The key to this approach is to make our assumptions explicit so they can be measured, monitored and adjusted to reflect future management strategies.

MP 3 was approved by the Ministry of Forests for a five year planning period from October 15, 2001 to October 14, 2006. MP 4 was approved July 24th 2007 and was made retroactively effective for October 15, 2006. The term was set to expire September31, 2011 however amendments to government regulation has eliminated the need to approve Management Plans and thus this MP has no expiry date.

A number of significant forest management initiatives of local and provincial importance have developed since the approval of MP 3, including:

- Change of CSA standard to Z809-08 from Z809-02
- Approval of Instrument 5 of the TFL 48 Licence document. This removes fields on the Rice Property and adds forested land in the Stewart Lake area.
- Completion of the Dunlevy Creek Management Plan under the Dawson Creek LRMP
- Change of CSA standard to Z809-02 from Z809-96
- Removal of new woodlot areas from the TFL
- Completion of VRI
- Introduction of Forest Range and Practices Act for the eventual replacement of the Forest Practices Code

These developments directly impact our management approach and our productive land base allocation. The SFMP will address these changing economic, social and environmental needs.

In April 1997 Canfor purchased the Rice Property for inclusion into TFL 48. In August 1998, the Ministry of Forests and Range approved the transfer of land into TFL 48 and the conversion to coniferous forests. To preserve the cultivated fields present on the Rice property, a land transfer was approved to remove the fields, and add immature forested land from the nearby Stewart Lake area. This was approved on July 27, 2004 through Instrument 5. The addition of the Rice Property/Stewart Lake land (6,295 ha gross) increased the operable landbase through the conversion of marginal agricultural land, mature deciduous stands and logged over coniferous sites to sustainable coniferous forest management.

1.2.3 Licence Holder and Administration

Canfor is a leading integrated forest products company based in Vancouver, British Columbia. The company is the largest producer of softwood lumber and one of the largest producers of northern softwood kraft pulp in Canada. Canfor's North American facilities produce high-quality dimension lumber, value-added finishing products, and top-quality pulp & paper. Canfor is also also a leading producer of wood pellets and green energy.

Through its operations, affiliated companies and contractors, Canfor employs approximately 9,700 people.

Canfor is based in Vancouver, British Columbia, with operations in Canada (British Columbia, Alberta and Quebec) and the United States (North Carolina and South Carolina). The main operating company is Canadian Forest Products Ltd., from which the name Canfor is derived.

The Chetwynd division of Canadian Forest Products Ltd located in Chetwynd manages TFL 48.

2 SUSTAINABLE FOREST MANAGEMENT

2.1 Management Principles

Canfor adopts an adaptive management approach in the short-term to achieve long-term goals of sustainable forest management (SFM). This incorporates the experience gained from the results of previous management methods and actions into updated objectives and strategies. The key to adaptive management is making strategies and assumptions explicit so they can be measured, monitored, and adjusted for future management strategies.

Canfor has defined the guiding vision, policies and principles for the company in the following documents: Mission Statement, Environment Policy and Forestry Principles. Canfor's commitment to:

(1) Achieve and maintain SFM;
(2) Meet or exceed all relevant legislation, regulations, policies, and other requirements to which the organization subscribes;
(3) Respect and recognize Aboriginal title and rights, and treaty rights;
(4) Provide for public participation;
(5) Provide participation opportunities for Aboriginal Peoples with rights to and interests in SFM within the DFA;
(6) Provide conditions and safeguards for the health and safety of DFA-related workers and the public;
(7) Honour all international agreements and conventions to which Canada is a Signatory;
(8) Improve knowledge about the forest and SFM, monitor advances in SFM science and technology, and incorporate these advances where applicable; and
(9) Demonstrate continual improvement of SFM.

are demonstrated through the following documents as well as the SFM Plan and processes.

2.1.1 Canfor Mission Statement

Canfor's Mission

We will be a highly successful competitor in the global forest products industry, managing with integrity the resources entrusted to our care.

We will be characterized by:

- Employing and developing highly motivated, empowered and committed people who enjoy their work.
- Consistently satisfying customer needs with quality products and services
- Enhancing the forest resource, ensuring responsible stewardship of the environment, and protecting human health and safety.
- Encouraging, recognizing and rewarding excellence in all our endeavours, with an emphasis on innovation and results.
- Increasing value for shareholders.

We will be guided by the core values of integrity, trust, openness and respect for people.

Figure 2: Canfor's Mission (2011)

2.1.2 Canfor Environment Policy

Environment Policy

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.

Don Kayne
President and Chief Executive Officer

Ronald L. Cliff
Chairman

May 2011

Figure 3: Canfor's Environment Policy (2011)

2.1.3 Canfor's SFM Commitments

Canadian Forest Products

Sustainable Forest Management Commitments - May 2012

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.

Opportunities for Participation
We will provide opportunities for the public, communities, other stakeholders and Aboriginal Peoples 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.

_____
Don Kayne

President and Chief Executive Officer
May 2012

Figure 4: Canfor's SFM Commitments (2012)

2.2 Forest Management Systems Certification

2.2.1 ISO Environmental Management System

As a preparatory step to sustainable forest management certification, Canfor developed an environmental management system (EMS) for the company's woodlands operations. In November 1999 this environmental management system was certified to the ISO 14001 standard developed by the International Organization for Standardization. The company EMS provides a platform on which to build the sustainable forest management elements required to meet CAN/CSA-Z809-08.

2.2.2 CSA Sustainable Forestry System

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 System standard CAN/CSA-Z809-96. TFL 48 was initially registered to the CSA Standard in July 2000 and was re-registered in October 2002. Re-registration was conducted in 2005 to the CAN/CSA-Z809-02 standard. Additionally in 2005 BCTS expressed interest to join the certification for their operation on TFL 48. A gap analysis was completed in the fall of 2005 and a BCTS registration audit for their operations was conducted in the fall of 2006. In July of 2007 the Ministry of Forests and Range approved the SFMP4 dated September 26, 2006. Re-registration was again conducted in 2008. Re-registration in 2011 to the CAN/CSA-Z809-08 standard occurred. Management Plan content was removed from the SFMP in 2015.

2.3 Roles and Responsibilities

Canfor is not the sole operator within TFL 48. BC Timber Sales has access to 54,330 m^3 per year of conifer leading volume. Chetwynd Mechanical Pulp has access to 55,000 m^3 of deciduous leading volume through the PA 13 licence.

2.3.1 BC Timber Sales

Canfor and BCTS had agreed to seek a joint certification to the CAN/CSA-Z809-02 standard in 2006. See Appendix 2 – BCTS SFM Policies for copies of BCTS Environment Policy and Sustainable Resource Management Policy. This SFMP serves as the SFMP for this process.

Canfor has jointly developed Operating Guidelines with BCTS for their operations within TFL 48. Canfor retains control over the planning stages of these areas and can therefore directly ensure that the proposed cut blocks meet the SFM objectives. BCTS has the responsibility to report all harvesting and silviculture activities to Canfor until free growing has been achieved and is committed to operate within the requirements of the joint certification SFM plan. Canfor incorporates all of the BCTS activities in the annual reports. In addition to this summary a detailed responsibility action matrix has been developed for all the indicators listed in section 3 which includes all of BCTS responsibilities as well as Canfor's.

BCTS had awarded 40,000 m3/year of their allocation to licence A64393 issued to Emporium Investments Ltd. All of the blocks harvested in this licence have been included in the analysis supporting this SFMP. Approximately 178,101 m^3 was laid out during MP 3 and will not be subject to stand level requirements of SFMP 5. All future blocks will come from Canfor's FSP and Canfor is responsible for conducting the analysis for these areas. BCTS assumes the responsibility to ensure layout conducted after 2005 and harvesting activities are consistent with this SFMP. This licence expired April 19, 2011. BCTS retains the silviculture liability for this licence.

2.3.2 Other Forest Tenure Holders

Canfor had a memorandum of understanding with the former PA 13 holder, Louisiana Pacific. When LP sold the license to CMP which was purchased by Chetwynd Mechanical Pulp (CMP), this MoU was dissolved. Although a new agreement has not yet been formalized with CMP, Canfor and CMP have been operating under the intent

of the former MoU. CMP has the same commitment to report activities to Canfor, so that they can be incorporated into the annual reports.

2.3.3 Other Industrial Users (Oil and Gas, Mining, etc)

All oil, gas and mining activities (e.g., seismic, roads, pipelines, well sites, mine sites) proposed for the TFL are referred to the Canfor office. Canfor provides comments to minimize impacts on the timber harvesting land base (e.g., reforest disturbed sites), proposed road locations and known resource features.

For oil and gas these comments are provided to the company proposing development. The company is then obligated to report these comments and how they will incorporate these comments to the Oil and Gas Commission.

For mining activities (e.g., mine review) the comments are provided to the company proposing development and to the Ministry of Energy and Mines.

Canfor offers to purchase merchantable coniferous timber from these developments at market value.

Industrial developments (e.g., well sites, pipelines, mines) are mapped by Canfor and included in timber supply analysis.

2.3.4 Chetwynd Public Advisory Committee

The Chetwynd Public Advisory Committee (PAC) serves to provide the vital public participation component of SFM in Canada. Since its first meeting on February 4, 2000, the members' participation has enhanced their own knowledge of SFM in general and has provided a valuable opportunity to be involved with the decision making for the local forest.

2.4 Existing Strategic Plans

2.4.1 Dawson Creek Land and Resource Management Plan

Objectives for values and resources, and acceptable uses on Crown land, were outlined in the Dawson Creek LRMP, a public land use process. The plan was approved by cabinet on March 4, 1999. The plan incorporates the principles of integrated resource management into a long term plan (ten years) for resource development on Crown land within the Dawson Creek Timber Supply Area (TSA) and TFL 48. TFL 48 falls completely within the area covered by the Dawson Creek LRMP.

The Dawson Creek LRMP is the outcome of the deliberations of a range of local private citizens, stakeholders, including Canfor and government agency representatives. The Dawson Creek LRMP process incorporated a form of consensus-based decision-making that enabled general agreement on all issues.

The Dawson Creek LRMP adopts the following principles as stated in the approved document:

- Sustainable use of renewable natural resources.
- The management of any one resource shall take into consideration other resource values, rights, tenures, and development opportunities and shall recognize the biological and physical limitations of the land and resources.
- Maintenance or enhancement of the quality of life, social and economic stability, employment opportunities including job creation, and the vitality of the local communities.
- Acknowledgement that communities located within the planning area should have the opportunity to benefit from the natural resources within the planning area. This can be achieved through, but is not limited to, the following: economic diversification, managed access to resources, and increased value-added manufacturing and processing.
- Land, water, air and all living organisms are integral parts of the ecosystem and should be sustained and accommodated by management plans.

An implementation plan for the LRMP has been developed and is reviewed periodically by a core of representatives from the original planning table. The implementation plan is under the direction of the Ministry of Agriculture and Lands.

Forest resource planning conducted by Canfor, including the Sustainable Forest Management Plan, will be consistent with the objectives of the Dawson Creek LRMP. Canfor is committed to managing to the spirit and intent of the LRMP and this is reflected in this SFMP. Appendix 11 – Linkages of SFMP 4 to Dawson Creek LRMP cross-references the linkages between SFMP 4 objectives, indicators and targets, and the Dawson Creek LRMP objectives.

2.4.2 Dunlevy Creek Management Plan

The Dawson Creek LRMP identifies several special resource management zones in recognition of their respective wildlife habitat / wilderness recreation values. The Dunlevy Creek Special Management Zone (SMZ) is one of these zones.

Under the direction of the LRMP, the Dunlevy Creek SMZ project was initiated in May 2000. This project resulted in a strategic management plan for the Dunlevy Creek SMZ that guides oil and gas development and the disposition of petroleum and natural gas tenures, and enables landscape level planning to guide forest development.

In the Dunlevy Creek Management Plan, recommendations to coordinate resource development activities among tenured users and to plan resource developments in consultation with interested stakeholders in the Dunlevy Creek SMZ are intended to integrate resource planning and development in a manner that is consistent with the Dawson Creek LRMP.

Refer to Section 3.9 for specific information on the Dunlevy Creek Management Plan.

2.5 Sustaining Biological Richness

The concept of “sustaining biological richness” as described in this SFMP was derived from the work initially developed by Dr. Fred Bunnell and the Weyerhaeuser Adaptive Management Working Group (Bunnell et. al. 2003). This concept is further described in discussion papers completed for Canfor’s TFL 48 (Bunnell 2002), and for the Prince George Timber Supply Area (Wells et. al. 2003b). The following section describes the importance of “sustaining biological richness” as it relates to “biodiversity” and three “indicators” that may be used to assess achievement. The term “indicator” used by Bunnell et. al. 2003; Bunnell 2002; and Wells et. al. 2003a,b is used in the context of providing broad qualitative tests not to be confused with the indicators in Section 3 of this plan, which are specific measures of performance.

Table 1 identifies biological richness and the indicators and sub-indicators defined by Wells et. al. 2003a,b. Performance indicators are contained in Section 3 that measure and demonstrate performance with regard to the conservation of biological richness over time.

Table 1: Biological Richness and its Indicators and Sub-indicators (Wells et. al. 2003)

Biological Diversity Criterion: Biological richness and its associated values are sustained within the management unit.	
Indicator 1: Ecologically distinct ecosystem types are represented in the non-harvestable land base of the management unit to maintain lesser known species and ecological functions.	
Indicator 2: The amount, distribution and heterogeneity of habitat and landscape structure important to sustain biological richness is maintained over time.	Coarse woody debris
	Large live trees
	Cavity trees (snags)
	Shrubs
	Broad-leaved trees
	Riparian areas
	Late seral and early seral
	Adjacent or continuous canopy
Indicator 3: Productive and well-distributed populations of forest dwelling species are maintained over time.	

Table 2 identifies the critical habitat and landscape elements (sub indicators in Table 1) defined by Bunnell et. al.1999 and their importance for ecosystem management.

Table 2: Habitat and Landscape Elements Identified by Bunnell et al. (1999)

Coarse woody debris (downed wood)	Important habitat for a wide range of invertebrates, small vertebrates and cryptogams (mosses, liverworts and lichens). Large variations in persistence exist by size (diameter) and species.
Large live trees	Important contributors to snags and coarse woody debris. Important for larger sized cavities. Abundance dramatically affected by forest management.
Cavities (snags)	Snags form critical habitat for at least a portion of the life cycle for a significant portion of all animal species. Tree species preferences exist. Large variations in persistence exist by size (diameter) and species.
Shrubs	Important as food sources for many species (leaves and berries). Important as a habitat component for small mammals and birds, including nest sites. Species diversity increases in early seral, riparian and open stands.
Broad-leaved trees	Mixtures of coniferous and deciduous trees frequently increase niche diversity. Deciduous snags are frequently preferred as habitat for cavity dwellers. Broad-leaved trees are frequently early seral colonizers, and abundance may decline in low intensity managed and unmanaged areas protected from fire.
Riparian	Unique assemblages of species and stand structures. Frequently large impacts on aquatic habitat through temperature controls and biotic inputs. Potentially large impact on water quality.
Late seral and early seral	Very old and very young stands have the greatest niche diversity. Many species appear dependant on either late or early seral stands. Relative importance varies with natural disturbance type and large impact on habitat. Influences water quality and quantity through leaf area (evapotranspiration) and runoff.
Adjacent or continuous canopy	Important habitat attribute for some species through influences on species movements. When coupled with spatial considerations, has a large impact on habitat connectivity. Closely associated with patch size and seral stage distributions. Relative frequency of forest opening of different sizes. Major influence on decisions related to scale. Large impact on interior forest and thus habitat.

The term "***biodiversity***" is complex and difficult to demonstrate the conservation of the value over time. Biological richness is a much more concise term and is a credible surrogate for biological diversity (Bunnell 1998; Wells et. al. 2003a,b,c). The intent of sustaining biological richness is to maintain productive, well-distributed populations of species in a defined management area over time, and can be assessed through the use of the three (3) indicators identified in Table 1:

- Ecosystem representation
- Habitat and landscape elements
- Species productivity and distribution

Biodiversity: The variability among living organisms from all sources including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems. (Canadian Biodiversity Strategy 1995)

Ecosystem representation is a coarse filter approach intended to ensure a proportion of ecologically distinct ecosystem types are maintained within the non-harvestable land base (NHLB). Maintaining representative ecosystems in an unmanaged state (i.e. NHLB) is important for three (3) reasons (Wells et. al. 2003): 1) They sustain poorly understood ecological functions and species habitat requirements; 2) They act as a precautionary buffer against errors in efforts intended to sustain species in the managed forest, and; 3) They provide an ecological baseline against which the effects of human activities can be compared.

Habitat and landscape elements are structural attributes that occur at a variety of temporal and spatial scales. Maintaining these elements is a medium filter approach and is important for two (2) reasons (Bunnell and Kremsater 1990; Lindenmayer and Franklin 2002; Wells et. al. 2003): 1) Studies have shown that most forest dwelling species require these elements as a habitat requirement, and; 2) Forest management activities have a strong influence over the abundance, distribution and functionality of these elements.

Species productivity and distribution is a fine filter approach intended to monitor the presence and trends of species in response to changes in habitat structure and pattern. This indicator is a long-term adaptive approach, which tests the "effectiveness" of the provisions designed to manage indicators 1 and 2 (above). This approach is often referred to as "effectiveness monitoring" and relies on the results of long-term forest monitoring and research programs such as, forest inventory monitoring plots, and wildlife research that supports species accounts (distribution and abundance). As stated above, effectiveness monitoring can be used to support adaptive management or continuous improvement of forest practices related to Indicators 1 and 2 (see Table 1) over time. Continuous improvement of the SFMP is further discussed in Section 2.9.

2.6 Natural Disturbance Unit Planning

Natural disturbance unit planning refers to the work completed by DeLong (2002) which provides a summary of research findings to illustrate the range of natural variability for some of elements described in Table 2 across a set of Natural Disturbance Units (NDU). The Ministry of Sustainable Resource Management and the Ministry of Forests have indicated (MSRM and MoF 2002) that the guidance provided in DeLong 2002, is a synthesis of the most current scientific information on the natural range of variability for habitat management in the previous Prince George Forest Region. The indicators and targets identified in Section 3 therefore rely on DeLong 2002 for local-level baseline information.

The underlying assumption of NDU's is that the biota of a forest is adapted to the conditions created by natural disturbances and thus should cope more easily with the ecological changes associated with forest management activities if the pattern and structure created resemble those of natural disturbance.

The underlying assumption of NDU's is that the biota of a forest is adapted to the conditions created by natural disturbances and thus should cope more easily with the ecological changes associated with forest management activities if the pattern and structure created resemble those of natural disturbance (Hunter 1993, Swanson et al. 1993, Bunnell 1995, DeLong and Tanner 1996, Bergeron and Harvey 1997, Angelstam 1998, DeLong and Kessler 2000). Adopting forest management practices that approximate the natural range of variability is being widely accepted as an appropriate way to manage for the needs of many organisms. The Biodiversity Guidebook (1995) was the first attempt in British Columbia to present guidance for forest management based on the natural disturbance template. Since the completion of the Biodiversity Guidebook, more information on natural disturbance dynamics has become available. Within the Prince George Forest Region a number of studies have investigated particular aspects of natural disturbance (DeLong 1998, DeLong and Kessler 2000, Lewis and Lindgren 2000, Rogeau 2001).

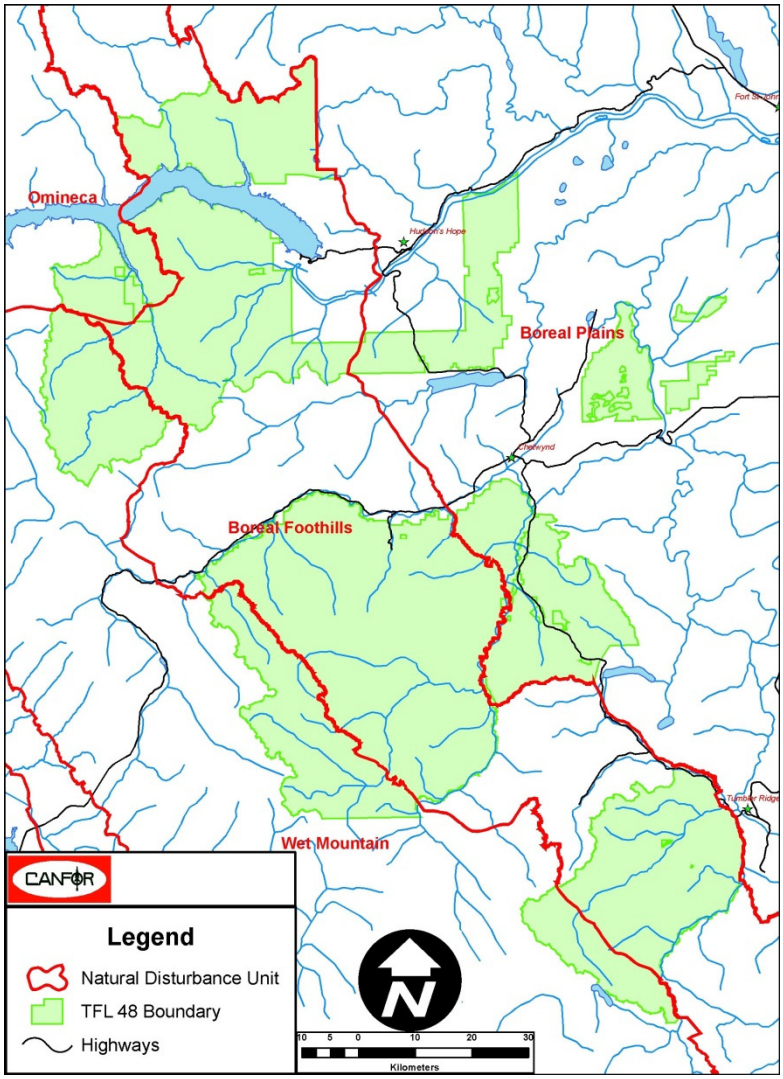


Figure 5: Natural Disturbance Units

Instead of adopting the Natural Disturbance Types (NDT's) presented in the Biodiversity Guidebook (1995) DeLong 2002 presents information for nine Natural Disturbance Units. These units better separate areas based on differences in disturbance processes, stand development, and temporal and spatial landscape pattern. DeLong 2002 contains guidance on management of old forest, young natural forest, patch size distribution, and stand species composition and structure. Most of the guidance relates to approximating wildfire as it was the key stand

replacement disturbance agent in most landscapes and it is the one that we have exhibited the most control over. In other words it is the disturbance process we are attempting to replace with harvesting.

Examples of how this plan has adopted the principles identified in DeLong 2002 include:

- Maintenance of some naturally disturbed areas over time, which is not salvaged.
- Openings, which represent a more natural patch, size distribution.
- Providing for stand-level characteristics (e.g. species composition, stand structure) that emulate natural baseline information as much as possible.

To move towards a more natural range of variation and to emulate patterns of natural disturbance many of the indicators and targets identified in Section 3 are established at a NDU or DFA level, as opposed to management strategies directed at individual stands or cutblocks.

2.7 Resource Inventories

Canfor has completed a variety of resource inventories since it was awarded TFL 48. These are periodically updated as needed to meet strategic or operational planning needs. Key inventories are briefly discussed below while additional detail is provided in the information package (Appendix 5 – Timber Supply Analysis Information Package).

Vegetation Resource Inventory

Canfor recently completed several projects focusing on improving forest cover or Vegetation Resource Inventory (VRI) information within TFL 48. These projects include:

- Photo Interpretation (Phase I) – Classification completed in June 2000 to the VRI 1998 standard.
- Ground Sampling (Phase II) – Sampling forest cover polygons and compiling the data was completed in the fall of 2002 to the VRI standard.
- Adjustment – Statistical analysis and adjustment of the VRI was completed in March 2003 to the VRI standard.
- Net Volume Adjustment Factors (NVAF) – Sampling trees from the Phase II project, compiling, analyzing and adjusting the VRI was completed in March 2005 to the VRI standard. See report titled Tree Farm Licence 48 Vegetation Resources Inventory Statistical Adjustment (Appendix 9 – TFL 48 Vegetation Resource Inventory Statistical Adjustment).

Recreation

The most recent recreation inventory was completed in 1994 to the MoFR standard, while a separate inventory of recreation sites and trails was completed in 1999.

Visual Landscape Inventory

During the term of MP 2 (1994), an inventory of visual portions of the TFL landscape was completed by Canfor. In 1999 this visual landscape inventory was added to and updated to the 1997 standard. In 2005 the Ministry of Forests consolidated all visual landscape inventories within the previous Dawson Creek Forest District (TFL48 and Dawson Creek TSA). During this process it was discovered that some areas that had been declared and made known were not part of the TFL 48 visual inventory used in MP3. The 2005 consolidated inventory that was provided by the MoFR, and identifies polygons having an existing VQO (EVQO) on the file, is used in the base case for TFL 48.

The areas added during the 1999 inventory are represented in the 2005 consolidated inventory with recommended VQO's (RVQO). Sensitivity analysis will be carried out that adds 'Recommended' VQO's to the 2005 consolidated visual landscape inventory. The sensitivity analysis is the cumulative amount of established and recommended VQO's from the 2005 consolidated inventory.

Terrain Mapping

In March 2001 Terrain Mapping to the RIC 1994 standard was completed for TFL 48. This inventory along with a landslide inventory formed the basis for operability definitions and the Predictive Ecosystem Mapping.

Physical Operability

Using the terrain components of the TEM work completed for the Burnt River LU and the Lower Sukunka LU, the terrain mapping for the remainder of the TFL, and the Landslide Inventory Terrain Stability Classes were derived for the entire TFL using the Stability Index MAPing (SINMAP) model.

The SINDEX map is then further analyzed and classified into physical operability classes.

Predictive Ecosystem Mapping

Using the terrain mapping completed for the TFL along with VRI and TRIM data a predictive ecosystem map was completed for TFL 48 in January 2003. An August 2006 accuracy assessment demonstrated that the area weighted dominant correct score on the PEM database, based on 88 field polygons is over 77%. This information is used for habitat modeling and managed stand site index estimates.

Fish and Fish Habitat

Since 1995, Canfor has been conducting 1:20,000 reconnaissance level RIC standard fish and fish habitat surveys within TFL 48.

RIC standard reconnaissance level fish and fish habitat inventories have been completed across the TFL. In 2005 Canfor completed the stream modeling project which assigned stream classifications based on stream barriers and derived stream width for all streams within TFL 48. This information is used for strategic planning purposes.

Fish inventories will continue to be required on an operational basis (e.g., cut block and road planning).

Cultural Heritage

Canfor obtained GIS coverage's for the Archaeological Overview Assessment (AOA) and Archaeological Site Information for the Dawson Creek Forest District from the Ministry of Small Business Tourism and Culture (MSBTC) in June 1999. The data is maintained under a Confidentiality Agreement with the MSBTC.

At the time of timber supply analysis there were 20 known heritage sites within the TFL, six of these sites occurred within new Protected Areas and up to six of the known sites were expected to occur in riparian management areas.

We have completed over 50 Archaeological Impact Assessments (AIAs) for forest roads and cut blocks since 1995. To date we have not found any Heritage Resources during these surveys. Canfor expects that heritage resources will be identified and protected on site-specific areas in the future.

Wildlife and Wildlife Habitat

Since 1996, Canfor has undertaken a series of measures to address wildlife and wildlife habitat. These measures include wildlife habitat modeling (Table 3), wildlife inventories, habitat monitoring and wildlife research.

Wildlife habitat modeling on TFL 48 began in 1997. The species chosen for habitat modeling (Table 3) were selected relative to their importance as defined in the LRMP, and to their provincial or federally listed status. The list was presented to Canfor's Public Advisory Committee (PAC) in April-May 2000 and subsequently revised based upon expert opinion. These models have been forecasted explicitly and reported on in the SFMP (see section 3.10)

Table 3: Species Selected for Habitat Modeling and Some of the Criteria for their Selection

Species	National Status	Provincial Status	LRMP/Local Use
Grizzly Bear	Vulnerable	Blue/Identified	Locally Important/Hunting
Marten			Trapping
Fisher		Blue/Identified	Trapping
Wolverine			Trapping
Caribou	Vulnerable	Blue	Hunting
Moose			Hunting
Elk			Hunting

All models have been developed through the cooperative efforts of Canfor, MELP, Forest Renewal BC and Forest Investment Account. The models are based on the relationships between a site series (as identified by Predictive Ecosystem Modeling (PEM) or Terrestrial Ecosystem Mapping (TEM)), and the

structural stage of the forest as derived from Vegetation Resources Inventory (VRI) and forecasted in the spatial modeling forecast. The animals' relationship to its habitat is based on the literature including local studies and environmental impact assessments wherever possible. Detailed ground sampling throughout the TFL as part of the TEM and Terrain mapping processes was used to assist in developing the species habitat relationships.

2.8 Managed Stand Monitoring

Under the principles of SFM, monitoring is defined as the periodic measurement and assessment of change of an indicator, where an indicator is a variable used to report progress towards achieving an objective. Objectives are broad, general statements that describe a desired state or condition related to one or more forest values (CAN/CSA-Z809-08). In this context, two broad categories of monitoring can be recognized. The first, which may be referred to as "administrative monitoring", checks that planned SFM activities are carried out (i.e., did we do what we said we were going to do?). An example is monitoring to ensure conformance with late seral targets.

The second category of monitoring may be referred to as monitoring the state of the forest, which includes activities that measure timber and non-timber variables over time. Growth and Yield (GY) monitoring, which is the process of checking GY estimates for a defined population, is in this broad category. Monitoring the state of the forest requires a long-term commitment to establishing and re-measuring plots over time.

Monitoring is a key process in adaptive management. It is a feedback loop that provides information for continuous improvement. The level of success in achieving objectives can be evaluated and planning and management activities can be improved accordingly.

Canfor is committed to implementing a GY monitoring program for managed stands within the TFL 48 DFA. This program is based upon a 2-km grid covering the whole DFA. When any one of the points is harvested a GY monitoring plot will be established 15 years post-harvest and periodically re-measured over time. The GY monitoring objectives for the TFL 48 DFA are as follows:

- Monitor the change in volume, species composition, top height, and site index in managed stands from 15 years post-harvest onwards.

  The intent is that this data will be compared with predicted values of the same attributes used in timber supply analysis. This is to develop a level-of-confidence in the accuracy and precision of projections used in timber supply analysis. This data can also be used to address several SFM indicators pertaining to maintaining or improving the harvest level over time.
- Provide data on snags, coarse woody debris, and shrubs to address SFM objectives.
- Provide data on stand growth and development that can be used as a subset of the data required for developing new GY models.
- Use a sample design that can be modified in the future to incorporate establishment of plots in mature stands and linkages with other inventory sampling.

See Appendix 10 – TFL 48 Change Monitoring Inventory Sample Plan for a detailed description of the sample design and objectives developed for the TFL 48 DFA.

2.9 Continuous Improvement

In keeping with the principles of SFM, opportunities to continuously improve the SFMP are built into the SFM process. Continuous improvement relies on the ability to recognize, plan for, and adapt to change as it occurs. As time goes by, changes will occur to both the practice of forest management and the process in which it is delivered. Ensuring that a process is in place to accept and adapt to change is a necessary part of SFM. To ensure continuous improvement occurs means that the sources of "change" are recognized and strategies developed to accept and adapt to these changes. Table 4 identifies the sources of change with regard to forest management and the strategies that are in place to adapt.

Table 4: Continuous Improvement Process for the SFMP

Source of Change	Adaptation Strategy
Change in environmental circumstance i.e. natural events such as large fires or insect epidemics.	• Performance monitoring as outlined in Section 3 will occur on an annual basis. • Conduct an annual *performance management evaluation and review* of monitoring results and compare to original targets. • Adjustments to practices and/or targets are made.
New information that can reveal assumptions, targets or measures are incorrect or could be improved.	• Adjustments to practices and/or targets are made as a result of the new information.
Changing social values or SFM criteria/standards.	• Periodic meetings are held with the Public Advisory Committee annually to gather local changes in public values over time. • The annual performance management evaluation and review will take into account government policy and land base planning and zonation changes. • Annual audits will be completed to verify compliance to the existing SFM Criteria/Standards. • Adjustments to practices and/or targets are made if necessary.

Continual improvement includes the incorporation of new information and knowledge, the identification of other information gaps, and undertaking research to address such gaps. The incorporation of new knowledge and understanding allows for better management approaches to evolve. Continual improvement activities also include modifications to the adaptive management system as a result of what is learned from indicator monitoring. Indicator results provide a means to evaluate the achievement of objectives and to determine whether values are being maintained. This process may also reveal issues with the SFM system that requires adjustment to the SFM system in part, or as a whole.

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

The SFMP is intended to be delivered and implemented through the existing FMS organizational structure. Since the FMS is designed as a performance management loop, the SFMP will continuously improve, adjust and adapt to changing circumstances.

3 SFM OBJECTIVES, INDICATORS AND TARGETS

Values & Objectives - What is locally important and what is desirable?

The first step in developing the SFMP is to identify what is locally important and describe what is desirable. This involves reviewing SFM standards and TFL 48 licence requirements and comparing them to the local area so that *values* that are considered locally important are identified. Once values are identified, one or more *objectives* are then developed to describe the future state or condition of each of the values. Objectives are usually broad, general statements that are qualitative as opposed to quantitative. To develop this SFMP, local values and objectives were derived from reviewing SFM Standards, TFL 48 Licence requirements, LRMP's and input from the PAC.

Objective: a broad statement describing a desired future state or condition for a value.

Indicator: a variable that measures the state or condition of an objective for which one or more targets is set.

Target: a specific statement describing a desired future state or condition of an indicator. Targets are succinct, measurable, achievable, realistic, and time bound.

Indicators & Targets - How do we know we have been successful?

A method of knowing when we are successful has often been a missing link within past and contemporary forest management plans. Strategic objectives are well defined throughout BC, but forest managers are often challenged with implementing on-the-ground practices and knowing whether or not the overall strategic objectives have been met. To overcome this uncertainty, SFMP's establish one or more performance measures *(indicators)* for each objective. One or more *targets* are then identified for each indicator. This is a fundamental difference between SFMP's and other strategic plans that exist throughout the Province. Indicators and targets are also a core part of the Performance Management system as a whole. A detailed description of each indicator and target are provided as demonstrated in the example below.

X INDICATOR

Criterion #:	**Element #(s):**
Criterion Topic	Element Topic
Core Indicators Relevant to Indicator and Target	
Indicator Statement	**Target Statement**
A reiteration of the indicator as identified in the landscape level strategy or the SFM matrix	A specific statement describing a desired future state or condition of an indicator. Targets are succinct, measurable, achievable, realistic, and time bound
Value(s): A description the SFM Value(s) that this indicator and target relate to.	
SFM Objective: A description the SFM objectives that this indicator and target relate to.	
Canfor common indicator statement: Intended to replace Indicator Statement once TFL Management Plan is separated from the SFMP.	

ACCEPTABLE VARIANCE

This provides the acceptable variance from the desired level of the Indicator.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

A description of the indicator.

CURRENT STATUS

The information provided under this heading summarizes the current state (if known) and objective levels of the quantifiable indicator. This information will usually be summarized in table format by Natural Disturbance Unit and BEC sub zone, or whatever scale at which the objective is to be met. Where current and quantitative information is available for the indicator, that information will be presented here.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

CSA specifies that: a) quantitative and long-term projections of expected future indicator levels have been prepared; b) that the assumptions and analytic methods used in forecasting have been specified; and c) the public participation process was used to select the preferred forecast.

Where possible and when they exist, this section provides a summary of the forecasting assumptions and analytical methods used to project a variety of possible future forest conditions that could result from present forest management activities.

STRATEGY AND IMPLEMENTATION SCHEDULE

A description of the chosen strategy, including all significant actions to be undertaken and their associated implementation schedule.

MONITORING PROCEDURE

The information provided under this heading summarizes the sources of monitoring information, timing and frequency of monitoring to ensure that Canfor meet the targets.

LINKAGES TO OPERATIONAL PLANS

A demonstration of the links between short-term operational plans and the SFMP.

Classifying indicators is important because it helps us understand the variable we are attempting to measure and the data that is produced. Indicators can be divided into three groups: context, process, and response indicators (Duinker 2000):

- **Context Indicators** – These indicators measure the output of a system where the outcome cannot be controlled at the local level. An example is measuring climate variables such as temperature or precipitation. These indicators provide useful data to help us understand the context in which we operate, but provide little value within our SFMP because the outcome is not directly linked to our actions.
- **Process Indicators** – These indicators measure the output of an agreed upon practice or process. An example is measuring the number of seedlings planted in a given year or season. These indicators are usually very effective because it is relatively easy to establish targets and measure and record data. However, they are based on an assumption that the practice or process is correct in the first place. Further investigation and validation of the assumptions used can help mitigate these uncertainties and facilitate continuous improvement.
- **Response Indicators** – These indicators measure the output of a system as a direct response to actions applied. An example is the change in site index of a managed stand as various silviculture or harvesting practices are applied. These indicators are very useful but are often difficult to measure, or the results are difficult to interpret. The lack of knowledge of biological systems and/or the expense of providing meaningful results can be preventative in the short term. Gathering more knowledge about biological systems, coupled with technological improvements will aid in the development of these types of indicators.

To be effective, an SFMP should contain both process and response indicators. Once all SFM objectives are covered by one or more of these types of indicators, the addition of context indicators may provide enhanced value.

All indicators do not "weigh in" equally. Some will be stronger in some areas while others are weaker. Therefore, any one indicator by itself is "weak", however, it is the package, or suite of indicators that provides the strength to measure performance towards sustainable forest management.

3.1 Ecosystem Representation

Criterion 1:	Element(s): 1.1, 1.2, 1.4
Biological Diversity	Ecosystem Diversity; Species Diversity; Protected Areas and Sites of Special Biological and Cultural Significance
CSA Core Indicator(s): 1.1.1: Ecosystem area by type **1.2.1:** Degree of habitat protection for selected focal species, including species at risk **1.2.2:** Degree of suitable habitat in the long term for selected focal species, including species at risk	
Indicator Statement	**Target Statement**
Proportion of rare ecosystem groups reserved from harvest	100% of rare ecosystems reserved from harvest
Value(s): Ecosystem Diversity, Native Species Richness, Protected areas and sites of special geological, biological, or cultural significance	
SFM Objective: We will conserve or restore ecosystem diversity within the natural range of variation within DFA over time. We will sustain sufficient and appropriately distributed suitable habitat elements to maintain native species richness. We will implement management strategies appropriate to the long term maintenance of protected areas and sites of special geological, biological, or cultural significance.	
Canfor common indicator statement: Percent representation of ecosystem groups across the DFA	

ACCEPTABLE VARIANCE

10 ha or 10% of area, whichever is greater for rare ecosystem groups if required for access purposes.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

The following is adapted from Bunnell 2002 and Wells et al. 2003a,b,c.

Habitat structures and patterns are “medium filters” that are monitored by the indicators of, forest type, seral stage, patch size, snags/cavity sites, coarse woody derbies, riparian, shrubs, and wildlife tree patches, and are designed to capture the habitat requirements of many species. There are, however, many more species about which we know little, but that may be restricted to particular ecosystem types or geographic localities. Most species, but especially those for which knowledge is sparse or absent, are best sustained by ensuring that some portion of each distinct ecosystem type is represented in a relatively unmanaged state.

Unmanaged stands also play an important role as a precautionary buffer against errors in efforts intended to sustain species in the managed forest. While we can develop management practices intended to keep many forest-dwelling species in managed forests, we also recognize that we have insufficient knowledge to ensure that proposed practices will meet all species’ requirements in managed stands. That is particularly true of the many poorly known, or completely unknown, organisms. Unmanaged stands are an ecological safeguard against the inevitable errors that occur during management.

Poorly understood functions also will be sustained in unmanaged areas. For example, natural disturbances can occur that would otherwise be suppressed or reduced. While some aspects of natural disturbance can be mimicked in managed stands, other aspects cannot be (e.g., large patches of burned snags, or large areas attacked by spruce or balsam bark beetles). Some species benefit from or rely on these features of natural disturbance, so may not be productive in managed landscapes.

A final function of unmanaged areas in the landscape is to provide an ecological baseline against which the effects of human activities can be compared (Arcese and Sinclair 1997). This role as a benchmark is especially critical in the long-term monitoring required to assess effectiveness of forest practices.

It is preferable to conduct this type of representative management based on site series or clusters of site series or plant associations. An unmanaged condition for the purposes of this indicator is considered as areas not contributing to the long-term harvest level within the DFA or non-timber harvesting land base

(non-THLB).

For the purposes of this SFMP rare ecosystem groups are defined as those that make up less than 1,500 ha on TFL 48.

CURRENT STATUS

Table 5 below shows the ecosystem groups developed by Wells and Haag (2003c) for TFL 48. Those groups highlighted in green indicate the groups removed from the timber harvesting land base (THLB) because they were rare or less than 1,500 ha within TFL 48.

Table 5: Ecosystem Representation Groups (2003)

Group #	Zone	Variant	Site Series	Description
1	BWBS	submesic mw/wk2	mw1-04	Sb - Lingonberry - Coltsfoot; submesic-subhygric, medium
			wk2-04	Sb - Lingonberry - Coltsfoot; submesic-subhygric, very poor-poor
			wk2-01	Sw - Huckleberry - Stepmoss; submesic-mesic, medium
2	BWBS	submesic-subhygric mw/wk2	mw1-03	Sw - Wildrye - Peavine; submesic-mesic, poor-medium
			mw1-01	Sw - At - Stepmoss; submesic-mesic, poor-rich
			mw1-05	Sw - Currant - Oak Fern; mesic-subhygric, rich
			mw1-06	Sw - Currant - Bluebells; mesic-subhygric, rich
3	BWBS	submesic-mesic wk2-03	wk2-03	Sw - Wildrye - Peavine; submesic-mesic, medium
4	BWBS	subhygric-hygric mw1/wk2	mw1-07	Sw - Currant - Horsetail; subhygric-hygric, medium-rich
			wk2-05	Sw - Currant - Bluebells; mesic-subhygric, medium-rich
			wk2-06	Sw - Currant - Horsetail; subhygric-hygric, medium-rich
5	BWBS	xeric mw1-02	mw1-02	Pl - Lingonberry - Velvet-leaved Blueberry; subxeric, poor-medium
6	BWBS	subhygric wk1	wk1-05	Sw - Currant - Bluebells; subhygric, medium-rich
			wk1-06	Sw - Currant - Horsetail; subhygric-hygric, medium-rich
7	BWBS	xeric wk2-02	wk2-02	Pl - Lingonberry - Feathermoss; xeric-subxeric, very poor-poor
8	BWBS	subxeric-mesic wk1	wk1-02	Pl - Lingonberry - Velvet-leaved Blueberry; subxeric, very poor-poor
			wk1-03	Sb - Lingonberry - Coltsfoot; submesic-subhygric, very poor-poor
			wk1-04	Sw - Wildrye - Peavine; submesic-mesic, poor-medium
9	BWBS	mesic wk1-01	wk1-01	Sw - Huckleberry - Stepmoss; submesic-mesic, medium
10	BWBS	subhydric wk1	wk1-07	Sb - Horsetail - Sphagnum; subhydric, very poor-poor
			wk1-08	Sb - Willow - Glow Moss; hygric-subhydric, poor-rich
11	BWBS	subhydric mw1/wk2	mw1-08	Sb - Labrador Tea - Sphagnum; hygric-subhydric, very poor-poor
			wk2-07	Subhydric (Sb - labrador tea - sphagnum)
			wk2-08	Subhydric (Sb - willows - step moss)
12	SBS	subhygric wk2	wk2-05	Sxw - Devil's Club; mesic-subhygric, medium-rich
			wk2-06	Sxw - Horsetail; subhygric-hygric, medium-rich
			wk2-07	Sb – Labrador tea, Sphagnum
13	SBS	mesic-submesic wk2	wk2-03	Sxw - Huckleberry - Highbush Cranberry; submesic, poor-medium
			wk2-01	Sxw - Oak Fern; submesic-mesic, medium
			wk2-04	Sb - Huckleberry - Clubmoss; submesic-subhygric, poor-medium
14	SBS	subxeric wk2	wk2-02	Pl - Huckleberry - Cladina; subxeric, poor
15	ESSF	submesic-mesic-hygric mv	mv2-01	Bl - Rhododendron - Feathermoss; submesic-mesic, poor-medium
			mv4-01	Bl - Rhododendron - Feathermoss; submesic-mesic, poor-rich
			mv4-04	Bl - Rhododendron - Horsetail; subhygric, medium-rich

Group #	Zone	Variant	Site Series	Description
16	ESSF	drier mv	mv2-02	Bl - Lingonberry; subxeric-submesic, poor-medium
			mv2-03	Bl - Sb - Labrador Tea; submesic, very poor-poor
			mv4-02	Bl - Pl - Crowberry - Cladina; subxeric-submesic, poor
			mv4-03	Bl - Sb - Labrador Tea; submesic, very poor-poor
17	ESSF	mesic-subhygric wk2	wk2-01	Bl - Oak Fern - Knight's Plume; submesic-subhygric, poor-rich
			wk2-04	Bl - Devil's Club - Rhododendron; subhygric-hygric, poor-medium
			wk2-05	Bl - Rhododendron - Lady Fern; subhygric, medium-rich
			wk2-06	Bl - Horsetail - Sphagnum; hygric, medium-rich
18	ESSF	mesic-subhygric mv2	mv2-04	Bl - Oak Fern - Knight's Plume; mesic-subhygric, medium-rich
			mv2-05	Bl - Devil's Club - Rhododendron; subhygric, rich
19	ESSF	subxeric wk2-02	wk2-02	Bl - Oak Fern - Sarsaparilla; subxeric-submesic, poor-medium
20	ESSF	mesic wk2-03	wk2-03	Bl - Oak Fern - Bluebells; mesic-subhygric, medium-rich
21	ESSF	subhygric-hygric mv	mv2-06	Bl - Alder - Horsetail; subhygric-hygric, medium-rich
			mv4-05	Bl - Alder - Horsetail; hygric, poor-rich
22	ESSF	wetter wc3	wc3-01	Bl - Rhododendron - Oak Fern; submesic-mesic, poor-medium
			wc3-03	Bl - Globeflower - Horsetail; mesic-hygric, medium-rich
23	ESSF	xeric wc3-02	wc3-02	Bl - Rhododendron - Queen's Cup; xeric-submesic, very poor-poor

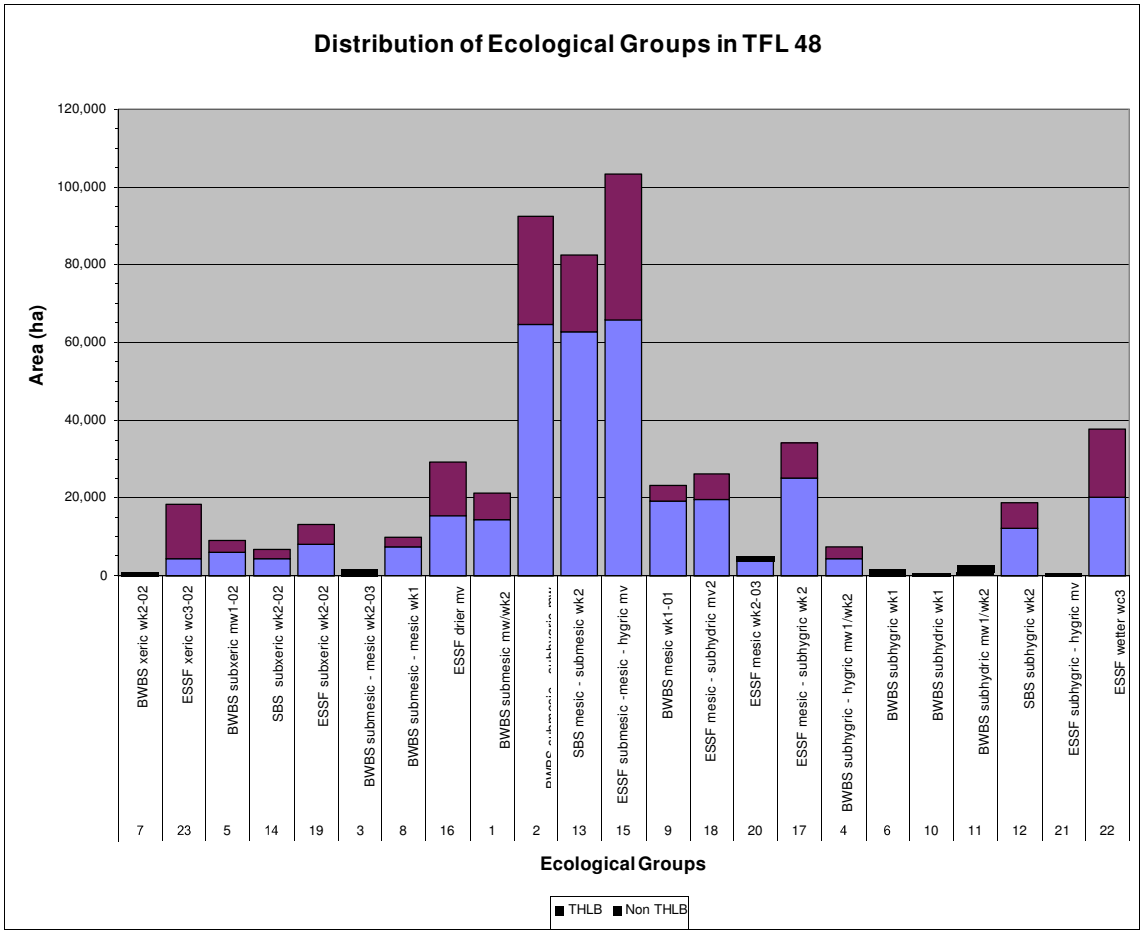


Figure 6: Ecosystem Representation by THLB vs. Non-THLB (2005)

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

Does forecasting apply (y/n)? Yes

Area identified as rare ecosystems (those ecosystem groups with less than 1,500 ha in total) within TFL 48 represent 4,080 ha or 0.7% of the total forested land base and have been removed from the timber harvesting land base.

All cut block layout completed after June 2005 will incorporate an assessment of rare ecosystems into the fieldwork stage of development. It is anticipated that rare ecosystems, as defined by the current ecosystem representation analysis, will be maintained into the future which will result in the maintenance of biodiversity through a diversity ecosystems represented on the landbase.

STRATEGY AND IMPLEMENTATION SCHEDULE

Setting aside a large percentage of the land base as unmanaged forest to ensure that biological richness is sustained is not compatible with economic and social objectives of managed forests. Fortunately, forest tenures in BC typically have 20% to 50% or more of the forest in an unmanaged state. This unmanaged area is of two types: 1) areas that are not harvested or are harvested only lightly because of concerns other than conserving biological diversity (e.g., operability, visual quality, watershed protection, favoured-species management[1]); and 2) areas intentionally set aside to protect biological diversity (e.g., wildlife tree patches, riparian buffers). This unmanaged proportion of the land base exceeds the objective for protected areas of most jurisdictions (typically 12%, following the Brundtland commission), and is comparable to many recommendations derived from principles of conservation biology (e.g., 33 to 50%; Noss 1993; Sætersdal and Birks 1993; Stokland 1997; Soulé and Sanjayen 1998) (Bunnell 2002).

On the TFL 48 DFA, wholly constrained areas represent 35.8% of the forest. Area identified as rare ecosystems (those ecosystem groups with less than 1,500 ha in total) within TFL 48 represent 4,080 ha or 0.7% of the total forested land base and have been removed from the THLB.

All cut block layout completed after June 2005 will incorporate an assessment of rare ecosystems into the fieldwork stage of development.

MONITORING PROCEDURE

This indicator is analyzed at each TSR. Ecosystem groups undergo an extensive review to see whether and by how much they contribute to timber supply. Depending on how much area of each group exists the group is either included or excluded from the THLB. The current status was derived from the base case analysis definition of the THLB conducted in support of SFMP 4.

During development of Forest Development Plans (FDP) or Forest Stewardship Plans (FSP's) blocks are compared against the rare ecosystem data and activities identified where the presence of the rare ecosystem is confirmed. The results of the ground confirmation will be reported annually in the annual report.

LINKAGES TO OPERATIONAL PLANS

In order to ensure that 100% of the rare ecosystem groups are reserved from harvesting, the following actions will be undertaken.

- Prior to layout being conducted a map identifying the locations of rare ecosystems is compared to proposed road and block locations. The requirement to assess the block for absence or presence of rare ecosystems is tracked in Canfor's forest information management system Genus (Task window of Cut Block Management System).
- The requirement to reserve rare ecosystems from harvest is reviewed with layout contractors during the pre-work stage. This will enable the contractors to identify any of the rare ecosystem sites during their fieldwork.
- Where rare ecosystem groups are identified the areas will be preserved from harvest or road construction by either removing from block or incorporating in WTP's.

[1] Even though favoured species, such as caribou and Northern Goshawk, are a component of biological richness, such species-specific approaches can work against sustaining all of biological diversity. It is important to assess how areas set aside for a single species contribute to the broader goals of representation.

3.2 Forest Types

Criterion 1:	Element(s): 1.1
Biological Diversity	Ecosystem Diversity
CSA Core Indicator(s): 1.1.2: Forest area by type or species composition	
Indicator Statement	**Target Statement**
Percent distribution of forest type (deciduous, deciduous mixedwood, conifer mixedwood, conifer) >20 years old across DFA	100% of forest type groups will be within the target range (Conifer - 75-85%, Conifer Mixedwood - 4-6%, Deciduous - 9-15%, Deciduous Mixedwood - 2-4%)
Value(s): Ecosystem Diversity	
SFM Objective: We will conserve or restore ecosystem diversity within the natural range of variation within the DFA over time.	
Canfor common indicator statement: Percent distribution of forest type (treed conifer, treed broad leaf, treed mixed) >20 years old across the DFA	

ACCEPTABLE VARIANCE

There is no acceptable variance for this indicator. Targets may need to be reviewed following large natural catastrophic events.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Forest type groups are the designation of stand types into one of 4 ecologically significant groups – pure deciduous, deciduous leading mixedwood, conifer leading mixedwood, and pure conifer. The classification is based on the British Columbia Land Classification System (BCLCS). For the purposes of this indicator the BCLCS code treed broadleaf (TB) is deciduous, treed mixed (TM) is mixedwood and treed conifer (TC) is conifer. Treed mixed is further delineated into either deciduous mixedwood or conifer mixedwood based on the leading species.

Table 6: Description of Forest Types

Forest Type	Description
Coniferous*	Greater than 75% of total tree cover is coniferous
Mixed-Coniferous*	Greater than 50% but less than 75% of total tree cover is coniferous
Mixed-Deciduous**	Greater than 50% but less than 75% of total tree cover is deciduous
Deciduous**	Greater than 75% of total tree cover is deciduous

* Contributes to coniferous timber harvesting land base
** Contributes to deciduous timber harvesting land base

This indicator monitors the change in the proportion of forest type groups (>20 years old) within each variant over time. Stands less than 20 years of age are not included because it is expected that 0 - 20 year-old stands will show significant fluctuations in tree species composition each year due to silviculture practices and rapid natural ingress of species in regenerating stands.

This indicator is important because forest operations, through harvesting and reforestation, have a dramatic influence over the composition of forest types across forested landscapes. This influence increases with the duration and intensity of management of regenerating stands. Since forest operations have a significant influence over the distribution of stand composition groups, it is important to monitor changes over time as harvest and reforestation activities are applied.

CURRENT STATUS

The following table (Table 7) indicates the MP 5 status which represents baseline data, current status, baseline targets, and projected status for each forest type. Coniferous forest types remain relatively unchanged in the forecast, however the percentage of mixed-deciduous increases while the percentage of deciduous forest types decreases below the target range. This is a result of the different harvest levels between coniferous and deciduous forest types. The decrease in deciduous is due to an increase in the total area greater than 20 years as harvesting decreases in this forest type.

Table 7: Forest Type Distribution Status and Target Ranges (2014)

Forest Type	Area by Forest Type										Target Range
	2010 Actual	%	2015 Projected	%	2014	%	2019	%	2024	%	
Coniferous	423,107	80%	431,071	80%	372,560	77%	363,321	76%	359,175	76%	75 - 85%
Mixed - Coniferous	27,374	5%	26,942	5%	28,553	6%	28,907	6%	27,732	6%	4 - 6%
Mixed - Deciduous	18,121	3%	16,165	3%	63,183	13%	62,886	13%	61,872	13%	2 - 4%
Deciduous	63,743	12%	64,661	12%	21,276	4%	21,697	5%	21,539	5%	9 - 15%
Grand Total	532,345		538,839		485,572		476,811		470,318		

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

Does forecasting apply (y/n)? Yes

This indicator was tracked explicitly in the Patchworks model whereby the actual area of stands by forest type that is greater than 20 years of age at each point in time is measured. The model does not account for natural succession that results in a change in forest type. It is assumed that a stands forest type remains the same throughout the planning horizon. Only stand ages change through natural aging and forest management activities.

STRATEGY AND IMPLEMENTATION SCHEDULE

The forest type strategy is to maintain the relative species composition by forest type group across the TFL within the ranges identified in Table 7. This supports two objectives: one to maintain the relative ecological function and habitats over time and the second is to sustain the harvest species and manufacturing facilities that rely on a portion of their harvest profile of either conifer or deciduous species.

Coniferous Strategy

Canfor's coniferous fibre supply strategy is to maximize the sustainable coniferous timber production from the TFL conifer sites.

The economic operability criteria developed for the different harvesting systems in use on the TFL determines the operable land base that supports the proposed AAC.

Minor components of commercial deciduous species that occur in conifer leading stands will be managed over the total land base to achieve a variety of landscape level objectives. Management regimes will range from maintaining mature deciduous stems on site to contribute to non-timber resource values (Indicator 3.37 – Visual, Indicator 3.5 – Snags/Live Tree Retention, Indicator 3.7 – Riparian, etc.) to removing all deciduous volumes where resource values will not be compromised and economic conditions permit. Deciduous that is harvested incidentally from conifer leading stands contributes to the conifer AAC and is accounted for accordingly.

Deciduous Fibre Strategy

Canfor's deciduous fibre supply strategy is to maintain the existing commercial deciduous production from the TFL operable deciduous land base. A maximum harvest of 100,000 m^3/year (to be determined by Chief Forester) can be maintained.

Deciduous leading stands that occur on non-conventional (mixed, cable and aerial harvesting systems) ground, or in the ESSF Biogeoclimatic Zone do not contribute to the proposed deciduous harvest level.

LP is currently operating an OSB plant in Ft. St. John (formerly as a part of a 50/50 joint venture with Canfor). It is expected that this will create additional demand for utilization of the deciduous fibre. The Peace Valley OSB plant began production in the fall of 2005.

[2] MP 3 data is shown as a percent due to a slight change in the way this indicator is reported. The indicator has change to reporting only stands greater than 20 years old and there have been some changes to the area of TFL 48.

Our deciduous utilization policy will be to plan, permit and make available for sale, all commercial deciduous species from deciduous leading stands (as determined by the individual block cruise), up to the level of the deciduous harvest as determined by the Chief Forester.

Commercial deciduous volumes incidentally harvested by Canfor's coniferous operations will be made available for purchase to the holders of Pulpwood Agreements under a negotiated fibre supply agreement. In the absence of a fibre supply agreement, this fibre will be made available to any company or individual that wishes to purchase the timber. If no purchaser can be found, the deciduous component will be left standing and made available when economic conditions permit.

In 2001 Louisiana-Pacific Canada Ltd. and Canadian Forest Products Ltd. had signed a memorandum of understanding pertaining to the management of deciduous leading stands within the common boundaries of TFL 48 and PA's 10 and 13. Since that time Louisiana Pacific enacted their option to exit from the agreement to remove any encumbrances to the PA 13 licence as they were selling the pulp mill and tenure to CMP. CMP has since indicated that they would honour the intent of the MOU. The MOU contained a provision that they would develop and harvest some volume as part of the transition for areas that were already within the PA 13 FDP. Canfor is currently working with CMP on an MOU to cover the management of deciduous leading stands on TFL 48.

All deciduous and conifer species cut from deciduous leading stands will be tracked separately (from the conifer AAC) and contribute to the deciduous harvest level. Any coniferous volumes that are harvested from deciduous leading stands will be utilized in Canfor's manufacturing facilities.

The Ministry of Forests and Range is responsible for providing TSL information such as regeneration success, post-harvest assessments and volumes harvested to Canfor for incorporation into Forest Development Plans and Management Plans for those deciduous areas that have been harvested through the previous Small Business Forest Enterprise Program.

BCTS does not have a deciduous allocation on TFL 48.

Mixed Wood Fibre Strategy

The forested land base of TFL 48, although dominated by coniferous stands, is comprised of a variety of forest types, each of which contributes to the TFL's coniferous and/or deciduous fibre supply (Table 8).

Table 8: Forest Type Distribution Within TFL 48

Forest Type	Species Mix	MP 4 Landbase		MP 5 Landbase		Management Regime
		Forested	THLB	Forested	THLB	
Coniferous	Coniferous > 75% Deciduous < 25%	80%	82%	78%	78%	Manage for conifer sawlogs at 81 - 121 years minimum
Mixed Wood Coniferous Leading	Coniferous > 50% Deciduous > 25%	5%	5%	6%	7%	Manage for conifer sawlogs at 81 - 121 years minimum
Mixed Wood Deciduous Leading	Coniferous > 25% Deciduous > 50%	3%	3%	12%	11%	Manage for conifer sawlogs at 81 years minimum
Deciduous	Coniferous < 25% Deciduous > 75%	12%	10%	4%	4%	Manage for deciduous sawlogs at 61 years minimum

Harvest planning will strive to blend mixed wood stands into the harvest profile. Operability constraints may have to be adjusted to reflect the equipment complement required to capture the value contribution of these stands.

Biological constraints must also be considered within a mixed wood management strategy. Mixed stands, although composed of different species, tend to be even aged as a result of forest succession following disturbance. In coniferous leading stands, the conifers may not have reached harvesting age while the deciduous is in decline.

It is not the intention to necessarily regenerate an area back to the same species composition as was harvested, however over the landscape and over time the forest type groups will be maintained within the baseline target range for each forest type group.

[3] The intention is to not manage for a mid-rotation deciduous entry but to wait until the conifer will form a saw log. The management intent is to regenerate these sites back to a similar species composition to be tracked at the landscape level.

Long-term monitoring of species composition change within managed stands will occur through Change Monitoring Inventory (CMI) plots established over the DFA. These plots are systematically established across the DFA based on a 2-km grid in managed stands 15 years after harvesting. These plots will provide a representative sample of all managed stands over time. The first set of plots is to be established in 2006. Once the initial backlog of approximately 61 samples is established for stands that have been harvested greater than 15 years ago there will be an additional 3 to 5 samples established each year.

MONITORING PROCEDURE

Data sources include vegetation resource inventory (VRI) and GENUS data.

VRI information is updated by Canfor. These data sources are updated periodically to support FDP/ FSP planning or TSR processes. The Genus system is a "real-time, or live" database that is maintained and updated by the Canfor staff as they carry out their daily activities. Genus data is used from the silviculture current status to update the VRI to account for depletion and silviculture activities.

The following formula documents the analysis methods for this indicator.

Formula:

$$\mathbf{FT\%}_{\text{species group}} = (\mathbf{FTA}_{\text{species group}} / \mathbf{PFA}_{\text{TFL}}) * 100$$

Variables:

$\mathbf{FTA}_{\text{species group}}$	Forest type area by species group for stands > 20 years old for TFL
$\mathbf{PFA}_{\text{TFL}}$	Productive forest area across TFL > 20 years old
$\mathbf{FT\%}_{\text{species group}}$	Resulting percent of each forest type group for TFL 48

To monitor this indicator, the report will be run at each SFMP and compared to the overall target.

LINKAGES TO OPERATIONAL PLANS

The data will be used at a strategic direction level to guide provide feedback on silviculture strategies and used by the silviculture staff to review long term trends in reforestation policies and to adjust practices where necessary.

3.3 Late Seral Forest

Criterion 1:	**Element(s): 1.1**
Biological Diversity	Ecosystem Diversity
CSA Core Indicator(s): 1.1.3: Forest area by seral stage or age class	
Indicator Statement	**Target Statement**
The minimum acceptable proportion (%) of late seral forest by Natural Disturbance Unit (NDU) and NDU by BEC	The minimum proportion (%) of late seral forest by NDU and NDU by BEC as shown in Table11
Value(s): Ecosystem Diversity	
SFM Objective: We will conserve or restore ecosystem diversity within the natural range of variation within DFA over time.	
Canfor common indicator statement: Percent late seral distribution by ecological unit across the DFA	

ACCEPTABLE VARIANCE

Harvesting can continue in late seral stands if at least 50% of the target is met and the time to reach the full target is not delayed by more than 10 years.

Where large natural disturbances occur within Natural Disturbance Units (NDU) the minimum proportion of late seral may decline by 5% to relieve salvage pressures and allow young natural forests to persist on the landscape.

A variance of up to 50 ha in each NDU is acceptable to allow access location or small inclusions within larger blocks.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Forests occurring in different seral and structural stages over space and time are recognized as an important part of the landscape that provides distinct habitat elements for a variety of species. Late seral is defined as greater than 100 years for deciduous leading stands and greater than 140 years old for coniferous leading stands. DeLong (2002) has estimated the Natural Range of Variation (NRoV) for different NDU's within the DFA.

Deciduous stands are typically a short lived early seral species and if left undisturbed for long periods of time (>150 years) will eventually convert to coniferous stands or die and cycle back to a similar species composition. Therefore it would be inappropriate to manage for the same distribution of ages for deciduous as for conifer species.

Deciduous stands greater than 100 years old are structurally distinct from young and mature stands (Stelfox 1995). These stands provide lower density stands and hence larger diameter trees, higher level of coarse woody debris and are therefore important to maintain some occurrence on the landscape over time. DeLong (personal communication) recommends that 10 to 15% of deciduous dominated landscapes be maintained in stands greater than 100 years old. As deciduous makes up approximately 30% of the forested land base in the Boreal Plains and Boreal Foothills Valley NDU's, targets are applied to both deciduous and coniferous in these NDU's. Deciduous makes up only 1.6% (1.1% is within the ESSF and excluded from the THLB) of the remainder of the TFL and as a result only one late seral target is applied to the entire forested land base in the Boreal Foothills Mountain, Omineca and Wet Mountain NDU's.

Additionally, the NRoV estimated by DeLong (2002) is based on very large areas. The proportion of each NDU within TFL 48 is considerably smaller, ranging from less than 1% to 41% of each larger NDU (See Table 9). Therefore it would be expected that the range of variation would be considerably larger at the smaller scale. While it may be within the NRoV to have almost no Late Seral forest in some of the smaller portions of TFL 48 when compared to the larger NDU, it is still desirable to have some level of late seral distributed across representative disturbance units and at a finer biogeoclimatic ecological classification (BEC) units within managed forested landscapes. Subsequently, targets are applied at two separate scales: one target at the minimum NRoV at the NDU level and one target at 30% of the minimum NRoV at the NDU by BEC level (See Table 10). The exception to this is for the deciduous leading stands in the Boreal Plains and Boreal Foothills Valley where the target is the same at both the NDU and NDU by BEC levels. Units that have very small areas within TFL 48 such as the Boreal Plains – Conifer SBSwk2 unit do not have targets applied at the NDU by BEC level.

Table 9: Proportion of NDU's within TFL 48

Natural Disturbance Unit	NDU Subzone	Area Outside TFL 48		Area Within TFL 48		Total ha
		ha	%	ha	%	
Boreal Plains		9,638,065	99%	111,480	1%	9,749,545
Boreal Foothills	Mountain	529,623	76%	169,096	24%	698,719
	Valley	238,695	59%	164,649	41%	403,344
Omineca	Mountain	2,819,489	99.5%	13,163	0.5%	2,832,652
	Valley	2,150,533	99.7%	6,171	0.3%	2,156,704
Wet Mountain		1,369,048	94%	86,758	6%	1,455,806
Grand Total		16,745,453		551,317		17,296,770

Table 10: Late Seral Forest Targets

Natural Disturbance Unit	BEC	Late Seral Target >100 Yrs Decid >140 Yrs Conifer	Years to Meet Target
Boreal Plains - Deciduous	BWBSmw 1	10%	0
	BWBSwk 1	10%	0
	ESSFmv 2	10%	0
	SBS wk 2	N/A	N/A
Boreal Plains - Deciduous Total		10%	0
Boreal Foothills - Valley - Deciduous	BWBSmw 1	10%	0
	BWBSwk 1	10%	0
	BWBSwk 2	10%	0
	SBS wk 2	10%	0
Boreal Foothills - Valley - Deciduous Total		10%	0
Boreal Plains - Conifer	BWBSmw 1	5%	0
	BWBSwk 1	5%	0
	ESSFmv 2	5%	0
	SBS wk 2	N/A	N/A
Boreal Plains - Conifer Total		17%	20
Boreal Foothills - Valley - Conifer	BWBSmw 1	7%	0
	BWBSwk 1	7%	0
	BWBSwk 2	7%	0
	SBS wk 2	7%	0
Boreal Foothills - Valley - Conifer Total		23%	10
Boreal Foothills - Mountain	ESSFmv 2	10%	0
	ESSFmv 4	10%	0
	ESSFwc 3	10%	0
	ESSFwk 2	10%	0
Boreal Foothills - Mountain Total		33%	10
Omineca - Valley	BWBSmw 1	N/A	N/A
	SBS wk 2	7%	0
Omineca - Valley Total		23%	0
Omineca - Mountain	ESSFmv 2	17%	0
Omineca - Mountain Total		58%	40
Wet Mountain	ESSFmv 2	25%	0
	ESSFwc 3	25%	0
	ESSFwk 2	25%	0
	SBS wk 2	25%	0
Wet Mountain Total		84%	100

CURRENT STATUS

The following Tables 11 to 14 outline the status of TFL 48 in relation to the targets both currently and after the harvesting of all proposed blocks in the current FSP. For the deciduous the actual amount of 101+ in 2014 was lower than the projection conducted for 2015 by 18% (6,451 ha decrease) for the Boreal Plains and 8% (1,508 ha decrease) for the Boreal Foothills. Even though there is a decrease in late seral forest from MP 4, each NDU by BEC still has a surplus area of late forest above the 101+ target.

For conifer late seral (141+) all NDUs by BEC experienced a decrease. Boreal Plains and Boreal Foothills – Valley decreased by 6% (5,562 ha and 8,730 ha respectively), Boreal Foothills – Mountain decreased by 9% (13,905 ha), Omineca Valley decreased by 10% (630 ha), Omineca Mountain decreased by 17% (2,191 ha), and Wet Mountain decreased by 6% (3,360 ha). Overall there was a decrease in conifer late

seral forest from MP 4, however the current and projected status for each NDU by BEC maintains a surplus from the 141+ target.

The projections of late seral out to 2024 show increasing trends in some NDU by BEC, such as Boreal Foothills – Mountain and Wet Mountain, while the remaining NDU by BEC units show decreasing trends within a range of 5%.

Table 11: Historic Status and Projection of Late Seral Forest – Deciduous (2011)

		Deciduous Seral Age Groups															
		<40				40-100				101+							
NDU	BEC	Actual (ha) 2010	%	Projected (ha) 2015	%	Actual (ha) 2010	%	Projected (ha) 2015	%	Actual (ha) 2010	%	Surplus (Deficit)	Projected (ha) 2015	%	Surplus (Deficit)	Total Forested Area (ha)	101+ Target
Boreal Plains - Deciduous	BWBSmw 1	2,739	7%	3,019	8%	14,957	41%	11,632	32%	19,041	52%	15,367	22,086	60%	18,412	36,737	10%
	BWBSwk 1	66	2%	116	3%	2,124	54%	1,004	25%	1,773	44%	1,377	2,843	72%	2,447	3,963	10%
	ESSFmv 2	11	3%	10	2%	318	70%	271	60%	121	27%	76	170	38%	125	451	10%
	SBS wk 2		0%		0%	11	28%	11	28%	29	72%	N/A	29	72%	N/A	40	N/A
Boreal Plains - Deciduous Total		2,816	7%	3,145	8%	17,410	42%	12,918	31%	20,964	51%	16,845	25,128	61%	21,009	41,191	10%
Boreal Foothills - Valley - Deciduous	BWBSmw 1	2,408	11%	2,396	11%	6,845	32%	5,904	27%	12,276	57%	10,123	13,229	61%	11,077	21,529	10%
	BWBSwk 1	26	2%	29	2%	914	64%	892	62%	493	34%	350	512	36%	369	1,433	10%
	BWBSwk 2	270	5%	248	5%	1,368	28%	1,318	27%	3,323	67%	2,827	3,395	68%	2,899	4,961	10%
	SBS wk 2	356	4%	374	4%	3,296	40%	2,475	30%	4,692	56%	3,858	5,495	66%	4,661	8,344	10%
Boreal Foothills - Valley - Deciduous Total		3,060	9%	3,047	8%	12,423	34%	10,589	29%	20,784	57%	17,158	22,631	62%	19,004	36,267	10%

Table 12: Current Status and Projection of Late Seral Forest – Deciduous (2014)

NDU	BEC	Deciduous Seral Age Groups																				Total Forested Area (ha)	101+ Target
		<40						40 - 100						101+									
		2014		2019		2024		2014		2019		2024		2014	Surplus (Deficit)	2019	Surplus (Deficit)	2024	Surplus (Deficit)				
		ha	%	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%	ha	ha	%	ha	ha	%	ha	ha	%
Boreal Plains - Deciduous	BWBSmw1	6,013	15%	7,229	19%	8,390	22%	16,154	41%	15,158	39%	13,720	35%	16,827	43%	12,928	16606	43%	12,707	16,883	43%	12,984	38,993	10%
	BWBSwk1	328	8%	457	11%	508	12%	2,300	55%	1,889	45%	1,667	40%	1,586	38%	1,165	1869	44%	1,448	2,040	48%	1,619	4,215	10%
	ESSFmv2	11	2%	9	2%	4	1%	265	52%	201	39%	184	36%	235	46%	184	300	59%	249	323	63%	272	511	10%
	SBSwk2	-	0%	-	0%	-	0%	12	30%	12	30%	12	30%	29	70%	N/A	29	70%	N/A	29	70%	N/A	41	N/A
Boreal Plains - Deciduous Total		6,352	15%	7,695	18%	8,902	21%	18,731	43%	17,260	40%	15,583	36%	18,677	43%	14,276	18,804	43%	14,403	19,275	44%	14,874	43,760	10%
Boreal Foothills - Valley - Deciduous	BWBSmw1	2,958	13%	3,253	14%	3,188	14%	7,687	33%	7,391	32%	7,651	33%	12,457	54%	10,147	12,457	54%	10,147	12,263	53%	9,953	23,101	10%
	BWBSwk1	51	3%	65	4%	76	5%	1,032	64%	1,000	62%	949	59%	524	33%	363	542	34%	381	582	36%	421	1,607	10%
	BWBSwk2	472	9%	879	17%	1,265	25%	1,572	31%	1,357	27%	1,255	25%	3,035	60%	2,527	2,843	56%	2,335	2,559	50%	2,051	5,079	10%
	SBSwk2	1,103	11%	1,145	12%	1,147	12%	3,620	37%	3,329	34%	3,073	31%	5,107	52%	4,124	5,358	55%	4,375	5,611	57%	4,628	9,831	10%
Deciduous Total		4,584	12%	5,342	14%	5,676	16%	13,911	36%	13,077	34%	12,928	34%	21,123	54%	17,161	21,200	54%	17,238	21,015	53%	17,053	39,618	10%

Table 13: Historic Status and Projection of Late Seral Forest – Coniferous (2011)

		Coniferous Seral Age Groups																			
		<40				40-100				101-140				141+							
NDU	BEC	2005	%	2010	%	2005	%	2010	%	2005	%	2010	%	2005	%	Surplus (Deficit)	2010	%	Surplus (Deficit)	Total Forested Area (ha)	141+ Target
Boreal Plains - Conifer	BWBSmw 1	7,866	24%	9,168	28%	10,725	33%	9,973	31%	11,820	36%	10,267	32%	2,050	6%	427	3,053	9%	1,430	32,462	5%
	BWBSwk 1	2,315	10%	4,003	17%	6,783	29%	6,022	25%	12,555	53%	10,550	44%	2,117	9%	928	3,195	13%	2,006	23,770	5%
	ESSFmv 2	625	5%	895	7%	2,442	19%	2,021	16%	6,603	51%	6,311	48%	3,344	26%	2,693	3,789	29%	3,138	13,015	5%
	SBS wk 2	3	1%	3	1%	178	89%	178	89%	10	5%	10	5%	10	5%	N/A	10	5%	N/A	201	N/A
Boreal Plains - Conifer Total		10,809	16%	14,069	20%	20,128	29%	18,194	26%	30,989	45%	27,137	39%	7,521	11%	(4,285)	10,047	14%	(1,759)	69,447	17%
Boreal Foothills - Valley - Conifer	BWBSmw 1	4,419	14%	5,226	16%	9,152	29%	8,606	27%	12,338	39%	10,593	33%	5,946	19%	3,716	7,430	23%	5,200	31,855	7%
	BWBSwk 1	655	12%	1,096	20%	1,809	33%	1,646	30%	1,298	24%	946	17%	1,665	31%	1,286	1,739	32%	1,359	5,427	7%
	BWBSwk 2	450	6%	655	9%	3,561	48%	3,528	47%	2,760	37%	2,579	35%	674	9%	153	683	9%	161	7,444	7%
	SBS wk 2	13,090	16%	17,343	21%	26,275	32%	21,550	26%	23,563	28%	21,755	26%	20,190	24%	14,371	22,469	27%	16,651	83,118	7%
Boreal Foothills - Valley - Conifer Total		18,614	15%	24,320	19%	40,797	32%	35,330	28%	39,958	31%	35,874	28%	28,475	22%	(929)	32,320	25%	2,916	127,844	23%
Boreal Foothills - Mountain	ESSFwc 3	2,479	10%	1,960	8%	4,900	20%	4,952	20%	9,827	40%	9,495	39%	7,321	30%	4,868	8,120	33%	5,667	24,527	10%
	ESSFwcp	318	21%	273	18%	427	28%	370	24%	753	49%	778	51%	40	3%	N/A	119	8%	N/A	1,539	N/A
	ESSFwk 2	3,636	14%	4,498	17%	7,314	28%	6,655	25%	9,340	35%	8,848	34%	6,116	23%	3,475	6,405	24%	3,765	26,406	10%
	ESSFmv 2	10,722	10%	11,667	11%	27,240	26%	25,493	24%	31,330	29%	29,578	28%	36,930	35%	26,308	39,485	37%	28,863	106,223	10%
	ESSFmv 4	740	6%	988	8%	5,801	49%	5,155	44%	3,876	33%	4,147	35%	1,320	11%	147	1,448	12%	274	11,738	10%
	ESSFmvp	736	13%	622	11%	1,819	32%	1,678	29%	1,899	33%	1,957	34%	1,255	22%	N/A	1,453	25%	N/A	5,709	N/A
Boreal Foothills - Mountain Total		18,632	11%	20,008	11%	47,502	27%	44,303	25%	57,025	32%	54,801	31%	52,983	30%	(5,144)	57,030	32%	(1,097)	176,141	33%
Omineca - Valley	BWBSmw 1		0%		0%	13	49%	13	49%	14	51%	14	51%		0%	N/A		0%	N/A	27	N/A
	SBS wk 2	683	11%	656	11%	658	11%	471	8%	3,394	55%	3,385	55%	1,441	23%	1,009	1,665	27%	1,233	6,177	7%
Omineca - Valley Total		683	11%	656	11%	672	11%	484	8%	3,408	55%	3,399	55%	1,441	23%	14	1,665	27%	238	6,204	23%
Omineca - Mountain	ESSFmv 2	857	7%	1,282	10%	1,863	14%	1,418	11%	6,498	49%	6,289	48%	3,968	30%	1,727	4,198	32%	1,956	13,186	17%
	ESSFmvp	47	9%	47	8%	108	19%	99	18%	268	48%	277	50%	132	24%	N/A	132	24%	N/A	556	N/A
Omineca - Mountain Total		904	7%	1,329	10%	1,971	14%	1,517	11%	6,766	49%	6,566	48%	4,101	30%	(3,870)	4,330	32%	(3,640)	13,742	58%
Wet Mountain	ESSFwc 3	1,938	6%	2,081	6%	4,290	13%	3,795	12%	5,904	18%	5,980	18%	20,215	62%	12,128	20,490	63%	12,404	32,347	25%
	ESSFwcp	491	11%	491	11%	1,296	28%	1,100	24%	1,724	38%	1,818	40%	1,075	23%	N/A	1,176	26%	N/A	4,586	N/A
	ESSFwk 2	4,064	15%	4,941	19%	4,036	15%	3,215	12%	3,133	12%	3,496	13%	15,006	57%	8,446	14,588	56%	8,028	26,240	25%
	ESSFmv 2	667	4%	831	5%	3,782	23%	3,428	21%	3,382	21%	3,297	20%	8,425	52%	4,361	8,702	54%	4,637	16,257	25%
	ESSFmvp	250	17%	250	17%	620	41%	547	37%	292	19%	322	22%	334	22%	N/A	377	25%	N/A	1,496	N/A
	SBS wk 2	2,254	20%	3,464	30%	3,376	29%	2,517	22%	1,920	17%	1,785	15%	4,006	35%	1,117	3,791	33%	902	11,556	25%
Wet Mountain Total		9,665	10%	12,058	13%	17,400	19%	14,602	16%	16,355	18%	16,698	18%	49,062	53%	(28,623)	49,124	53%	(28,561)	92,482	84%

Source: VRI – 2004 and Current TFL 48 FDP(2004 Major Amendment))

Table 14: Current Status and Projection of Late Seral Forest – Coniferous (2014)

NDU	BEC	Coniferous Seral Age Groups																								Total Forested Area (ha)	141+ Target
		<40						40 - 100						101 - 140				141+									
		2014		2019		2024		2014		2019		2024		2014		2019		2024		2014		Surplus (Deficit)	2019		Surplus (Deficit)	2024		Surplus (Deficit)		
Boreal Plains - Conifer	BWBSmw1	8,726	28%	9,687	31%	10,507	34%	6,759	22%	6,471	21%	6,933	22%	9,299	30%	8,357	27%	7,960	25%	6,567	21%	4,999	6,837	22%	5,269	5,951	19%	4,383	31,351	5%
	BWBSwk1	8,625	37%	9,894	42%	10,546	45%	2,951	13%	2,346	10%	2,506	11%	6,977	30%	6,350	27%	5,746	24%	4,913	21%	3,740	4,877	21%	3,704	4,669	20%	3,496	23,467	5%
	ESSFmv2	3,556	27%	4,380	34%	4,910	38%	791	6%	391	3%	358	3%	4,012	31%	3,788	29%	3,461	27%	4,584	35%	3,937	4,385	34%	3,738	4,215	33%	3,568	12,943	5%
	SBSwk2	12	6%	12	6%	13	6%	162	81%	162	81%	153	76%	14	7%	10	5%	19	9%	13	6%	N/A	16	8%	N/A	16	8%	N/A	201	N/A
Boreal Plains - Conifer Total		20,919	31%	23,973	36%	25,976	0.39	10,663	19%	9,370	18%	9,950	0.19	20,302	30%	18,505	27%	17,186	0.25	16,077	25%	12,676	16,115	25%	12,711	14,851	23%	11,447	67,962	
Boreal Foothills - Valley - Conifer	BWBSmw1	5,466	18%	6,225	20%	6,832	22%	5,993	19%	6,398	21%	7,378	24%	8,525	28%	7,320	24%	6,602	21%	10,885	35%	8,724	10,925	35%	8,764	10,056	33%	7,895	30,869	7%
	BWBSwk1	1,400	27%	1,700	32%	1,679	32%	714	14%	590	11%	503	10%	1,066	20%	1,021	19%	1,297	25%	2,100	40%	1,730	1,969	37%	1,599	1,801	34%	1,431	5,280	7%
	BWBSwk2	362	5%	663	9%	629	8%	2,964	40%	2,928	39%	2,995	40%	2,734	37%	2,302	31%	2,100	28%	1,364	18%	844	1,532	21%	1,012	1,700	23%	1,180	7,425	7%
	SBSwk2	28,221	35%	31,151	38%	31,611	39%	8,780	11%	8,631	11%	11,757	14%	20,448	25%	17,231	21%	16,498	20%	24,007	29%	18,305	24,444	30%	18,742	21,592	27%	15,890	81,457	7%
Boreal Foothills - Valley - Conifer Total		35,449	31%	39,739	35%	40,751	35%	18,451	18%	18,547	19%	22,633	21%	32,773	27%	27,874	23%	26,497	21%	38,356	31%	29,604	38,870	32%	30,118	35,149	28%	26,397	125,031	
Boreal Foothills - Mountain	ESSFwc3	1,175	5%	1,123	5%	1,318	5%	3,672	15%	3,565	14%	3,475	14%	9,412	38%	9,220	37%	8,037	32%	10,583	43%	8,099	10,934	44%	8,450	12,011	48%	9,527	24,841	10%
	ESSFwk2	6,018	23%	6,484	24%	7,183	27%	3,460	13%	3,926	15%	3,976	15%	9,390	35%	8,025	30%	7,316	28%	7,707	29%	5,050	8,139	31%	5,482	8,099	30%	5,442	26,574	10%
	ESSFmv2	20,492	19%	24,621	23%	27,522	26%	13,933	13%	11,862	11%	11,808	11%	27,075	26%	25,472	24%	24,421	23%	44,425	42%	33,832	43,970	42%	33,377	42,175	40%	31,582	105,926	10%
	ESSFmv4	657	6%	1,065	9%	1,056	9%	3,718	32%	3,536	30%	3,510	30%	4,733	40%	4,380	37%	4,208	36%	2,646	23%	1,471	2,773	24%	1,598	2,980	25%	1,805	11,754	10%
	ESSFmvp2	12	0%	12	0%	12	0%	826	17%	670	14%	531	11%	2,302	47%	2,303	47%	2,055	42%	1,767	36%	1,276	1,922	39%	1,431	2,309	47%	1,818	4,907	10%
	ESSFmvp4	4	0%	4	0%	4	0%	385	27%	297	21%	293	20%	682	48%	681	48%	562	39%	360	25%	217	449	31%	306	573	40%	430	1,432	10%
	ESSFwcp3	10	1%	10	1%	10	1%	128	9%	95	6%	88	6%	1,147	78%	1,171	79%	1,132	77%	192	13%	44	201	14%	53	247	17%	99	1,477	10%
Boreal Foothills - Mountain Total		28,368	19%	33,319	22%	37,105	25%	26,122	16%	23,951	15%	23,681	15%	54,741	33%	51,252	31%	47,731	29%	67,680	39%	49,989	68,388	40%	50,697	68,394	40%	50,703	176,911	
Omineca - Valley	BWBSmw1	-	0%	0	0%	0	0%	6	21%	6	21%	6	21%	22	79%	22	79%	22	79%	-	0%	N/A	-	0%	N/A	-	0%	N/A	27	N/A
	SBSwk2	1,853	30%	2,218	36%	2,537	41%	212	3%	186	3%	174	3%	1,851	30%	1,566	25%	1,446	23%	2,255	37%	1,823	2,201	36%	1,769	2,013	33%	1,581	6,171	7%
Omineca - Valley Total		1,853	30%	2,218	36%	2,537	41%	218	4%	192	4%	180	3%	1,873	31%	1,588	26%	1,468	24%	2,255	37%	1,823	2,201	36%	1,769	2,013	33%	1,581	6,198	
Omineca - Mountain	ESSFmv2	3,512	27%	4,638	35%	5,346	41%	610	5%	397	3%	260	2%	3,931	30%	3,312	25%	3,037	23%	5,111	39%	2,873	4,816	37%	2,578	4,521	34%	2,283	13,163	17%
Omineca - Mountain Total		3,512	27%	4,638	35%	5,346	41%	610	5%	397	3%	260	2%	3,931	30%	3,312	25%	3,037	23%	5,111	39%	2,873	4,816	37%	2,578	4,521	34%	2,283	13,163	
Wet Mountain	ESSFwk2	3,957	15%	4,185	16%	4,295	16%	1,120	4%	990	4%	1,167	4%	3,862	15%	3,803	14%	3,450	13%	17,359	66%	10,784	17,322	66%	10,747	17,386	66%	10,811	26,299	25%
	ESSFmv2	784	5%	1,102	7%	1,528	9%	2,666	16%	1,900	12%	1,042	6%	2,666	16%	1,900	12%	1,042	6%	9,826	60%	5,763	10,053	62%	5,990	9,837	61%	5,774	16,251	25%
	SBSwk2	2,642	23%	2,755	24%	2,405	21%	994	9%	1,077	9%	1,560	13%	3,579	31%	3,265	28%	3,208	28%	4,432	38%	1,520	4,550	39%	1,638	4,474	38%	1,562	11,647	25%
	ESSFmvp2	1	0%	1	0%	1	0%	652	43%	582	39%	233	15%	363	24%	375	25%	706	47%	494	33%	117	553	37%	176	570	38%	193	1,510	25%
	ESSFmwc3	549	2%	577	2%	751	2%	2,300	7%	1,944	6%	1,733	5%	6,659	20%	6,720	21%	5,864	18%	23,053	71%	14,913	23,321	72%	15,181	24,214	74%	16,074	32,562	25%
	ESSFwcp3	35	1%	35	1%	35	1%	743	17%	620	14%	545	12%	2,127	47%	2,175	48%	1,914	43%	1,589	35%	466	1,664	37%	541	2,000	45%	877	4,494	25%
Wet Mountain Total		7,968	16%	8,655	16%	9,015	15%	8,475	13%	7,113	11%	6,280	8%	19,256	24%	18,238	23%	16,184	22%	56,753	64%	33,562	57,463	64%	34,272	58,481	65%	35,290	92,763	

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

The late seral forest targets are applied in timber supply analysis forecasts. The constraint is applied as an area target that must be greater than 140 years old for conifer or 100 years old for deciduous. Harvesting is allowed in the model from younger age classes as long as there is enough area reserved to allow recruitment to achieve the target. Seral forecast results are noted Table 12 and 14.

STRATEGY AND IMPLEMENTATION SCHEDULE

Seral targets have been applied and monitored since 2000 on TFL 48. Seral targets as described earlier are based on ranges appropriate to a very large NDU. On TFL 48 they are being applied at a smaller portion of the NDU. As a result of this, previous natural disturbances and harvesting, the targets are not always met initially in each NDU.

If sufficient amounts of late seral are not available then harvesting may only continue if the proposed harvesting of late seral does not lower the post FSP status to less than 50% of the late seral target. The proposed harvesting will not impact the forecasted timeline to achieve the target by more than 10 years. Harvesting of "mature" seral stages will be planned so as not to compromise recruitment of late seral stages. After replacement stands develop into late seral stages (from mature), then stands that were deferred are available for harvest.

MONITORING PROCEDURE

Data sources for this include forest cover, Genus data, NDU boundaries, BEC and DFA boundaries.

Forest cover will be updated with harvesting data from Genus as required to complete seral stage analysis. Disturbances due to fires and other industrial users are generally updated less frequently (approximately 5 year intervals).

There are two steps that are required to be completed for reporting this indicator. The calculations are described below:

The first step will be to update and project the forest cover for all disturbances to the current reporting period based on Genus data. Each stand is assigned to either the deciduous or coniferous group based on the leading species and a seral stage based on the age of the leading species for the rank 1 layer. The area of each stand is then summed for by NDU/ LU and expressed as a percentage of the productive forested area within the NDU/ LU.

The second step is to include all proposed harvesting, project ages to the end of the proposed development period and calculate the seral distribution as described above.

The monitoring of this indicator will occur coincident with the development of the FSP.

Formula:

$$\%S_{class,\ NDU} = (S_{class,\ NDU} / TFA_{NDU}) * 100$$

$$\%S_{class,\ NDU,\ BEC} = (S_{class,\ NDU,\ BEC} / TFA_{NDU,\ BEC}) * 100$$

Variables:

$S_{class,\ NDU}$	Amount of productive forest land (ha) within the late seral class by the specific NDU
$S_{class,\ NDU,\ BEC}$	Amount of productive forest land (ha) within the late seral class by the specific NDU by BEC
TFA_{NDU}	Total productive forest land (ha) within the specific NDU
$TFA_{NDU,\ BEC}$	Total productive forest land (ha) within the specific NDU by BEC
$\%S_{class,\ NDU}$	Percentage of late seral class by the specific NDU
$\%S_{class,\ NDU,\ BEC}$	Percentage of late seral class by the specific NDU by BEC

LINKAGES TO OPERATIONAL PLANS

FSP's will be analyzed to ensure that they are consistent with targets and implementation schedule for seral stage prior to publication. Proposed development will be adjusted if necessary to ensure consistency with targets and recruitment strategies.

3.4 Patch Size Distribution

Criterion 1:	Element(s): 1.1
Biological Diversity	Ecosystem Diversity
CSA Core Indicator(s) 1.1.3: Forest area by seral stage or age class	
Indicator Statement	**Target Statement**
Percent area by Patch Size Class (0-50, 51-100 and >100 ha) by Natural Disturbance Unit (NDU) by early or mature and proportion of mature interior forest condition.	Targets by Patch Size Class by NDU by early or mature are shown in Table 15.
Value(s): Ecosystem Diversity	
SFM Objective: We will conserve or restore ecosystem diversity within the natural range of variation within DFA over time.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCES

Natural disturbance events that shift the patch size distribution to such a level that it cannot be accommodated in a short (decade) time frame. An action plan will be created in this event to develop strategies to trend back to the targets over time.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

A patch is defined as a stand of similar-aged forest resulting from either a natural disturbance or created by timber harvesting. A patch may be composed of either a single disturbance event or an aggregate of events (natural, timber harvesting, or a combination of both). In forested landscapes patches represent a legacy or history of disturbances and as such may have a variety of species, stocking and ages contained within one patch. Forest patches are created naturally by disturbances such as fire, wind or pest outbreaks. In the absence of these natural disturbances forest management, through harvesting, affects the distribution and size ranges of forest patches. Over a rotation or more of the forest, harvesting can then lead to either inflating or fragmenting the landscape beyond the limits of the natural variability of the landscape, which has developed over centuries from natural disturbances. It is therefore important to establish target ranges for the size of patches that are consistent with the natural pattern of forested landscapes. This indicator will monitor the consistency of our harvesting patterns compared to the natural pattern of our landscapes.

With forest management it is then important to manage not only what is created through early patches but also what is left as mature forest patches. As such both early and mature patches are monitored over time. Mature patches are reported in two ways (Table 17), the distribution of each patch class by NDU and the relative proportion of each class that is in an interior forest condition. Interior forest condition is defined as that inner portion of a mature patch more than 100 m from the edge.

The distribution of early and mature patches is monitored based on NDU's as they represent areas with similar disturbance patterns, and they are expected to have similar landscape level size distributions of young and mature patch sizes. The NDU's are based on natural disturbance regime research by DeLong (2002). There are approximately 19,300 ha or less than 1% of the Omineca NDU within TFL 48 (See Table 9). Due to the small amount of the Omineca NDU within TFL 48 and the similarity of the disturbance patterns the Omineca and Boreal Foothills NDU's are grouped together for the purposes of patch targets.

Targets are applied separately for early and mature patches and the overall proportion of mature in an interior forest condition. See Table 15 for the targets by NDU. Targets are applied to patches greater than 100 ha for early and mature patches and to early 50 – 100 ha patches. For early patches there are 2 main design consideration that are appropriate: one is maintaining a minimum amount of large early patches and the second is minimizing the mid-size patches as these are generally the least prevalent in a natural landscape. Generally targets are not applied to early patches less than 50 ha, the one variance to this is in the Wet Mountain NDU (see Table 15). The early patch target is applied as a maximum amount for patches greater than 100 ha. Long-term forecasting indicates that, with the exception of the mature patches in the Wet Mountains zone, early and mature patch size targets are achieved throughout the planning horizon. Target levels in the Wet Mountains zone are generally more restrictive than the other zones and are therefore more difficult to achieve.

While DeLong (2002) provides NDU guidance on the natural disturbance regimes and patterns, there are additional forest management constraints such as visual management (Section 3.37), and peak flow index or equivalent clear cut area for water quantity management (Section 3.30) that limit our ability to fully achieve a natural pattern. The targets in Table 15 reflect both our desire to manage a natural landscape pattern as well as the additional constraints that we manage for.

Table 15: Patch Size Class Targets

NDU	Patch Size Class Targets (%)				
	Early	Early	Early	Mature	
	< 50 ha	50-100 ha	100+ ha		% Mature Interior Forest
Boreal Plains	N/A	<15%	>50%	>70%	>30%
Boreal Foothills / Omineca	N/A	<20%	>40%	>80%	>35%
Wet Mountains	N/A	<25%	<60%	>85%	>60%

CURRENT STATUS

The following Tables 16 and 17 show the baseline data for patch size and the forecasted status for the next 10 years in 5-year increments. Early patches are consistent with identified targets for all NDUs by BEC. For the mature patch targets, Boreal Plains and Boreal Foothills/ Omineca are consistent with their respective targets throughout the forecast, however Wet Mountain is consistently lower than the identified target. Performance is tracked annually in the Annual Report that is produced and reported to public and stakeholders.

Table 16: Early Patch Size Class Current and Future Status (2014)

NDU	Year	Early Patch Size Class (ha)								Total ha
		<50		51-100			100+			
		ha	%	ha	%	Target	ha	%	Target	
Boreal Plains	2005	1,918	16%	749	6%		9,340	78%		12,008
	Post FDP	2,172	10%	1,186	6%		17,888	84%		21,246
	2014	6,026	22%	2,710	10%	<15%	18,737	68%	>50%	27,473
	2019	6,954	22%	3,007	9%		22,019	69%		31,980
	2024	7,734	22%	3,334	9%		24,309	69%		35,377
Boreal Foothills/ Omineca	2005	7,445	22%	6,262	18%		20,489	60%		34,197
	Post FDP	9,236	17%	7,836	14%		37,954	69%		55,027
	2014	19,753	27%	11,688	16%	<20%	43,063	58%	>40%	74,504
	2019	19,905	23%	9,769	11%		56,933	66%		86,608
	2024	20,642	22%	7,455	8%		63,977	69%		92,075
Wet Mountain	2005	1,222	23%	1,205	23%		2,840	54%		5,267
	Post FDP	3,325	31%	1,464	14%		5,914	55%		10,703
	2014	2,773	35%	1,454	18%	<25%	3,749	47%	<60%	7,977
	2019	3,074	35%	1,558	18%		4,071	47%		8,703
	2024	3,862	43%	1,171	13%		4,004	44%		9,038

Table 17: Mature Patch Size Class Current and Future Status (2014)

NDU	Year	Mature Patch Size Class (ha)										Total ha	Total Interior Forest %	Interior Forest Target %
		<50			51-100			100+						
		ha	%	Int%	ha	%	Int%	ha	%	Target	Int %			
Boreal Plains	2005	6,782	12%	6%	1,948	3%	23%	48,148	85%		54%	56,878	47%	
	Post FDP	9,009	17%	9%	3536	7%	28%	41,590	77%		52%	54,135	43%	
	2014	3,966	7%	2%	1,968	4%	1%	47,624	89%	>70%	19%	53,559	47%	>30%
	2019	4,156	8%	3%	1,492	3%	1%	47,356	89%		17%	53,003	47%	
	2024	4,545	9%	3%	1,624	3%	2%	44,653	88%		13%	50,822	46%	
Boreal Foothill/ Omineca	2005	15,322	7%	5%	5,448	2%	20%	197,640	90%		60%	218,409	55%	
	Post FDP	22,140	10%	7%	9,096	4%	28%	194,861	86%		55%	226,097	50%	
	2014	8,722	4%	4%	2,929	1%	1%	206,406	95%	>80%	27%	218,056	57%	>35%
	2019	8,657	4%	3%	2,813	1%	1%	207,415	95%		23%	218,885	55%	
	2024	9,545	5%	3%	2,670	1%	1%	197,749	94%		21%	209,964	54%	
Wet Mountain	2005	2,449	3%	5%	216	0%	13%	68,969	96%		61%	71,633	59%	
	Post FDP	3,210	4%	6%	645	1%	23%	68,014	95%		52%	71,870	50%	
	2014	1,277	2%	2%	94	0%	1%	73,046	98%	>85%	28%	74,417	57%	>60%
	2019	1,146	1%	2%	152	0%	1%	75,672	98%		22%	76,970	54%	
	2024	1,037	1%	3%	289	0%	1%	76,266	98%		16%	77,591	49%	

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

Forecasting of this indicator was completed with two separate processes. The spatial timber supply model Woodstock/Stanley was used to forecast patches into the future for the first 100 years of the simulation. The second method was to incorporate the current Forest Development Plan and forecast the result of implementing the harvest areas and report the status in relation to the targets. The results are shown in Table 16 and Table 17. Actual patches due to proposed harvest will generally be less than that indicated because stand level reserves for riparian or WTP's have not yet been designed.

Early patches are defined as those patches of forest that are ≤40 years old. Recognizing that there could be great variability within the defined patch and that the patch may change over time and to ensure that a reasonable functional estimate of the size of early patches is reported, a 100 m buffer is applied to early patches. Early Patches that fall within the 100 m buffer, or are within 200 m of each other have their areas summed and are reported as one patch.

Mature patches are defined as those forested areas greater than 100 years old. Interior forest condition is that portion of a patch that is not influenced by edges. Edge effect is thought to be minimized at 2-4 tree lengths from the edge (Biodiversity Guidebook 1995). Approximately 95% of the forests within the TFL 48 DFA are less than 30 m tall and as such interior forest is defined as that portion of a mature patch that is greater than 100 m from a forest edge. To simplify the analysis mature patches were buffered inside by 100 m. It is likely that the amount of interior forest will be under estimated because there is likely no edge effect between a mid-aged stand and a mature stand.

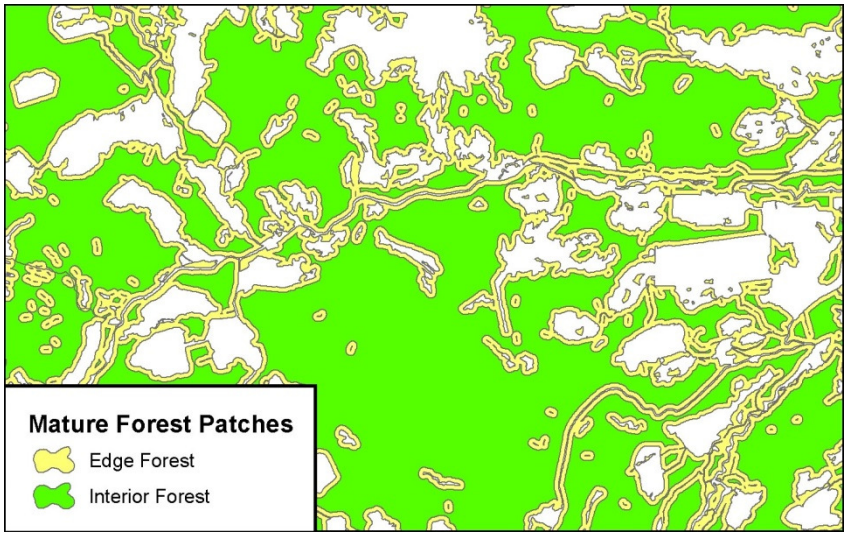


Figure 7: Mature Interior Forest Patches

STRATEGY AND IMPLEMENTATION SCHEDULE

If a natural disturbance event occurs that impacts the achievement of the targets then recruitment strategies will be developed and timelines identified to allow the patch targets to trend back to the desired condition.

In general smaller patches will be planned in more sensitive areas such as visually sensitive areas and may be restricted due to Peak Flow Index (see Section 3.30) constraints.

Patch sizes have been managed and reported on since MP 3. The refinement in SFMP 4 and 5 is due to the spatially explicit forecasting completed.

Subsequent FSP's will incorporate the design and reporting of this indicator.

MONITORING PROCEDURE

Data sources for this include forest cover, Genus data, NDU boundaries and DFA boundaries.

Forest cover will be updated with harvesting data from Genus as required to complete patch size analysis. Disturbances due to fires and other industrial users are generally updated less frequently (approximately 2-5 year intervals).

There are two steps that are required to be completed for reporting this indicator. The calculations are described below:

- The first step will be to update and project the forest cover for all disturbances to the current reporting period based on GENUS data. Contiguous areas are dissolved into each other based on age of the leading species for the rank 1 layer. Early patches are then grouped together if they are within 200 m of each other. The area of an early patch is then summed and treated as one patch. Mature patches are reported as they occur no additional grouping is done. The area of each group is then summed by patch size class by NDU and expressed as a percentage of either early of mature area within the NDU. All stands less than 40 years old are included in the early patch classes. Mature patches are buffered inwards by 100 m. This buffer is then overlaid on the mature patches and the area inside of this buffer is considered to be interior forest (see Figure 8).
- The second step is to include all proposed harvesting, project ages to the end of the proposed development period and calculate the post FDP condition patch size distribution as described above.

The monitoring of this indicator will occur coincident with the development of a Forest Stewardship Plan (FSP).

LINKAGES TO OPERATIONAL PLANS

FSP's will be analyzed and adjusted if necessary to ensure they are consistent with the targets for patch size prior to publication.

3.5 Snags/Live Tree Retention

Criterion 1:	**Element(s): 1.1, 1.2**
Biological Diversity	Ecosystem Diversity, Species Diversity
CSA Core Indicator(s): 1.1.4: Degree of within-stand structural retention **1.2.2:** Degree of suitable habitat in the long term for selected focal species, including species at risk	
Indicator Statement	**Target Statement**
Number of snags and/or live trees (>23.0 cm DBH) per ha on prescribed areas	Retain annually an average of at least 2 snags and/or live trees (>23.0 cm DBH) per hectare on prescribed areas
Value(s): Ecosystem Diversity, Native Species Richness	
SFM Objective: We will conserve or restore ecosystem diversity within the natural range of variation within DFA over time. We will sustain sufficient and appropriately distributed suitable habitat elements to maintain native species richness.	
Canfor common indicator statement: Percent of blocks meeting dispersed retention levels as prescribed in the site plan/logging plan	

ACCEPTABLE VARIANCE

Blocks that are already under a site plan will not apply to this indicator.

Natural forces such as fire, wind, flooding will affect this indicator.

If leaving the tree creates a hazardous work environment, safety must be considered first, and the snag may be felled.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Snags refer to dead standing trees. Snags, or live trees greater than 17.5 cm diameter (i.e. merchantable sized trees) are capable of providing cavity and foraging sites now, or at some future point in the development of a stand. The prescribed area refers to those portions of cut blocks to which the site plan prescribes the retention of snags or live trees to provide potential future cavity sites.

These elements can provide important habitats for at least portions of life cycles of a wide variety of animals. Snags or live trees retained within the perimeter of a block can provide cavity sites and other habitat values for several decades following disturbance, provided they remain standing. Hoyt and Hannon (2002), for example, note that trees averaging 16 cm and 23 cm DBH provide feeding and nesting habitat respectively for black backed and three toed woodpeckers in recent burns. In 2009 Bunnell et al. proposed a change in diameter to the retention target suggesting a 23.0 cm DBH provided greater habitat value and as such the retention strategy will be measured and monitored for trees that are >23.0cm DBH.

Snags and/ or residual live trees are a common component of young stands following natural disturbance. Fires (the predominant natural disturbance in the DFA) burn at different intensities, depending on site and climatic conditions. This results in the natural retention of live trees and snags at variable densities across the landscape.

Retaining some dispersed snags or live trees in suitable portions of managed stands supplements sources of this habitat element from wildlife tree patches, unsalvaged natural disturbances, and from the non-timber harvesting land base. All of these sources of this habitat element supports re-establishment of the many species dependent on this element.

Bunnell et al, (1997) states that primary excavators prefer trees that are easier to excavate. Generally hardwoods are the commonly preferred trees for cavity excavation. Decay prone hardwoods are more desirable than decay resistant hardwoods. When hardwood options are limited, birds will use conifers, but prefer those that have rotten heartwood.

While the retention of standing material in managed stands may be at relatively low levels, the duration of retention of the vertical structure is likely longer than average, due to the lack of fire damage. This indicator thereby contributes to maintaining ecosystem function, composition and structure that assists the ecosystem in recovering quicker from logging disturbance.

Harvested stands on the DFA tend to be relatively uniform, with smaller tree sizes, and fewer dead trees than similar stands in other parts of the province. This is apparently due to the frequency of fires on the landscape, and the relatively young age of the forest stands.

Relatively little research exists on desired levels of retention, particularly in the boreal forest. Bunnell (1999) reports that little use is gained by sustained provision of more than about 2 snags/ ha.

CURRENT STATUS

Currently on the DFA we are managing for snags and live tree retention. The following statement, or a similar derivative of this statement is included in our site plans where ground conditions exist:

> *"Where operationally feasible retain the larger clumps/islands of deciduous stems. Avoid leaving dispersed individual deciduous stems, as they will impede future silviculture operations. Large snags may be retained for wildlife trees if they meet with WCB regulations and do not compromise harvesting or silviculture activities; or they may be stubbed or felled."*

While harvesting supervisors assess conformance to site plan measures during harvesting inspections, which includes prescribed snag or live tree retention, no information is currently available on actual densities of retained snags, live trees or stub trees following the completion of operations.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

Does forecasting apply (y/n)? Yes

It is anticipated that snags/live tree retention will be prescribed on up to approximately 38% of the timber harvesting land base. Achievement of the indicator is expected to result in healthy ecosystems with a diversity and abundance of native species and habitats. It is also expected to result in harvested areas with stand level habitat attributes that will help to sustain biological and ecological processes.

STRATEGY AND IMPLEMENTATION SCHEDULE

Subsequent to harvesting, with consideration for safety and economic limitations, dispersed snags or live trees are retained in some suitable areas within managed stands to provide potential cavity sites through time. The guidelines below describe where this indicator will be applied.

- This strategy is designed to encourage the retention of some snags or live trees capable of providing cavity sites, within the harvested portion of the timber harvesting land base.

- Snags or trees may be stubbed at 3-5 m to meet safety requirements and ensure windfirmness. It is not required that retention be evenly distributed across an area, rather retention should be distributed in areas which minimize the risk of damaging the retained snags or trees.
- Operational Foresters will identify in site plans to which blocks, or specific portions of blocks, this indicator will be applied (i.e. the prescribed area), using the following guidelines:
- For blocks that have at least 10% of the gross area designated as wildlife tree patches, this indicator need not be applied, as the habitat element will be well represented within the WTP's.
- In salvage (e.g. beetle) operations, if forest health or worker safety is a potential concern, this indicator need not apply.
- In stands that average less than 23.0 cm DBH (e.g. height class two pine stands), this indicator need not apply, due to the lack of suitable candidate trees.
- This indicator need not apply on cable harvesting area.
- This indicator need not apply to areas where steep slopes (>30%) or in narrow fingers of harvested blocks (less than 40 m wide) which restrict machine maneuverability. These factors may limit the capability to safely and economically stub snags or live trees, or limit the ability of skidding or site preparation equipment to avoid significantly damaging stubbed trees.
- For areas where shelterwood or partial cut systems are employed this indicator need not apply.
- For areas within the following ecosystem groups indicated by blue in Figure 9 and Figure 10 below, the indicator does not apply.

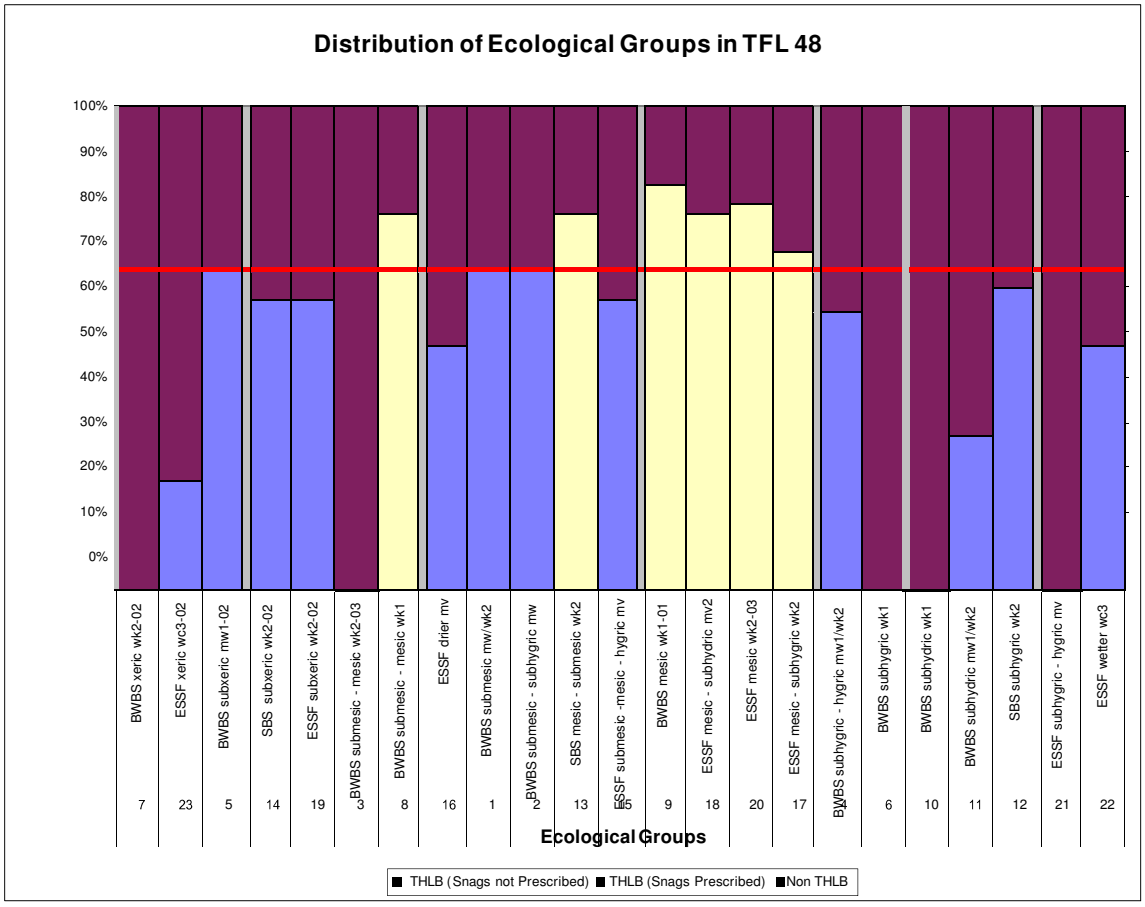


Figure 8: Distribution of Ecological Groups by THLB and Where Snags are Prescribed (2005)

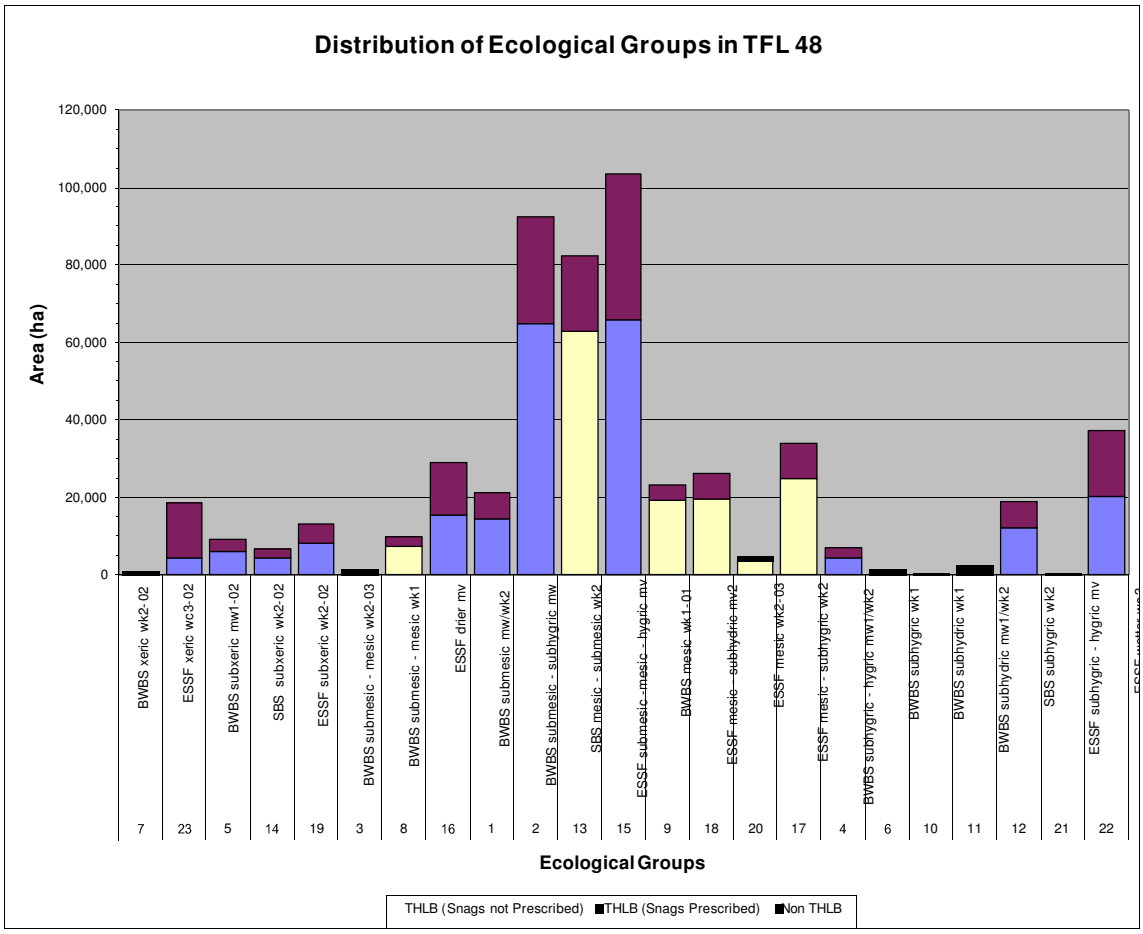


Figure 9: Ecological Groups Distribution between THLB and Non-THLB (2005)

Table 18 indicates those ecosystem groups and associated site series where the indicator will apply subject to the previous exceptions. The area where this applies is where the non-timber harvesting land base makes up less than 30% of the ecosystem group. Snags/live tree retention will be prescribed on up to approximately 38% of the timber harvesting land base.

Table 18: Ecosystem Groups where Snags/ Live Tree Retention is Prescribed

Group #	Variant	Name	Site Series	Description
8	BWBS	subxeric-mesic wk1	wk1-02	Pl - Lingonberry - Velvet-leaved Blueberry; subxeric, very poor-poor
			wk1-03	Sb - Lingonberry - Coltsfoot; submesic-subhygric, very poor-poor
			wk1-04	Sw - Wildrye - Peavine; submesic-mesic, poor-medium
9	BWBS	mesic wk1-01	wk1-01	Sw - Huckleberry - Stepmoss; submesic-mesic, medium
13	SBS	mesic-submesic wk2	wk2-03	Sxw - Huckleberry - Highbush Cranberry; submesic, poor-medium
			wk2-01	Sxw - Oak Fern; submesic-mesic, medium
			wk2-04	Sb - Huckleberry - Clubmoss; submesic-subhygric, poor-medium
17	ESSF	mesic-subhygric wk2	wk2-01	Bl - Oak Fern - Knight's Plume; submesic-subhygric, poor-rich
			wk2-04	Bl - Devil's Club - Rhododendron; subhygric-hygric, poor-medium
			wk2-05	Bl - Rhododendron - Lady Fern; subhygric, medium-rich
			wk2-06	Bl - Horsetail - Sphagnum; hygric, medium-rich
18	ESSF	mesic-subhygric mv2	mv2-04	Bl - Oak Fern - Knight's Plume; mesic-subhygric, medium-rich
			mv2-05	Bl - Devil's Club - Rhododendron; subhygric, rich
20	ESSF	mesic wk2-03	wk2-03	Bl - Oak Fern - Bluebells; mesic-subhygric, medium-rich

Planning supervisors spatially identify in genus the area where snag/ live tree retention will be retained and choose the appropriate harvesting strategy, i.e. clearcut with snag retention.

During the harvesting pre-work, prior to the commencement of operations, operational supervisors are advised if this indicator is applicable to a block, and if so specifically to which sections of the block it applies. This information will be identified on the logging plan maps.

Logging supervisors will consult with the silviculture forester on each block to determine if stubbing is the preferred method to meet the target for this indicator. Leaving live trees or snags can seriously impede the treatment options for brushing. For example, aerial herbicide requires snag/ live tree removal, as the helicopter cannot adequately or safely maneuver around these standing trees. By carrying out stubbing in areas with poor access, or on sites where aerial herbicide is anticipated, the treatment options are left open.

Silviculture will have access to the layer where this data exists. They will be able to overlay this layer with their planned blocks, to determine in which areas of the blocks the indicator applies.

Supervisors will review the requirements pertaining to this indicator in pre-works with harvesting and silviculture workers, and discuss methods and procedures to create and/ or retain these habitat elements to the target levels.

MONITORING PROCEDURE

Monitoring and reporting procedures will be as follows:

On areas where this indicator applies, operations supervisors note in harvesting inspections whether or not operational activities are in general compliance with the indicator.

The reporting summary table will be similar to the following format.

Cutblock Number	Prescribed Area (ha)	Was indicator applied correctly?
700-005	32	Yes

Silviculture will also note in their inspections whether we are in conformance with this indicators, on blocks that they carry out snag falling.

LINKAGES TO OPERATIONAL PLANS

Site plans will identify whether cutblocks or portions thereof are candidate areas for dispersed snag or live tree retention.

Logging plan maps will show areas where the indicator is applied.

3.6 Wildlife Tree Patches

Criterion 1:	**Element(s): 1.1**
Biological Diversity	Ecosystem Diversity
CSA Core Indicator(s): 1.1.4: Degree of within-stand structural retention	
Indicator Statement	**Target Statement**
Cumulative wildlife tree patch percentage in blocks harvested since 1995 by landscape unit by BEC sub zone	Cumulative wildlife tree patch % will be at least 8% by BEC sub zone
Value(s): Ecosystem Diversity	
SFM Objective: We will conserve or restore ecosystem diversity within the natural range of variation within DFA over time.	
Canfor common indicator statement: Percent of stand structure retained across the DFA in harvested areas	

ACCEPTABLE VARIANCE

Where the target is not currently met new proposed harvesting must have the minimum proportion of WTP prescribed at the block level. Exceptions to this requirement is if the proposed harvesting is a non-clear cut system such as irregular shelterwood or partial cutting. No other variance is acceptable.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

This indicator will track the proportion of forest retained as WTP's within each biogeoclimatic subzone. WTP's provide sources of shrubs, large live trees, broadleaf trees, coarse woody debris (CWD) and snag or cavity sites. These elements can provide key habitat components that support the residual populations, the reintroduction of populations extirpated by the disturbance, and overall ecosystem function (Bunnell et al 1999).

WTP's within managed stands have been shown to be important in the re-establishment or maintenance of a variety of species, including moose (Gasaway and Dubois 1985), and birds (Seip 1997). Residual patches include both islands within the block (internal WTP's) and patches immediately adjacent to harvested areas that are also adjoined to unharvested areas (external WTP's). Both internal and external residual patches may be suitable for WTP's provided they can function as sources of habitat elements, which will depend on their site specific attributes. External WTP's connected to adjacent unharvested areas are typically more wind firm and may receive higher initial use by wildlife due to the proximity of adjacent unharvested habitats.

Maintaining habitat elements in wildlife tree patches contributes to enhancing species richness by providing the critical features needed to support a variety of species. Retaining WTP's with similar composition and structure to natural remnants will contribute to maintaining a NRoV in ecosystem function, composition, and structure, which allows ecosystems to recover from disturbance and stress.

WTP's can also be used to protect site-specific habitats, such as mineral licks and raptor nesting sites and provide a source of local genetic material.

CURRENT STATUS

The table below summarizes current status of WTP retention levels for blocks on which harvesting has commenced since 1995. The WTP retention levels exceeds the target in all sub zones except the ESSFwc3, however 60% or 411 ha of the 689 ha under prescription has been harvested with an irregular shelterwood retention system. Typically 55% of the area is retained between the trails so 55% of the 411 ha is 226 ha plus the 39 ha of WTP prescribed is a total of 265 ha of retention or 38% of the total area under prescription.

Table 19: Summary of WTP's in Areas Harvested Since 1995 to 2013 (2013)

BEC Sub Zone	Total Area Under Prescription	WTP Area	WTP %
BWBSmw	8,938	1,281	14%
BWBSwk	3,459	595	17%
ESSFmv	7,355	822	11%
ESSFwc	689	39	6%
ESSFwk	4,636	503	11%
SBS wk	11,570	1,849	16%
Grand Total	**36,646**	**5,090**	**14%**

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? No

WTP's are not spatially identified in the forecasting simulation conducted in support of SFMP 5. To account for the area that will be retained as WTP's a percent volume reduction is used as a proxy to identify volume and area retained as WTP's. See Appendix 5 – Timber Supply Analysis Information Package for a full description of analysis assumptions used to model WTP's.

STRATEGY AND IMPLEMENTATION SCHEDULE

Wildlife tree patches will be established across landscape units to act as sources of key habitat elements, provide stand level structural characteristics, and protect site-specific habitats. WTP retention levels will be assessed at the landscape level to reflect the natural variability in residual retention levels in natural disturbance patches.

New WTP's will be designed using the following guidelines:

- WTP minimum size will be 0.20 ha. WTP's should be of various sizes, including some areas larger than 1 ha in larger blocks particularly (i.e. greater than 100 ha), if possible. WTP's should contain proportional representation of the vegetation contained in the general cut block area, both merchantable and non-merchantable. General priorities for WTP placement will be as follows:
- Areas of key site specific habitat importance, such as eagle, or osprey nests, mineral licks, and riparian areas.
- Areas of operational concern, which can contribute significantly to the provision of, key habitat elements (riparian habitats, large live trees, snags or declining trees, large trees, broadleaf trees, CWD, or shrubs).
- Tree species, which are uncommon in the BEC sub zone (i.e. deciduous in the ESSF sub zones) and may provide some unique niche habitats.
- Other wind firm forested stands, which can provide these habitat elements.
- The retention of WTP's will generally be higher in ecosystem groups identified in Table 17 and less in other units. The overall sub zone target will still apply.

WTP's have been designated and retained as part of silviculture prescriptions or site plans since 1995. The requirement to track at the BEC subzone level is a new requirement and as such it will take time as new harvesting is proposed to fully reach the target levels.

MONITORING PROCEDURE

The percentage of WTP's is calculated by overlaying the areas of WTP's over the total area under prescription within each BEC subzone. Status of this indicator will be reported annually in the annual report.

Formula:

$$\%WTP_{\text{BEC Subzone}} = (WTP_{\text{BEC Subzone}} / TAUP_{\text{BEC Subzone}})*100$$

Variables:

%WTP BEC Subzone	Percent area in wildlife tree patches relative to the total area under prescription by Biogeoclimatic Ecosystem Classification Subzone.
WTP BEC Subzone	Area in wildlife tree patches by Biogeoclimatic Ecosystem Classification Subzone.
TAUP BEC Subzone	Total area under prescription by Biogeoclimatic Ecosystem Classification Subzone.

LINKAGES TO OPERATIONAL PLANS

Silviculture prescriptions and site plans prescribe the areas to be retained as WTP's.

3.7 Average Minimum Width of RRZ and RMZ

Criterion 1:	**Element(s): 1.2, 3.2**
Biological Diversity	Species Diversity; Water Quality and Quantity
CSA Core Indicator(s): 1.2.1: Degree of habitat protection for selected focal species, including species at risk	
Indicator Statement	**Target Statement**
Average minimum width of retention by Riparian Reserve Zone or Riparian Management Zone by appropriate stream, lake or wetland classification within cutblocks	We will meet or exceed the regulatory retention widths by Riparian Reserve Zone by appropriate stream, lake or wetland classification within cutblocks
Value(s): Native Species Richness, Water Quality and Quantity	
SFM Objective: We will sustain sufficient and appropriately distributed suitable habitat elements to maintain native species richness. We will maintain water quality and quantity.	
Canfor common indicator statement: Number of non-conformances where forest operations are not consistent with riparian management requirements as identified in operation plans	

ACCEPTABLE VARIANCE

The only acceptable variances will be where the district manager has approved removal within the Riparian Management Zone (RMZ) because of specific issues, such as removal of timber infested with Mountain Pine Beetle.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Riparian areas occur adjacent to wetlands or bodies of water such as rivers, streams, or lakes. Riparian habitats include the stream bank and flood plain area adjacent to streams or waterbodies. On larger streams particularly, riparian areas often provide productive, structurally diverse habitats. In addition to providing ready access to water, these areas also support important characteristics such as coarse woody debris, cavity sites, shrubs and broadleaf trees, which have been identified as key habitat elements necessary to support species richness.

Riparian reserve zones (RRZ) are specific areas on larger fish bearing streams, in which harvesting is not normally permitted, in order to protect significant riparian and aquatic habitats. Maintaining RRZ's provides many of the habitat elements needed to support a diverse species mix across the landscape.

Minimum RRZ's do not apply to road right of ways of roads that cross streams.

CURRENT STATUS

In 2004, the district manager authorized a blanket exemption for harvesting within the Riparian Reserve Zone to remove wood infested by Mountain Pine Beetle. The total area logged in the RRZ was 0.33 ha.

Table 20: Summary of Riparian Reserve and Management Zones from 2000 – 2013 (2013)

Year	Stream, Wetland or Lake Class	Total Stream Length (m)[b]	RRZ – Required Width (m)[c]	RRZ–Actual Width (m)[c]	RMZ Required Width (m) c	RMZ – Actual Width (m)[c]	RMA Required Width (m)[c]	RMA - Actual Width (m)[c]
Average 2000-2010	S1	**34,694**	50	104.4	20	4.8	70	109.2
	S2	**28,370**	30	91.9	20	12.5	50	104.4
	S3	**38,020**	20	48.1	20	16.5	40	64.6
	S4	**20,452**	0	7.1	30	25.9	30	33.0
	S5	**45,175**	0	17.4	30	29.2	30	46.6
	S6	**390,915**	0	4.8	20	19.7	20	24.4
	W3	**4,423**	0	6.8	30	25.1	30	31.9
	W5	**673**	10	27.3	40	25.8	50	53.1

a Channel widths for S1 streams are >20m, <100m.

b Streams that flow through, rather than adjacent to a block have had their lengths doubled to account for the application of RMA's to both sides. Therefore true stream length is less than reported in this table.

c RRZ and RMZ widths are applied to a single side of a stream. If stream flows through the block the length has been doubled (see footnote b) but the widths are not doubled.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes.

Sustainable Forest Management Plan 4 describes a comprehensive approach for accounting for riparian net downs across the land base. Data collected on average reserve width is used during the Timber Supply Review and will ultimately reflect in the AAC calculation.

STRATEGY AND IMPLEMENTATION SCHEDULE

During the site plan phase, RRZ and RMZ details will be entered into Genus, to ensure tracking is kept current. Streams within and adjacent to block boundaries will be GPS traversed. All streams will be classified during the site plan phase, and stream classification information will be entered into Genus. Site-specific retention strategies are developed and prescribed for each stream. At a minimum the regulatory requirements are met although often these requirements are exceeded as indicated in Table 20.

MONITORING PROCEDURE

Pre-harvest inspections are conducted based on risk ranking described in Canfor's EMS. Logging foreman conduct pre-works with the logging contractors to ensure that Riparian Management Areas are known and flagged. Post-harvest inspections are conducted on all cutblocks.

The areas managed as RRZ or RMZ by appropriate stream, lake or wetland classification will be summarized in the annual report.

Analytical Method

Query the blocks data set from Genus to get a subset of the blocks that had harvesting completed for the year in question.

Measure all stream lengths within and adjacent to blocks.

Double lengths of streams that run through the blocks to account for the riparian management area on each side.

When measuring streams, include the ones within WTP's as well. If the stream runs through the WTP then double the length. If the stream is adjacent to the WTP, then do not double. Determine the area of the WTP, then multiply by 10,000 to convert to square meters. Next, divide by the length of the stream. (WTP Area x 10,000)/ stream length). The resultant number is the average reserve width. Tally this number with the summary for RRZ's.

Summarize the data by calculating total length, hectares and average widths, by stream class and reserve type.

LINKAGES TO OPERATIONAL PLANS

The location, classification and, where applicable, RRZ requirements of waterbodies will be included in SP's and/ or operational maps used for timber harvesting, road construction and silviculture activities.

Field foresters will identify site specific requirements for the protection of reserve zones, and management practices will be included in SP's.

Pre-works completed prior to harvesting, road construction or silviculture activities will review RRZ's size and location, and any site specific protection measures.

3.8 Shrubs/Early Forest

Criterion 1:	**Element(s): 1.2**
Biological Diversity	Species Diversity
CSA Core Indicator(s): 1.2.1: Degree of habitat protection for selected focal species, including species	
Indicator Statement	**Target Statement**
The minimum proportion of shrub habitat (%) by Natural Disturbance Unit	Each Natural Disturbance Unit will meet or exceed the baseline target (%) proportion of shrub habitat (Table 21)
Value(s): Native Species Richness	
SFM Objective: We will sustain sufficient and appropriately distributed habitat elements to maintain native species richness.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

Acceptable variance is ± 20% of the baseline target.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Shrubs are defined in the Vegetation Resource Inventory (VRI) BCLCS Level 4 as either shrub low (SL) or shrub tall (ST). Forest or harvested sites less than 30 years old are also considered to contribute to shrub habitat in the DFA.

Shrubs are common in riparian areas, and readily enter larger forest openings, especially on moist sites. As the stand closes they are suppressed by the taller trees, and remain uncommon until the stand naturally opens. Many species respond positively to shrub abundance, and shrub abundance is influenced by forest practices (Bunnell 1999).

In a review of the vertebrates known to be within TFL 48 Bunnell (2005) found that 41%, 42% and 35% were restricted to or favoured shrub or early seral habitat in the BWBS, ESSF and SBS biogeoclimatic zones respectively.

CURRENT STATUS

Table 21 indicates the current and post FDP condition of shrub habitat within the DFA. Targets were established for this indicator by reviewing the amount of naturally occurring shrub areas by NDU as well as forested areas less than 30 years old. Natural disturbance units with low levels of naturally occurring shrubs generally have lower targets than areas with higher levels of shrubs. The Omineca NDU was consistently projected below the baseline target, whereas the Boreal Plains and Boreal Foothills NDU's were double to triple the baseline target.

Table 21: Historic Shrub Habitat, Current Condition, and Targets (2014)

NDU	NDU Subunit	Total NDU Area	2010		2014		2024		2034		2059		2109		2259		Baseline Target %
			ha	%	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%	
Boreal Plains		120,891	17,803	15%	25,487	27%	31,425	26%	31,819	25%	21,925	22%	24,073	23%	21,804	19%	14%
Boreal Foothills	Valley	178,225	27,687	16%	31,761	34%	41,787	35%	43,784	34%	26,810	27%	33,299	33%	36,103	32%	12%
	Mountain	205,406	22,944	11%	25,379	27%	33,122	28%	37,624	29%	28,255	28%	29,904	29%	31,851	28%	11%
Omineca	Valley	6,504	812	12%	1,849	28%	2,154	33%	1,892	29%	400	6%	1,257	19%	1,168	18%	7%
	Mountain	15,031	1,719	11%	3,512	23%	4,858	32%	5,727	38%	2,001	13%	3,765	25%	2,928	19%	10%
Wet Mountain		117,618	14,958	13%	6,788	7%	5,610	5%	7,782	7%	21,555	21%	10,144	10%	19,401	17%	7%
Grand Total		643,676	85,924	13%	94,776	17%	118,956	17%	128,628	17%	100,946	17%	102,442	17%	113,255	17%	

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

Forecasting was completed for this indicator by tracking the proportion of forest stands that are less than 30 years old over the full 250-year planning horizon. There was no site conversion or brush rehabilitation to forest forecasted in the analysis.

STRATEGY AND IMPLEMENTATION SCHEDULE

Early forest less than 30 years old can provide important shrub habitat and this can be created through harvesting. Harvesting and silviculture practices can influence the abundance and distribution of shrubs over time.

Long-term monitoring of shrubs/ early forest change within managed stands will occur through Change Monitoring Inventory (CMI) plots established over the DFA. These plots are systematically established across the DFA based on a 2-km grid in managed stands 15 years after harvesting. These plots will provide a representative sample of all managed stands over time. The first set of plots was established in 2006. Once the initial backlog of approximately 61 samples was established for stands that had been harvested greater than 15 years ago then an additional 3 to 5 samples were established each year.

MONITORING PROCEDURE

Data sources include vegetation resource inventory (VRI), NDU maps, and GENUS data.

Canfor periodically updates VRI information every two to five years. The GENUS system is a "real-time or live" database that is maintained and updated by Canfor staff as they carry out their daily activities.

The CMI plots will be re-measured on an approximately 10 year cycle and will allow comparisons of shrub composition and abundance among other things over time.

This information will feed back to operational practices overtime to determine which practices are adversely impacting the habitat element and corrective action will be taken if necessary.

To monitor this indicator, the report will be run at each SFMP and compared to the overall target. The following formula describes the calculation used to estimate shrub proportion by NDU.

Formula:

$$\%SH_{NDU} = ((SH_{NDU} + EF_{NDU}) / AREA_{NDU})*100$$

Variables:

$\%SH_{NDU}$	Percent area in a shrub /early forest structural stage relative to the total area by Natural Disturbance Unit
SH_{NDU}	Area classified as shrub in the VRI for TFL 48 (BCLCS Lv 4 = ST or SL by Natural Disturbance Unit
EF_{NDU}	Area classified as Early Forest VRI for TFL 48 (BCLCS Lv 2 = T and Projected Age <30 years) by Natural Disturbance Unit
$AREA_{NDU}$	Total Area of Natural Disturbance Unit within TFL 48

LINKAGES TO OPERATIONAL PLANS

The data will be used at the Forest Stewardship Plan level to guide future harvest planning and will be used by the silviculture staff to review long term trends in reforestation policies and to adjust practices where necessary.

3.9 Wildlife Habitat Areas, Ungulate Winter Ranges and Dunlevy Creek Management Plan

Criterion 1:	**Element(s): 1.2, 1.4**
Biological Diversity	Species Diversity; Protected Areas and Sites of Special Biological and Cultural Significance
CSA Core Indicator(s) 1.2.1: Degree of habitat protection for selected focal species, including species at risk **1.2.2:** Degree of suitable habitat in the long term for selected focal species, including species at risk	
Indicator Statement	**Target Statement**
Proportion of activities consistent with objectives of Wildlife Habitat Areas (WHA), Ungulate Winter Ranges (UWR), and Dunlevy Creek Management Plan	All forest management activities will be consistent with objectives of Wildlife Habitat Areas (WHA), Ungulate Winter Ranges (UWR), and Dunlevy Creek Management Plan
Value(s): Native Species Richness, Protected Areas and Sites of Special Geological, Biological, or Cultural Significance	
SFM Objective: We will sustain sufficient and appropriately distributed suitable habitat elements to maintain native species richness. We will implement management strategies appropriate to the long term maintenance of protected areas and sites of special geological, biological, or cultural significance.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

No variances unless authorized by the Regional Manager Ministry of Environment.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Consistency with the objectives of Wildlife Habitat Areas (WHA) and Ungulate Winter Ranges (UWR) ensures the protection of specific features and critical habitat. The objectives designed for these areas generally allow activities provided that protection of the special features of these areas is maintained.

WHA's are mapped areas of habitat that are biologically limiting to a species or are remaining examples of identified plant communities. They are established by MWLAP to protect critical habitat elements for one or more species of Identified Wildlife. Identified Wildlife are considered to be sensitive to habitat alteration associated with forest and range practices and are considered to be at risk (i.e. endangered, threatened, vulnerable, or regionally important).

UWR's refers to an area that is identified as being necessary for the winter survival of an ungulate species.

Dunlevy Creek Management Plan (DCMP) refers to a special management plan for the Dunlevy block of the TFL developed and prepared during the term of MP 3 by the Ministry of Sustainable Resource Management (2002). The Plan divides the Dunlevy into several subzones (See Figure 11) and identifies specific operational guidelines around how and when harvesting and mineral extraction may occur.

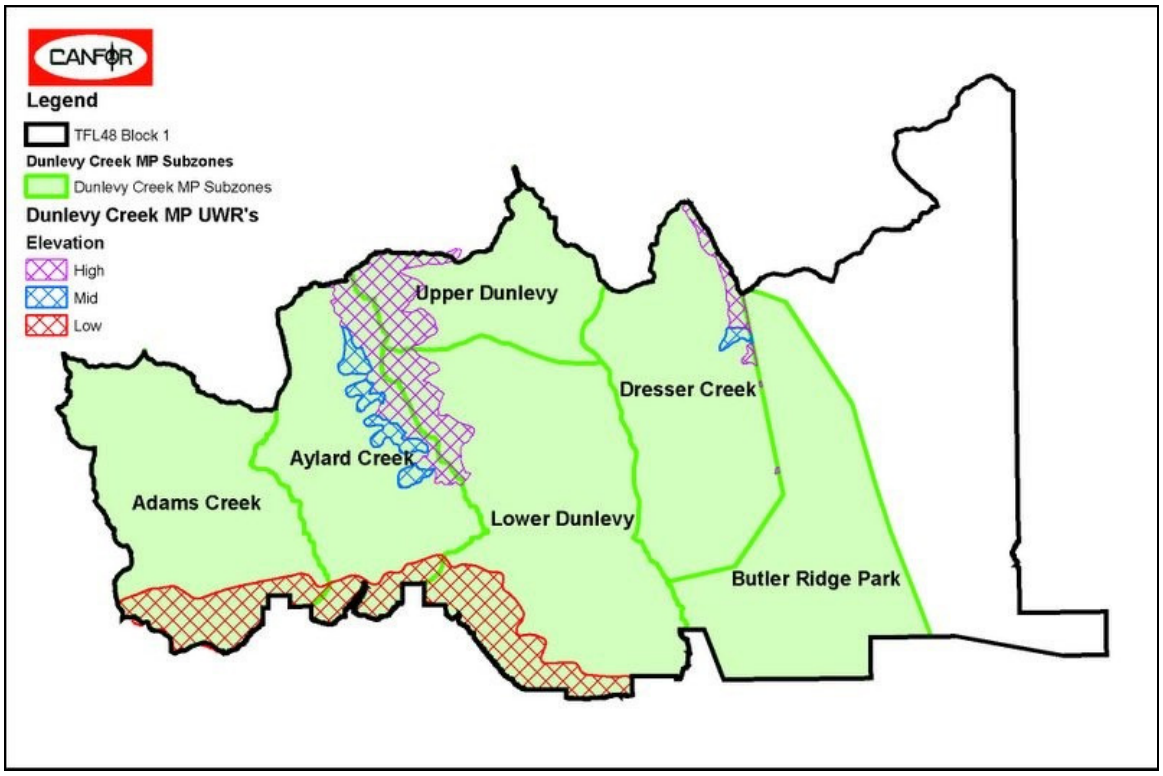


Figure 10: Dunlevy Creek Management Plan Subzones and UWR's

CURRENT STATUS

Wildlife Habitat Areas

Currently within the TFL there are 16 wildlife habitat areas (WHA's) have been identified and approved. There has been no forest activity within WHA's.

Ungulate Winter Ranges

Ungulate winter ranges have been identified as part of the Dunlevy Creek Management Plan in addition to those included in MP 3 or MP 4. See Table 22 for a summary of areas managed as WHA or UWR and their corresponding contribution to the timber harvesting land base. There has been approximately 29 ha of forest area harvested within the elk UWR. Harvesting of this area occurred prior to the designation of this area as UWR. There is no forestry activity planned in either WHA or UWR.

Dunlevy Special Management Zone

During the term of MP 3, 216 ha of harvesting (CP 275 and 276) occurred within the Lower Dunlevy subzone in 2001 and 2002. The harvesting and subsequent deactivation is consistent with the Dunlevy Creek Management Plan. Since then there has been no forest activity in this area.

Table 22: WHA and UWR Area's Incorporated in SFMP 5 (2011)

WHA / UWR	Location	Gross Area (ha)	Forest Area (ha)	Net Area Contributing to THLB
WHA - 9-029		101	84	0
WHA - 9-041	Meadow Creek	653	613	263
WHA - 9-044	Aylard Ridge	3,744	2,700	652
WHA - 9-045	Husky Ridge	203	166	134
WHA - 9-049	Butler	69	67	52
WHA - 9-050	Mt.McAllister	5,263	3,771	389
WHA - 9-051	Mt.Monteith, Mt.Frank Roy	211	29	0
WHA - 9-055	Mt.Stephenson, Pyramis Peak	6,0000	3,751	189
WHA - 9-056	Mountain Creek	1,047	621	8
WHA - 9-057	Milburn Peak	1,685	777	51
WHA - 9-059	Mt. Crum	5	0	0
WHA - 9-061	Mt.Spieker, Mt. Reesor	6,392	4,363	648
WHA - 9-062	Perry Creek	470	403	46
WHA - 9-063	Wolverine River	7,310	3,148	395
WHA - 9-064	Goat Mtn.	1,930	1,077	45
WHA - 9-065	Albright Ridge	2,117	766	7
	Total WHA	**37,199**	**22,336**	**2,881**
Ungulate Winter Range	9-002	39,524	25,218	1,620
	9-004	3,267	2,956	1,893
	Dunlevy	2,953	2,607	1
	Elk	2,809	2,633	1,648
	Total UWR	**48,553**	**33,414**	**5,163**
Total All Wildlife		**85,752**	**55,750**	**8,044**

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

The existing WHA for Bulltrout and the UWR's within the DCMP area have been removed from the THLB.

The information used to determine that amount of harvesting in each compartment of the DCMP was based upon the MP 4 THLB. Since the THLB has changed in the SFMP 5 analysis, the area targets are adjusted accordingly and in keeping with the relative amount of harvest area to THLB area. The timing of harvest has not changed; however, additional periods were included to cover the entire planning horizon.

Table 23: Area Targeted for Harvest by Decade within the Dunlevy Creek Plan Area (2005)

THLB Area and Decade Targeted	Compartment				
	Adams	Aylard	Dresser Creek	Lower Dunlevy	Upper Dunlevy
2014	1468	51			365
2024				244	
2034					480
2044		560		244	
2054			1696	488	
2064	722				
2074				488	
2084					
2094	896				
2104				726	
2114		848			
2124			1696	726	
2134		848			
2144					566
2154	1230			244	
2164					
2174				244	404
2184		560			
2194	536			244	
2204					
2214				488	

THLB Area and Decade Targeted	Compartment				
	Adams	Aylard	Dresser Creek	Lower Dunlevy	Upper Dunlevy
2224		832			
2234				488	
2244	893		1696		
2254					

STRATEGY AND IMPLEMENTATION SCHEDULE

The locations of the WHA's and UWR's are maintained within Canfor's GIS. No activities are proposed for WHA's or UWR's within the Dunlevy. Harvesting within the Dunlevy is conducted as per the schedule outlined in Table 23.

Harvesting in the Sukunka/ Graveyard UWR's will be conducted only when a maximum of 20% of the forested land base is less than 3 m tall and 50% of the forested land base must be greater than 100 years old.

MONITORING PROCEDURE

When activities are proposed and/ or implemented within the Dunlevy Creek Management Plan area or UWR's, where harvesting is an acceptable activity, a summary of these activities will be presented in the annual report.

LINKAGES TO OPERATIONAL PLANS

FSP's and SP's will be developed in accordance to the objectives of the WHA's, UWR's and Dunlevy Creek Management Plan.

3.10 Habitat Supply for Species of Public Concern

Criterion 1:	**Element(s): 1.2**
Biological Diversity	Species Diversity
CSA Core Indicator(s): 1.2.1: Degree of habitat protection for selected focal species, including species at risk	
Indicator Statement	**Target Statement**
Habitat supply for species of public interest (grizzly bear, wolverine, marten, fisher, elk, moose, caribou)	When habitat supply decreases by 20% over time beyond the natural range of variation baseline for species of public interest, stand level management strategies will be developed within one year
Value(s): Native Species Richness	
SFM Objective: We will sustain sufficient and appropriately distributed suitable habitat elements to maintain native species richness.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

Where target is not met due to natural disturbances then this is an acceptable variance. Should this occur then an action plan would be developed to manage habitat until the target can be achieved. This may include stand level management guidelines targeted at specific species.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Canfor is using indicators at coarse (3.1 Ecosystem Representation), medium (3.2 Forest Types, 3.3 Late Seral Forest, 3.4 Patch Size Distribution, 3.5 Snags/ Live Tree Retention, 3.6 Wildlife Tree Patches, 3.7 Average Minimum Width of RRZ and RMZ, 3.8 Shrubs/ Early Forest, and 3.27 Coarse Woody Debris) and fine filter (3.11 Species of Management Concern) scales to ensure that biodiversity is maintained across the DFA over time. Habitat supply for specific species, as measured by habitat models, is a complementary system which attempts to model changes to specific wildlife species as a result of modifications at the coarse, medium and fine filters. This indicator acts as a cross-check at the species level to help determine the effectiveness of filters and to potentially direct stand level management actions.

Habitat supply will be no more than 20% less than the baseline NRoV for selected species over time. The degree of variance is relatively high for two reasons. As discussed in Section 2.6 (Natural Disturbance Unit Planning) the forest types within the DFA can experience a high range of natural variability. It is anticipated that the wildlife species within the DFA are adapted to experience fairly wide ranges of disturbance over periods of time. In addition, changes in habitat types for one species may be beneficial for another, e.g., grizzly bears prefer early seral habitat and an increase in this habitat type may result in reduced habitat for a species dependent on older seral stages (e.g., marten/ caribou). By allowing fairly large variances natural and human induced changes can benefit one species without necessarily requiring a management action for the other species.

It may be argued that species habitat modeling is redundant to the filter method and Canfor will evaluate the efficiency of using both systems through the course of SFMP 5.

Canfor has modeled for several species since Management Plan 3 as summarized in Table 24.

Table 24: Species Selected for Wildlife Habitat Supply Analysis

Species	MP 3	SFMP 4	Reason for change
Grizzly bear	yes	yes	n/a
Wolverine	yes	yes	n/a
Marten	yes	yes	n/a
Fisher	yes	yes	n/a
Moose	yes	yes	n/a
Elk	yes	yes	n/a
Caribou	yes	yes	n/a

CURRENT STATUS

The following Figures 12 to 18 represent habitat supply modeling that was conducted during SFMP 4. Forecasting for these indicators was not updated with the 2014 SFMP update. A review of the previous forecasting shows very little change to the distribution of habitat value categories through time. Updating the habitat value forecasts based on the recent harvest schedule will likely yield similar results and will therefore provide very little additional value over and above what has already been provided below. These indicators will be reassessed in future updates to determine if there is value in reforecasting them.

Moose was modeled for the summer feeding period. TFL 48 represents excellent moose habitat with over 340,000 ha classified in very high, high and moderate categories of habitat supply.

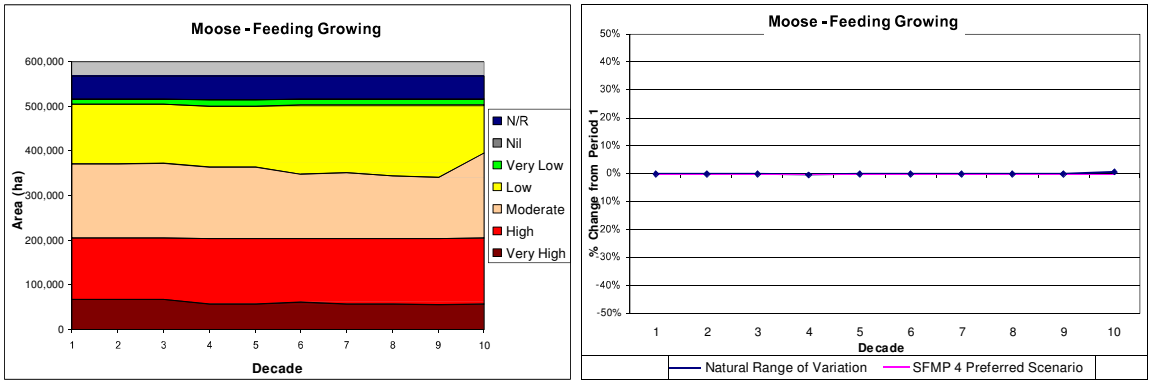


Figure 11: Moose Habitat Supply (2005)

Elk habitat was modeled as summer feeding habitat. TFL 48 represents excellent elk habitat with over 230,000 ha classified in very high, high and moderate categories of habitat supply.

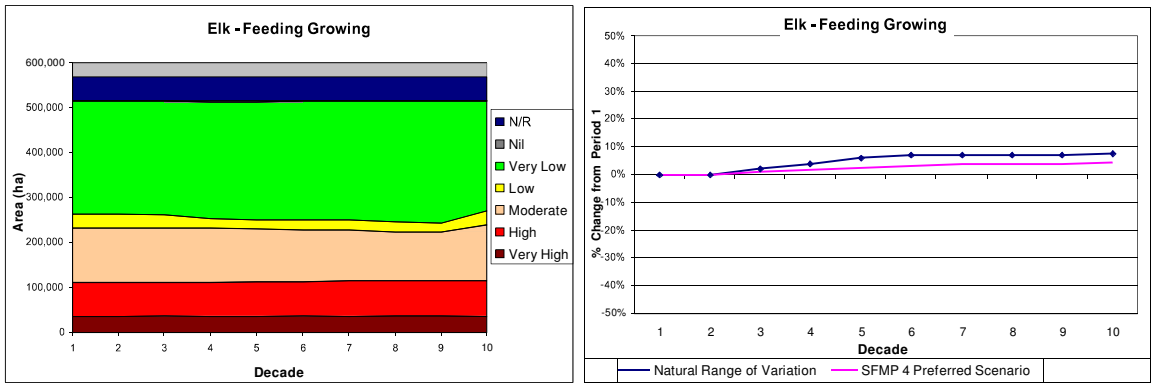


Figure 12: Elk Habitat Supply (2005)

Caribou was modeled for both late and early winter habitat types. In contrast to moose and elk there is comparatively little very high, high and moderate habitat for caribou, approximately 15,000 ha of early winter. (This is likely underrepresented with the current model.) Late winter habitat trends to a significantly less amount in the preferred scenario versus the NRoV baseline.

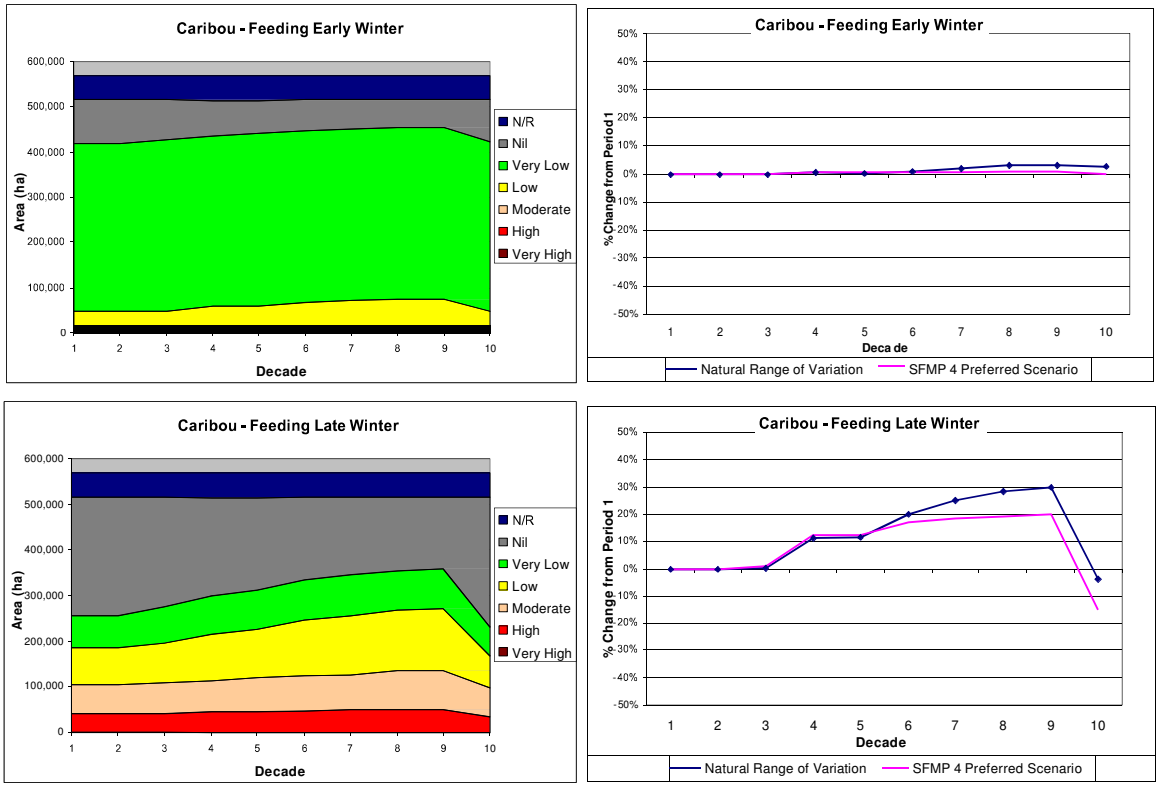


Figure 13: Caribou Habitat Supply (2005)

Marten habitat was modeled as general winter habitat. TFL 48 has a large amount of habitat (over 250,000 ha) modeled as very high, high and moderate. While habitat steadily declines over the 100 year simulation the preferred scenario has less of a decline than the NRoV simulation.

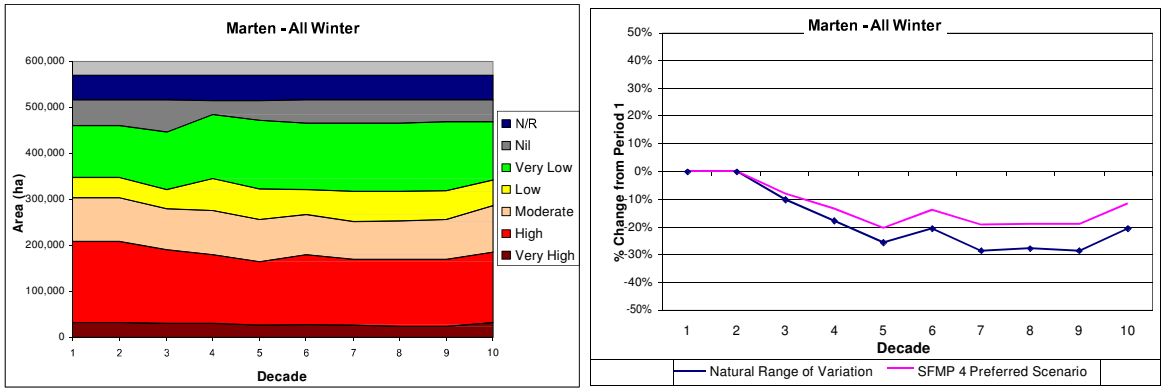


Figure 14: Marten Habitat Supply (2005)

Fisher habitat was modeled as general winter habitat. TFL 48 represents a large area of very high, high and moderate habitat with over 196,000 ha classified in these categories.

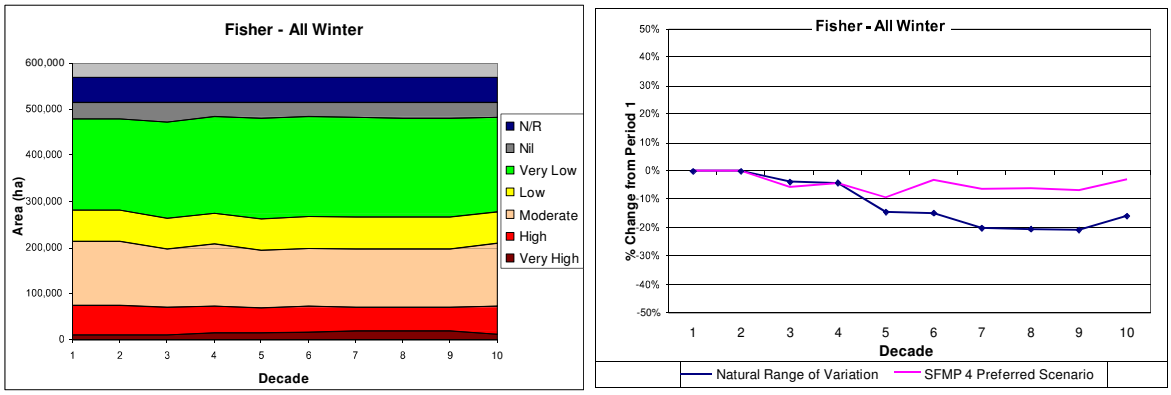


Figure 15: Fisher Habitat Supply (2005)

Grizzly bear habitat was modeled as spring feeding habitat. TFL 48 has a moderate amount of very high, high and moderate grizzly bear habitat with over 111,000 ha classified in these categories.

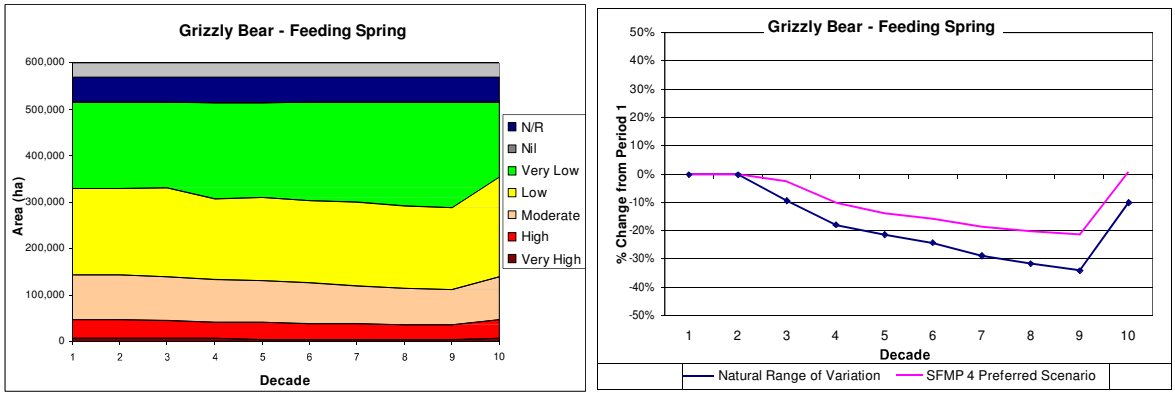


Figure 16: Grizzly Bear Habitat Supply (2005)

Wolverine habitat was modeled as winter feeding habitat. TFL 48 represents an excellent area for wolverine with over 440,000 ha modeled as high and moderate habitat quality. Again while the trend is for a decline in the overall amount of high quality habitat the preferred scenario shows less of a decline than the NRoV simulation.

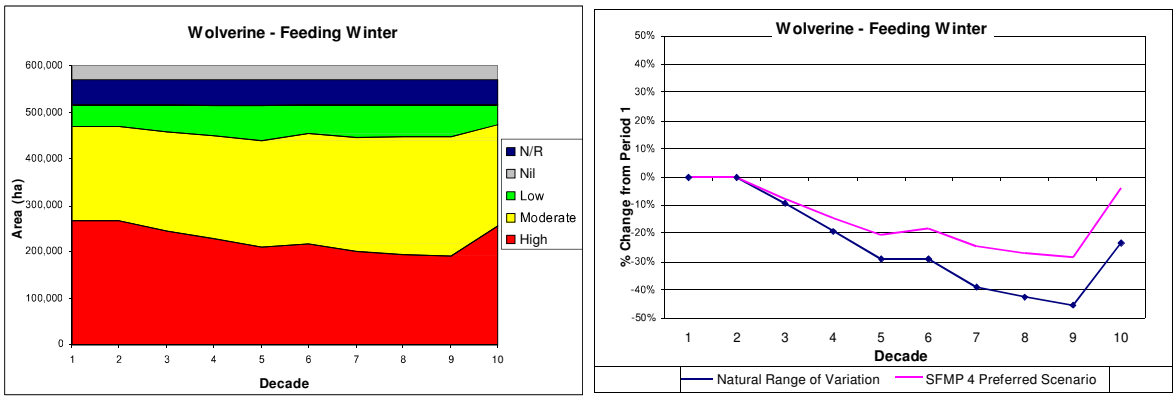


Figure 17: Wolverine Habitat Supply (2005)

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply? Yes.

Wildlife habitat models were developed for species using a qualitative model based on biogeoclimatic units in which each site series classification is given a qualitative rating based on a 1-4 or 1-6 rating scale (depending on the level of species knowledge). The number of hectares in each unit is calculated for each period of the timber supply cycle, thereby showing quantitative changes in the number of hectares of habitat quality over time. The baseline scenario was based on modeling natural disturbances in a no harvesting, no fire suppression scenario. The rate of disturbance applied was determined by NDU as indicated in Table 25 or 0.68% or the TFL being disturbed per year versus an average disturbance of between 0.45% and 0.50% being disturbed per year in the preferred scenario.

Table 25: Natural Rates of Disturbance by NDU

NDU	Total Forest Area (ha)	Stand Replacement Disturbance Cycle	Annual Area% disturbed/year	Area Disturbed per Decade
Boreal Plains - Upland – Conifer	68,120	100	1.00%	6,812
Boreal Plains - Upland – Deciduous.	43,814	100	1.00%	4,381
Boreal Foothills – Mountain	177,423	150	0.67%	11,828
Boreal Foothills – Valley - Conifer	125,200	120	0.83%	10,433
Boreal Foothills – Valley – Deciduous.	39,669	120	0.83%	3,306
Omineca – Mountain	13,220	300	0.33%	441
Omineca – Valley	6,210	120	0.83%	518
Wet Mountain	92,738	900	0.11%	1,030
Total Area (ha)	566,394		0.68%	38,749

STRATEGY AND IMPLEMENTATION SCHEDULE:

Habitat supply modeling was started during the term of MP 3. Some analysis occurred during MP 3, which lead to changes in the species being modeled (see Table 24).

Moose, elk, caribou (early winter) and wolverine habitat supply all stayed relatively constant over the 100-year habitat supply modeling conducted with the timber supply analysis. No additional strategies are necessary.

Marten winter, fisher winter, grizzly bear spring feeding, and wolverine winter feeding all decreased over the 100 year period, however all are above the level of habitat indicated in the natural disturbance baseline so no additional strategies are necessary.

Caribou late winter habitat is modeled as increasing over the 100-year natural baseline however the preferred scenario does not increase to be within the acceptable variance. Canfor is continuing to work with BC Environment to implement UWR strategies for caribou within TFL 48 (see Section 3.9). UWR's and WHA's for caribou are expected to be completed by the end of 2006.

MONITORING PROCEDURE

Habitat models are run as new timber supply analysis is conducted through the management planning cycle, or when changes (e.g., large natural disturbance events) require changes in timber supply modeling.

LINKAGES TO OPERATIONAL PLANS:

If habitat supply is within the allowed range of variance no change in operational plans is required (however, site specific measures as driven by practice or other indicators may require change, e.g., road deactivation may be conducted for specific wildlife concerns). If habitat supply is not within the range of acceptable variance Canfor will investigate the causes and implement stand level management strategies consistent with section 3.11.

3.11 Species of Management Concern

Criterion 1:	**Element(s): 1.2**
Biological Diversity	Species Diversity
CSA Core Indicator(s): 1.2.1: Degree of habitat protection for selected focal species, including species at risk	
Indicator Statement	**Target Statement**
Percent consistency with management strategies for species of management concern	On an annual basis, 100% of the management strategies for species of management concern are consistently being implemented as scheduled
Value(s): Native Species Richness	
SFM Objective: We will sustain sufficient and appropriately distributed suitable habitat elements to maintain native species richness.	
Canfor common indicator statement: Percent of forest management activities consistent with management strategies for Species of Management Concern	

ACCEPTABLE VARIANCE

Annually a 5% variance down to 95% of the management strategies for species of management concern are consistently being implemented as scheduled is acceptable.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Application of landscape, (coarse filter) and stand level (medium filter) biodiversity management measures contribute to the maintenance of most of the biodiversity needs in the planning area. However, coarse and medium filter guidelines may not be sufficient to ensure the conservation of all species. These species will require fine filter management to ensure that they are maintained within our ecosystems. This indicator will ensure that specific management strategies are in place to conserve and manage specific habitat needs for species of management concern.

The habitat requirements of most species of management concern are sufficiently known to prescribe activities that will minimize the impact to these species. The management strategies will be based on information already in place (e.g., National Recovery Teams of Environment Canada, Identified Wildlife Management Strategy) and on scientific literature. Management strategies will be implemented in operational plans to ensure the development/maintenance of species' habitats.

CURRENT STATUS

Canfor has tracked species of management concern since MP2, with increasing levels of awareness during the Term of MP 4. Canfor's current list of vertebrate species of management concern as listed in Table 26. Generally the number of species being tracked since MP2 has decreased as the level of species awareness has increased. Species selection was based one or more of the following criteria:

- COSEWIC Schedule 1 list;
- Provincially red and blue listed forest-dwelling species that are sensitive to forest practices; and
- Regionally rare species that may be sensitive to forestry operations (Sandhill Crane)

Table 26: Vertebrate Species of Potential Management Concern (2011)

Common Name	Scientific Name	COSEWIC[1]	BC CDC List 2005 [2]	IWMS 2004 [3]
AMPHIBIAN				
Western Toad	*Bufo boreas*	Special Concern (2002)	Blue	
FISH				
Bull Trout	*Salvelinus confluentus*		Blue	
Pearl Dace	*Margariscus margarita*		Blue	
Northern Redbelly Dace	*Chrosomus eos*		Blue	
Spottail Shiner	*Notropis hudsonius*		Red	
BIRDS				
American Bittern	*Botaurus lentiginosus*		Blue	Yes
Barn Swallow	*Hirundo rustica*	Threatened	Blue	
Bay-breasted Warbler	*Dendroica castanea*		Red	
Cape May Warbler	*Dendroica tigrina*		Red	
Black-throated Green Warbler	*Dendroica virens*		Blue	
Broad-winged Hawk	*Buteo platypterus*		Blue	
Canada Warbler	*Wilsonia canadensis*	Threatened	Blue	
Cape May Warbler	*Dendroica tigrina*		Red	
Common Nighthawk	*Chordeiles minor*	Threatened		
Connecticut Warbler	*Oporornis agilis*		Red	
Horned Grebe	*Podiceps auritus*	Special Concern		
LeConte's Sparrow	*Ammodramus leconteii*		Blue	
Northern Goshawk	*Accipiter gentilis*			Yes
Olive-sided Flycatcher	*Contopus borealis*	Threatened	Blue	
Peregrine Falcon	*Falco peregrinus*	Special Concern		
Rusty Blackbird	*Euphagus carolinus*	Special Concern	Blue	
Sandhill Crane	*Grus canadensis*	Not at Risk (1979)		Yes
Sharp-tailed Sparrow	*Ammodramus nelsoni*	Not at Risk	Red	
Short-eared Owl	*Asio flammeus*	Special Concern	Blue	
Snowy Owl	*Nyctea scandiaca*	Not at Risk	Blue	
Surf Scoter	*Melanitta perspicillata*		Blue	
Swainson's Hawk	*Buteo swainsoni*		Red	
Trumpeter Swan	*Cygnus buccinator*	Not at Risk		Yes
Upland Sandpiper	*Bartramia longicauda*		Red	
Yellow Rail	*Coturnicops noveboracensis*	Special Concern	Red	
MAMMALS				
Northern Long-eared Myotis	*Myotis septentrionalis*		Blue	
Fisher	*Martes pennanti*		Blue	Yes
Grizzly Bear	*Ursus arctos*	Special Concern (2002)	Blue	Yes
Mountain Goat	*Oreamnos americanus*			Yes
Wood Bison	*Bos bison athabascae*	Threatened	Red	
Woodland Caribou (Northern ecotype)	*Rangifer tarandus*	Threatened (2002)	Blue	

1 Committee on the Status of Endangered Wildlife in Canada: www.speciesatrisk.gc.ca
2 BC Conservation Data Centre's Species and Ecosystem Explorer http://srmapps.gov.bc.ca/apps/eswp/
3 IWMS - Identified Wildlife Management Strategy

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

It is anticipated that short- and long-term supply of desirable habitat for all Species of Management Concern will be maintained on the DFA. It is anticipated that legal obligations, associated with WHA's, UWR and General Wildlife Management Strategies established by government, will be achieved by Canfor and BCTS. The use of best available information and habitat supply modeling was completed at the provincial/regional level for specific focal species for which WHA's and UWRs are established.

STRATEGY AND IMPLEMENTATION SCHEDULE

Canfor Chetwynd Division, in partnership with academia and the provincial government, is developing a new approach for identifying species of potential conservation concern based on stewardship responsibility, trend, threat and vulnerability (Fred Bunnell, personal communication August 17, 2005). The process to identify the species of conservation concern for TFL 48 is as follows:

- List all terrestrial vertebrates, vascular plants and freshwater fish in TFL 48;
- Extract species of conservation concern based on stewardship responsibility, trend, threat and vulnerability (Squires 2005);
- Determine which species are forest-dwelling based on previous list;
- Determine which species are sensitive to forest practices based on the previous list; and
- Determine if the habitat needs of the species that are sensitive to forest practices are adequately addressed by coarse (i.e., ecosystem representation) and/ or medium (i.e., retention of habitat elements) filters. If not, fine scale management strategies will be developed.

MONITORING PROCEDURE

Identified wildlife will be monitored via the BC Provincial Government's Listing of Identified Wildlife.

Management strategies will be updated depending on changing circumstances and status of species.

All wildlife tree patch areas are documented and tracked in Genus.

All site-level plans are subject to internal and external inspections. Non-conformances and non-compliances in relation to the plan are communicated to Canfor's planning foresters, who will take actions to remedy the particular situations. Monitoring for consistency is summarized in the SFM annual report.

LINKAGES TO OPERATIONAL PLANS

Silviculture prescriptions or site plans prescribe the areas to be retained as WTP's and describe wildlife habitat areas found adjacent to cutblocks.

3.12 Coniferous Seeds

Criterion 1:	**Element(s): 1.2, 1.3**
Biological Diversity	Species Diversity, Genetic Diversity
CSA Core Indicator(s): 1.2.3: Proportion of regeneration comprised of native species **1.3:** Genetic Diversity – No core indicator	
Indicator Statement	**Target Statement**
The proportion of seeds for coniferous species collected and seedlings planted in accordance with the regulation	All coniferous seeds will be collected and seedlings will be planted in accordance with the regulations
Value(s): Native Species Richness, Genetic Diversity	
SFM Objectives: We will conserve genetic diversity of tree stock.	
Canfor common indicator statement: Regeneration will be consistent with provincial regulations and standards for seed and vegetative material use	

ACCEPTABLE VARIANCE

The acceptable variance is zero unless the Chief Forester authorizes a variance that differs from the transfer rules outlined in the Chief Forester's Standards for Seed Use.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Genetic diversity of seedlings used for reforestation is ensured through the ministry's seedlot registration policies and standards. Cones and seed obtained from wild forest stands must be collected from a minimum of 10 trees. The ministry licences tree seed orchards to ensure that their design and management practices maintain genetic diversity. Seed derived from licensed orchards must also contain a minimum level of genetic diversity - or effective population size (Ne) – as measured by the quantity of pollen and cones from each contributing tree in the orchard. Orchard seedlots must have a minimum Ne of 10. Similar registration requirements also apply to vegetatively propagated reforestation materials. These rules ensure that planted forests contain sufficient genetic diversity so they are able to withstand any biotic (e.g. insect or disease) or abiotic (e.g. wind, snow, frost, or climate change) event as well as a naturally regenerated forest."

Transfer guidelines minimize the risks of maladaptation 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).

CURRENT STATUS

All (100%) seedlots grown and planted within the DFA are registered in accordance with the Forest Planning and Practices Regulation and the Chief Forester's Seed Use Standards effective April 1, 2005.

All seeds have been registered with and tracked by Tree Improvement Branch of the Ministry of Forests and Range.

In 2013 there were a total of 2,876,743 trees planted on TFL 48 of which Canfor planted 2,643,553. Chetwynd Mechanical Pulp planted 156,780 seedlings and BCTS planted 76, 410 trees. All seeds have been registered with and tracked by the Tree Improvement Branch of the Ministry of Forests Lands and Natural Resource Operations. Licensees operating on TFL 48 were 96.4% in compliance with the Chief Forester's Standards for Seed Use effective April 1, 2005. The Standard requires that practices be in 95% or greater conformance which has been achieved. All of the non-compliances were trees that were known, or thought to have been, planted outside of the designated Seed Planning Zone.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

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 established and maintained.

STRATEGY AND IMPLEMENTATION SCHEDULE

Seeds will be collected and planted in accordance with the Forest Planning and Practices Regulation and the Chief Forester's Seed Use Standards effective April 1, 2005. Based upon the seedlot registration information, seeds are planted only where they are genetically and ecologically appropriate for the site.

MONITORING PROCEDURE

All reforestation activities are documented and tracked in Genus. Seedlots are tracked and recorded for every area planted.

LINKAGES TO OPERATIONAL PLANS

Silviculture prescriptions and site plans prescribe the areas to be reforested. Silviculture staff uses this information to allocate the appropriate seedlots to conform to the transfer guidelines.

3.13 Deciduous Seeds and Vegetative Material

Criterion 1:	**Element(s): 1.2, 1.3**
Biological Diversity	Species Diversity, Genetic Diversity
CSA Core Indicator(s): 1.2.3: Proportion of regeneration comprised of native species **1.3:** Genetic Diversity – No core indicator	
Indicator Statement	**Target Statement**
The proportion of seed or vegetative material for deciduous species collected and planted in accordance with the regulation	All deciduous species will be collected and planted in accordance with the regulations
Value(s): Native Species Richness, Genetic Diversity	
SFM Objectives: We will conserve genetic diversity of tree stock.	
Canfor common indicator statement: Regeneration will be consistent with provincial regulations and standards for seed and vegetative material use	

ACCEPTABLE VARIANCE

The acceptable variance is zero unless the Chief Forester authorizes a variance that differs from the transfer rules outlined in the Chief Forester's Standards for Seed Use.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Genetic diversity of seedlings used for reforestation is ensured through the ministry's seedlot registration policies and standards. Seed and vegetative material obtained from wild forest stands must be collected from a minimum of 10 trees. The ministry licences tree seed orchards to ensure that their design and management practices maintain genetic diversity. Seed and vegetative material derived from licensed orchards must also contain a minimum level of genetic diversity - or effective population size (Ne) – as measured by the quantity of pollen and cones from each contributing tree in the orchard. Orchard seedlots must have a minimum Ne of 10. Note: There are currently no orchards producing deciduous seed or vegetative propagates for TFL 48 operating area. These rules ensure that planted forests contain sufficient genetic diversity so they are able to withstand any biotic (e.g. insect or disease) or abiotic (e.g. wind, snow, frost, or climate change) event as well as a naturally regenerated forest.

Transfer guidelines minimize the risks of maladaptation 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).

CURRENT STATUS

Canfor has not planted any deciduous seedlings or vegetative propagates on TFL 48. Any (100%) seedlots grown or planted within TFL 48 will be registered in accordance with the Forest Planning and Practices Regulation and the Chief Forester's Seed Use Standards effective April 1, 2005.

All seeds will be registered with and tracked by Tree Improvement Branch of the Ministry of Forests and Range.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

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 established and maintained.

STRATEGY AND IMPLEMENTATION SCHEDULE

Seeds and vegetative material will be collected and planted in accordance with the Forest Planning and Practices Regulation and the Chief Forester's Seed Use Standards effective April 1, 2005. Based upon the seedlot registration information, seeds and vegetative materials are planted only where they are genetically and ecologically appropriate for the site.

MONITORING PROCEDURE

All reforestation activities are documented and tracked in Genus. Seedlots are tracked and recorded for every area planted.

LINKAGES TO OPERATIONAL PLANS

Silviculture prescriptions and site plans prescribe the areas to be reforested. Silviculture staff uses this information to allocate the appropriate seedlots to conform to the transfer guidelines.

3.14 Class A Parks, Ecological Reserves and LRMP Designated Protected Areas

Criterion 1:	**Element(s): 1.4**
Biological Diversity	Protected Areas and Sites of Special Biological and Cultural Significance
CSA Core Indicator(s): 1.4.1 Proportion of identified sites with implemented management	
Indicator Statement	**Target Statement**
Hectares of forestry related harvesting or road construction within Class A parks, protected areas, ecological reserves and LRMP designated protected areas	Zero hectares of forestry related harvesting or road construction within Class A parks, protected areas, ecological reserves or LRMP designated protected areas
Value(s): Protected Areas and Sites of Special Geological, Biological, or Cultural Significance	
SFM Objective: We will implement management strategies appropriate to the long term maintenance of protected areas and sites of special geological, biological, or cultural significance.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

There will be no acceptable variances to this target.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

This indicator identifies whether the values protected within Class A parks, protected areas, ecological reserves and LRMP designated protected areas are going to be impacted by forestry related harvesting and road construction. Targeting for no forestry related harvesting or road construction will contribute to the protection of these ecosystems.

CURRENT STATUS

In order to avoid operating in these areas, forestry activities need to clearly identify the status and location of Class A parks, protected areas, ecological reserves and LRMP designated protected areas.

Protected areas and sites of special biological significance within or adjacent to the DFA have been identified through a variety of processes.

LRMP Protected Areas and Parks

Goal 1 protected areas are established primarily for ecological representation to protect viable examples of natural diversity such as major terrestrial, marine, and freshwater systems, characteristic habitats, hydrology and landforms and/ or characteristic backcountry recreational or cultural and heritage features.

Goal 2 protected areas represent special features such as cultural, heritage and recreation sites, rare and endangered species and critical habitats, outstanding or unique botanical, zoological, geological and paleontological features, outstanding or fragile culture and heritage features, and outstanding outdoor recreational features such as trails.

Potential protected areas were initially identified through a technical team formed from government agencies (RPAT). This group delineated Areas of Interest, which met the above criteria. The Dawson Creek LRMP then used this information to finalize proposed Protected Area (PA) boundaries.

Following is a summary of the classified protected areas in or adjacent to the DFA, and their major characteristics.

Bocock Peak (1,133 ha)

Bocock Peak is located along the northwestern boundary of the planning area, south of the Peace Arm of Williston Lake and adjacent to Eleven Mile Creek in the Hart Ranges ecosection.

PAS Values:

- Contains three significant karst caves (White Hole, Short Straw Cave and Lesser Sink)

Butler Ridge (6,694 ha)

The Butler Ridge Protected Area is located 20 km northwest of the District of Hudson's Hope. It incorporates the easternmost portion of the Dunlevy Creek watershed north of Williston Lake and the west side of Butler Ridge. The area includes a portion of the shoreline adjacent to the east side of Dunlevy inlet on Williston Lake that is adjacent to the Dunlevy Recreation Area.

This area represents a portion of the Peace Foothills ecosection. It encompasses three biogeoclimatic zones, namely the moist, very cold Engelmann Spruce-Subalpine Fir, the Sub-Boreal Spruce, and the Black and White Boreal Spruce zones. The area provides good examples of the forests of the Rocky Mountain Foothills, and valley bottom to alpine ecosystem connectivity.

The Butler Ridge area provides critical winter range for caribou, Stone's sheep habitat as well as moose and elk winter range. These attributes contribute to the Protected Area's regionally significant value as a wildlife viewing area.

Butler Ridge has historically supported a number of recreational activities including hiking, cross-country skiing, hunting and fishing. The area is also recognized as a traditional use area for First Nations, and continues to support First Nation's cultural values.

Hole-in-the-Wall (131 ha)

Hole-in-the-Wall spring is located adjacent to the Sukunka River near Windfall Creek in the Hart Foothills ecosection.

PAS Values:

- Unique underground stream appearing from the base of a limestone cliff near the Sukunka River
- Unique and relatively constant water quantity and quality parameters

Klin-se-za (Twin Sisters/Beattie Peaks, 2,671 ha)

The Klin-se-za Protected Area is an area of profound spiritual significance and traditional use value to the First Nations people of northeastern B.C. It is the centre of spiritual prophecies that shape the belief systems and culture of the First Nations. The need to protect these values led to the Twin Sisters Special Management Committee Recommendations (October 21, 1997). More details regarding this protected area can be found within the Dawson Creek LRMP document. These details are not to be extracted from the LRMP document, and are therefore not within this management plan.

Peace River/Boudreau Lake (19,738 ha)

The Peace River/Boudreau Lake Protected Area is located between Hudson’s Hope and Fort St. John. It incorporates a major portion of the southerly bank of the Peace River valley; the lower Moberly River valley and the Peace River islands between Maurice Creek and the Moberly River.

This Goal 1 Protected Area is shared between the Fort St. John and Dawson Creek LRMP’s. The islands located within the Peace River that are adjacent to the Fort St. John LRMP boundary are within the Fort St. John LRMP planning area while the balance of the islands within the Protected Area are within the Dawson Creek planning area.

The Protected Area represents a portion of the moist, warm Boreal White and Black Spruce biogeoclimatic zone within the Peace Lowlands ecosection. Within it are captured the typical mixed forest types of the Peace River valley along with stands of alluvial cottonwood and spruce ecosystems.

The area provides habitat for a number of wildlife species including critical trumpeter swan nesting sites around Boudreau Lake. High value winter range is provided for moose, deer and elk. The area also contains a number of cultural heritage sites of First Nations' and European settlements and uses. These include the first site of European settlement on mainland B.C. at Rocky Mountain Fort (1794-1804), and a historic travel corridor for First Nations, early European explorers and fur traders. This area has traditionally supported a number of recreational activities, both public and commercial, including boating, canoeing, bird watching, hunting and fishing.

Pine/ LeMoray (32,975 ha)

The Pine/ LeMoray Protected Area is located 70 km southwest of Chetwynd in the Hart Ranges ecosection of the Rocky Mountains. It includes the Link and Mountain Creek watersheds and is bordered in the southwest by the planning area boundary and by the Pine River on the northwest and north boundaries. Heart Lake lies within the area.

This area provides good representation of the wet, cool Engelmann Spruce-Subalpine Fir biogeoclimatic zone found within the Hart Ranges of the Rocky Mountains. Located primarily on the east slope of the continental divide, it is a mountainous area of high elevation spruce-subalpine fir forest and rugged alpine terrain.

The area provides important habitat for many fish and wildlife species including Arctic grayling, high elevation caribou, moose, and wolverine; and includes high capability habitat areas for grizzly bear. The Protected Area is also significant for its fossil sites and examples of karst topography and alpine areas. Traditional use by First Nations is also recognized in this area.

The high value backcountry and wilderness recreation values associated with relatively easy access make this area a regionally significant recreation area. Hiking, hunting, fishing, and snowmobiling, as well as commercial recreation activities have traditionally occurred in the area. A Forest Service recreation site exists at Heart Lake.

Adjacent to this proposed Protected Area is an Area of Interest located within the Mackenzie LRMP area.

A few parks also exist within or adjacent to TFL 48. The parks are described below.

Butler Ridge Provincial Park (6,145 ha) is located in the Peace Foothill ecosection just east of the Rocky Mountains. The area provides important winter range for caribou and stone sheep habitat in the higher elevations as well as moose and elk winter range in the lower elevations. A blue-listed species, the Arkansas rose, has been recorded in the park.

Gwillim Lake Provincial Park (32,458 ha) is located in the Hart Foothills ecosection. Gwillim Lake Provincial Park houses a diverse array of both coniferous and deciduous tree species. Lodgepole pine, white spruce, trembling aspen, paper birch and balsam poplar are found along the lakeshore intermixed with low wetlands of black spruce, willow and alder. Forests at higher elevations consist of Engelmann spruce and subalpine fir that open up into parklands and alpine meadows higher up.

Sukunka Falls Provincial Park (423 ha). Boreal white and black spruce is characteristic of the valley bottom with stands of aspen, cottonwood, and poplar. The Sukunka valley has been identified as key winter range for moose and deer.

Monkman Provincial Park (62,896 ha) Lower elevations in the park are dominated by mature sub-alpine fir, white spruce and lodgepole pine. The higher elevations support growths of Engelmann spruce, sub-alpine fir and white spruce. Above the tree line, only plants adapted to the conditions are to be found. Monkman Provincial Park conserves representative areas of the Central Rocky Mountains and Foothills. Lower elevations in the park are dominated by mature sub-alpine fir, white spruce and lodgepole pine. The higher elevations support growth of Engelmann spruce, sub-alpine fir and white spruce. Above tree line, the trees become dwarfed and twisted. Alpine meadows of heathers, grasses and wildflowers, such as white rhododendron, arctic lupine, glacier lily and Indian paintbrush cover large areas and are intermixed with shrubs.

Ecological Reserves

Ecological reserves are areas selected to preserve representative and special natural ecosystems, plant and animal species, features and phenomena. The key role of ecological reserves is to contribute to the maintenance of biological diversity and the protection of genetic materials. Scientific research and educational purposes are the principle uses of ecological reserves. The benefits of these areas are to provide for the maintenance of biological diversity, they provide outdoor laboratories and classrooms for studies, and they can act as benchmarks against which environmental changes can be measured.

Currently there are no Ecological Reserves within or adjacent to the TFL.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

By following the SFMP indicator strategy, it is anticipated that protected areas and sites of special biological and cultural significance will be maintained. It is anticipated that forest operations will respect and reflect the

interests of non-timber resource users, local public and First Nations, resulting in the maintenance of existing non timber and recreation values offered by the established recreational sites and trails, ecological reserves and LRMP designated protected areas in TFL 48.

STRATEGY AND IMPLEMENTATION SCHEDULE

Within one month of the identification and declaration of a new area for protection, detailed location and management information will be requested from the government by the Planning Superintendent.

Map information will be digitally stored by the GIS Supervisor within 1 month of this information being made available by the government, and planning maps will display this information, provided the data is not considered sensitive (e.g. some WHA's will not be shown on public maps).

Applicable management information will be circulated to affected staff by the Planning Supervisor for consideration in all planning activities within 1 month of receipt of this information from government.

MONITORING PROCEDURE

Changes to protected areas will be reported in future annual reports.

LINKAGES TO OPERATIONAL PLANS

Staff members will refer to base maps to locate protected areas when preparing operational plans. When planned activities are in the general vicinity of the identified areas, staff members will ensure operational plans are consistent with any management guidelines for these protected areas.

3.15 Known Values and Uses Addressed in Operational Planning

<table>
<tr><th>Criterion 1:</th><th>Element(s): 1.4, 6.1, 6.2</th></tr>
<tr><td>Biological Diversity</td><td>Protected Areas and Sites of Special Biological and Cultural Significance; Aboriginal and Treaty Rights; Respect for Aboriginal Forest Values, Knowledge and Uses</td></tr>
<tr><td colspan="2">CSA Core Indicator(s): 1.4.2 Protection of identified sacred and culturally important sites
6.1.3: Level of management and/or protection of areas where culturally important practices and activities (hunting, fishing, gathering) occur
6.2.1: 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</td></tr>
<tr><th>Indicator Statement</th><th>Target Statement</th></tr>
<tr><td>Percentage of known traditional site-specific aboriginal values and uses identified during SFMP, FDP, FSP, or PMP referrals addressed in operational plans</td><td>100% of known traditional site-specific aboriginal values and uses identified during SFMP, FDP, FSP, or PMP referrals will be addressed in operational plans</td></tr>
<tr><td colspan="2">Value(s): Protected Areas and Sites of Special Geological, Biological, or Cultural Significance; Treaty and Aboriginal Rights; Aboriginal Forest Values and Uses</td></tr>
<tr><td colspan="2">SFM Objective:
We will implement management strategies appropriate to the long term maintenance of protected areas and sites of special geological, biological, or cultural significance.
We will recognize and respect Treaty 8 rights.
We will respect known traditional Aboriginal forest values, and uses.</td></tr>
<tr><td colspan="2">Canfor common indicator statement: Percent of identified Aboriginal forest values, knowledge and uses considered in forestry planning processes</td></tr>
</table>

ACCEPTABLE VARIANCE

None.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

The indicator is a measure of Canfor's recognition and response to the traditional aboriginal values and uses that are made known in a timely manner during referral processes. The requirement for site-specificity enables both Canfor and First Nations to best qualify and/or quantify the effects of forest development and the strategies required to manage for the development.

This indicator contributes to respecting the social, cultural, heritage and spiritual needs of aboriginal people who traditionally and currently use the DFA for the maintenance of traditional aspects of their lifestyle. Working with aboriginal peoples to identify, define and develop management strategies for traditional values and uses is an important component of the forest industry's sustainable forest management plans.

This indicator does not apply to values, which may otherwise be well represented in the same general area, or sites where information cannot be validated through traditional or scientific knowledge sources from both within and outside of the First Nations.

CURRENT STATUS

Following a review of FSP blocks, the District Manager currently directs Canfor to conduct Archaeological Impact Assessments (AIA) on areas with high potential, as determined from an Archaeological Overview Assessment. In addition to MoFR direction, Canfor has initiated contracts with a third-party archaeologist to further evaluate a number of proposed FSP cutblocks using a detailed risk-rating process for archaeological potential. The process adds resolution to the older AOA, and will assist in providing direction regarding cultural heritage resources.

Canfor has an obligation to not damage any resource feature, including cultural heritage features. Canfor has made a number of adjustments to operational plans for local First Nations values brought to their attention. For example, WTP's have been amended to include CMT's, riparian and lake buffers have been widened to accommodate traditional use areas, and vegetation management buffers have been extended to avoid berry-picking patches.

A 1998 report summarizes a number of Traditional Use Studies (TUS's), which were carried out by First Nations in the DFA. Canfor and government currently do not have any access to the information or data due to the confidential nature of much of the information. Canfor's ability to effectively manage for traditional values and uses may be dependent upon the First Nation(s) providing access to some levels of confidential information.

To date there has been no harvesting or road construction for the purposes of carrying out forestry operations within Class A parks, protected areas, ecological reserves or LRMP designated protected areas within TFL 48.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

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

STRATEGY AND IMPLEMENTATION SCHEDULE

- Canfor will continue with ongoing relationship building processes with First Nations, to encourage meaningful engagement and input to the development of SFMP, FSP and PMP's.
- Canfor will engage in and record all communications and meetings with First Nations (including attempts) to garner input on the development of operational plans
- Canfor will seek to gain access to site-specific information about traditional values and uses (subject to confidentiality agreements) at the SFMP, FSP and PMP stages.
- Canfor will work with First Nations in an attempt to develop joint agreement on operational strategies to manage for site-specific traditional values and uses.
- Canfor will implement strategies in operational plans to address all site specific known values and uses included in the scope of this indicator that are identified during referrals of these major plans.
- Detailed planning will occur after referral comment periods for major plans expire. Information

provided subsequent to these referral review and comment periods will be considered and addressed to the extent Canfor is able to without unduly disrupting ongoing operations.

MONITORING PROCEDURE

Canfor will record the number of opportunities for communication, meetings and input into each plan.

Canfor will record the adoption of all strategies used to manage for known site-specific traditional values and uses in operational plans (and will be adopted for strategic plans as required). This information will be summarized in operational planning processes subject to confidentiality agreements.

Information from Archaeological Impact Assessments (AIA) required by the District Manager, will be monitored through Canfor's GIS system, also subject to confidentiality agreements.

LINKAGES TO OPERATIONAL PLANS

Operational plans will be consistent with jointly agreed upon strategies between Canfor and First Nations. Information from AIA's will guide the development of operational plans.

3.16 Conformance to Elements Pertinent to Treaty Rights

Criterion 1:	**Element(s): 1.4, 6.1**
Biological Diversity	Protected Areas and Sites of Special Biological and Cultural Significance; Aboriginal and Treaty Rights
CSA Core Indicator(s): 1.4.2 Protection of identified sacred and culturally important sites **6.1.3:** Level of management and/or protection of areas where culturally important practices and activities (hunting, fishing, gathering) occur	
Indicator Statement	**Target Statement**
% conformance to SFM elements pertinent to treaty rights (i.e., hunting, fishing and trapping) defined in Treaty 8	100% conformance to the SFM indicators and targets of the SFM Elements pertinent to sustaining hunting, fishing and trapping, as follows: • Element 1.1 Ecosystem Diversity (Indicators 3.1, 3.2, 3.3, and 3.4), and Element 1.2 Species Diversity (Habitat Elements) Indicators (3.5, 3.6, 3.7, 3.8, and 3.10), • Element 3.1 Soil Quality and Quantity (Indicator 27), and • Element 3.2 Water Quality and Quantity Indicators (3.28, 3.29, 3.30, 3.31, and 3.32)
Value(s): Protected Areas and Sites of Special Geological, Biological, or Cultural Significance; Treaty and Aboriginal Rights	
SFM Objective: We will implement management strategies appropriate to the long term maintenance of protected areas and sites of special geological, biological, or cultural significance. We will recognize and respect Treaty 8 rights.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

Variances provided in the specific indicators will apply.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

The DFA is within a larger area of Treaty 8 of 1899, which established hunting, fishing and trapping as treaty rights for the local aboriginal First Nations communities. The rights as such are available across the treaty area and have no site specificity or quantum. The following four First Nations have known traditional territory in the DFA whose treaty rights are protected under Treaty 8, Halfway River, West Moberly, Saulteau, and McLeod Lake.

Aboriginal rights are affirmed in the Canadian Constitution (S. 35), but have not been proven through judicial processes in the DFA.

The indicator identifies and measures Canfor's effectiveness in recognizing and respecting existing treaty rights. In doing so Canfor can demonstrate its role of recognizing and respecting society's commitment to sustain core traditional values and ways of life for First Nations in the DFA, as follows:

- **Hunting and trapping rights** are generally upheld by meeting Criterion 1 – Conservation of Biological Diversity, Element 1.1 Ecosystem Diversity – specifically ecosystem representation, forest type, late seral forest, and patch size, and Element 1.2 Species Diversity more specifically by meeting the objective of suitable habitat elements and its relevant indicators: snags/ live tree retention, coarse woody debris, riparian, shrubs, wildlife tree patches and habitat supply.
- **Fishing rights** are generally upheld by meeting Criterion 3 – Conservation of Soil and Water Resources, Element 3.2 Water Quality and Quantity, and more specifically by meeting the objectives and indicators of maintaining water quality and water quantity.
- Canfor desires good working relationships and communications with the First Nations in the DFA in order to meaningfully consider and plan for site-specific information related to treaty or aboriginal rights in forest development (and stewardship) plans. This aspect is further covered in Indicator 3.15.

CURRENT STATUS

Canfor refers Forest Stewardship Plans (FSP's) and Pest Management Plans (PMP's) to First Nations for comment and input on planned development. Canfor often calls for a meeting to provide clarification and answer questions. Capacity is often cited as a reason that First Nations cannot better address the effect of forest development on treaty (or aboriginal) rights. Government has a fiduciary obligation and carries out the role of meeting consultation requirements.

Canfor also has a developing relationship, capacity building and consultation processes underway with the local First Nations, in particular the Dunne-za joint venture agreement that includes a small-pine license for 100,000 cubic metres per year for 20 years in the Dawson Creek TSA.

See also Indicators (3.1 – 3.8, 3.10) for current status about the biological diversity and species diversity (habitat element) indicators.

See also Indicator (3.27) for current status about the soil quality and quantity indicator.

See also Indicators (3.28 through 3.32) for current status about the water quality and quantity indicators.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

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. Meaningful relationships and open communication with local Aboriginal communities will provide insight to help ensure that forest operations are managed in a way that provides opportunity to retain aboriginal traditions, values and exercise of treaty rights.

It is anticipated that mitigative strategies will be developed within operational plans to minimize or eliminate negative impact on ability to exercise treaty rights.

STRATEGY AND IMPLEMENTATION SCHEDULE

- Continue with the relationship, capacity building and consultation processes as noted above.
- Continue to engage with First Nations in the development of strategic and operational plans.
- Report annually on the performance of the Indicators noted for SFM Elements 1.1, 1.2, 3.1 and 3.2, as noted above.
- Review legal compliance to aboriginal rights as duly established in law and accepted by government and summarize for each annual report.

MONITORING PROCEDURE

Canfor will maintain an annual record of performance.

LINKAGES TO OPERATIONAL PLANS

Operational plans will be consistent with the strategies to manage for the indicators and targets for SFM Element 1.1 (Ecosystem Diversity), SFM Element 1.2 (Species Diversity), SFM Element 3.1 (Soil Quality and Quantity) and SFM Element 3.2 (Water Quality and Quantity).

3.17 Free Growing Stands

Criterion 2:	**Element(s): 2.1**
Ecosystem Condition and Productivity	Forest Ecosystem Resilience
CSA Core Indicator(s): 2.1.1 Reforestation success	
Indicator Statement	**Target Statement**
Proportion of area harvested that has free growing stands re-established	100% of the area harvested will meet the free growing requirements identified in the silviculture prescriptions/site plans
Value(s): Ecosystem Resilience	
SFM Objectives: We will sustain a natural range of variability in ecosystem function, composition and structure which allows ecosystems to recover from disturbance and stress.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

None.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Canfor is obligated to establish free growing stands on all areas harvested in accordance with the regulations and site plans/ silviculture prescriptions. The standards for which a free growing stand must be established are defined in the site plans/silviculture prescriptions. For blocks exempted from site plans under the Bark Beetle Regulations, the requirements for free growing stands are defined in the regulation. A free growing stand is established on a standard unit and will meet the requirements for acceptable species, minimum specie tree heights, and minimum well-spaced density. The individual trees accepted as free growing will also be healthy and be free of deleterious competition.

The net area to be reforested (NAR), as defined in the site plan or silviculture prescription, will describe the proportion of area harvested that will have a free growing stand re-established.

Establishing free growing stands is an important indicator because it ensures healthy and productive forests are being replaced after harvesting. Ensuring that harvested stands meet the prescribed free growing requirements is an indication that the harvested area has maintained the ability to recover from a disturbance and thereby maintaining its resiliency and productive capacity. Failure or delays in establishing a free growing stand will negatively impact future growth and harvest levels as well as impact other ecosystem processes that rely on forest replacement.

CURRENT STATUS

100% of the blocks have achieved their free growing requirements within the timeframe identified in the Silviculture Prescription/ Site Plans (Canfor and BCTS; calculated to December 31, 2012).

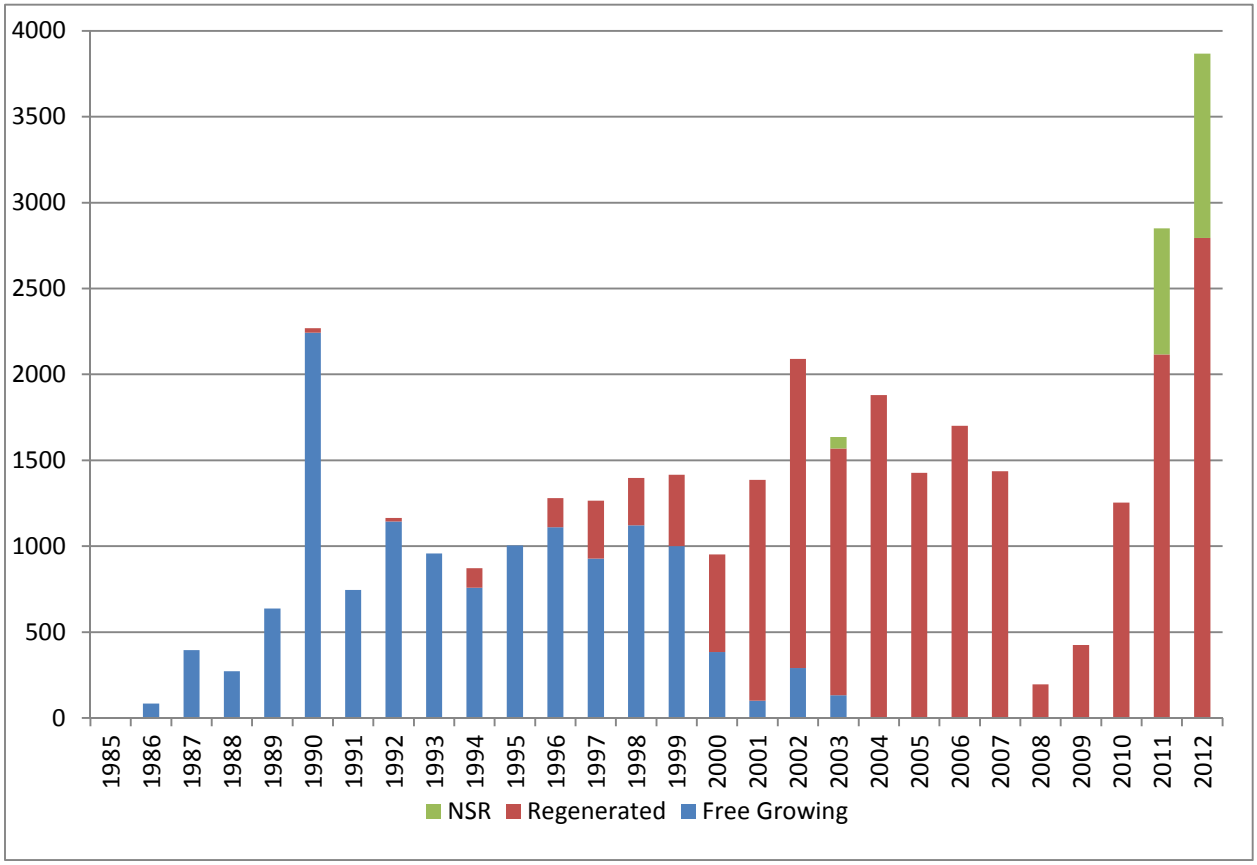


Figure 18: Free Growing Status by Year of Harvest Start (2013)

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

Records of harvesting activity, silviculture treatments and current stocking status are made in Genus. On an annual basis these records are reviewed and all harvested area that is not free growing is identified.

Canfor is obligated to establish free growing stands on all areas harvested in accordance with the regulations and site plans/silviculture prescriptions. Records of harvesting activity, silviculture treatments and current stocking status are made in Genus. On an annual basis these records are reviewed and all harvested area that is not free growing is identified and action plans are made to identify the treatments anticipated to be needed to achieve free growing status.

In addition, the achievement of free growing status on all areas harvested in accordance with the regulations and site plans/silviculture prescriptions is expected to yield the following results. 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

STRATEGY AND IMPLEMENTATION SCHEDULE

Site plans/ silviculture prescriptions (SP) identify silviculture stocking standards and timelines on a standard unit level. Genus records harvesting activity and future treatments based on the SP's and post-harvest block reviews. Surveys are scheduled to review the current status of the standard units at regular intervals between harvest completion and the late free growing date. The Silviculture Forester will make adjustments to the planned silviculture regime in Genus based on the results of the surveys to ensure the requirements for a free growing stand will be met.

MONITORING PROCEDURE

All reforestation activities are documented and tracked in Genus. Silviculture surveys are usually scheduled to occur between 2 to 3 years after crop establishment, 7 to 9 year after crop establishment and within 4 years of the late free growing date. Additional surveys may be conducted within 2 to 3 years of a silviculture treatment such as fill planting or brushing to measure the effectiveness of the treatment and to make any necessary adjustments to the planned silviculture treatment regime. Late free growing dates are recorded in Genus and reports are run annually to ensure all standard units have achieved free growing within the set timeframe.

Survey Requirements

A free growing survey will be carried out between the early and late free growing dates to confirm stocking levels meet the requirements of the appropriate SP. The surveys will meet current standards at the time of writing for measuring free growing and total trees.

LINKAGES TO OPERATIONAL PLANS

Silviculture prescriptions and site plans detail timing and stocking requirements.

3.18 Regeneration Declaration

Criterion 2:	**Element(s): 2.1, 4.1**
Ecosystem Condition and Productivity	Forest Ecosystem Resilience; Carbon Uptake and Storage
CSA Core Indicator(s): 2.1.1 Reforestation success	
Indicator Statement	**Target Statement**
Area weighted average time delay from harvesting starting and initial restocking of harvest area by DFA	Average delay will be no more than 2 years
Value(s): Ecosystem Resilience, Carbon Uptake and Storage	
SFM Objectives: We will sustain a natural range of variability in ecosystem function, composition and structure which allows ecosystems to recover from disturbance and stress. We will maintain the processes for carbon uptake and storage within the natural range of variation.	
Canfor common indicator statement: Average regeneration delay for stands established annually	

ACCEPTABLE VARIANCE

To allow for variations in site preparation requirements, access and delays in harvest the acceptable variance for regeneration delay is one half year.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Regeneration delay is the period from the start of harvest on the area to be reforested to the completion of initial regeneration of future tree species as required in the SP (site plan or silviculture prescription).

The regeneration delay is usually within two years where planting is prescribed and five years where the stand is expected to reforest naturally. Ensuring that harvested stands meet the prescribed regeneration delay is an indication that the harvested area has maintained the ability to recover from a disturbance and thereby maintaining its resiliency and productive capacity. Delays in the replacement of harvested species negatively impact future growth and harvest levels

CURRENT STATUS

The average age of NSR on TFL 48 at the end of 2013 is 0.9 years for conifer (arithmetic average between 2006 and 2014).

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

The regeneration delay is reviewed annually by summarizing data from Genus on all unstocked cutblocks and calculating the area weighted average age of unstocked area. Calculations will be based on the month of completion of surveys and entire cutblock net reforestable area will be used in the calculations if any or all of the cutblock NAR is unstocked.

Records of harvesting activity and silviculture treatments are made in Genus. Reforestation activities are

planned to achieve an average regen delay of 2 years, it is therefore anticipated that the target average regen delay will be achieved.

Achieving regen delay requirements is anticipated to result in maintenance of the productive capacity of the land base. As well, prompt reforestation will yield actively growing, healthy forests which will contribute to carbon uptake and storage. Prompt reforestation will also promote healthy ecosystems with a diversity of native broadleaf and coniferous species that will be maintained at endemic and sustainable levels. .

STRATEGY AND IMPLEMENTATION SCHEDULE

We carry out basic silviculture activities to:

- Establish and tend new stands that suit the ecological characteristics and productivity estimates of each site,
- Optimize the timing of management activities that positively influence the stand's development, and
- Produce a diverse and sustainable flow of species and products.

Our basic silviculture strategy incorporates the following standards:

- Preferred species are those tree species that are ecologically suited to the site and management activities are primarily aimed at their establishment and growth. The characteristics of these species are consistent with the desired timber and non-timber objectives for the site.
- Stocking standards set out target numbers of trees per hectare to ensure full site occupancy. Minimum standards are set in accordance with legislation. Stocking method outlines recommended treatments to achieve target stocking.
- Minimum inter-tree distance sets out the prescribed inter-tree spacing which in combination with average spacing will result in target stocking with a good distribution. During planting operations, plantable spot decisions will be based on microsite quality rather than measured distances to ensure maximum seedling survival and production. On difficult sites, inter-tree spacing may be reduced to take advantage of limited plantable spots.
- Regeneration delay sets the allowable delay or "fallow period" for a given area measured from commencement of primary harvesting operations. The regeneration delay specified in the tables sets the administrative period which allows for completion of harvest, restocking, surveys and reporting. The vast majority of areas are restocked within 1 year of harvest completion (i.e. cutblocks are fallow for no more than one growing season).
- Free-growing age defines the period measured from commencement of primary harvesting where a stand must meet free-growing requirements and is usually defined as a range (earliest to latest). (See section 3.17 for description of Free Growing Strategies).
- Free-growing height defines for each species on a site, the minimum height that must be attained for a given tree to be considered free growing.

Blocks planted will have a survey of well-spaced carried out during the same growing season as establishment to confirm stocking levels meet the requirements of the appropriate SP. A further survey of well-spaced will be carried out within three growing seasons to confirm stocking is maintained above minimum levels.

Although 100% of cutblocks harvested on TFL 48 are planned to be planted, natural regeneration may be prescribed where the post-harvest assessment indicates that it is a suitable treatment option. A survey of well-spaced will be carried out post-harvest to confirm stocking levels meet the requirements of the appropriate SP.

Site plans/ silviculture prescriptions (SP) identify silviculture stocking standards and timelines on a standard unit level.

MONITORING PROCEDURE

All reforestation activities are documented and tracked in Genus. The silviculture forester reviews regeneration delay annually by summarizing data from Genus on all unstocked cutblocks and calculating the area weighted average age of unstocked area. Calculations will be based on the month of completion of surveys and entire cutblock net reforestable area will be used in the calculations if any or all of the cutblock NAR is unstocked.

Survey Requirements

A free growing survey will be carried out between the early and late free growing dates to confirm stocking levels meet the requirements of the appropriate SP. The surveys will meet current standards at the time of writing for measuring free growing, well spaced and total trees.

LINKAGES TO OPERATIONAL PLANS

Silviculture prescriptions and site plans detail timing and stocking requirements.

3.19 Area of Forested Land Lost to Non-Forest Industry

Criterion 2:	**Element(s): 2.2, 4.2**
Ecosystem Condition and Productivity	Forest Ecosystem Productivity, Forest Land
CSA Core Indicator(s): 2.2.1 Additions and deletions to the forest area	
Indicator Statement	**Target Statement**
Area of forested land lost due to non-forest industry	We will track, monitor and report every 3 years losses to other non - forest industry uses and incorporate these losses when AAC calculations are determined
Value(s): Ecosystem Productivity, Forested Land Base	
SFM Objective: We will sustain forests within the DFA.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

Omissions would have less than a 1% impact on AAC calculations. Omissions are in reference to areas that are un-accounted for but are attributable to one of the features found in Table 27.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Forests provide important ecological functions and contributions to global ecological cycles. Forests may be turned into a variety of non-forested ecosystems through both SFM activities as well as those that are outside of the control of Canfor or other forest management activities such as the oil and gas, mining, transmission utilities, and urban development. The intent of this indicator is to ensure that activities that permanently remove area from the forested land base are identified and accounted for in our SFM planning and analysis.

CURRENT STATUS

During the term of MP 3 Canfor developed a spatial tracking system to identify what and where non-forest related activities were occurring within TFL 48. All activities proposed within TFL 48 are referred to Canfor and comments are provided which stress the objective of minimizing permanent removal of area from the forested land base. The following table (27) shows reductions to the land base due to other uses, which remain unchanged from MP 4.

Table 27: Reductions to Land Base Due to Other Uses (Excluding Roads[4]) (2014)

Feature	Total Area (ha)
Well Sites[5]	464
Mines[6,7]	2,166
Pipelines	466
Cutlines	1,527
Trails	492
Transmission Lines	980
Grand Total	6,095

4 Roads are captured in Indicator 3.20 Permanent Access Corridors and are not easily separated as to which are only used by other industries or which are used by only the forest industry.

5 Includes Camps, Decking areas, Borrow Pits, and Sumps

6 Includes Mines where clearing had started prior to December 2004 (Quintette, Pine Valley Coal and Dillon Mine). Other proposed mines are included as a sensitivity analysis.

7 Includes roads within mine-cleared areas.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

No quantitative forecasting is completed for this indicator with the exception of planned activities that have not yet been initiated by other industries. This is completed as a sensitivity analysis as part of the timber supply analysis where the potential area to be removed by non forest industry use is conducted to determine the timber harvesting landbase. (See Appendix 5 – Timber Supply Analysis Information Package).

Site Plans set limits intended to minimize the amount of permanent road constructed within cutblocks. Wherever possible, Canfor will utilize existing access (seismic lines, existing oil and gas roads, existing forestry roads) to minimize the amount of new permanent access constructed. Through project referrals Canfor encourages other industries (mining, oil and gas) to utilize access constructed by the forest industry to minimize the total amount of area deleted from production. These activities are expected to result in the maintenance of productive forest soils with minimized losses in productivity and in the forest productive area lost resulting from the construction and maintenance of permanent access and other structures by other industries. Monitoring the amount of area deleted from the productive landbase at timber supply reviews will result in revisions to the estimate of the timber harvesting landbase which will result in more refined estimates of long run sustainable yield and annual allowable cut levels.

STRATEGY AND IMPLEMENTATION SCHEDULE

Where applicable existing cutlines or trails are upgraded for forestry access in an attempt to minimize the amount of land base permanently removed from the forested land base. Referrals stress the requirement to ensure road alignments and grades are suitable for forest management purposes as well to reduce the amount of additional roads to construct. This indicator has been tracked since MP 3.

MONITORING PROCEDURE

These features will be identified and incorporated into the vegetation update and removed from the timber harvesting land base in each timber supply analysis in support of the Management Plans. The identification methods will be through a combination of sources including but not limited to remote sensing, GPS, or data exchange with other industries or agencies. The status will be reported in conjunction with each Management Plan or Timber Supply Analysis.

LINKAGES TO OPERATIONAL PLANS

Where applicable existing cutlines or trails are upgraded for forestry access in an attempt to minimize the amount of land base permanently removed from the forested land base. Referrals stress the requirement to ensure road alignments and grades are suitable for forest management purposes as well to reduce the amount of additional roads to construct.

3.20 Permanent Access Corridors

Criterion 2:	**Element(s): 2.2, 4.2**
Ecosystem Condition and Productivity	Forest Ecosystem Productivity; Forest Land
CSA Core Indicator(s): 2.2.1 Additions and deletions to the forest area	
Indicator Statement	**Target Statement**
Percent of area of the DFA occupied by permanent access corridors associated with forest management activities	We will limit impacts on the land base due to the presence of permanent access corridors to less than 2.4% of the gross land base of the DFA
Value(s): Ecosystem Productivity, Forested Land Base	
SFM Objective: We will sustain forests within the DFA.	
Canfor common indicator statement: Percent of gross forested land base in the DFA converted to non-forest land use	

ACCEPTABLE VARIANCE

Acceptable variance to a maximum of 3.0%.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Permanent Access Corridors (PAC) are defined as those access corridors that are not planned to be returned to a forested state. Some of these roads or corridors may be managed to meet

access strategies but are still classed as a permanent reduction in forest area.

PAC includes roads, landings, trails, borrow pits, quarry or other similar structure within a cutblock or that provides access to cutblocks. These permanent access corridors are also used to provide access to other tenure holders and industrial uses as well as providing access for public recreation and fire protection activities. The PAC use and/ or construction material (e.g. hard gravel substrate) precludes the production of a commercial crop of trees. This indicator measures the proportion of area across the TFL that is removed for long periods of time from the productive forest land base. These permanent

access corridors do not contribute to the health of global ecological cycles. As these corridors are constructed they reduce from the productive forest land base some of the essential elements deemed necessary for a healthy forest ecosystem. It is therefore important to minimize the amount of area that is removed from the forested land base and converted to permanent access corridors.

CURRENT STATUS

Permanent access corridors currently occupy approximately 1.45% of the TFL as identified in Table 28. The total area and % of the gross TFL area for each road type remains unchanged from MP 4.

Table 28: Permanent Access Corridors in TFL 48 (Existing) (2014)

Road Type (RoW width in metres)	Total Area (ha)	% of Gross TFL Area (653,576 ha)
1 - ML (25 m)	2,292	0.36%
2 - Operational (20 m)	2,176	0.34%
3 - Block Perm (10 m)	2,634	0.41%
4 - Oil & Gas/ utility roads (10 m)	889	0.14%
5 - Undistinguished road type but delineated in VRI	1,266	0.20%
Grand Total	9,257	1.45%

Source VRI 2004

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

During MP 3, Canfor undertook a process that used the MP 3 THLB and terrain information to develop a classified future road network for the entire TFL. The road class derived differed slightly from the existing road class system used on TFL 48. To ensure a conservative estimate operational roads are assumed to have a 20 m right of way width for future roads.

Due to improved inventory estimates the THLB for MP4 was larger than that used in MP 3. In MP5, the MP4 THLB was reduced to account for additional wildlife habitat areas however assumptions regarding land base reductions for current and future roads were unchanged from MP4. To account for the difference the amount of future road was prorated to be consistent with the larger land base needing to be accessed in MP 4. The total amount of area estimated to be required for future permanent access corridors is 7,886 ha (see Table 29) or an additional 1.21% for a total of 2.38% of the gross area of TFL 48 in permanent access corridors.

Table 29: Forecasted Future Permanent Access Corridors (2005)

Road Type	Width (m)	Total Length (km)	Total Area (ha)
1 – Mainline	25	448	1,121
2 – Operational	20	1,138	2,276
3 – Block	8	5,611	4,489
Grand T otal		7,197	7,886

STRATEGY AND IMPLEMENTATION SCHEDULE

Permanent access corridors constructed are anticipated not to increase beyond 2.4% of the gross land base of TFL 48. Strategies to ensure future permanent access corridors are minimized are as follows:

- Prescribing temporary road/ trails (road/ trail that is reclaimed to productive forest) within site plans where the road/ trail will not be used for future access;
- Using roadside harvesting methods or intermediate sort yards (as opposed to landings) as a preferred method of access development.

Construction

- Roads constructed and maintained on Crown lands by Canfor will comply with the Forest Planning and Practices Regulation of the Forest and Range Practices Act and Road Permit documents.
- Road standards will reflect the expected volume and season of harvest. All right-of-way logging and road construction activities will be conducted under appropriate field conditions to minimize the impact on other resources.
- Maintaining road widths to a minimum while providing for safe and effective access;
- Coordinating access development with other industrial users to minimize total access development. This is achieved through referrals received by other users and providing comments concerning status and standard of access construction to make access useable to multiple users.

Maintenance

- Road maintenance will be conducted on a regular schedule on all roads where we have maintenance responsibilities.
- All maintenance activities will be carried out in a timely manner to minimize risk to the road, its users and the environment.
- Required maintenance activities will be determined from information documented during regular inspections as well as from information reported by users of the road.

Deactivation

- Deactivation of all inactive roads and logging trails will be conducted in a timely manner to protect the integrity of the road or structures and to protect non-timber values.
- Measures will be taken to stabilize roads during periods of inactivity, including the control of runoff, the removal of sidecast where necessary, and the re-establishment of vegetation for semi-permanent and permanently deactivated roads.

Road Rehabilitation

- We rehabilitate temporary roads to maximize the land base available for timber production.

MONITORING PROCEDURE

All roads constructed on TFL 48 are tracked in Genus. Information about road class, construction date, deactivation status etc. is tracked. This information is used to buffer and remove area from the productive forest land base and assign it to a road designation. Permanent access corridors are identified in our VRI database as having a Non Veg Cover Type of “RP” greater than 15% or a polygon type of one of the road types described in Table 27.

The percent of the TFL land base occupied by permanent access corridors is described by the following formula. This indicator is reported on at each Management Plan.

Formula:

% PACor = (PACor / DFA) * 100

Variables:

PACor Amount of area within permanent access corridors on TFL 48

DFA Gross area of TFL 48

% PACor Percent of gross land base within permanent access corridors on TFL 48

LINKAGES TO OPERATIONAL PLANS

Forest Stewardship Plans consider the overall forest resource and long term timber harvesting land base and the need for permanent access corridors. Site plans identify which roads are permanent and which are temporary and will be rehabilitated.

3.21 Harvest Levels/Volumes

Criterion 2:	Element(s): 2.2, 5.1
Ecosystem Condition and Productivity	Forest Ecosystem Productivity; Timber and Non-Timber Benefits
CSA Core Indicator(s): 2.2.2: Proportion of the calculated long-term sustainable harvest level that is actually harvested **5.1.1:** Quantity and quality of timber and non-timber benefits, products, and services produced in the DFA	
Indicator Statement	**Target Statement**
Harvest levels/volumes	Harvest volumes will not exceed 110% of the 5 year periodic cut control volume for the DFA
Value(s): Ecosystem Productivity, Timber and Non-Timber Multi-Use Benefits	
SFM Objective: We will sustain forests within the DFA. We will provide opportunities for a feasible mix of timber, recreational activities, visual quality, and non-timber commercial activities.	
Canfor common indicator statement: Percent of volume harvested compared to allocated harvest level	

ACCEPTABLE VARIANCE

None.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

The allotted periodic cut control is the five-year AAC volume assigned to the licence. Harvesting at levels that do not significantly exceed that volume supports the assumptions used in assigning annual allowable cuts in the Chief Foresters AAC determination, and is consistent with supporting ongoing sustainable timber supplies. Harvesting volumes up to 110% is permissible, as cut control target volumes for subsequent 5 year periods is reduced according to the amount harvested in excess of 100% of AAC.

While the AAC may change over time due to new analysis or information, changing social expectations for our forests or large catastrophic natural disturbances, the target to not exceed 110% of the 5 year periodic cut will remain.

CURRENT STATUS

Table 30: Actual Recorded and Allowable Annual Cut Summary (2014)

Year	Canfor Annual Cut Summary				BCTS Summary[2]			Deciduous Harvest Summary
	Allowable Annual Cut (m^3)	Adjustment (m^3)	Actual Recorded Cut (m^3)	Cut Control (%)	Allowable Allocation (m^3)	Actual Recorded Cut (m^3)	Allocation (%)	
1987-1991	1,742,500.0		1,787,732.0	102.6				
1992-1996	1,742,500.0	-41,572.0	1,659,920.5	97.6				
1997-2001	2,025,193.0	82,580.0	1,953,224.2	92.7				
2002-2006	2,331,850.0	57,575.04	2,344,509.91	98.1	276,750.0	197,997.25	71.5	66,084.52
2007-2011	3,311,101	0	1,719,885	51.9	290,546	358,267	123.3	252,155
2012	683,612	0	880,460	128.8	116,388	70,526	60.3	76,395
2013	683,612	0	767,187	112.3	116,388	35,292	30.3	16,152
2014								
Running Total	**1,367,224**	**0**	**1,647,647**	**121.5**	**232,776**	**105,548**	**90.6**	**92,547**

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

It is anticipated that the level of future harvesting will be within the target range established by the periodic cut control requirements set for the DFA. 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.

STRATEGY AND IMPLEMENTATION SCHEDULE

We will prepare harvest plans that are consistent with the licenses five year cut control volumes. The cut control volumes are monitored annually and revisions to plans made if needed to ensure the five-year targets are attainable.

MONITORING PROCEDURE

Harvest plans use the best available information to project volumes logged, for comparison to target cut levels. Scale information is used to monitor the actual deliveries compared to planned deliveries. The Ministry of Forests and Range provides annual summaries of actual cut control performance to the licensees.

Annual harvested volumes, and progress towards five-year periodic cut control levels will be reported in annual reports.

LINKAGES TO OPERATIONAL PLANS

SP's and cruise compilations are used for annual harvest plans to more accurately project the volumes to be delivered in the next year.

3.22 Allowable Annual Cut

Criterion 2:	**Element(s): 2.2**
Ecosystem Condition and Productivity	Forest Ecosystem Productivity
CSA Core Indicator(s): 2.2.2 Proportion of the calculated long-term sustainable harvest level that is actually harvested	
Indicator Statement	**Target Statement**
Allowable Annual Cut (AAC)	We will ensure that the Allowable Annual Cut will not adversely impact Long Term Harvest Level
Value(s): Ecosystem Productivity	
SFM Objective: We will sustain forests within the DFA.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

AAC increases as a result of natural disturbances (e.g. Mountain Pine Beetle) are an acceptable variance.

Canfor proposes an AAC however, the Chief Forester (Ministry of Forests and Range) determines the AAC for the management unit.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

The long-term harvest level (LTHL) is the harvest level that can be maintained indefinitely given a specified timber harvesting land base and associated management regime within the TFL. The analysis that accompanies the Timber Supply Review (TSR) is based on the best available information and provides a timber supply forecast for the next 250 years. TSRs are generally conducted every five to ten years during which the assessment of the long term sustainable harvest level can be reviewed in the context of current socio- economic condition, ecological consideration and also with updated inventory and forest management information.

It is Canfor's responsibility to prepare and conduct the Timber Supply Analysis information for review by the MoFR. The AAC determination is conducted by the Chief Forester of BC and is generally within the long-term harvest level forecasts in order to ensure sustainable forest productivity.

Since the impacts of forest utilization that occur today will affect future generations, it is necessary to be able to plan for sustainable forest management over centuries. The short and medium term harvest projections are directly linked to the long-term sustainable harvest levels. Incorporating new (best available) information and changing social values into the periodic timber supply analysis provides an opportunity to fine tune short-term and long-term harvest levels throughout time and be responsive to changing conditions while still considering the long term sustainability of the forest ecosystem.

CURRENT STATUS

The current AAC is based on the TSR Analysis Report completed and submitted in August 2006 and the AAC Rationale was dated May 25 2007. In 2014 TFL 48 requested an uplift to the AAC in response to the Mountain Pine Beetle epidemic. The analysis supporting this AAC uplift request was completed in 2014 and is currently under review by the MFLNRO. A revised AAC is expected to be set by the MFLNRO chief Forester in 2015.

See Table 31 for a history of the AAC's for TFL 48.

Table 31: Annual Allowable Cut and Long-Term Harvest Level

Partition	MP 1	MP 2	SFMP 3	SFMP 4
	AAC	AAC	AAC	AAC
Coniferous	410,000	460,000	525,000	800,000
Deciduous	0	54,000	55,000	100,000
Total	**410,000**	**514,000**	**580,000**	**900,000**

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

Forecasting of this indicator is completed as part of the TSR process and completed every 5-10 years.

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 LTHL.

STRATEGY AND IMPLEMENTATION SCHEDULE

During the term of MP 3 a significant threat from mountain pine beetle (MPB) to the lodgepole pine forests occurred within TFL 48. In 2004 the first occurrences of MPB were detected on TFL 48. Currently there are approximately 18.5 million m^3 of mature lodgepole pine greater than 80 years old within the timber harvesting land base. This equates to approximately 32% of the timber harvesting growing stock greater than 80 years old. Figure 20 shows the distribution of lodgepole pine volume within the THLB.

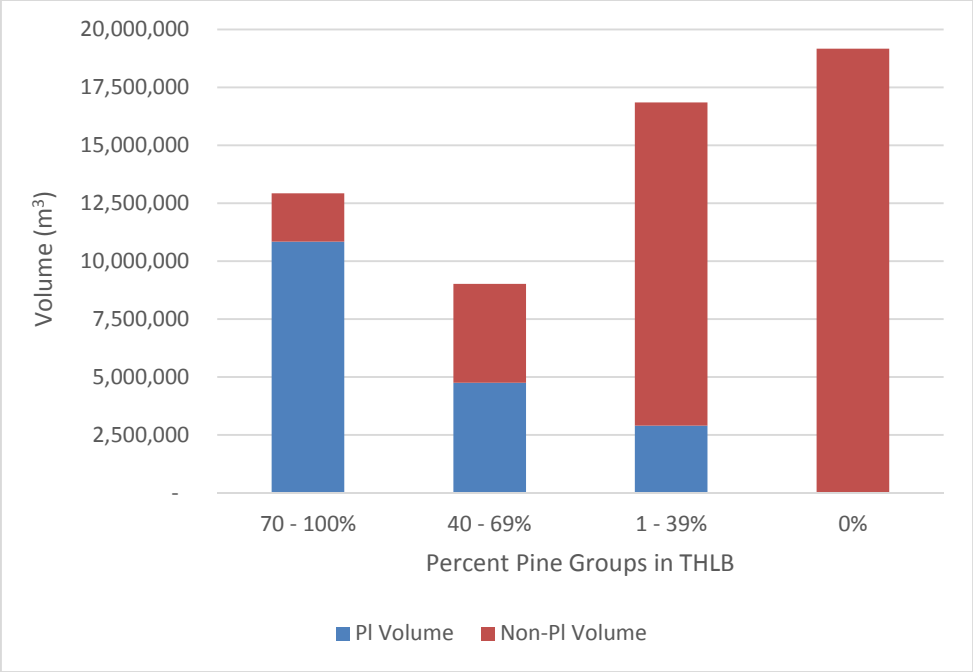


Figure 19: Distribution of Pine Volume in Stands Greater than 80 Years Old within THLB

To test some of the risks to TFL 48 some sensitivity assessments were conducted. The analyses are conducted for coniferous and deciduous separately, and are as follows (See Figure 21):

1. MP4 base case
2. Current AAC that was increased since MP4 to address the MPB infestation
3. MP5 base case

The MP5 base case depicts the best representation of current management on the TFL. The conifer harvest level starts at approximately 1.63 million m^3/ year for five years, dropping to approximately 738,000 m^3/ year for the second five-year period. Through the next 50 years the conifer harvest decreases slightly to an average of 663,000 m^3/ year before gradually increasing to the long-term harvest level (LTHL) of approximately 708,000 m^3/ year. The deciduous harvest level remains relatively constant throughout the planning horizon at approximately 100,000 m^3/ year.

The MP4 base case produced a flat line harvest level of approximately 643,000 m^3/ year from conifer-leading stands and approximately 94,000 m^3/ year from deciduous-leading stands. These harvest forecasts are shown relative to the MP5 base case harvest forecast levels. Citing a need to address the current MPB infestation, the Chief Forester in his 2006 rationale (MoF) set the AAC for the TFL at 800,000 m^3/ year from conifer-leading stands and 100,000 m^3/ year from deciduous-leading stands. These harvest levels are also shown as even flow levels in Figure 21 although there is nothing to suggest that these levels are intended to remain constant beyond the term of the 2007 determination.

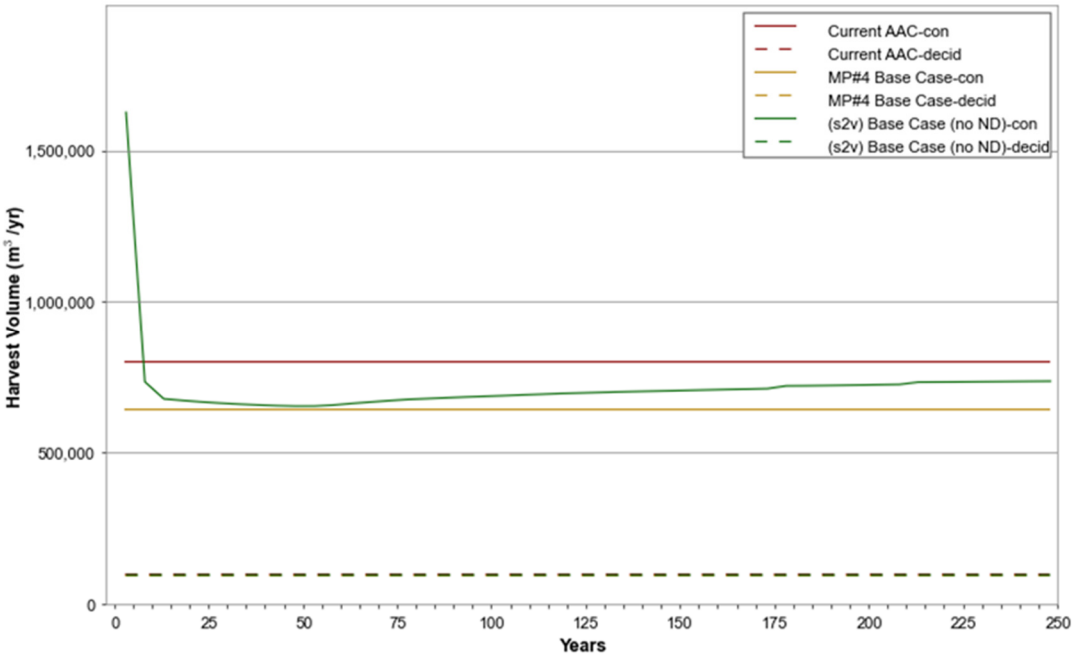


Figure 20: TFL 48 Alternative Coniferous Harvest Levels

MONITORING PROCEDURE

The data needed to monitor and forecast this indicator includes but is not limited to:

- VRI (Vegetation Resources Inventory) forest cover
- Timber supply information package; current management assumptions
- Growth and yield curves/tables
- Social-economic parameters (employment, taxes, government revenues etc.)

See Appendix 5 – Timber Supply Analysis Information Package and Appendix 6 – Timber Supply Analysis Report for detailed descriptions of the processes scenarios and results of the AAC calculations.

LINKAGES TO OPERATIONAL PLANS:

The TSR forecasts short, medium and long-term harvest levels for the DFA. The Chief Forester determines an AAC for both deciduous and coniferous timber harvesting land bases. Canfor then develops operational harvest plans (Forest Stewardship Plans) using the AAC as a key driver for development.

3.23 Soil Degradation

Criterion 3:	Element(s): 3.1
Soil and Water	Soil Quality and Quantity
CSA Core Indicator(s): 3.1.1 Level of soil disturbance	
Indicator Statement	**Target Statement**
Soil degradation	We will not exceed site degradation guidelines as defined in site plans
Value(s): Soil Productivity	
SFM Objective: We will protect soil resources to sustain productive forests.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

None. Limits and exceptions will be already identified in site plans.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Soil degradation refers to the reduction of the capacity of the soil to productively grow trees. The majority of soil degradation results from the construction of permanent access structures (PAS) required to harvest the block. PAS includes roads, landings, trails, borrow pits, quarry and other similar structures in a cutblock that are developed for timber harvesting or other forest management activities, and whose use and/ or construction material precludes the production of a commercial crop of trees. Roads are also used to provide access to other tenure holders and industrial users as well as providing access for public recreation and fire protection activities. This indicator measures the proportion of area that is removed for long periods of time from the productive forest land base within harvested cutblocks. These PAS do not contribute to maintaining forest ecosystem condition and productivity nor do they contribute to the health of global ecological cycles. As these structures are constructed they reduce from the productive forest land base some of the essential elements deemed necessary for a healthy forest ecosystem.

CURRENT STATUS

The limits as set in the site plans have been met for all blocks harvested in 2000 – 2013 inclusive.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

The forest development plan, the twenty year plan, and the timber supply analysis for the TFL consider and evaluate future requirements for permanent roads. Areas occupied by permanent access structures do not contribute to the THLB. Future estimates of area lost to permanent roads are incorporated into timber supply reviews and identification of the timber harvesting landbase. Operational plans establish limits on the amount of permanent access that may be constructed within individual cutblocks, as well as limits on the amount of soil disturbance that may occur within cutblocks. Based on past performance, it is anticipated that the permanent access structure and soil disturbance limits will not be exceeded. This will result in maintenance of productive forest soils with minimized losses from forest operations.

STRATEGY AND IMPLEMENTATION SCHEDULE

Disturbed road surface widths are actively monitored for compliance to the plan during road construction operations. The road widths are measured again following completion and a total disturbed area is calculated and compared against the plan. Compliance to the plan is then tracked and reported. This monitoring and tracking occurs constantly with the active operations.

MONITORING PROCEDURE

Road and harvest inspections and post-harvest assessments are conducted to ensure operations are within the prescribed limits.

LINKAGES TO OPERATIONAL PLANS

Operational plans as prepared by forest planners will continue to prescribe the most appropriate methods to reduce the losses to the forest land base and will be responsible to ensure that over all planned road and landing development will not be disproportionate to the area to be harvested. In other words, the

prescribing forester will only plan what is necessary to get the entire block harvested, typically larger blocks require less overall development percentage wise as opposed to smaller blocks.

3.24 Soil Disturbance Surveys

Criterion 3:	**Element(s): 3.1**
Soil and Water	Soil Quality and Quantity
CSA Core Indicator(s): 3.1.1 Level of soil disturbance	
Indicator Statement	**Target Statement**
Soil disturbance surveys	We will not exceed soil disturbance limits within cutblocks as defined in site plans
Value(s): Soil Productivity	
SFM Objective: We will protect soil resources to sustain productive forests.	
Canfor common indicator statement: Percent of harvested blocks meeting soil disturbance objectives identified in plans	

ACCEPTABLE VARIANCE

None. Limits and exceptions will be already identified in site plans.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

The following are types of soil disturbance possible on a cutblock as a result of harvesting

- Mass wasting from road and trail cut and fill failures
- Surface soil erosion
- Soil displacement
- Soil compaction
- Forest floor displacement

It is important to minimize soil disturbance as it may have a direct impact on the capacity of the soil to sustain a productive forest. While some disturbance is natural and even required to regenerate certain species, excessive unnatural disturbance is not desirable. When soil disturbance is excessive, some of the essential elements deemed necessary for a healthy forest ecosystem are removed.

CURRENT STATUS

All 2000-2013 harvested areas were within allowable soil disturbance limits. Sensitive sites are either harvested with low ground pressure equipment, cable yarders or helicopters. Table 32 outlines soil disturbance guidelines.

Table 32: Recommended Allowable Soil Disturbance Within the Net Area to be Reforested (NAR)

Leading soil disturbance hazard	Soil sensitivity rating[a]	Allowable dispersed soil disturbance (% NAR)
Mass wasting[b]	VH, H	5
Surface soil erosion	VH	5
Soil displacement	VH	5
Soil compaction	VH	5
Mass wasting	M, L	10
Surface soil erosion	H, M, L	10
Soil displacement	H, M, L	10
Soil compaction	H, M, L	10
Forest floor displacement	VH, H, M, L	10

a VH = Very High; H = High; M = Moderate; L = Low

b Mass wasting hazard refers to the potential for cut and fill failures, and should not be confused with terrain stability, which refers to the likelihood of landslides.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

Operational plans establish limits on the amount of permanent access that may be constructed within individual cutblocks, as well as limits on the amount of soil disturbance that may occur within cutblocks. Based on past performance, it is anticipated that the permanent access structure and soil disturbance limits will not be exceeded. This will result in maintenance of productive forest soils with minimized losses from forest operations. Winter conditions for harvesting may be prescribed to minimize impact on soil.

STRATEGY AND IMPLEMENTATION SCHEDULE

Cutblocks are assessed at the layout stage for disturbance sensitivity. The site plan will then identify the various soil sensitivities and will prescribe a harvest method and season that will be appropriate to meet the disturbance limits. Common practices used to minimize soil disturbance include:

- Limiting operations to frozen ground or sufficiently deep snow pack
- Using low ground pressure tires on skidders, or using tracked machines to skid wood
- Cable yarding
- Limiting harvesting to dry soil conditions only

Active operations are monitored for site disturbance. If there is evidence or apparent risk of exceeding the soil disturbance allowance, operations are suspended until soil conditions improve or an alternate harvesting method is employed that will result in acceptable levels of disturbance. Following harvest completion, a final ocular survey determines the actual amount of soil disturbance present. The actual is compared to the allowable amount, and the compliance is tracked

MONITORING PROCEDURE

Harvest inspections are conducted on each cut block to ensure operations are within the prescribed limits.

LINKAGES TO OPERATIONAL PLANS

Site disturbance limits are set in the site plan based on the preceding table based on the soil sensitivity hazard rating. Based on the likelihood of staying below the soil disturbance limit, alternate harvest methods or harvest seasons may be prescribed in the site plan.

3.25 Use of Environmentally Friendly Lubricants

Criterion 3:	**Element(s): 3.1**
Soil and Water	Soil Quality and Quantity
CSA Core Indicator(s): 3.1.1 Level of soil disturbance	
Indicator Statement	**Target Statement**
Use of environmentally friendly lubricants	We will research and identify environmentally friendly lubricants bi-annually
Value(s): Soil Productivity	
SFM Objective: We will protect soil resources to sustain productive forests.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

Not applicable.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Oil spills from the variety of machinery that operates on the land base are detrimental to the sustainability of productive forest. While these typically happen on very small scales, potential for an even smaller impact exists with the use of natural vegetable base lubricants. Research has developed a few of these lubricants, but so far they are not appropriate for use in the equipment that operates in this area. As time passes, these lubricants will likely improve so they should be reviewed on a regular basis.

CURRENT STATUS

The lubricant options were reviewed in 2001 and at that time were deemed to be inappropriate for local use. Our work force continues to use conventional and synthetic lubricants.

Many of the environmentally friendly lubricants are not made to withstand the harsh environmental conditions of northern BC. As well they can void warranties and are less effective than the alternative industrial lubricants. Harvesting operations are generally carried out on low risk areas away from running water where the main environmental impact could take place in a spill scenario. The high expense along with the above mentioned characteristics make environmentally friendly lubricants non-feasible at this time. Canfor will continue to watch the market for new, innovative products that could be an option for our loggers in the future

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

It is anticipated that the use of environmentally friendly lubricants will minimize negative impact to soil and water resources in the event of a spill. To date there have been no environmentally friendly lubricants identified that would be appropriate for the conditions experienced on TFL 48

STRATEGY AND IMPLEMENTATION SCHEDULE

FERIC research information will be generated over time. We will check for any new research material at least biannually and will evaluate it for use locally.

MONITORING PROCEDURE

Results of this review will be reported bi-annually in the annual report.

LINKAGES TO OPERATIONAL PLANS

Not applicable.

3.26 Site Index

Criterion 3:	**Element(s): 3.1**
Soil and Water	Soil Quality and Quantity
CSA Core Indicator(s): 2.2.1 Reforestation success **3.1.1** Level of soil disturbance **4.1.1** Net carbon uptake	
Indicator Statement	**Target Statement**
Area weighted average Site Index by ecological site series by leading species	The area weighted average Site Index by leading species by site series at free growing will not be less than the SIBEC predicted site index
Value(s): Soil Productivity	
SFM Objective: We will protect soil resources to sustain productive forests.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

A maximum negative variance of 10% post-harvest site index versus SIBEC.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Site index is a relative measure of forest site quality. It is a measure of the height growth that can be expected 50 years after trees reach 1.3 m in height for a tree species on a given site. Site index is highly sensitive to changes in ecological site conditions including soil nutrients, moisture and other variables, and is generally considered one of the most reliable indicators of site quality. Site index allows the comparison of productive potential between sites across a broad range of stand conditions. Conducting activities in a manner that decreases a sites potential capability to produce timber will be reflected in reduced post-harvest site index.

Soil productivity is one of the main factors impacting site productivity. Site index will be negatively affected if soil productivity were significantly reduced due to harvesting activities. A relative comparison of a strata's average site index when well growing compared to the predicted site index potential based on an ecological classification is therefore an appropriate method for evaluation if the resiliency and productive capacity of the forest stands and forest soils has been maintained.

This indicator is assessed when the trees are a minimum of 3 years old at 1.3 m in height during free growing surveys. The growth intercept method of assessing site index is used.

The predicted site index estimates are based on the Site Index Biogeoclimatic Ecological

Classification database provided and maintained by the Ministry of Forests and Range. The site index estimates provided in these reports are second approximations as they report mean plot site index and its standard error for each BEC site series/ species combination that have a minimum sample size of 7. This new estimate replaces the first approximation (1997) site index class estimate only if the minimum sample size criterion is met. As more data become available, subsequent approximations will be produced and named by year, e.g., 2005 approximation.

CURRENT STATUS

The following Table 33 shows the current status for stands declared free growing on TFL 48 in 2010 or earlier and site productivity assessed using the growth intercept methodology. The area declared free growing have had surveys completed which have collected growth intercept data during free growing surveys.

In MP4 the BWBSmw1 – 06 Lodgepole Pine and the BWBSwk1 – 04 Lodgepole Pine units were below the predicted site index 10% variance. Both samples represent very small areas, 0.2 and 6.2 ha respectively.

Table 33: Site Index by Leading Species for Free Growing Stands (2013)

		Species								
		Subalpine Fir			White Spruce			Lodgepole Pine		
BEC	Site Series	Ha	SI	Predicted SI	Ha	SI	Predicted SI	Ha	SI	Predicted SI
BWBSmw1	1	-	-	N/A	607.2	20.2	17.7	223.7	19.2	18
	2	-	-	N/A	95.3	18.6	9	20.5	19.6	12
	3	-	-	N/A	146.7	19.7	17	82.8	16.3	18
	4	-	-	N/A	63.7	18.7	12	25.2	18.5	15
	5	-	-	N/A	78.4	19.3	18	24.3	19.4	18
	6	-	-	N/A	49.0	19.6	18.1	0.2	9.0	18
	7	-	-	N/A	12.7	19.2	18	0.6	18.0	18
BWBSmw1 Total		-	-	N/A	1,052.9	19.8	16.6	377.4	18.6	17.6
BWBSwk1	1	-	-	N/A	157.4	19.3	12	296.3	17.2	15
	2	-	-	N/A	19.2	18.1	9	47.9	15.7	12
	3	-	-	N/A	37.9	17.8	9	54.5	14.6	12
	4	-	-	N/A	4.1	21.5	12	6.2	12.2	15
	5	-	-	N/A	0.0	0.0	15	0.5	16.0	15
	6	-	-	N/A	0.0	0.0	15	0.3	18.3	15
BWBSwk1 Total		-	-	N/A	218.7	19.0	11.5	405.6	16.6	14.6
BWBSwk2	1	-	-	N/A	36.9	17.1	12	46.4	19.0	15
	2	-	-	N/A		0	9	3.9	19.0	12
	3	-	-	N/A	36.9	17.1	12	50.3	19.0	15
	4	-	-	N/A	1,057.3	17.0	9	697.9	17.2	12
	5	-	-	N/A	73.5	17.0	15	52.8	18.0	15
BWBSwk2 Total		-	-	N/A	1,204.6	17.2	11.9	851.3	16.2	15
ESSFmv2	1	728.9	15.8	12	179.0	16.9	15	214.9	16.8	15
	2	19.4	14.5	9	4.1	17.0	9	0.6	15.5	12
	3	1.7	18.0	6	0.1	15.0	6	0.2	17.5	9
	4	3,425.3	15.0	15	1,331.5	17.0	15	1,004.8	17.1	18
	5	0.0	0.0	15	0.0	0.0	15	0.0	0.0	15
	6	0.0	0.0	15	0.0	0.0	15	0.0	0.0	15
ESSFmv2 Total		4,175.3	0	12.8	1,514.7	0	14.6	1,220.5	0	15.1
ESSFmv4	1	0.0	0.0	12	0.0	0.0	15	0.0	0.0	15
	2	0.0	0.0	9	0.0	0.0	9	0.0	0.0	12
	3	0.0	0.0	6	0.0	0.0	6	0.0	0.0	9

	4	0.0	0.0	15	0.0	0.0	15	0.0	0.0	18
ESSFmv4 Total		0.0	0	10.5	0.0	0	15	0.0	0	13.5
ESSFwc3	1	104.3	16.5	15	2.3	16.5	15	-	-	N/A
	2	1.3	14.0	9	0.0	0.0	9	-	-	N/A
	3	39.1	17.4	15	0.7	23.0	15	-	-	N/A
ESSFwc3 Total		144.7	16.7	15	3.0	17.9	13	0.0	-	N/A
ESSFwk2	1	641.0	16.8	15	289.2	17.4	15	80.2	16.5	N/A
	2	437.7	17.7	9	23.7	16.4	9	90.0	15.4	N/A
	3	341.3	16.9	12	49.8	18.6	12	11.6	17.3	15
	4	370.8	18.3	15	120.5	16.3	15	13.8	16.9	N/A
	5	232.8	19.5	15	62.1	19.6	15	3.6	13.9	N/A
	6	41.9	16.3	12	5.9	20.9	12	1.6	17.5	N/A
ESSFwk2 Total		2,065.5	17.6	12.4	551.2	17.5	14.1	200.9	16.0	15
SBSwk2	1	766.5	16.1	15	833.1	20.0	21.8	699.7	19.1	21
	2	16.9	18.4	12	50.4	19.9	15	47.8	18.8	15
	3	224.7	15.3	12	323.7	18.2	18	639.2	17.7	18
	4	98.3	14.7	N/A	418.5	18.8	15	224.3	17.8	18
	5	165.2	17.5	18	333.8	19.1	21	168.2	18.4	21
	6	31.4	18.2	18	147.6	21.8	24	2.4	20.2	21
	7	6.1	15.2	N/A	14.0	22.7	N/A	5.5	20.3	N/A
SBSwk2 Total		1,309.2	16.1	14.6	2,121.1	19.5	19.7	1,787.2	18.4	19.8
Grand Total		7,694.7	16.0	12.8	6,666.2	18.7	16.9	4,842.9	17.8	17.4

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

Practices implemented to protect soil productivity will result in maintenance of the productive capacity of the soil. Site index is an expression of soil productivity. It is anticipated that the implementation of practices to maintain soil productivity will result in the maintenance of the soils capacity to grow trees to a certain height within a specified time frame. This is also dependent upon soil moisture and rainfall. As climate warming occurs, summers in the BC interior are anticipated to be generally somewhat drier and warmer. This may have a slightly negative impact on actual growth rates

STRATEGY AND IMPLEMENTATION SCHEDULE

Practices are conducted to protect soil productivity such as assessment of soil and moisture conditions. Site plans are prepared which provide guidance for operations on levels of acceptable disturbance. Sites have harvesting or site preparation conducted during times that are appropriate to the site conditions such as frozen soils, dry soils, or using low ground pressure equipment.

Growth intercept SI data is collected from all stands that meet the growth intercept standard. These stands must be at least 2 to 3 years old at breast height (1.3 m) to be eligible. This data has been collected consistently since 2001 on TFL 48.

MONITORING PROCEDURE

The site index information will be compiled for each stratum in each well growing block surveyed. The area weighted averages SI for free growing stratums by leading species by site series is compared to the predicted site series based on the latest SIBEC compiled data, and reported in the annual report.

This information is stored in Canfor's Genus system and is compared to the TFL site series inventory information. The following formula is used to calculate the area weighted site index by leading species by site series.

The status of this indicator is reported in each annual report.

Formula:

$$\mathbf{FGSI}_{\text{leading species, site series}} = (\mathbf{SI}_{\text{leading species, ss, stratum}} * \mathbf{SA}_{\text{leading species, ss, stratum}}) / \mathbf{SSA}_{\text{leading species, ss}}$$

Variables:

$\mathbf{SI}_{\text{leading species, ss, stratum}}$	Site index by leading species by site series by stratum
$\mathbf{SA}_{\text{leading species, ss, stratum}}$	Area of stratum by leading species by site series
$\mathbf{SSA}_{\text{leading species, ss}}$	Total area by leading species by site series
$\mathbf{FGSI}_{\text{leading species, site series}}$	Area weighted site index at free growing by leading species by site series

LINKAGES TO OPERATIONAL PLANS

Site plans describe acceptable strategies or practices to achieve the objectives. Indicators 3.23 and 3.24 track the adherence to these plans. This indicator provides a long-term assessment that soil productivity has not been compromised and provides feedback to management over time.

3.27 Coarse Woody Debris

Criterion 3:	**Element(s): 3.1**
Soil and Water	Soil Quality and Quantity
CSA Core Indicator(s): 3.1.2 Level of downed woody debris	
Indicator Statement	**Target Statement**
Average Coarse Woody debris size and m^3/ha on blocks harvested on the TFL since Jan 1, 2004	Average retention level over the TFL since Jan 1, 2004 will be at least 92 m^3/ha of which a minimum of 46 m^3/ha will be greater than 17.5cm in diameter
Value(s): Ecosystem Productivity	
SFM Objective: We will protect soil resources to sustain productive forests.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

No less than 74 m^3/ha for average volume/ha over the TFL and no less than 28 m^3/ha will be greater than 17.5 cm in diameter.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Coarse woody debris (CWD) is used by rodents, small carnivores and amphibians for cover, nesting, denning and foraging. Woody debris also provides substrate for non-vertebrates, lichen and fungi, and influences such ecosystem processes as nutrient cycling, water retention and stream morphology (Bunnell et al. 2003). Important attributes of downed woody debris include size, decay state and density or distribution (Bunnell et al. 2003). Large pieces of CWD persist longer, providing shelter to larger vertebrates and breeding substrates for amphibians. A range of decay states is essential to support the succession of organisms that require different decay levels. Variability in CWD density and distribution provides subnivean rest sites for mammals in the winter (Porter 2002) and foraging sites for species preferring low volumes of CWD, and supports fungi and bryophytes that favour high volumes of downed wood. Managing and monitoring for these attributes is critical, as downed wood is the most likely habitat element to appear abundant initially after harvest, but become limiting through time (Bunnell et al. 2003). The occurrence of CWD following harvesting, therefore, is also an indicator of the ability of the ecosystem to recover from disturbance.

Based on 131 phase 2 VRI plots located in natural stands 92 m^3/ha was the average amount of CWD, thus has become the target for average retention levels in the future. To address the need for ecologically valuable large CWD, 50% of the target (46 m^3/ha) will be greater than 17.5 cm diameter. Due to the large variation of volumes of CWD occurring naturally over the TFL, the target amount reflects an average over the TFL land base and does not apply as a target to be achieved in all locations at all times.

CURRENT STATUS

Based on 131 phase 2 VRI plots located in natural stands from four biogeoclimatic (BEC) zones (BWBS, SBS, ESSF wet and ESSF moist) average CWD accumulations are 92.6 m^3/ha (SE ±18.6 m^3/ha @ 99%). Actual CWD accumulations ranged from a low of 0 m^3/ha to 379.3 m^3/ha. See Figure 22 for a scatter plot of all CWD samples from natural stands within TFL 48. Figure 22 illustrates that CWD is highly variable and there is not a strong relationship between volume of CWD detected and age of the forest stand or BEC zone.

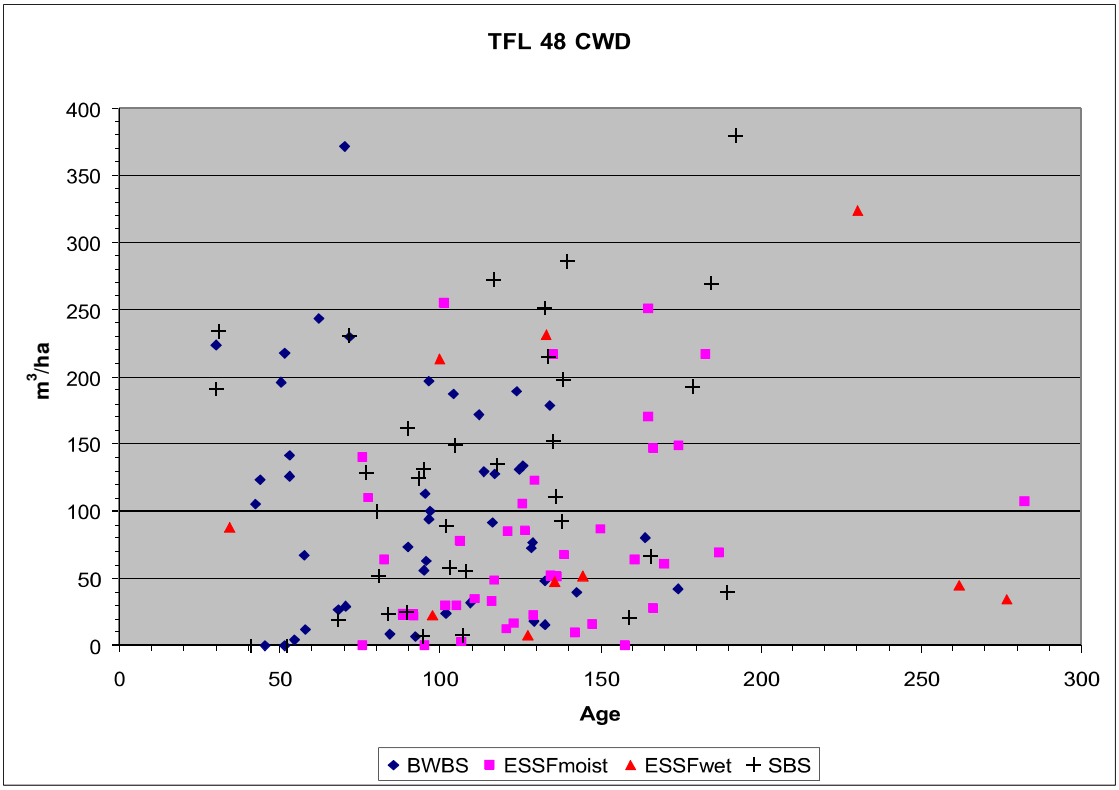


Figure 21: Range of CWD Accumulations (volume/ha) Over Age

Data based on 131 VRI phase 2 plots in natural stands across four BEC groups.

NIVMA information from 15 year old (approximately) managed stands in the North Peace indicate average CWD volumes between 92 and 110 m^3/ha. At the end of 2013 11 of 23 plots had been established on TFL 48. Progress to date for the 11 samples shows an average of 128 m^3/ha of which 56 m^3/ha is greater than 17.5 cm diameter.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

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.

STRATEGY AND IMPLEMENTATION SCHEDULE

While volumes of CWD remaining after harvesting may approximate pre-harvest levels, the quality of the CWD may not meet our objectives. SP's will identify site specific management strategies to contribute to the maintenance of CWD levels at the TFL level. These strategies will complement the retention of recruitment of CWD from WTP's, riparian areas, un-salvaged burns, and the forests outside of the THLB.

The following principles will be considered when developing site specific SP strategies:

- Minimize the amount of ecologically valuable CWD being burned in roadside piles. These

materials will be extracted and re-piled away from roadside where possible.

- Larger pieces of CWD are biologically more valuable than smaller pieces.
- Maintaining a wide range of decay and diameter classes is ecologically desirable.
- Retention of a variety of species is advantageous.
- Standing live and dead trees and/or stubs retained on cutblocks can provide important sources of CWD recruitment.
- CWD within riparian areas can be particularly beneficial ecologically.
- The retention of CWD should be harmonized with other silvicultural objectives.
- Maintain variability in the levels of CWD at the landscape level.
- Measures should include retention of CWD in both concentrations and dispersed patterns, as different organisms favour each of these strategies. Concentrating solely on one method could disadvantage some groups of species (Bunnell 1999).

Monitoring of CWD will begin during the 2006 field season and will include establishment of plots in stands harvested prior to 1991 as part of the managed stand monitoring (see section 2.8). Monitoring of current performance will also begin in 2006 with the establishment of a CWD plot in all areas harvested since Jan 1, 2004, which fall on a 2 km grid sample point.

MONITORING PROCEDURE

Average post-harvest CWD will be estimated from measurements taken at the 2 km long-term monitoring points during a silviculture survey subsequent to harvesting of these sample locations. Sampling methodology will follow the Resource Inventory Committee standard described in the Vegetation Resource Inventory ground sampling procedures. The average CWD volume will be monitored annually and depending on the results of this monitoring, revisions to the prescribed management practices within the SP's may need to be implemented to achieve the SFM targets.

The average CWD volume attained at all 2 km sample points in blocks logged from Jan 1, 2004 until the next SFMP will be reported in the next SFMP.

LINKAGES TO OPERATIONAL PLANS

Site plans or site level plans will identify site-specific management strategies to retain CWD. Annual reviews of CWD plot information will provide feedback on the suitability of SP CWD management measures, and changes to procedures can be made accordingly.

3.28 Stream Crossing Quality Index

Criterion 3:	**Element(s): 3.2**
Soil and Water	Water Quality and Quantity
CSA Core Indicator(s): 3.2.1 Proportion of watershed or water management areas with recent stand-replacing disturbance	
Indicator Statement	**Target Statement**
Maximum Stream Crossing Quality Index (SCQI) by watershed	The maximum SCQI score is 0.40 by watershed
Value(s): Water Quality and Quantity	
SFM Objective: We will maintain water quality and quantity.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

There is no acceptable variance for this indicator.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Sediment from forestry practices is generated mainly from the following three sources: roads, landslides and stream bank instability. Significant increases in sediment concentration in streams over natural levels can have a negative effect on fish and fish habitat (Slaney et al. 1977; Government of BC 1995; Hall et al. 1987; Hartman and Scrivener1990; Phillips 1971; Scrivener and Tripp 1998.). Sediment can also reduce the value of water for domestic and agricultural use (Government of BC 1995).

Sediment yields from logging roads can show a 2 to 50-fold increase over historical levels (Reid 1993). The main point of road sediment delivery to streams is at crossings such as culverts and bridges (Brownlee et al. 1988; Government of BC 1995). While it is recognized that roads are not the only source of sediment related to forestry practices, they are considered to be the most significant causes of increased sedimentation (Beschta 1978; Brownlee et al. 1988; Government of BC 1995; Reid and Dunne 1984). Through the proper layout, construction, deactivation and use of erosion and sediment control (ESC) measures, the impact that roads have on water quality can be significantly reduced (Beaudry 1998; Government of BC 1995). In an effort to assess the impact that stream crossings are having on the water quality within TFL 48, a field based assessment, known as the Stream Crossing Quality Assessment (SCQA) was developed.

The SCQA method is a subjective type of assessment, yet it is systematic in its approach. There are no detailed quantitative measures that must be made (e.g. length and depth of erosion rills). The SCQA method was designed with the assumption that it is better to assess a much larger number of crossings in a qualitative way (i.e. a significant proportion of the crossings within a watershed), than it is to assess only a few crossings in a very detailed, quantitative way. A balance between effectiveness and efficiency has been developed when performing the SCQA field assessments. The SCQA method was designed to be conducted relatively quickly (10 to 15 minutes per crossing) so that a maximum number of crossings can be assessed within an area of interest.

CURRENT STATUS

Table 34: SCQI and Water Quality Concerns for Three Sub-Basins within TFL 48 – Sampling Completed 2001 to 2013

Watershed Name	n	Erosion Indices			Water Quality Concern Ratings				
		Stream Crossing Density Index	Sum of Stream Crossing Quality Scores	Stream Crossing Quality Index	Stream Width Class[1]	% None (#streams/ #streams sampled)	% Low (#streams/ #streams sampled)	% Medium (#streams/ #streams sampled)	% High (#streams/ #streams sampled)
Gaylard (2009)[3]	54	0.34	3.66	0.02	1	0	0	0	0
					2	66.7	33.3	0	0
					3	80	20	0	0
					4	8.3	83.3	8.3	0
					5	0	94.1	5.9	0
Lower Peace Reach (2009)	54	0.38	2.38	0.02	1	0	0	0	0
					2	0	0	0	0
					3	57.1	42.9	0	0
					4	6.1	93.9	0	0
					5	0	100	0	0
Gething (2009)	52	0.28	4.29	0.02	1	0	0	0	0
					2	50	50	0	0
					3	80	10	10	0
					4	0	95.5	4.5	0
					5	0	100	0	0
Upper Wolverine (2013)	69	0.28	16.2	0.09	1	0	0	0	0
					2	25	75	0	0
					3	60	0	0	40
					4	46.7	33.3	13.3	6.7
					5	18.5	44.5	33.3	3.7
Middle Wolverine (2013)	18	0.13	3.96	0.02	1	0	0	0	0
					2	66.7	0	0	33.3
					3	72.7	9.1	0	18.2
					4	50	50	0	0
					5	75	25	0	0
Hasler Creek	120	0.63	87.72	0.46	1	0	0	0	0
					2	20	80	0	0

(2011)					3	30.8	53.9	0	15.4
					4	7	67.5	20.9	4.7
					5	16.9	50.9	20.3	11.9
					1	0	0	0	0
					2	20	40	0	40
					3	5.6	44.4	22.2	27.8
Brazion Creek					4	27.2	47.3	16.4	9.1
(2002)	105	0.32	34.48	0.11	5	22.2	55.6	14.8	7.4
					1	0	100	0	0
					2	50	50	0	0
					3	9.1	90.9	0	0
Highhat Creek					4	40	60	0	0
(2012)	70	0.45	17.87	0.11	5	51.7	48.3	0	0
					1	0	100	0	0
					2	100	0	0	0
					3	33.3	55.5	11.1	0
Lower Carbon					4	42.9	42.9	14.3	0
(2010)	37	0.28	3.73	0.03	5	57.9	31.6	10.5	0
					1	0	0	0	0
					2	100	0	0	0
					3	0	100	0	0
Seven Mile					4	14.3	71.4	0	14.3
(2010)	17	0.22	2.96	0.04	5	60	20	20	0
					1	0	100	0	0
					2	75	25	0	0
					3	100	0	0	0
Eleven Mile					4	50	50	0	0
(2010)	22	0.1	0.56	0	5	60	40	0	0
					1	75	25	0	0
					2	57.1	42.9	0	0
					3	33.3	66.6	0	0
Upper Carbon					4	20	80	0	0
(2010)	55	0.12	1.9	0.01	5	60.9	39.1	0	0
					1	0	0	0	0
					2	0	66.7	0	33.3
					3	10	30	15	45
Lower Sukunka					4	20.2	41.5	10.6	27.7
(2006)	191	0.36	70.63	0.13	5	28.8	37	23.3	10.9
					1	100	0	0	0
					2	0	100	0	0
					3	30	20	20	30
Upper Sukunka					4	18.8	43.7	18.8	18.7
(2013)	89	N/A[2]	N/A[2]	N/A[2]	5	31	34.5	31	3.4
					1	0	0	0	0
					2	0	0	0	0
					3	0	0	0	0
Lower Pine Residual					4	20	40	33.3	6.7
(2012)	78	0.44	1.62	0.01	5	9.5	54	11.1	25.4
					1	100	0	0	0
					2	25	37.5	25	12.5
					3	37.9	27.6	20.7	13.8
Burnt Creek					4	37.3	22.9	19.3	20.4
(2006)	205	0.33	72.66	0.12	5	29.3	26.8	20.7	33.2
					1	100	0	0	0
Lower Murray					2	50	50	0	0
(2007)	55	0.32	17.79	0.1	3	31.3	37.5	25	6.3

					4	10.7	71.4	3.6	14.3
					5	16.7	66.7	16.7	0
					1	100	0	0	0
					2	100	0	0	0
					3	54.5	27.3	13.6	4.5
Upper Murray					4	16.9	61	5.1	16.9
(2007)	154	0.86	32.18	0.18	5	52.4	11.1	25.4	11.1
					1	100	0	0	0
					2	75	25	0	0
					3	36.4	63.6	0	0
Lower					4	31	40.5	4.8	23.8
Wolverine	63	0.27	19.3	0.08	5	40	40	0	20
					1	100	0	0	0
					2	55.6	33.3	11.1	0
					3	14.8	59.3	18.5	7.4
Upper Pine Residual					4	29.5	51.1	10.2	9.1
(2008)	133	0.33	36.75	0.09	5	37.5	25	37.5	0
					1	0	0	0	0
					2	75	25	0	0
					3	38.5	61.5	0	0
Johnson					4	54.2	37.5	4.2	4.2
(2009)	49	0.23	5.23	0.02	5	25	75	0	0

1 = greater than 20m, 2 = 5 to 20m, 3 = 1.5 to 5m, 4 = 0.5 to 1.5m, 5 = less than 0.5m
2 = SCQI scores of 0
3 = Year the watershed was surveyed

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

  By following the SFMP indicator strategy it is anticipated that there will be acceptable levels of water quality and quantity generated throughout the TFL. Introduction of sedimentation into watercourses' will be minimized. It is anticipated that the natural range of variability in riparian systems functioning will be maintained, supporting human and ecological communities and including terrestrial and aquatic life.

STRATEGY AND IMPLEMENTATION SCHEDULE

Our strategy for protecting water quality is through sound road construction, maintenance and deactivation practices including but not limited to the following:

- Terrain Stability Assessments
- Temp work crossings to facilitate right of way falling and construction
- Additional cross drains to offload ditch water either side of stream crossings during construction
- Grass seeding crossing location upon completion of construction
- Rip Rap inlets and outlets of structures
- Removal of crossing structures and rehabilitation of site during deactivation
- Cross ditches 10-15m upslope of crossings during deactivation
- Grass seeding upon completion of deactivation
- Straw blanket on rehabilitated bridge sites

The SCQA system is a semi-quantitative method of assessing the effectiveness of our road construction, maintenance and deactivation practices. The SCQA system was implemented on the TFL in 2001. Continuation of the SCQA system is slated as follows:

- Annually, Canfor will select drainages for survey by area on the TFL. The TFL will be surveyed in a cyclical manner until the all areas have been covered, the surveys will then recommence with the first area. The result will be a recurring survey on an approximate 5-year cycle.
- Annually, stream-crossing surveys will be conducted and the resulting data analyzed.
- Results from the annual evaluation process of WQCR survey data will determine the need for development of recommendations and subsequent Action Plans. If required, plans will be

formulated to meet target goals and promote continuous improvement over time in the areas of road construction, maintenance, and deactivation practices.

MONITORING PROCEDURE

SCQI scores for individual crossings range between 0 and 1, depending on the impact the crossing is having on water quality. A score of 1 indicates that the crossing has a substantial impact on water quality. As the impact is reduced the score decreases until it eventually reaches 0. Adding the individual crossing scores and dividing this value by the watershed area to calculate watershed level SCQI's. Time, sediment control, erosion control and drainage control techniques can improve a crossing's SCQI score which provides an incentive to implement appropriate construction and deactivation techniques.

Example Calculation of SCQI (Table 35):

Watershed name: Bogus watershed

Watershed size: 30 km^2

Table 35: Stream Crossing Inventory for Bogus Watershed

Culvert ID	Field Comments	Score	Sum of Score
#1	Not checked	1	
#2	No erosion	0	
#3	Severe erosion	1	
#4	Mild erosion	0.2	
#5	Not checked	1	
#6	De-activated and stable	0	
#7	Not checked	1	
#8	Moderate erosion	0.5	
#9	Not checked	1.0	
#10	Severe erosion	1.0	
Equivalent Stream Crossing Number =			**6.7**

Stream crossing density = 10/30 km^2 = 0.33 crossings/km^2

The SCQI score for the Bogus watershed = 6.7/30 km^2 = 0.22 crossings/km^2

The overall watershed score is calculated as indicated above and reported in each annual report or SFMP.

Scores for each individual crossing assessed is stored in Genus and high WQCR crossings are identified for production of action plans (see Indicator 3.29). The results of each year's surveys are circulated to the applicable supervisor to review and complete action plans where required.

LINKAGES TO OPERATIONAL PLANS

Once data is compiled and evaluated for the surveyed area within the DFA, corrective action will be taken as necessary to meet or exceed targets. Achieving targets will support the overall objective by completing site-specific remediation as required and providing feedback to operations on construction, maintenance and deactivation practices.

3.29 Action Plans for High Water Quality Concern Rating (WQCR)

Criterion 3:	**Element(s): 3.2**
Soil and Water	Water Quality and Quantity
CSA Core Indicator(s): 3.2.1 Proportion of watershed or water management areas with recent stand-replacing disturbance	
Indicator Statement	**Target Statement**
Number of crossings with a High Water Quality Concern (WQCR) with actions plans prepared within one year of discovery	100% of High WQCR crossings will have action plans prepared within one year of discovery
Value(s): Water Quality and Quantity	
SFM Objective: We will maintain water quality and quantity.	
Canfor common indicator statement: Percent of high hazard drainage structures with identified water quality concerns that have mitigation strategies implemented	

ACCEPTABLE VARIANCE

A 10% variance is accepted to allow for the one off situations due to access issues or site conditions (i.e. unable to access/assess before snow fall) preventing the preparation of an action plan within one year. The 10% variance refers to the time line of completion only; the action plan must still be completed.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

This indicator will ensure the follow up evaluation and subsequent action plans for High WQCR crossings are consistently implemented, tracked, and completed, thus improving the SCQI score and reducing environmental impact. The data set developed can provide the basis for analysis to identify trends and opportunities to improve sediment control; erosion control and drainage control techniques, thus providing the means and incentive to implement appropriate construction and deactivation techniques as a proactive precaution rather than reaction. This indicator provides the closed loop feedback required for continuous improvement of SCQI results and operational practices.

CURRENT STATUS

From 2001 to present there have been 300 crossings assessed as having a High WQCR. The average occurrence of crossings with a High WQCR between 2001 and 2005 was 47.2%. Between 2005 and 2010 on an annual basis the average is 12.8%. There is a decreasing trend in the number of crossings that are rated as High.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

By following the SFMP indicator strategy it is anticipated that there will be acceptable levels of water quality and quantity generated throughout the TFL. Introduction of sedimentation into watercourses' will be minimized. It is anticipated that the natural range of variability in riparian systems functioning will be maintained, supporting human and ecological communities and including terrestrial and aquatic life.

Analytical Methods

This indicator is intended to be a measure of the level of completion expressed as a percentage (No. High crossings with action plans completed / No. High crossings discovered).

STRATEGY AND IMPLEMENTATION SCHEDULE

Upon receiving the SCQI report the data is loaded on our Genus system. The high sites are assigned to the logging supervisor by area and followed up on during the summer season. All associated action plans and resulting scheduled works are tracked through to completion in the Genus structures interface, linked to the corresponding WQCR inspection. Priority for remedial projects shall be in the following order: streams used for domestic water supply, fish bearing streams, and others.

MONITORING PROCEDURE

The statuses of follow up inspections and associated action plans for high sites will be reported out as a percentage of highs completed in the annual SFM report.

LINKAGES TO OPERATIONAL PLANS

The data will highlight opportunities for improved sediment control, erosion control and drainage control techniques to implement in the design, construction, and deactivation phases of our business. This indicator provides a closed loop for continuous improvement of operational practices.

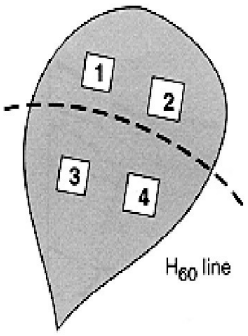
3.30 Peak Flow Index

Criterion 3:	Element(s): 3.2
Soil and Water	Water Quality and Quantity
CSA Core Indicator(s): 3.2.1 Proportion of watershed or water management areas with recent stand-replacing disturbance	
Indicator Statement	**Target Statement**
The percentage of watersheds within TFL 48 achieving baseline thresholds for Peak Flow Index	A minimum of 95% of the watersheds within TFL 48 will be below the baseline threshold
Value(s): Water Quality and Quantity	
SFM Objective: We will maintain water quality and quantity.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

No acceptable variance.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?



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

Weighted Total ECA = 72.5

Peak Flow Index = $\frac{72.5}{1000}$ = 0.0725

Figure 22: Peak Flow Index – Example Calculation

Most changes to stream channel stability and fish habitat occur during large runoff events, or peak flows (Beaudry and Gottesfeld 2001). In the interior of British Columbia most peak flows occur during spring snowmelt. Large disturbances in a forested watershed, such as extensive forest harvesting or wildfires, can have a negative impact on peak flows by increasing the flows above stability thresholds. This can accelerate streambed and stream bank erosion, damage fish habitat and result in an unstable fluvial system. After forest harvesting or wildfires have disturbed an area, both winter snow accumulation and spring snow melt rates increase (Winkler 2001).

However, the impact of disturbances on peak flows is not equal throughout a watershed. Disturbances that are located at higher elevations in a watershed have a greater impact on peak flows than do those located at lower elevations (Gluns 2001). Consequently, it is important that a good water quantity index take this fact into consideration. The Peak Flow Index (PFI) considers this by providing a greater weight factor to the disturbances that occur at higher elevations. The "higher elevation" is defined as the upper 60% of the watershed. This "upper watershed area" is defined individually for each watershed or sub-basin by using the concept of the "H60 line".

The Peak Flow Index also considers that the forest will re-grow over time within a disturbed area. As re-growth occurs, the negative impact of accelerated snow accumulation and melt is reduced and consequently so are the impacts to increased peak flows. The PFI considers stand height as the indicator of re-growth (See Table 36) (BC MoF 2001). The PFI value decreases as the stand height increases. The PFI provides an objective method to forecast and evaluate the potential effects of past disturbances and future plans. By providing conservative target values, it ensures that rates of forest harvesting do not contribute to the degradation of the water resource. Figure 23 provides an example of how PFI is calculated for a 1,000 ha watershed.

Table 36: Hydrological Recovery for Fully Stocked Stands That Reach a Maximum Crown Closure of 50%-70%

Average Ht of main canopy (m)	% Recovery
0 - <3	0
3 - <5	25
5 - <7	50
7 - <9	75
9+	90

CURRENT STATUS

Of the 34 watersheds, only the Gwillim and Gaylard watersheds are currently not meeting the PFI targets, and fail to do so when projected to 2023 (see Table 37). Projected harvesting for the next 15 years shows 3 additional watersheds not meeting the PFI targets. In 2018, Hasler Creek and Lower Pine Residual and in 2023 Medicine Woman Creek watersheds also fail to meet the PFI targets.

The PFI analysis was completed after the disturbance created by the Mount McAllister fire, which significantly impacted the Gething and Gaylard watersheds. The PFI analysis utilized the harvesting scenario predicted by the Patchworks timber supply analysis model. Actual results may differ from those predicted by the model if a different harvesting plan than that predicted by the model is implemented.

In Table 37 the 2010 period represents the original prediction made to that time in SFMP4 and is included here so that the reader can see how the values are predicted to change over time based on the new analysis completed for SFMP 5. 2013 represents the first of the revised analysis periods.

Actual results are noted in the SFMP annual report and are updated with the preparation of each new Management Plan.

Table 37: Peak Flow Index Post FSP and Current Status (2014)

Watershed	H60 ELEV (m)	Watershed (ha)	Below H60 (ha)	Above H60 (ha)	2010				2013				2018				2023				Max PFI %
					Below H60 ECA	Above H60 ECA	H60 Weighted	PFI %	Below H60 ECA	Above H60 ECA	H60 Weighted	PFI %	Below H60 ECA	Above H60 ECA	H60 Weighted	PFI %	Below H60 ECA	Above H60 ECA	H60 Weighted	PFI %	
Adams Creek	1,107	5,458	2,102	3,355	12	32	59	1%	-	2	4	0%	109	509	873	16%	800	658	1,787	33%	43
Aylard Creek	1,036	5,456	2,100	3,356	80	309	543	10%	0	28	43	1%	0	23	34	1%	0	73	109	2%	37
Basin "862"	853	4,884	1,725	3,159	57	226	396	8%	83	155	316	6%	89	170	344	7%	98	198	395	8%	43
Beany Creek	958	3,899	1,537	2,362	44	26	83	2%	10	-	10	0%	65	153	294	8%	219	270	623	16%	37
Brazion Creek	1,220	32,375	11,850	20,526	1,814	2,142	5,027	16%	1,365	551	2,191	7%	2,369	888	3,700	11%	2,522	1,289	4,455	14%	37
Burnt Creek	1,185	62,161	23,413	38,748	3,549	3,842	9,312	15%	3,019	485	3,747	6%	3,185	656	4,169	7%	3,302	734	4,402	7%	37
Cameron Creek	783	3,613	1,273	2,340	8	38	65	2%	-	-	-	0%	21	10	36	1%	35	49	108	3%	50
Dunlevy Creek	1,047	17,007	6,549	10,459	278	524	1,063	6%	41	191	327	2%	31	143	245	1%	31	473	741	4%	31
Eleven Mile	1,326	21,603	8,318	13,285	619	1,155	2,352	11%	466	-	466	2%	824	149	1,047	5%	974	184	1,249	6%	43
Gaylard	1,029	15,638	5,780	9,858	845	1,161	2,587	17%	698	923	2,083	13%	1,271	2,921	5,653	36%	1,538	3,247	6,408	41%	31
Gething	996	18,505	6,550	11,956	901	1,325	2,889	16%	650	946	2,069	11%	1,323	2,355	4,855	26%	1,591	2,617	5,517	30%	31
Gwillim	1,066	4,488	1,586	2,902	64	201	365	8%	51	485	779	17%	329	1,233	2,178	49%	458	1,333	2,458	55%	43
Hasler Creek	1,077	19,010	6,858	12,152	677	1,601	3,079	16%	1,120	1,720	3,700	19%	2,596	3,462	7,788	41%	2,670	3,764	8,316	44%	37
Highat Creek	1,037	15,647	5,382	10,265	700	1,169	2,454	16%	857	1,129	2,551	16%	1,563	2,790	5,748	37%	1,815	2,987	6,295	40%	43
Johnson	891	21,153	7,965	13,188	625	2,593	4,514	21%	109	455	791	4%	276	672	1,284	6%	315	698	1,362	6%	37
Lebleu Creek	874	1,999	719	1,280	14	29	56	3%	-	-	-	0%	0	39	58	3%	13	57	99	5%	50
LeMoray Creek	1,291	11,190	4,013	7,177	654	1,110	2,319	21%	639	46	708	6%	566	40	626	6%	554	26	593	5%	37
Lower Carbon	1,057	13,167	4,992	8,176	711	521	1,492	11%	620	376	1,184	9%	922	1,108	2,584	20%	1,069	1,958	4,007	30%	50
Lower Murray	1,066	17,398	6,308	11,091	439	434	1,091	6%	538	480	1,259	7%	547	1,159	2,287	13%	706	1,698	3,252	19%	37
Lower Peace Reach	955	14,347	5,579	8,768	926	1,228	2,768	19%	771	971	2,228	16%	851	1,857	3,636	25%	740	2,051	3,816	27%	50
Lower Pine Residual	923	16,228	5,713	10,515	486	1,427	2,625	16%	298	2,639	4,256	26%	697	4,480	7,417	46%	1,042	4,418	7,669	47%	43
Lower Sukunka	904	54,089	18,791	35,298	1,287	2,345	4,804	9%	1,967	2,721	6,048	11%	2,371	7,922	14,254	26%	2,405	9,357	16,440	30%	43
Lower Wolverine	1,161	23,241	8,678	14,563	936	1,570	3,291	14%	1,113	545	1,930	8%	1,450	1,392	3,539	15%	1,352	1,509	3,616	16%	37
Medicine Woman Creek	975	1,876	718	1,158	-	-	-	0%	-	12	18	1%	118	180	388	21%	184	348	706	38%	35
Middle Wolverine	1,205	17,585	6,549	11,036	614	2,234	3,964	23%	283	-	283	2%	838	232	1,187	7%	944	255	1,327	8%	43
North Peace Residual	929	9,462	3,813	5,649	239	92	377	4%	29	4	36	0%	62	34	113	1%	71	123	256	3%	50
Ruddy Creek	922	6,445	2,495	3,949	68	105	226	4%	81	0	81	1%	288	214	609	9%	373	346	892	14%	31
Seven Mile	1,257	7,878	2,990	4,889	275	373	835	11%	208	62	301	4%	1,124	636	2,078	26%	1,275	913	2,645	34%	43
Trapper Creek	1,179	7,571	2,616	4,955	0	127	191	3%	-	-	-	0%	809	621	1,740	23%	866	778	2,033	27%	37
Upper Carbon	1,291	46,258	17,582	28,676	2,319	1,773	4,979	11%	1,398	50	1,473	3%	1,954	246	2,323	5%	2,745	329	3,239	7%	37
Upper Murray	1,294	17,858	6,474	11,384	1,687	1,191	3,473	19%	1,869	179	2,138	12%	1,801	133	2,001	11%	1,511	89	1,645	9%	37
Upper Pine Residual	1,082	40,084	14,265	25,819	1,025	4,213	7,345	18%	1,876	2,042	4,938	12%	3,173	3,174	7,935	20%	3,627	3,707	9,187	23%	37
Upper Sukunka	1,075	23,444	8,602	14,842	820	1,934	3,722	16%	475	1,312	2,444	10%	824	2,047	3,894	17%	977	2,425	4,615	20%	43
Upper Wolverine	1,378	18,032	6,325	11,707	930	1,181	2,701	15%	1,116	250	1,491	8%	951	224	1,288	7%	823	193	1,112	6%	37

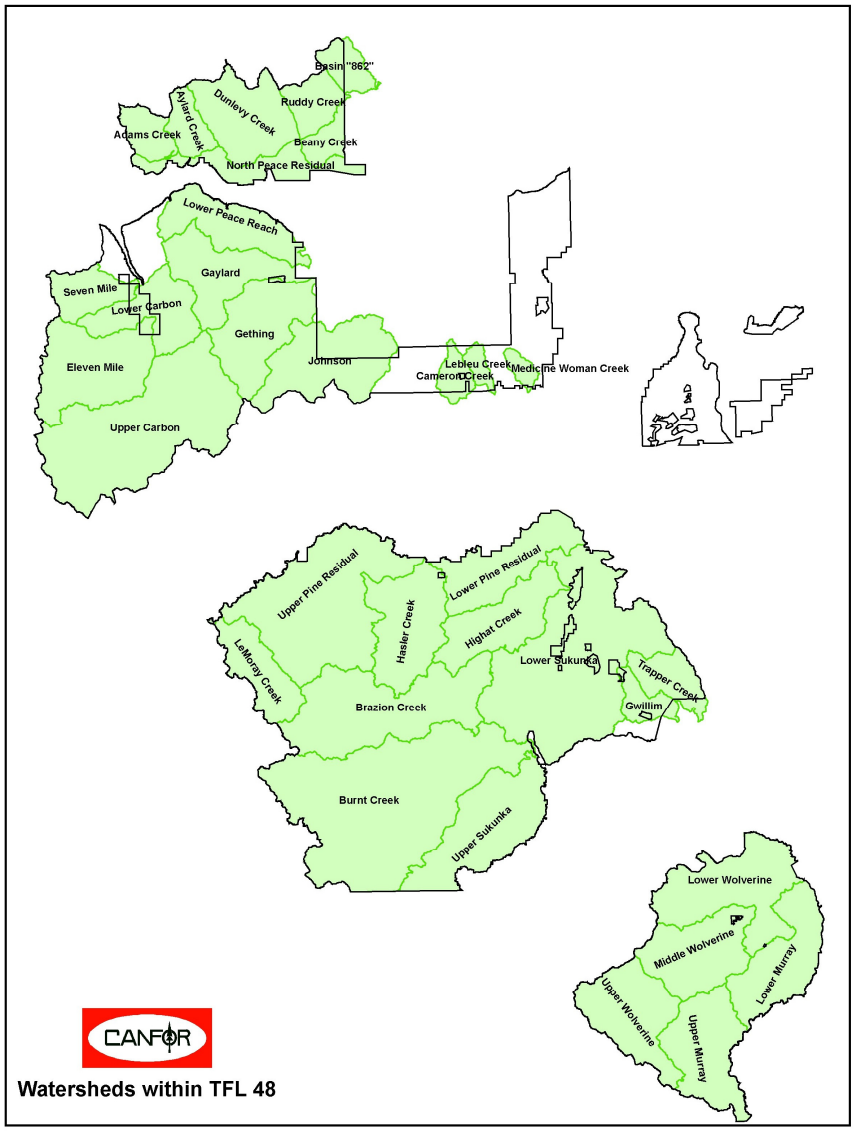


Figure 23: PFI Watersheds Within TFL 48

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

The watersheds and baseline target PFI's were developed by Pierre Beaudry, (P. Beaudry & Associates Ltd. Watershed Management Services). The watersheds are based on the BC Provincial Watershed Atlas. The following principles were applied when delineating watersheds:

The watershed boundaries are based on the concept of hydrologic watersheds (water draining through a single point) as opposed to political watersheds. Modifying the true hydrological watershed to fit within the political landscape was avoided wherever possible. Also, small watersheds, known as "residual areas" were not "lumped" or aggregated into a single unit. The PFI concept is most relevant if it monitors a single hydrologic watershed.

The size of sub basins in this plan range from approximately 19 to 620 square kilometres. Very small watersheds and very large watersheds are not included because the PFI concept is most applicable at the sub basin level.

Watersheds were delineated where the TFL covered at least 50% of the watershed area. Therefore some watersheds extend beyond the TFL. Alternatively, the TFL is not completely covered by watersheds. Despite these physical limitations the majority of the planning area is covered by watersheds (90.3%).

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

Once all watersheds were delineated, a baseline target was determined for each of the watersheds. The setting of an absolute PFI target is very difficult and can lead to significant controversy. Although there is no single widely accepted threshold value, conservative targets are suggested. Although we don't know what the physical and biological impacts from increased peak flows will be, we do know that there will be increased flows caused by the removal of a large percentage of the forest canopy. Consequently, a maximum target is set with the overall goal of maintaining the sustainability of the aquatic resource without being overly conservative. The targets must consider the type of watershed and type and stability of the fluvial system. The idea behind setting a baseline target is not to prevent changes in peak flows to occur, but to maintain flows within levels that will not unduly accelerated rates of streambed and stream bank erosion and degrade fish habitat. The suggested target PFI values are partly subjective and are based on a combination of professional opinion, scientific literature and 20 years of personal involvement in research projects investigating peak flows by Pierre Beaudry. Further details on the development of peak flow indices can be found in the report provided to Canfor by Pierre Beaudry, "Peak Flow Index (PFI) Targets for TFL 48 DFA Canadian Forest Products Ltd. Chetwynd Division, November, 2001".

Long term forecasting was completed over the full 250 year planning horizon for this indicator. Due to complexities in modeling the direct PFI index because of difficulties in tracking the area above and below the H60 line and applying the constraints, a simplified forecasting was done using Equivalent Clearcut Area (ECA) targets. ECA targets were developed by Pierre Beaudry as well as PFI targets. The ECA targets are set lower to reflect the lack of consideration for increased flows coming from above the H60 line within a watershed. All targets were met over the 250-year planning horizon.

STRATEGY AND IMPLEMENTATION SCHEDULE

As stated above, the PFI is intended to be a coarse filter so that if we are planning to exceed the baseline target we take a closer look at the specific watershed to ensure that water values are maintained. The indicator for Peak Flow Index is established to provide the number of watersheds with PFI's that may exist above the baseline PFI at any point in time. The target was determined from a review of the number of watersheds currently above the baseline target and the number that are expected to be above the baseline target after the Forest Development Plans or Forest Stewardship Plans are implemented.

MONITORING PROCEDURE

The status of this indicator is reported during each Management Plan. Assessments are made at each FSP to ensure that the targets will be met.

Formula:

$$\mathbf{PFI\%} = (\mathbf{WS}_{met} / \mathbf{WS}_{tot}) * 100$$

Variables:

$\mathbf{WS}_{met}$ Number of watersheds where the peak flow index is below the maximum

$\mathbf{WS}_{tot}$ Total number of watersheds assessed.

PFI% Percentage of watersheds where the peak flow index is below the maximum threshold.

For details on the calculation of the PFI for each watershed see Figure 23: Peak Flow Index – Example Calculation.

LINKAGES TO OPERATIONAL PLANS

When new harvesting is proposed in a FSP an assessment is made to determine if the new activity is consistent with the targets for PFI.

3.31 Watershed Reviews

Criterion 3:	Element(s): 3.2
Soil and Water	Water Quality and Quantity
CSA Core Indicator(s): 3.2.1 Proportion of watershed or water management areas with recent stand-replacing disturbance	
Indicator Statement	**Target Statement**
The percentage of watersheds reviews completed where the baseline threshold is exceeded	100% of watersheds that exceed the baseline threshold will have a watershed review completed when new harvesting is planned
Value(s): Water Quality and Quantity	
SFM Objective: We will maintain water quality and quantity.	
Canfor common indicator statement: Watersheds that are above Peak Flow targets will have further assessment	

ACCEPTABLE VARIANCE

No acceptable variance.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Although the Peak Flow Index is a good index, it is only that “an index”. It is not intended to be a detailed quantitative modeling of increased volumes of flows. The Peak Flow Index will be used as a "coarse-filter" to identify where a more detailed review of the watershed is required when new harvesting is planned i.e. if the PFI for the watershed is below the baseline target when new harvesting is planned then no further review is required, however, if the current PFI is above the baseline target when new harvesting is planned then a more detailed review of the watershed is required.

This indicator and target is established to ensure that where new harvesting is planned within watersheds that exceed the baseline PFI a watershed review is completed. The watershed review will be performed by a qualified professional and will make specific recommendations for further development in the watershed. These recommendations will then be implemented within our operational plans.

CURRENT STATUS

Currently there are no watershed reviews required. In 2013 there were no watershed reviews required as there were no watersheds where the PFI was exceeded and harvesting was proposed. Going forward however, if harvesting is proposed in the Gaylard and Gething watersheds reviews will be required. Each year this will be reassessed based upon growth and new areas proposed to be harvested. If it is forecasted that the PFI may be exceeded, such as is the case with the Gaylard and Gething watersheds, block development (layout) will be monitored to ensure that the ECA (equivalent clear cut area) does not elevate the PFI (peak flow index) to above the target.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

Watershed that are found to be above the peak flow targets will have further assessment done and strategies created for water management prior to initiating further harvest within the watershed will result in development of harvesting plans that are compatible with targets for water production within watersheds that have exceeded baseline targets for peak flow.

STRATEGY AND IMPLEMENTATION SCHEDULE

As stated above, the PFI is intended to be a coarse filter so that if we are planning to exceed the baseline target we take a closer look at the specific watershed to ensure that water values are maintained. This strategy was implemented during MP 3.

MONITORING PROCEDURE

The requirement to conduct watershed reviews and the results of these reviews will be summarized in the SFM plan or annual reports. The calculation of the performance on this indicator is as follows:

Formula:

$$\mathbf{WSR\%} = (\mathbf{WSR}_{com} / \mathbf{WSR}_{req}) * 100$$

Variables:

$\mathbf{WSR}_{com}$	Number of watersheds reviews completed
$\mathbf{WSR}_{req}$	Total number of watersheds reviews required
WSR%	Percentage of watershed reviews completed

LINKAGES TO OPERATIONAL PLANS

The requirement to conduct watershed reviews will be determined following new harvest proposals in FSP's. Harvest plans and site plans will be produced to be consistent with recommendations from watershed reviews.

3.32 Spills Entering Water Bodies

Criterion 3:	**Element(s): 3.2**
Soil and Water	Water Quality and Quantity
CSA Core Indicator(s): 3.2.1 Proportion of watershed or water management areas with recent stand-replacing disturbance	
Indicator Statement	**Target Statement**
Number of reportable spills or misapplications entering water bodies	Zero reportable spills or misapplications entering water bodies
Value(s): Water Quality and Quantity	
SFM Objective: We will maintain water quality and quantity	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

None.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

A reportable spill is any spill that enters a waterbody or is greater than the levels indicated in Table 38 below.

Table 38: Spill Reporting Levels

Material	Reportable Levels
Antifreeze	5 kg
Diesel Fuel	100 l
Gasoline (auto & chainsaw)	100 l
Greases	100 l
Hydraulic Oil	100 l
Lubricating Oils	100 l
Methyl Hydrate	5 kg
Paints & Paint Thinners	100 l
Solvents	100 l
Pesticides	1 kg
Explosives	Any

CURRENT STATUS

There were zero reportable spills entering water bodies since the initial tracking of this indicator in 2000.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

By following the SFMP indicator strategy to minimize spills or chemical applications into waterbodies it is anticipated that there will be acceptable levels of water quality generated throughout the TFL. It is anticipated that the natural range of variability in riparian systems functioning will be maintained, supporting human and ecological communities and including terrestrial and aquatic life.

- All reportable spills will be investigated to minimize future occurrences.

STRATEGY AND IMPLEMENTATION SCHEDULE

Applicable operational controls are within the Environmental Management Systems including: Work Instructions, Emergency Preparedness and Response Plan, and spill response training.

MONITORING PROCEDURE

Regular audits and inspections of our activities will be conducted. All reportable spills will be entered into the Issue Tracking System.

We will annual review and summarize our performance towards this target.

LINKAGES TO OPERATIONAL PLANS

Preworks are conducted prior to commencement of operations.

3.33 Carbon Sequestration

Criterion 4:	**Element(s): 4.1**
Role in Global Ecological Cycles	Carbon Uptake and Storage
CSA Core Indicator(s): 4.1.1 Net carbon uptake	
Indicator Statement	**Target Statement**
DFA Average Carbon (C) sequestration rate (Mg C/year)	Maintain DFA average carbon sequestration rates that are no more than 15% less than those achieved using the minimum natural range of variation
Value(s): Carbon Uptake and Storage	
SFM Objective: We will maintain the processes for carbon uptake and storage within the natural range of variation.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

No variances due to Canfor management. Variances due to large catastrophic natural disturbances (e.g. wildfires, mountain pine beetle, etc.) will be acceptable.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

As a result of the 1997 Kyoto protocol, international attention has been focused on the problem of global greenhouse gas emissions. This has placed considerable pressure on the public and private sectors to account for the role of forests in storing carbon and reducing global CO2 emissions. The capacity of forest ecosystems to sequester carbon can thus be considered an environmental value and should therefore be included as one aspect of sustainable forest management practice. For carbon sequestration to be effectively represented within an ecosystem-level management plan, however, it must be considered within the context of timber production, wildlife conservation, and visual aesthetics. Presently, there are few forest-level decision support tools available to managers for assessing carbon sequestration as part of an integrated suite of indicators of SFM (Seely and Nelson, 2002).

Sequestration is defined as the net amount of carbon (C) removed from the atmosphere and stored in the ecosystem each year. The calculation of average net C sequestration rates within a 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 C. Average sequestration rates are based on changes in ecosystem carbon storage over time without accounting for C 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.

CURRENT STATUS

The following are two graphs for comparison. The first provides an example of the average C sequestration rate for an individual stand (Forecast AU 3 – Natural and Forecast AU 34 – Managed), while the second shows the average C sequestration rate over the whole DFA over time.

Figure 24: An Example of Average C Sequestration Rates for a Natural Spruce Leading BWBS Mesic Site Stand (Forecast AU 5) and an Associated Managed Stand (Forecast AU M3)

At the stand level there is a greater release of C to the atmosphere following the decomposition of the larger pool of dead organic matter (snags and CWD) in the natural stand which results in a lower sequestration rate during the first several decades of stand development (Figure 25). In the example provided, the average sequestration rate takes longer to return to positive values in the natural stand versus the managed stand. This is partly related to the fact that the harvested wood removed from the site during harvesting does not contribute to ecosystem C release to the atmosphere. Rather, it is assumed to be stored in wood products.

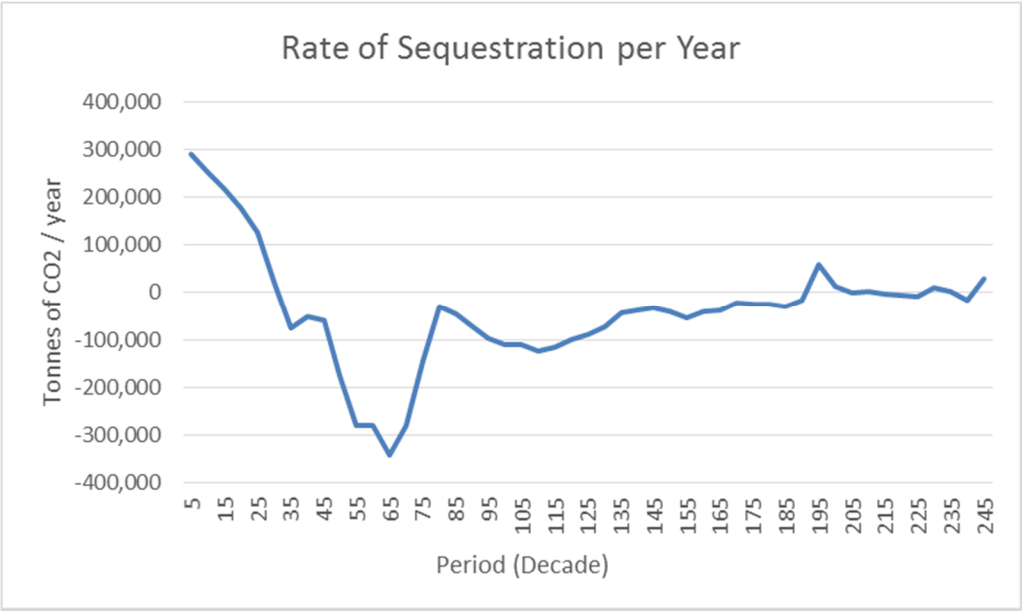


Figure 25: Carbon Sequestration (Mg C/year) within TFL 48 Over Time

At the DFA level the average sequestration rate declines from the present level of about 245,000 tonnes of C/ year over the next 80 years and stabilizes between 0 and 10,000 tonnes of C/ year in the long term. The decline from the current rate of sequestration is due in combination to the mortality of large portions of the land base from mountain pine beetle and the time for those stands to reach culmination age and achieve maximum sequestration rates. As a larger portion of the TFL is converted from older stands to higher productivity managed stands, the overall sequestration rates increase.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

Stand level C curves were generated for the TFL 48 on both the THLB and the non-THLB using the CFS-CBM model.

A carbon curve database was subsequently prepared by summarizing the results for total ecosystem C storage on 10-year time steps for each of the CFS-CBM carbon AU's. In addition, average rates of C sequestration were calculated for each time step based on the following equation:

$$\text{Avg. Sequestration Rate}_t = \frac{\text{Ecosystem } C_t - \text{Ecosystem } C_{t-10}}{10}$$

These curves were incorporated into the forest estate model used to do forecasting in support of this SFMP.

STRATEGY AND IMPLEMENTATION SCHEDULE

The strategy to manage sequestration rates is through prompt reforestation (Section 3.18) and maintaining acceptable levels of stocking in order to provide a free growing stand (Section 3.17).

Fire suppression as well contributes to maintaining the sequestration rates by controlling age class distributions. Fire management strategies are described in Section 3.42.

The process described for this indicator is a first approximation of the effects of forest management on sequestration rates over time. The models used to predict C sequestration rates are still rudimentary at this point and as new knowledge is gained this indictor will be assessed to determine if this data and methods are appropriate and methods will be adjusted if necessary.

MONITORING PROCEDURE

During TSR processes sequestration rates will be calculated for both the Timber Harvesting Land Base and the Non-Timber Harvesting Land Base and compared to the targets.

LINKAGES TO OPERATIONAL PLANS

The most direct link to operational plans is prompt reforestation and ensuring that sufficient stocking is on the harvested and regenerated sites. This is monitored through Indicators 3.18 and 3.17 respectively.

Results from the monitoring plots and estimates of MAI influences harvest levels and long-term harvest levels. This indicator is reviewed and incorporated into Timber Supply Review process, which influences actual harvest levels within the DFA.

3.34 Ecosystem Carbon Storage (Mg) in the DFA

Criterion 4:	**Element(s): 4.1**
Role in Global Ecological Cycles	Carbon Uptake and Storage
CSA Core Indicator(s): 4.1.1 Net carbon uptake	
Indicator Statement	**Target Statement**
Ecosystem Carbon (C) Storage (Mg) in the DFA	Minimum of 95% of minimum natural range of variation disturbance levels of Ecosystem Carbon Storage
Value(s): Carbon Uptake and Storage	
SFM Objective: We will maintain the processes for carbon uptake and storage within the natural range of variation.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

No acceptable variance.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT

As a result of the 1997 Kyoto protocol, international attention has been focused on the problem of global greenhouse gas emissions. This has placed considerable pressure on the public and private sectors to account for the role of forests in storing carbon and reducing global CO2 emissions. (Seely and Nelson, 2002).

Carbon (C) storage is contained in several components of forests including tree biomass, plant biomass, coarse woody debris, forest floor litter, and soil. Forest soils are a large but relatively stable reservoir of C with minimal changes over time. In contrast, variation in C storage in tree biomass is the dominant factor regulating temporal patterns in total ecosystem C storage (Seely and Nelson, 2002).

CURRENT STATUS

The following are two graphs for comparison. The first is a stand level graph (Figure 27) which demonstrates a natural stand and its associated managed stand C storage levels over time. Note that while the natural stand started with more C remaining on the site after the disturbance the managed stand catches up in about 40 years. The second graph shows the total carbon sequestration by carbon pool (e.g. above and below ground biomass, dead organic matter, and soil biomass) for TFL 48.

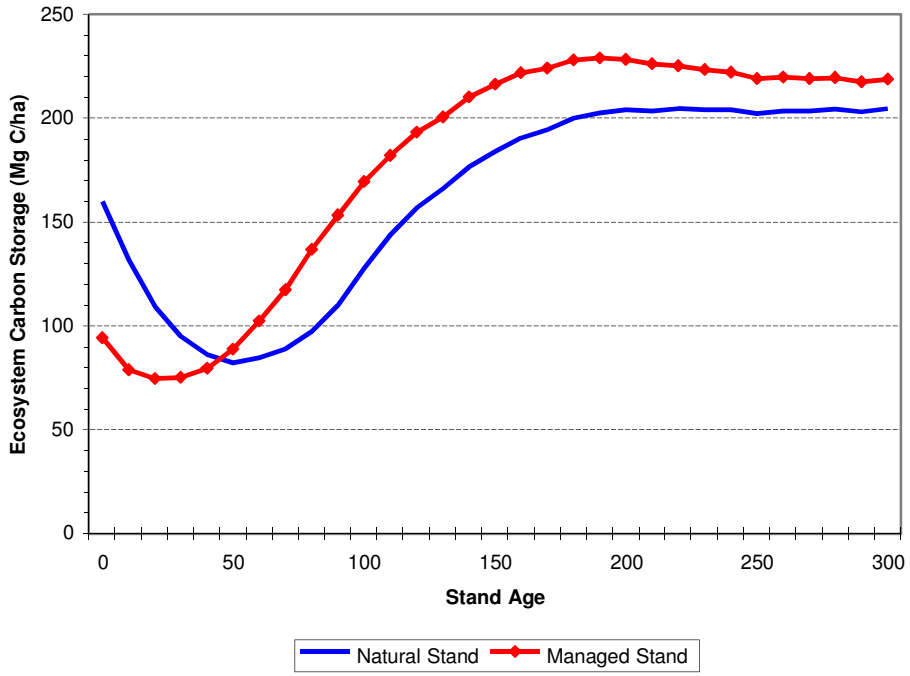


Figure 26: An Example of C Storage for a Natural Spruce Leading BWBS Mesic Site Stand (Forecast AU 5) and an Associated Managed Stand (Forecast AU M3)

There is an estimated 89 million tonnes of C currently stored in the TFL 48 ecosystem declining in the short term to approximately 81 million tonnes of C, but stabilizing at 96 million tonnes of C in the long term (see Figure 28). All carbon pools remain stable throughout the forecast, with the greatest sequestration of carbon occurring in soil biomass and dead organic matter.

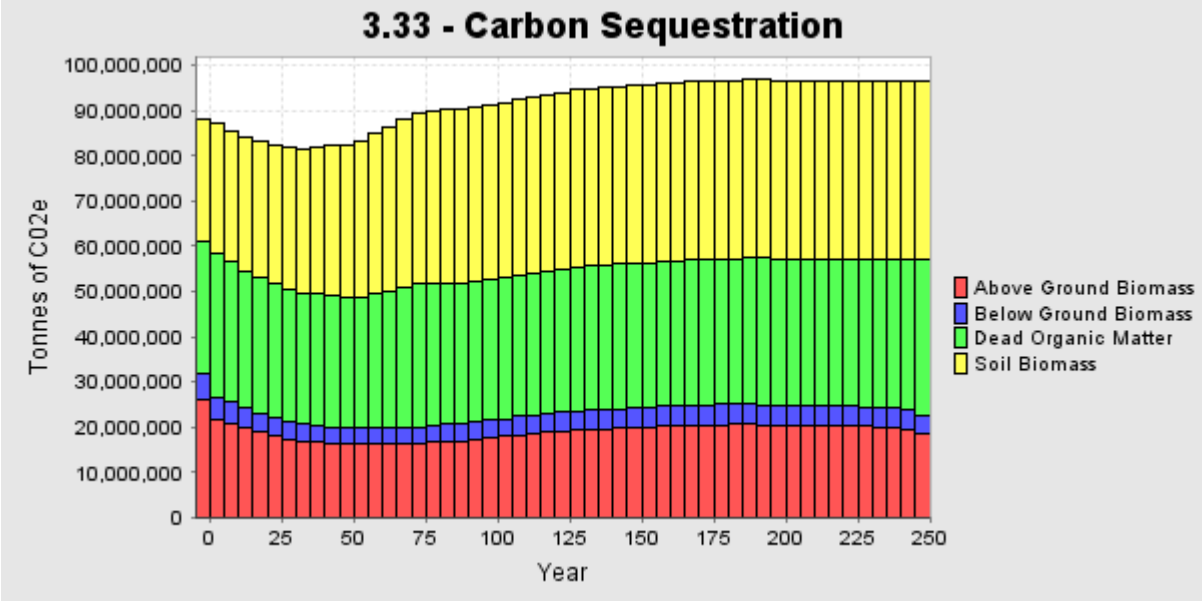


Figure 27: Total Ecosystem Carbon (Mg) Storage in the DFA Over Time

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

See Indicator 3.33 for details on how the C indicators were forecasted and analyzed. The exception being for Indicator 3.34 that total ecosystem C storage is tracked rather than sequestration rates.

STRATEGY AND IMPLEMENTATION SCHEDULE

The strategy to manage C storage is through prompt reforestation (Section 3.18) and maintaining acceptable levels of stocking over the landscape on previously harvested and regenerated sites (Section 3.17).

Fire suppression as well contributes to maintaining C storage by controlling age class distributions and minimizing C release into the atmosphere through wildfires. Fire management strategies are described in Section 3.42.

The process described for this indicator is a first approximation of the effects of forest management on C storage in comparison to a natural disturbance regime. The models and inventory used to predict C storage are still rudimentary at this point and as new knowledge is gained this indictor will be assessed to determine if this data and methods are appropriate and methods will be adjusted if necessary.

MONITORING PROCEDURE

During TSR processes C storage will be calculated for both the Timber Harvesting Land Base and the Non-Timber Harvesting Land Base and compared to the targets.

LINKAGES TO OPERATIONAL PLANS

Forestry activities influence total C storage through fire prevention policies, prompt reforestation, and harvest levels, which are, monitored through Indicators 3.42, 3.18,and 3.21.

3.35 Range Opportunities

Criterion 5:	**Element(s): 5.1, 6.3**
Economic and Social Benefits	Timber and Non-Timber Benefits; Forest Community Well-Being and Resilience
CSA Core Indicator(s): 5.1.1 Quantity and quality of timber and non-timber benefits, products, and services produced in the DFA **6.3.1** 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	
Indicator Statement	**Target Statement**
Annual minimum number of Animal Unit Months opportunity	We will maintain an annual minimum of 1500 Animal Unit Months (excludes brush control by sheep grazing)
Value(s): Timber and Non-Timber Multi-use Benefits, Strengthening and Diversifying Community Businesses and Business Opportunities	
SFM Objective: We will provide opportunities for a feasible mix of timber, recreational activities, visual quality, and non-timber commercial activities. We will provide opportunities for local economic development.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

None.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

An animal unit month (AUM) is the quantity of forage consumed by a 450-kg cow (with or without calf) in a 30-day period. The AUM is the measure we use to gauge forage consumption by herbivores.

The ranching industry is a significant non-timber resource user, which overlaps portions of the TFL. The intention of this indicator is to ensure that there is a base minimum opportunity for grazing within TFL 48. There may be times when demand is below the 1500 AUM level however Canfor is committed to maintaining the opportunity of a minimum level of AUM's.

CURRENT STATUS

There are currently range tenures issued by the Ministry of Forests and Range within the TFL totaling approximately 1,252 AUM's (see Table 39).

Table 39: Animal Unit Months on TFL 48 (2013)

Range Tenure	Tenure Total AUMs	TFL Proportion (%)	TFL AUM's
RAN075680	660	40.5	267
RAN074239	104	1.2	1
RAN073876	366	26.5	97
RAN076505	767	34.9	268
RAN074307	51	100.0	51
RAN075557	356	39.8	142
RAN076672	0	0.1	0
RAN076313	0	87.9	0
RAN073263	157	2.8	4
RAN073616	170	0.04	0
RAN076419	118	9.9	12
RAN077560	699	58.7	410
Total			**1,252**

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

These range tenures in most cases overlap and are not fully contained within the TFL. The methodology to determine the amount applicable to just the TFL was to simply prorate by area the number of AUM's attributable to the TFL.

By implementing the SFMP indicator strategy it is anticipated that opportunities to support grazing of cattle will be maintained on the TFL which will serve to help diversify the local economy. This will also create a diverse landscape which will benefit biodiversity on the TFL

STRATEGY AND IMPLEMENTATION SCHEDULE

The commitment to have not less than 1000 AUM's available on the TFL was made in Management Plans since MP 1.

Trails, roads and landings within range use areas are seeded to the appropriate approved range seed mix following deactivation.

Grazing opportunities may also arise once the new coniferous seedlings are well established and are tall enough to withstand cattle grazing in the remainder of the area. Range Use Plans may be developed for these areas in co-ordination between Canfor, the Ministry of Forests and Range and the range licensee. These Range Use Plans may include cross fencing, cattle guards, AUM constraints and water development to ensure that seedling damage is kept to less than 5 percent.

MONITORING PROCEDURE

The number of AUM's issued in range tenures for the TFL will be requested from the Ministry of Forests and Range to be included in the annual SFM report. The information gathered during this annual review will be used to assess whether range improvement plans need to be implemented to ensure a minimum of 1500 AUM's are maintained.

LINKAGES TO OPERATIONAL PLANS

Site Level Plans, Forest Operations Schedules and all other short-term operational plans will be consistent with strategies and recommendations regarding range improvements agreed to with the range tenure holders.

3.36 Harvest Method

Criterion 5:	Element(s): 5.1
Economic and Social Benefits	Timber and Non-Timber Benefits
CSA Core Indicator(s): 5.1.1 Quantity and quality of timber and non-timber benefits, products, and services produced in the DFA	
Indicator Statement	**Target Statement**
Proportion (%) of coniferous harvesting area completed with conventional ground based methods by 5 year cut control period	A maximum of 84% of the coniferous harvesting area (ha) will be completed with conventional ground based methods by 5 year cut control period
Value(s): Timber and Non-Timber Multi-Use Benefits	
SFM Objective: We will provide opportunities for a feasible mix of timber, recreational activities, visual quality, and non-timber commercial activities.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

An acceptable variance will be a maximum of 91% conventional ground based harvest methods in a 5 year cut control period.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

This indicator measures the percentage of coniferous area harvested using conventional ground based harvesting methods. The indicator applies only to the coniferous land base portion of TFL 48 as non-conventional or cable harvesting areas were removed from the deciduous portion of the timber harvesting land base.

Based on the physical operability mapping completed for TFL 48 and subsequent merchantability net downs to the timber harvesting land base the conifer THLB distribution between conventional, mixed and cable systems is 84%, 6% and 10% respectively. To ensure that long term economically viable harvesting is maintained on the TFL it is preferable to be addressing the harvest method profile over some reasonable periods of time. To be not over addressing the conventional portion of the land base within a 5-year cut control period is a reasonable time frame to achieve this indicator. The variance is provided to provide some flexibility to accommodate logistical cost concerns such as mobilization and demobilization or forest health salvage concerns which may be disproportionately shifted to conventional areas in any one 5-year period.

CURRENT STATUS

The following Figure 29 shows the history of the harvesting program over the cut control period 2007 – 2012. For the period 89% of the area harvested utilized a conventional system with the remaining 11% utilizing the cable system. At the end of December 2013, the results were unchanged - 89% of area harvested used a conventional system with the remaining 11% utilizing the cable system. The indicator was missed by 4% and therefore the target was not achieved.

Lumber market conditions have a direct effect on the pricing of forested stands. During poor market conditions harvesting of steep slope stands is less economical because of the higher cost associated with steep slope harvesting. This has resulted in making some steep slope stands uneconomic to harvest.

As market conditions improve, and forest licensees in the interior of the province begin to harvest stands not infested by the Mountain Pine Beetle, the value of forest stands will increase which will make steep slope stands in the Chetwynd area more attractive to harvest.

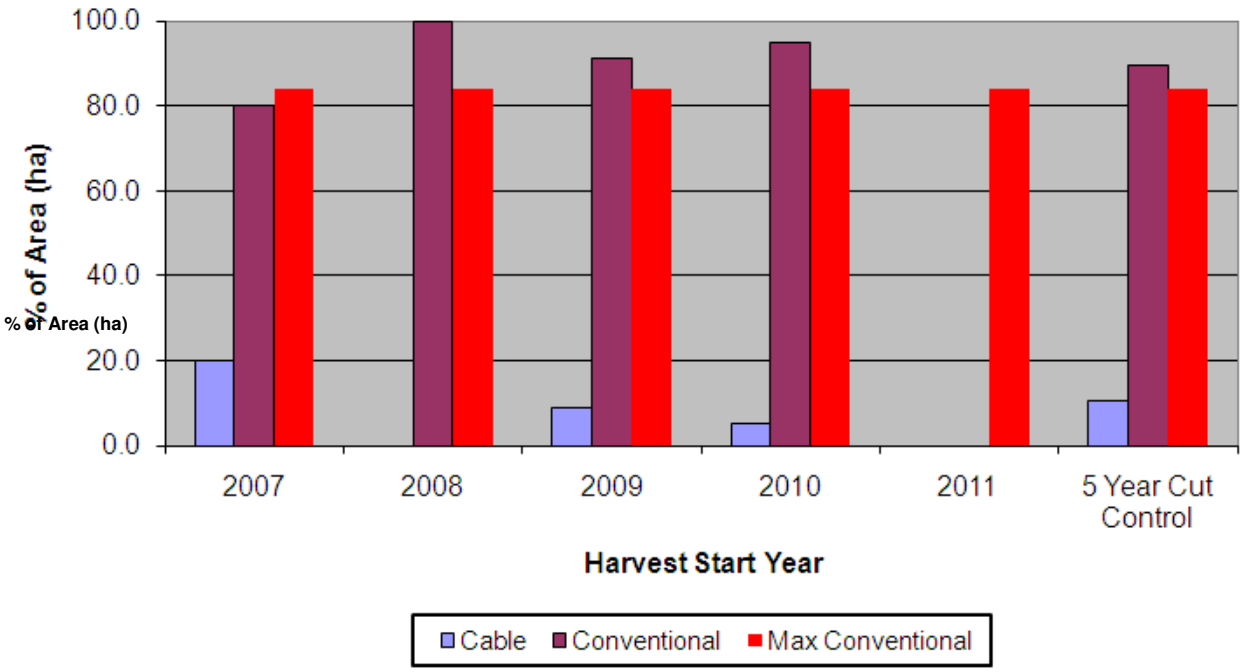


Figure 28: Proportion of Conventional Harvest Systems Used 2007-2012

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

By developing a steep ground harvesting program, a significant portion of the THLB will be available for harvest by methods other than conventional ground based systems, which will provide opportunities to diversify the local harvesting contractor base.

STRATEGY AND IMPLEMENTATION SCHEDULE

We employ a range of financially feasible timber harvest methods and practices to mitigate any negative impacts to other forest resources. Cable harvesting methods have been used on TFL 48 since management plan 2. A brief description of each method is as follows:

Conventional (Ground-based)

This method is generally utilized on stable to quasi-stable soils with slopes ranging from 0 to 45% and a minimum of 120 m^3/ha. On mixed operability transitioning to cable a minimum of 150 m^3/ha is required.

Conventional harvesting is the primary harvest method employed on the TFL. Generally, feller bunchers, grapple skidders, processors are used. Roadside log loading capability limits the need for landing construction. Low ground pressure skidding equipment is used in all but the winter season.

Cable Yarding

This method is generally utilized on quasi-stable to lower-threshold soils with slopes ranging from 10 to 70% and a minimum of 200 m^3/ha

This harvest method consists primarily of a mobile swing yarder utilizing grapple and skylining techniques. It is used for harvesting timber on steep and sensitive terrain for distances up to 300 meters. Operations are mechanized as much as possible. Handfelling and choker setting are used 20 - 30% of the time.

Aerial

This method is generally utilized on lower-threshold soils with slopes ranging from 70 to 100%.

Helicopter logging is planned where cable yarders are not feasible and road access is economically or environmentally prohibitive. Helicopters generally require large landings for safe operations. Helicopter logging has only been employed on a very limited basis, as we can successfully harvest most of our operable timber using ground-based and cable systems. We will continue to evaluate the feasibility of helicopter logging on a site-specific basis. While aerial systems have been used on the TFL its use has been very limited and as such these areas have not been included in the timber harvesting land base.

MONITORING PROCEDURE

Harvest method is tracked for each harvest unit within Genus. Annually the proportion of conventional ground based harvesting area will be reported for blocks, which had harvesting start in the year in question. Determination of meeting the target is made at the end of the cut control period for blocks, which had harvesting start within the period. The following formula describes how the proportions are calculated.

Formula:

$$\textbf{CON\%} = (\textbf{CON}_{area} / \textbf{HARV}_{area}) * 100$$

Variables:

CON $_{area}$	Area of conventional harvesting started within 5 year cut control period.
HARV $_{area}$	Total area of harvesting started within 5 year cut control period.
CON%	Percentage of conventional harvesting started within 5 year cut control period.

LINKAGES TO OPERATIONAL PLANS

Harvest method is determined through detailed on ground assessments, which consider safety, costs, harvest system limitations, soil conditions, and slope stability. The harvest method is indicated in silviculture prescriptions / site plans and on logging maps.

3.37 Proportion of Harvesting Consistent with Visual Quality Objective

Criterion 5:	**Element(s): 5.1**
Economic and Social Benefits	Timber and Non-Timber Benefits
CSA Core Indicator(s): 5.1.1 Quantity and quality of timber and non-timber benefits, products, and services produced in the DFA	
Indicator Statement	**Target Statement**
Proportion of harvesting within known visual areas that are consistent with the Visual Quality Objective (VQO)	100% of harvesting within visual areas will be consistent with the Visual Quality Objective
Value(s): Timber and Non-Timber Multi-Use Benefits	
SFM Objective: We will provide opportunities for a feasible mix of timber, recreational activities, visual quality, and non-timber commercial activities.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

Variances to achieving the established Visual Quality Objectives (VQO's) that have a supporting rationale and are approved by the District Manager are acceptable.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

The Visual Landscape Inventory will identify visually sensitive areas visible from communities, public use areas, travel corridors and viewpoints that have been identified through a visual landscape planning process. The Visual Quality Objective is a resource management objective established by the district manager or contained in a higher-level plan; these objectives reflect the desired level of visual quality based on the physical characteristics and social concern for the area.

Being consistent with the visual quality objective is important in order to maintain the visual values of the landscape.

CURRENT STATUS

All blocks harvested to date are consistent with VQO's and VIA's.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes.
  Harvest levels are constrained based on the VQO constraints applied in the timber supply analysis. This ensures that harvest levels are achievable within the visual or scenic objects for TFL 48.

STRATEGY AND IMPLEMENTATION SCHEDULE

Pre-harvest visual impact assessments and landscape design processes are done within areas identified as being visually sensitive in the 2005 consolidated VLI. Where variances to achieving the VQO are necessary to achieve other forest management objectives (e.g. salvage of damaged timber), a rationale for the variance is submitted and a variance is requested from the district manager. A copy of the variance and the district manager approval is kept.

Post-harvest reviews are conducted within one year of harvest completion and compared to the VIA to ensure that the completed development is consistent with the VQO.

MONITORING PROCEDURE

Post-harvest reviews and their results kept on file and are tracked in Genus.

LINKAGES TO OPERATIONAL PLANS

Staff members will refer to base maps to locate visual polygons when preparing plans. When planned activities are in the general vicinity of the identified areas, staff members will ensure plans are consistent with visual quality objectives or acceptable variances.

Silviculture prescriptions or site plans identify the visual polygons and describe visual quality objectives and measures to achieve the objectives.

3.38 Back Country Condition

Criterion 5:	**Element(s): 5.1**
Economic and Social Benefits	Timber and Non-Timber Benefits
CSA Core Indicator(s): 5.1.1 Quantity and quality of timber and non-timber benefits, products, and services produced in the DFA	
Indicator Statement	**Target Statement**
Proportion (%)of back country areas (ha) that are in a semi-primitive recreation opportunity spectrum (ROS) class	We will maintain or increase semi-primitive ROS in Klin-se-za, Bocock, Butler Ridge, Pine/Lemoray, Peace River/Boudreau and Elephant Ridge/Gwillim Protected Areas and manage Special Management Zones (Klin se za, North Burnt, Dunlevy) as per LRMP (See Table 39 for baseline)
Value(s): Timber and Non-Timber Multi-Use Benefits	
SFM Objective: We will provide opportunities for a feasible mix of timber, recreational activities, visual quality, and non-timber commercial activities.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

New road construction will be open for the duration of the season in which the forest management activity occurs (e.g. road construction, harvesting, and primary silviculture). Seasonal deactivation and access restrictions will be completed by the end of the active season. Upon completion of primary silviculture activities (planting) the road will be deactivated and motorized access restricted.

Access management and deactivation can be used as tools to achieve the desired ROS classification.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

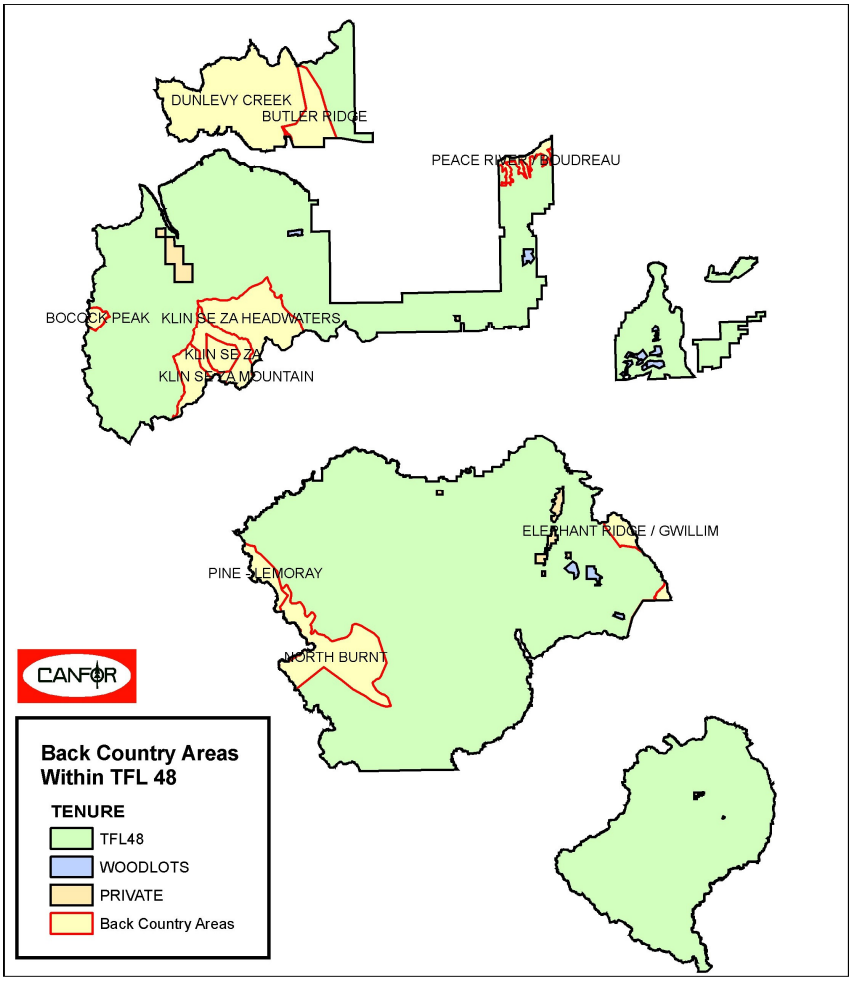


Figure 29: Back Country Areas Within TFL 48

This indicator is a measure of the amount of semi-primitive forest land that has been classified under the Ministry of Forests Recreation Opportunity Spectrum (BC MoF 1998) within each back country area that will provide a full range of wilderness recreational opportunities for the general public.

The Dawson Creek LRMP has identified the importance of maintaining and providing a wide range of public and commercial outdoor recreational opportunities. The specifically identified backcountry protected areas or special management zones provide an additional recreational opportunity in the retention of the "wilderness recreation experience" that can be found in these areas. This can be described as a moderate to high probability of experiencing solitude, closeness to nature, high degree of self-reliance, natural appearing environment, low interaction with people and little to some on-the-ground evidence of other people.

Access management and deactivation can be used as tools to achieve the desired ROS classification.

Canfor may use roads developed and maintained by other non-forest industry industrial users (e.g. oil/ gas, mining). If Canfor assumes responsibility for the road due to no other industrial user having long term interests in the road then it will be assessed as a change in ROS attributable to forest management activities.

Photo 1: Back Country Conditions Exist Throughout the TFL

CURRENT STATUS

The baseline (2001 and 2005) and current (2014) recreational opportunity spectrum for the stated Backcountry areas are shown on the following tables (Table 40 and Table 41). Over the term of MP 3 there has been harvesting and road building activity in both the Dunlevy and North Burnt back country areas. Primary road construction, harvesting, silviculture activities and deactivation have been completed. The change in condition has moved approximately 945 ha in the Dunlevy and 1,798 ha in the North Burnt areas from semi-primitive non-motorized to the semi primitive motorized classification. This change is acceptable within this indicator as the deactivation and removing bridges in the Dunlevy, and North Burnt and de- constructing the road access to CP 722 in the northern portion of the North Burnt area have maintained motorized access barriers. Since MP4 there have been no changes on the ground that would result in the need to update this indicator in MP5.

Table 40: ROS Baseline Condition – ROS Inventory (2005)

Back Country Area	ROS Class Baseline Condition – (2001)							
	Roaded			Roaded Total	Semi Primitive		Semi Primitive Total	Grand Total
	Rural	Modified	Natural		Motorized	Non-Motorized		
BOCOCK PEAK						1,126	1,126	1,126
BUTLER RIDGE			1,133	1,133	1,309	4,151	5,460	6,593
DUNLEVY CREEK			5,283	5,283	5,001	21,564	26,565	31,848
ELEPHANT RIDGE / GWILLIM		12		12		2,801	2,801	2,813
NORTH BURNT		53		53	6,076	10,683	16,759	16,813
PEACE RIVER / BOUDREAU	990			990		1,219	1,219	2,209
PINE - LEMORAY					882	2,260	3,142	3,142
KLIN SE ZA			0	0		2,668	2,668	2,669
KLIN SE ZA HEADWATERS			7,140	7,140	137	10,581	10,718	17,857
KLIN SE ZA MOUNTAIN			1,711	1,711		4,639	4,639	6,350
Grand Total	990	65	15,266	16,321	13,404	61,694	75,098	91,419

Table 41: Current Condition – ROS Inventory Updated to 2014

Back Country Area	ROS Class (2014)							
	Roaded			Roaded Total	Semi Primitive		Semi Primitive Total	Grand Total
	Rural	Modified	Natural		Motorized	Non Motorized		
Bocock Peak						1,126	1,126	1,126
Butler Ridge			1,133	1,133	1,309	4,151	5,460	6,593
Dunlevy Creek			5,283	5,283	5,946	20,619	26,565	31,848
Elephant Ridge / Gwillim		12		12		2,801	2,801	2,813
North Burnt		53		53	7,874	8,886	16,759	16,813
Peace River / Boudreau	990			990		1,219	1,219	2,209
Pine - Lemoray					882	2,260	3,142	3,142
Klin-se-za			0	0		2,668	2,668	2,669
Klin-se-za Headwaters			7,140	7,140	137	10,581	10,718	17,857
Klin-se-za Mountain			1,711	1,711		4,639	4,639	6,350
Grand Total	990	65	15,266	16,321	16,147	58,951	75,098	91,419

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS:

- Does forecasting apply (y/n)? Yes

By implementing the SFMP indicator strategy it is anticipated that a range of semi primitive recreation opportunity spectrum opportunities will be maintained in the backcountry areas of TFL 48.

STRATEGY AND IMPLEMENTATION SCHEDULE:

Forest management activities will not occur in the Protected Areas unless otherwise requested. Forest management will be consistent with the objectives of the SMZ. Access will be managed under the Sensitive Access Management direction given in the LRMP in the SMZ's. This may involve access control, road deactivation, accelerated harvesting or alternative silvicultural techniques. Access control and or deactivation may be completed for existing roads adjacent to or within backcountry areas to remove areas from the roaded classification and move to the semi-primitive. These works and strategies are subject to agency approvals and do not include oil/ gas or mining activities. All deactivation measures and other mitigating measures will be implemented as soon as feasibly possible following harvesting and primary silviculture activities.

New road construction will be open for the duration of the season in which the forest management activity occurs (e.g. road construction, harvesting, and primary silviculture). Seasonal deactivation and access restrictions will be completed by the end of the active season. Upon completion of primary silviculture activities (site preparation and planting) the road will be deactivated and motorized access restricted.

This indicator has been tracked and managed since 2000 on TFL 48.

MONITORING PROCEDURE:

Activities occurring within the back country areas will be reported in each annual report. The ROS classification will be updated and reported in each SFM plan.

LINKAGES TO OPERATIONAL PLANS

Operational plans as prepared by the forest planners will have to carefully evaluate the impact of any access management plans in the preparation of a Forest Stewardship Plan to ensure that the amount of semi-primitive ROS is not adversely affected. It is expected that the amount may fluctuate over time and that deactivation strategies will be developed to mitigate any short term impacts.

3.39 Recreational Sites

Criterion 5:	Element(s): 5.1
Economic and Social Benefits	Timber and Non-Timber Benefits
CSA Core Indicator(s): 5.1.1 Quantity and quality of timber and non-timber benefits, products, and services produced in the DFA	
Indicator Statement	**Target Statement**
Number of recreational trails and campsites maintained by Canfor	Canfor will provide and/or maintain 1 backcountry trail and 3 campsites on TFL 48
Value(s): Timber and Non-Timber Multi-Use Benefits	
SFM Objective: We will provide opportunities for a feasible mix of timber, recreational activities, visual quality and non-timber commercial values.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

No less than the target.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

To provide backcountry recreational opportunity with focus on remote but locally popular areas. This will help meet local demand for recreational and spiritual pursuits in a natural setting.

CURRENT STATUS

Canfor currently maintains the Gething Creek, Carbon Lake and Wright Lake campsites. The Gething and Carbon are road access sites. Wright Lake campsite is a remote wilderness site with off highway vehicle or hiking access.

The Battleship Mountain trailhead is road accessible, with a moderately difficult hike a user can be in the alpine in just a few hours. All of these recreational values provide a number of outdoor activities (hunting, fishing, hiking and canoeing). All of the above recreational sites can be accessed from the Johnson Creek FSR.

Canfor committed in 2000 to assume management and maintenance of all 4 recreational areas. Some of the work that has been done to the sites since 2000 is listed below:

- snag falling around campsites and access trails
- replace outdoor pit toilet (Carbon Lake)
- fire ring placement (Carbon and Gething)
- picnic table repair
- general site clean-up (annually)

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

It is anticipated that maintaining/providing these recreation sites will promote recreational use of the TFL area, thereby strengthening the local economy through spending on materials and supplies needed to engage in the recreational pursuits offered or accessed via the recreation sites.

STRATEGY AND IMPLEMENTATION SCHEDULE

Annual maintenance and inspections are scheduled each year for the various recreational sites. Work is prioritized and completed as required. Public safety is the main goal in our yearly plan. Some of the work to be completed is listed below:

- trail marking
- trail brushing
- location signage
- toilet repairs (Wright Lake)

MONITORING PROCEDURE

The maintenance, inspections and work completed will be recorded and reported out annually. Work is generally completed in the spring/summer by Canfor staff, summer staff or contractor personnel.

LINKAGES TO OPERATIONAL PLANS

The recreational sites and surrounding values are considered when any industrial activity is planned in their vicinity. Carbon Lake and Wright Lake are both inside visual quality polygons.

3.40 Consistency with Third Party Action Plans

Criterion 5:	**Element(s): 5.1**
Economic and Social Benefits	Timber and Non-Timber Benefits
CSA Core Indicator(s): 5.1.1 Quantity and quality of timber and non-timber benefits, products, and services produced in the DFA	
Indicator Statement	**Target Statement**
Consistency with mutually agreed upon action plans for guides, trappers, range tenure holders, and other non-timber commercial interests	Operations 100% consistent with the resultant action plans
Value(s): Timber and Non-Timber Multi-Use Benefits	
SFM Objective: We will provide opportunities for a feasible mix of timber, recreational activities, visual quality, and non-timber commercial activities.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

Variances are permissible only on reaching mutual agreement between the affected tenure holders and Canfor.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Diversity in commercial resource activities within a limited landbase is important to the sustainability of communities. Extensive overlap of forest tenures with guide, trapping, and other non-timber commercial interests may necessitate mutually agreed upon action plans to address site specific issues. This indicator measures Canfor's implementation success in addressing these actions.

CURRENT STATUS

Canfor notifies trappers, guides and others that may be affected by proposed activities during the preparation of the FSP, as part of the regulatory public review and comment period. Prior to the commencement of approved forest activities, further notification is provided to those stakeholders that will be affected by the activity. In the event site specific comments are received, Canfor's attempt to come to agreement with the stakeholder on reasonable actions that may mitigate the impacts. Canfor tracks comments, responses, and actions arising from this consultation with stakeholders. Currently there are no mutually agreed on action plans prepared.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Y e s

By implementing the SFMP indicator strategy a range of forest based commercial interests will be maintained thereby maintaining the diversity of the local forest based economy.

STRATEGY AND IMPLEMENTATION SCHEDULE

During the referral period for each FSP or PMP Canfor will provide opportunities to meet with affected guide, trapper, and known non-timber commercial interest stakeholders to:

- Provide a review of the current FSP, PMP's, and/or Site Plans (if available) as applicable,

- Seek site specific information from tenure holders and known non-timber commercial interests regarding tenure improvements, tenure use timing, and other issue pertinent to the overlap of forest and guide, trapping tenures and non-timber commercial interest activities, and
- Where possible, develop, review and implement a mutually agreed action plan to address site-specific issues.

While it is Canfor's objective to identify issues and areas where action plans are required during the review and comment process mutually agreeable action plans can be developed outside of the review and comment periods.

MONITORING PROCEDURE

An annual review and summary of conformance to action plans will be conducted, and reported in annual reports.

LINKAGES TO OPERATIONAL PLANS

FSP's, site plans, and all other short-term operational plans will be consistent with any agreements between Canfor and guides, trappers and other known non-timber commercial interests.

3.41 Waste

Criterion 5:	**Element(s): 5.1**
Economic and Social Benefits	Timber and Non-Timber Benefits
CSA Core Indicator(s): 5.1.1 Quantity and quality of timber and non-timber benefits, products, and services produced in the DFA	
Indicator Statement	**Target Statement**
The percentage of blocks and roads assessed in which avoidable waste and residue levels are within the target range	Annually, 100% of cutblocks and roads will fall within the target avoidable waste and residue range where scale based stumpage is applied and waste and residue benchmarks are still in place.
Value(s): Timber and Non-Timber Multi-Use Benefits	
SFM Objective: We will provide opportunities for a feasible mix of timber, recreational activities, visual quality, and non-timber commercial activities.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

Maximum acceptable annual variance is 2% less than the target.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

This indicator is a measure of actual waste and residue compared to acceptable waste and residue ranges.

Timber utilization levels can impact the long-term sustainability of the timber harvest level by impacting the volume per hectare delivered. Lower utilization levels may result in more area being harvested to provide the same volume deliveries to mills, and therefore are a potential source of concern for maintaining sustainable harvest levels. Operations that are not consistent with the utilization specifications as defined in Schedule C – Felling, Bucking and Utilization Specifications of the TFL 48 Licence – Instrument 4 document dated April 1, 2000 are classified as waste and residue.

The following range of avoidable merchantable waste and residue, derived from guidelines in the Logging Residue and Waste Procedures Manual (Section 3), will be the basis for evaluating this indicator.

Table 42: Avoidable Waste and Residue Guidelines

Biogeoclimatic Zone	Avoidable Waste &Residue range (m^3/ha)
ESSF	0- 20 m^3/ha
BWBS/SBS	0-10 m^3/ha

CURRENT STATUS

In 2013 there were a total of 65 blocks harvested. Of the 63 Canfor blocks, 21 blocks fell under scale based stumpage where waste benchmarks still apply. The blocks that were surveyed were below waste benchmarks. The remaining blocks are not subject to waste assessments as they were either under cruise based stumpage or tabular rate stumpage which requires the licencee to pay for all of the volume of timber that is within the stand. BCTS did not report any waste issues in 2013. Chetwynd Mechanical Pulp also did not report any waste issues on the 1 block they logged in 2013. Prior to 2013 there were zero occurrences of exceeding the benchmarks.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? No.

STRATEGY AND IMPLEMENTATION SCHEDULE

Harvesting operations are inspected during and following operations, and inspections note whether waste and residue levels are acceptable. Where activities are noted as unacceptable during operations, contractors are required to rework areas to achieve acceptable results if practical.

An ocular assessment of waste and residue levels will be made by qualified assessors on all blocks and operational roads the first summer following completion of harvesting. If the waste level is potentially near the threshold a full survey procedure will be completed to more accurately determine the waste level.

MONITORING PROCEDURE

Information on waste levels is reported periodically to the MoFR, and a summary of performance is included in the annual report.

LINKAGES TO OPERATIONAL PLANS

Not applicable.

3.42 Forest Health

Criterion 5:	**Element(s): 5.1**
Economic and Social Benefits	Timber and Non-Timber Benefits
CSA Core Indicator(s): 5.1.1 Quantity and quality of timber and non-timber benefits, products, and services produced in the DFA	
Indicator Statement	**Target Statement**
% of significant detected forest health damaging events which have treatment plans prepared	100% of significant detected forest health damaging events will have treatment plans prepared within 1 year of initial detection
Value(s): Timber and Non-Timber Multi-Use Benefits	
SFM Objective: We will provide opportunities for a feasible mix of timber, recreational activities, visual quality, and non-timber commercial activities.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

A variance of 1 year is permissible to provide for additional information collection and consultation with forest health specialists.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

This indicator describes the effectiveness of the forest health management strategy in addressing identified problems. This indicator will identify that treatment plans are developed and implemented in a timely manner to address significant forest health issues.

- Significant forest health damaging events are defined as those identified as:
- Medium or high risk from the risk management classification system (see Strategy and Implementation Schedule, below), or
- Forest health events identified as significant by the MoFR, or
- Damage which threatens the achievement of silviculture stocking standards within a plantation, or
- Damage which threatens the survival of 10% or more of the trees in a merchantable stand greater than 50 hectares.

CURRENT STATUS

Managed Stands

The table below was created from data extracted from Genus to determine the current incidence of forest health issues on the TFL. This data is entered into the stocking status tab in Genus, which is the record of the most recent silviculture survey. Free-growing damage (health) standards are used to assess stand health in managed stands during silviculture surveys.

This data shows that the most common forest health concern on the TFL in managed stands is caused by abiotic factors, followed by insects, then disease. The primary abiotic factor is frost. Eriophyid Mites and pine stems rusts are the most common disease and insect concerns on the DFA.

Table 43: Summary of Forest Health Concerns on TFL 48 (2005)

Forest Health Class	Pest Damage Agent Grouping	Percent of Managed Stands on TFL Affected
Abiotic	Abiotic: Frost	0.5
	Abiotic: Snow-press	0.4
	Wildlife Browse	0.3
	Abiotic: Competition	0.3
	Other Abiotic	0.2
	Abiotic: Sunscald	Less than 0.1 %
	Abiotic: Livestock Damage	Less than 0.1 %
	Abiotic: Windthrow	Less than 0.1 %
	Abiotic: Winter Desiccation	Less than 0.1 %
	Abiotic: Flooding	Less than 0.1 %
	Abiotic: Fire	Less than 0.1 %
Sum of Abiotic Injuries		**1.9**
Insect	Eriophyid mites	0.2
	Warren's rootcollar weevil	0.1
	Spruce Weevil	Less than 0.1 %
	Other Insect	Less than 0.1 %
Sum of Insect		**0.3**
Disease	Pine Stem Rusts	0.2
	Other Disease	Less than 0.1 %
	Foliar Diseases of deciduous	Less than 0.1 %
	Conifer foliar diseases	Less than 0.1 %
Sum of Disease		**0.3**
Managed stands with known forest health issues		**2.5**

Unmanaged Stands

Insects, disease, and abiotic factors have been routinely identified from field information and overview flights, and salvage programs developed as required. The following table describes the current status for forest health issues on unmanaged stands on TFL 48. There were no wild fires on TFL 48 in 2004.

Table 44: 2000-2013 Summary of Forest Health Issues on Unmanaged Stands (2013)

Factor	Volume (m^3)	Area (ha)	Comments
Blow Down	10,665	38.8	Derived area from volume /275.
Mountain Pine Beetle	18,599,90	67,636	Derived volume based on .35 m^3 per tree. Derived area from volume /275.
Spruce Bark Beetle	1,800	6.5	Derived area from volume /275.
Fire	21,425	247.6	One 38 ha burn not in a forested area.
Balsam Bark Beetle	0	0	Very light incidence in mountain areas.
Spruce Budworm	0	0	Possible incidence in 2000 – may have been misclassified.
Forest Tent Caterpillar	0	0	Scattered levels in 2000.
Environmental	0	0	Incidental and scattered snow damage – not quantifiable.
Total	**9,329,715**	**34,095.9**	

The most critical forest health issue on the TFL's unmanaged stands is the Mountain Pine Beetle. In 2013 the ongoing Mountain Pine Beetle (MPB) infestation was the only significant forest health agent that occurred within the DFA.

In 2007 when the AAC was determined by the Chief Forester, the TSR package that was submitted to government to support the determination identified 26.8 million m3 of pine volume susceptible to MPB attack. Quantifying the extent of MPB attack with much precision is very difficult. In 2010 the government designated the TFL as a "salvage" Emergency Bark Beetle Management Area. Since that time there has been little to no monitoring of the rate of spread or level of attack of MPB on the TFL. However the forest health overview assessments completed by the MFLNRO have indicated that the rate of spread has decreased as the main wave of attack has moved north out of the TFL.

The 2013 projection is based on a variety of assumptions that takes into account both age class and pine stand density. This area totals approximately 67,636 ha. The corresponding volume is determined by multiplying the default volume per ha of 275. The area assumption is based on aerial flights and field observations completed by MFLNRO and Canfor staff on the spread and extent of the MPB. Of the 73.1 million m3 of conifer volume on the TFL, 27.3 million m3 (37%) is pine and of this, approximately 18.6 million m3 (25% of the total conifer and 68% of pine volume) is attacked by MPB.

Canfor Chetwynd utilizes the forest health management expertise in the Canadian Forestry Service and the BC Ministry of Forests and Range as needed. The Canadian Forestry Service holds extensive historical information (old Forest Insect and Disease Survey), and it also houses expert diagnostic services, and conducts research relevant to forest health management. The Ministry of Forests and Range also has leading experts in diagnostics, management and training. Canfor Chetwynd contacts the CFS and the Canadian Food Inspection Agency (CFIA) in the event of an alien invasive pest found on the DFA.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

It is anticipated that implementing the SFMP indicator strategy to prepare treatment plans will result in implementation of actions to minimize the spread of damaging agents, which will reduce the amount of timber damaged on the TFL.

STRATEGY AND IMPLEMENTATION SCHEDULE

We will establish, and maintain a summary of damaging agents and their estimated incidence, current status and their potential impacts. Table 43 is the initial estimate of incidence and severity of damaging agents in the DFA. Each pest damage agent is rated as high, medium or low. Agents that have a risk management class of high or medium will have the risk rating completed. Agents that have a low risk ranking will not have the risk rating completed unless their severity changes to medium or high.

Table 45: Estimated Incidence, Severity, Current Conditions and Potential Impact of Damage Agents in the TFL 48 DFA

Pest Damage Agent	Estimated Incidence (area affected of DFA) by Severity Class (Low, mid & high)			Severity Class Breakpoints (Low, Mid & High)	Distribution	Potential Impact	Risk Management Class	Landscape & Stand Hazard, and Risk Management Activities
	Low	Mid	High	E.g., prefixes denote classification is under development	Estimated extent of pest damage in the DFA, and type of damage	Type of damage, and seral stage affected	HIGH Moderate or Low	Description & Source
Mountain pine beetle	99.5%	0.5%	0	E.g., <2%, 2-10%, >10%	Common	Stand destroying (mid-to-late-mature)	High	Stand Hazard Rating: As per the procedure outlined in the Bark Beetle Management Guidebook (BBMgmtGB) p. 19-20. We have run a stand hazard rating; producing a spatial map for the DFA. Stand hazard conditions have been re-assessed & mapped. Risk Rating: The Shore – Safranyik Beetle Model will be used to assess susceptibility.
Spruce beetle	98.5%	1.5%	0	E.g., <2%, 2-10%, >10%	Uncommon, stem mortality; central, western and northern areas of DFA	Stand destroying (mature)	Moderate	Stand Hazard Rating: Conduct as per Table 11 of Bark Beetle Mgmt Guidebook (BBMgmtGB) Stand hazard ratings as per Table 11 (BBMgmtGB). Canfor will run a 2005 stand hazard rating; producing a spatial map for the DFA. Stand hazard conditions will be re-assessed & mapped prior to SFMP renewal dates. Risk Rating: Assessments (aerial or ground) will be conducted by Canfor as per Strategy & Implementation Pt 3, Indicator 3.16. Susceptible stands within 2 km of spruce bark beetle infestations are defined as HIGH Risk.
Pine stem rusts	<800m a.s.l. 70%	800 – 1100m a.s.l. 25%	<1100m a.s.l. 5%	<10%, 10-20%, >20% & >1100m a.s.l. 0% (Pers comm., R.W. Reich, 2003)	Ubiquitous/common, localized mid-high severity	Stem mortality, reduces stand density (early seral)	Moderate	Stand Hazard Rating: Hazard rating by elevation band indicates <800m is LOW, and between 800 to 1100m is LOW to HIGH. Note, one or more of the rust species alternate (herbaceous or woody plant) species hosts present on/near the site. Alternate rust hosts are as follows: None for DSG (Endocronartium harknessii); Bastard toad-flax (Geocaulon lividum) for DSC (Cronartium comandrae); and Indian paint-brush (Castelleja spp.) for DSS (Cronartium coleosporioides) Revision of Rust Stand Hazard Rating: Records of silviculture surveys, stored in GENUS, will be queried for every Management Plan to assess damage agent incidence & intensity relationships (e.g., hazard). Risk Rating: Risk assessments will be conducted as per the MoFR Standard Operating Procedure 7.1-1 for Ground Detection and Assessment Procedures for lodgepole pine stem rust (May 24, 2000).
Abiotic: Fire	99%	<1%	<1%	<5% mortality-5-30% mortality; >30% mortality	Uncommon to common, localized to widespread damage, highly variable occurrence annually	Stem quality to stem and stand mortality	Moderate	Fuel Hazard Rating: MoFR is currently working on a provincial coverage of fuel loading. When available, it will be assessed for guiding forest operations for strategic planning. Provisions under the Wildfire Act (2005) guide Canfor's forest and stand (cutblock) level risk management procedures.
Wildlife browse (hares, elk moose, etc)	90%	10%	0%	E.g., <10%, 10-30%, >30%	Ubiquitous but localized both conifer & deciduous	Low to severe growth reduction (early seral)	Moderate	Stand Hazard Rating: No known relationships; cannot be risk rated at this time. Records of silviculture surveys, stored in GENUS, will be queried for every Management Plan to assess damage agent incidence & intensity relationships (e.g., hazard and risk).

Pest Damage Agent	Estimated Incidence (area affected of DFA) by Severity Class (Low, mid & high)			Severity Class Breakpoints (Low, Mid & High)	Distribution	Potential Impact	Risk Management Class	Landscape & Stand Hazard, and Risk Management Activities
	Low	Mid	High	E.g., prefixes denote classification is under development	Estimated extent of pest damage in the DFA, and type of damage	Type of damage, and seral stage affected	HIGH Moderate or Low	Description & Source
Tomentosus root rot	98%	2%	<1%	<6, 6-15, 15+ % (Pers comm., R.W. Reich)	Common below 700m a.s.l. (I.e., ~ 5000 ha in DFA)	Low to severe growth reduction, limited mortality & windthrow (early to mature)	Moderate	Stand Hazard & Risk Rating: High-risk stands are defined as predominantly spruce-leading, mesic & dry sites AND at elevations below 700 m a.s.l. No mapping is required for this damage agent, as 4,880 ha of conifer or 1.55% of the THLB fall below 700m. Records of silviculture surveys, stored in GENUS, will be queried for every Management Plan to assess damage agent incidence & intensity relationships (e.g., hazard and risk).
Abiotic: Frost	90%	5%	5%	E.g., <1% 1-10%, >10%	Common, localized to widespread damage	Growth reduction, sometimes stem deformity or stem mortality (early seral is most severely affected)	Low	Stand Hazard Rating: Conifer reforested areas up to 20yrs, particularly in low-lying areas Records of silviculture surveys, stored in GENUS, will be queried for every Management Plan to assess damage agent incidence & intensity relationships (e.g., hazard and risk).
Livestock damage	90%	10%	0%	E.g., <10%, 10-30%, >30%	Localized to range tenures on both conifer & deciduous	Low to severe growth reduction & mortality (early seral)	Low	Stand Hazard Rating: Aspen-leading mesic and dry sites that are primary (& possibly secondary) native pasture grazing areas in a Range Use Plan (RUP) are defined as high hazard. Records of silviculture surveys, stored in GENUS, will be queried for every Management Plan to assess damage agent incidence & intensity relationships (e.g., hazard and risk). Risk Rating: High Risk - Deciduous and coniferous plantations on historic primary native range on actively grazed Range tenures Moderate Risk – Deciduous and coniferous plantations on historic secondary native range on actively grazed Range tenures Low Risk – Deciduous and coniferous plantations on historic tertiary native range and on non-Range tenured forest lands.
Insect defoliators of deciduous	80%	10%	10%	E.g., <10%, 10-30%, >30%	Periodical, wide range of severity; growth reduction	Limited stem mortality, growth reduction (early to mature seral)	Low	Stand Hazard Rating: Use Imre Otvos' (NRCAN-CFS PFC) hazard & risk mapping work from 2003 when available later in 2005. Risk Rating: A proximity based risk classification similar to that used for spruce bark beetle will be used; e.g., High hazard deciduous stands <2km from an infestation are classed as High risk.
Foliar diseases of deciduous (Venturia sp.)	93%	5%	2%	E.g., <10%, 10-30%, >30%	Ubiquitous/common, annual moist-weather condition dependant, often severe growth impact	Severe growth reduction, reduces stand density (early seral)	Low	Stand Hazard Rating: No known relationships exist; foliar diseases cannot be risk rated at this time. Their variable effects are thought to be clonally controlled, and may require making observations of adjacent mature stand tree crowns to ascertain potential incidence and severity of future Venturia sp. outbreaks. Records of silviculture surveys, stored in GENUS, will be queried for every Management Plan to assess damage agent incidence & intensity relationships (e.g., hazard and risk).

Pest Damage Agent	Estimated Incidence (area affected of DFA) by Severity Class (Low, mid & high)			Severity Class Breakpoints (Low, Mid & High)	Distribution	Potential Impact	Risk Management Class	Landscape & Stand Hazard, and Risk Management Activities
	Low	Mid	High	E.g., prefixes denote classification is under development	Estimated extent of pest damage in the DFA, and type of damage	Type of damage, and seral stage affected	HIGH Moderate or Low	Description & Source
Spruce weevil	97%	2%	1%	E.g., <2%, 2-10%, >10%	Uncommon, localized attack; stem deformity and growth reduction	Stem deformity and growth reduction (early seral)	Low	Stand Hazard Rating: Records of silviculture surveys, stored in GENUS, will be queried for every Management Plan to assess damage agent incidence & intensity relationships (e.g., hazard).
Warren's root collar weevil	99%	1%	0	E.g., <2%, 2-10%, >10%	Ubiquitous but localized stem mortality	Scattered stem mortality (early seral, <10yrs)	Low	No known relationships; cannot be risk rated at this time. Records of silviculture surveys, stored in GENUS, will be queried for every Management Plan to assess damage agent incidence & intensity relationships (e.g., hazard and risk).
Eriophyid mites (Petrova sp., Northern pitch twig moth, Adelges sp.)	99%	0%	1%	E.g., <1% 1-10%, >10%	Very uncommon, localized attack; little growth reduction	Growth reduction (early seral, predominantly on conifer)	Low	Stand Hazard Rating: Conifer reforested areas up to 20yrs, particularly in low-lying areas Records of silviculture surveys, stored in GENUS, will be queried for every Management Plan to assess damage agent incidence & intensity relationships (e.g., hazard and risk).
Wood decay fungi	70%	20%	10%	E.g., <10%, 10-30%, >30%	Ubiquitous, variable by stand	None to severe wood quality effects (mature)	Low	Stand Hazard Rating: No known relationships relating to stand hazard or risk that can be used for managing the effects of wood decay fungi on wood quality or productivity; other than the positive correlation increasing stand age and other decay predisposing damage agents such as windthrow, frost and breakage.
Conifer foliar diseases	90%	5%	5%	E.g., <10%, 10-20%, >10%	Uncommon, localized attack; growth reduction	Growth reduction (early to mature seral)	Low	Stand Hazard Rating: Reforested areas up to 20yrs, particularly lodgepole pine in low-lying areas Records of silviculture surveys, stored in GENUS, will be queried for every Management Plan to assess damage agent incidence & intensity relationships (e.g., hazard and risk).
Western balsam bark beetle	90%	10%	0%	E.g., <2%, 2-10%, >10%	Common but variable attack intensity	Stand destroying (mature)	Low	Stand Hazard Rating: Balsam-leading mature & overmature high-elevation stands Risk Rating: Not required, mostly in inoperable areas and protected areas
Abiotic: Snow-press	90%	5%	5%	E.g., <1% 1-10%, >10%	Common, localized to widespread damage	Stem deformity to breakage (early to mid seral)	Low	Stand Hazard Rating: Deciduous reforested areas up to 30yrs old, with no known relationship to topography or aspect. Records of silviculture surveys, stored in GENUS, will be queried for every Management Plan to assess damage agent incidence & intensity relationships (e.g., hazard and risk).
Abiotic: Hail	99%	0%	1%	E.g., <1% 1-10%, >10%	Common, localized damage; most affects deciduous species	Stem damage or forking (early)	Low	Stand Hazard Rating: Deciduous reforested areas up to 30yrs old, with no known relationship to topography or aspect. Records of silviculture surveys, stored in GENUS, will be queried for every Management Plan to assess damage agent incidence & intensity relationships (e.g., hazard and risk).

Pest Damage Agent	Estimated Incidence (area affected of DFA) by Severity Class (Low, mid & high)			Severity Class Breakpoints (Low, Mid & High)	Distribution	Potential Impact	Risk Management Class	Landscape & Stand Hazard, and Risk Management Activities
	Low	Mid	High	E.g., prefixes denote classification is under development	Estimated extent of pest damage in the DFA, and type of damage	Type of damage, and seral stage affected	HIGH Moderate or Low	Description & Source
Abiotic: Winter Desiccation (Red belt)	90%	5%	5%	E.g., <1% 1-10%, >10%	Common, localized mid – high elevation bands or plantations at any elevation; on conifer species	Foliage mortality on mature, or seedling mortality in plantations	Low	Records of silviculture surveys, stored in GENUS, will be queried for every Management Plan to assess damage agent incidence & intensity relationships (e.g., hazard and risk).
Abiotic: Sunscald	99%	1%	0%	E.g., <1% 1-10%, >10%	Uncommon, localized to widespread damage	Stem mortality (early to mid seral)	Low	Records of silviculture surveys, stored in GENUS, will be queried for every Management Plan to assess damage agent incidence & intensity relationships (e.g., hazard and risk).
Abiotic: Windthrow	85%	10%	5%	E.g., <1% 1-10%, >10%	Uncommon, localized to widespread damage associated with wet soils	Stem breakage (mature)	Low	For managed stands, records of silviculture surveys, stored in GENUS, will be queried for every Management Plan to assess damage agent incidence & intensity relationships (e.g., hazard and risk). For unmanaged stands, overview flights will be used for detection.
Abiotic: Flooding	95%	4%	1%	E.g., <1% 1-10%, >10%	Uncommon, localized to widespread damage	Stem mortality (early to mature)	Low	Stand Hazard Rating: Low-lying areas and riparian areas. Risk Rating: High for riparian areas identified as floodplains, and areas upstream from active beaver huts.
Abiotic: H2S et& SO2c gas	99%	<1%	<1%	E.g., <1% 1-10%, >10%	Uncommon, localized near energy operations	Growth reduction to mortality (early to mature)	Low	Stand Hazard Rating: Conifer stands are more susceptible to H2S or SO2 damage. Risk Rating: Conifer stands within 1km of energy operations that may release gases

This table will be updated as new information becomes available.

We will maintain a detection and monitoring program for damaging agents that are not at epidemic levels or at pre-epidemic[8] levels over the land base. Some of the detection and monitoring techniques which may be employed are:

- conducting aerial and ground surveys in management zones in which forest operations will be proposed during the term of this plan if there is an identified forest health issue
- utilizing data from pest surveys conducted by the MoFR and Forestry Canada
- continue to operate a spruce beetle detection program
- following MoFR standards and guidelines for the prevention and control of Warren's Root Collar Weevil, planting of alternate species and other control measures where required
- following accepted cultural practices in the control or eradication of root disease (e.g., Tomentosus root rot) as part of our silviculture program
- monitoring any increase in spruce weevil infestations
- developing models to identify high risk areas
- annually fly the DFA to determine where forest health concerns exist. A GPS coordinate will be taken of these points, so that they can be later mapped, and incorporated into our treatment plans
- where models are available, carry out hazard rating analysis to determine which stands are at the greatest risk for forest health disturbances
- ensure appropriate forest workers, consultants and industry staff, are competent at identifying specific forest health concerns within the DFA
- maintain a record of agent incidence and intensity

We will develop treatment plans for significant forest health events. Treatment plans will identify the location of the significant concern, and an implementation schedule for the proposed treatments. Treatment plans will be developed using forest health specialists as needed. Plans will consider the risk presented by the damaging agent, and the cost: benefits of a range of available options. Some of the more common options which may be employed are:

- relocating harvesting activities to meet forest health management requirements,
- pheromone baiting and lethal trap programs (trap trees in forested conditions, and lethal traps in mill yard conditions),
- incorporating forest health requirements into cutblock designs where necessary to prevent the development of forest health problems (e.g., cold air drainage for frost potential, or block design to minimize potential for windthrow),
- fill-planting or species conversion for plantation related problems,
- maintain natural ecological processes, if so warranted by the level of risk and cost/benefit analysis (the latter to be developed, as part of treatment plans).

The strategy of maintaining natural processes will be applied in some areas where there is little risk to adjacent stands. In these areas suppression (not including fire) and salvage activities will not occur in order to allow for natural stand initiating events to take place. Stand-initiating disturbances are those processes that largely terminate the existing forest stand and initiate secondary succession in order to produce a new stand. The disturbance agents are mostly wildfires, windstorms and, to a lesser extent, insects and landslides (Ministry of Forests, 1995). Disturbance and succession are the foundation for more complex processes that occur at higher levels of organization where interactions among organisms, and between organisms and their environment occur (Lindgren and Lewis, 1997). Many human activities have disrupted the way that natural disturbances help maintain healthy, sustainable ecosystems (Rocky Mountain Research Station, 1999). By allowing some natural disturbances to run their cycle on the Defined Forest Area, we are contributing to maintaining healthier, sustainable ecosystems.

General measures to be implemented for potential significant problems, for endemic and pre-endemic populations of disease and pests, depending on site conditions, are summarized in Table 43.

[8] Pre-epidemic levels are defined as levels where without aggressive suppression activities, an epidemic may occur

Table 46: Detection & Monitoring, and Treatment Groupings for Damage Agents

	Damage Agents			
Forest Health Management Groupings	Spruce beetle Mountain pine beetle Fire	Western balsam bark beetle Red-belt desiccation	Tomentosus root rot Wildlife browse Pine stem rusts Windthrow	Foliar diseases of deciduous & coniferous species Spruce weevil Warren's root collar weevil Eriophyid mites Frost, snow-press, hail, sunscald, flooding
Detection and Monitoring	Detect and Monitor via aerial surveys, and pre-harvest operations surveys and assessments	Detect and Monitor via aerial surveys (for areas classified as high risk, or anecdotal observations)	Detect and Monitor during pre-harvest, and reforestation success survey operations.	Detect and Monitor during silviculture surveys
Treatment or Control	Implement containment sanitation and salvage harvesting strategies	Fill planting	Prescribe pest control or salvage strategies at pre-harvest phase; for pine stem rusts; genetically resistant stock types and/or fill-planting	Fill-planting

Fire Management

We will address fire management issues in fire preparedness plans that outline objectives, duties and responsibilities related to minimizing fire risk, and responding to fire occurrence.

Prevention and Suppression

We will protect the forest from fire by:

- Preparing an annual Fire Pre-organization Plan. This Plan outlines our commitment to fire prevention, detection and suppression. Our objective is to control all wildfires by 10:00 A.M. on the day after discovery. A copy of this plan is provided to the MoFR.
- Obtaining accurate weather data and monitoring fire weather indices.
- Maintaining an adequate inventory of firefighting equipment.
- Ensuring that company and contract personnel are properly trained to report fires and safely and efficiently use fire tools and equipment.

Prescribed Fire

Burning of residue from harvesting will be carried out in accordance with District and Regional smoke management guidelines. Prior to any prescribed burning we will evaluate the risk factors. Broadcast burning is not typically prescribed due to unpredictable winds across the TFL. Operational controls include our Forest Management System Procedures including the Emergency Preparedness and Response Plans contained therein.

Fuel Management

We conduct post-harvest fire hazard assessments for each cutblock.

Fuel management will be addressed by burning landing and roadside debris piles. Additional slash accumulations that are assessed as hazardous may be prescribed for piling and burning. Disposal will normally occur within twelve months of harvest.

Exceptions may include:

- Horse logging where limbing and topping in the bush are prescribed to help meet social objectives, and
- Coarse woody debris piles that provide habitat for small mammals and furbearers,
- Helicopter logging.

MONITORING PROCEDURE

Canfor retains records of all significant forest health damaging agents detected. Forest health information on areas or damage agents of broad concern effecting or potentially effecting other forest managers (e.g.

mountain pine beetle, spruce bark beetle) will be forwarded to the MoFR. Canfor will notify the MoFR following treatment action on high-risk damage agents. A summary of significant pest conditions and treatment plans will be presented in each annual report.

LINKAGES TO OPERATIONAL PLANS

Site level plans will identify significant forest health concerns and proposed treatment options. Forest Stewardship Plans are modified as needed to relocate harvesting to address forest health issues.

3.43 Proportion of Completed Forest Health Action Plans

Criterion 5:	**Element(s): 5.1**
Economic and Social Benefits	Timber and Non-Timber Benefits
CSA Core Indicator(s): 5.1.1 Quantity and quality of timber and non-timber benefits, products, and services produced in the DFA	
Indicator Statement	**Target Statement**
Proportion of required actions completed as per forest health treatment plans	100% of required actions will be completed as per forest health treatment plans
Value(s): Timber and Non-Timber Multi-Use Benefits	
SFM Objective: We will provide opportunities for a feasible mix of timber, recreational activities, visual quality, and non-timber commercial activities.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

Environmental constraints such as road/bridge wash outs may make action plans unachievable.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

This indicator will ensure that treatment plans are implemented in a timely manner to address significant forest health issues.

CURRENT STATUS

Managed Stands

The following activities are applied on the TFL to minimize negative impacts from forest health factors:

- Fill-planting is the most commonly applied treatment for damage to plantations from forest health factors.
- During brushing and spacing activities, crews are advised to remove crop trees at a level that prevents them from being free growing.
- For blocks with known Tomentosus issues, planting crews are advised keep trees away from stumps to avoid inoculation.

Unmanaged Stands

Mountain Pine Beetle is currently the greatest forest health threat to our unmanaged stands. Detection was in February 2004. All actions taken to date to suppress the population are as follows:

- Aerial detection (Blocks 4 and 5 of the TFL)
- Probing
- Fall and burn (2917 trees)
- Shifting harvesting plans to ensure infested wood and susceptible wood is targeted for harvest
- Emergence study to determine peak flight, so that appropriate hauling arrangements can be made
- Log yard pheromone studies to determine the amount of beetle that flies from the log decks
- Baiting to concentrate Mountain Pine Beetle in areas that are scheduled for harvest
- Joint effort with other licensees to suppress populations

Blowdown, Spruce Bark Beetle and fire are the next significant forest health factors affecting the DFA. Harvesting is currently the most commonly applied treatment and control for protecting mature timber inventories from these factors, as it is the most effective and economical means of management.

In June of 2010 the Ministry of Forests and Range released a memorandum regarding the Re-designation of Emergency Management Units. These units depict the location of various levels of Mountain Pine Beetle attack and associated with those levels of attack are one of three management strategies: aggressive; containment, and; salvage. The TFL was identified as an area that has sustained a high level of impact from the Mountain Pine beetle and was therefore identified as an area where the recommended management strategy is to harvest/salvage as much affected pine as possible. In 2007 when the Deputy Chief Forester determined the Annual Allowable Cut (AAC) for the TFL his direction/expectation for Canfor as the licensee was to direct harvesting towards pine leading stands with a target of exceeding 70% pine volume delivered. Deliveries from TFL 48 through 2013 were 59% pine being delivered (see Indicator 22).

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

It is anticipated that implementing the SFMP indicator strategies to prepare and implement treatment plans will result in implementation of actions to minimize the spread of damaging agents, which will reduce the amount of timber damaged on the TFL and/or will result in efforts to salvage the timber damaged on the TFL.

STRATEGY AND IMPLEMENTATION SCHEDULE

Managed stands

The extent of forest health damaging agents will be determined during Silviculture surveys. Surveys will occur by the schedule set out in Genus by the Silviculture Forester. Fill planting will be used to restock sites that fall below acceptable stocking levels. Fill planting activities will be scheduled in Genus by the Silviculture Forester.

Brushing or thinning treatments will be determined during the silviculture survey. The survey will note any rust issues, and will be recorded in Genus. Depending on the extent of the forest health factor, the Silviculture Forester will decide if sanitation will be done in conjunction with the brushing or thinning treatments.

Unmanaged Stands

Once significant forest health factors are detected in unmanaged stands, they will be recorded in our forest health treatment plan database. This database will be started in the fall of 2005 after the overview flights for Mountain Pine Beetle are complete.

MONITORING PROCEDURE

The status of implementation will be monitored annually to ensure that we meet our 100% obligation for treatment plan actions.

LINKAGES TO OPERATIONAL PLANS

Site plans will identify significant forest health concerns and prescribed treatment plans.

3.44 Community Donations

Criterion 5:	**Element(s): 5.2**
Economic and Social Benefits	Communities and Sustainability
CSA Core Indicator(s): 5.2.1 Level of investment in initiatives that contribute to community	
Indicator Statement	**Target Statement**
Canfor community donations per year	A minimum of $7,000/year will be made available for community donations
Value(s): Local Employment	
SFM Objective: We will ensure local communities and contractors have the opportunity to share in benefits such as jobs, contracts and sales.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

No less than 95% of the target will be achieved. This indicator is only applicable to Canfor.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

At Canfor, we have a long tradition of investing in the communities that we call home. Canfor's Corporate Sponsorship and Donation Program serves as the principal funding entity for the company's charitable contributions. The program approves and allocates funding for organizations and events in an equitable manner in communities where we operate.

Canfor's Sponsorship & Donations program funds charitable organizations that deliver innovative community programs focusing on:

- Youth and Education
- Community Enhancement
- Forestry and Environment
- Amateur Sports
- Health and Wellness

The amount of money donated to local causes, scholarships and charities is a quantifiable measure of the amount of financial support provided to a community outside of the major contributions of employment and taxes.

In addition to those locally quantifiable donations that Canfor makes there are other larger though less quantifiable donations that Canfor makes at the regional level which provide a benefit to the residents of the region as a whole however is not reported on in this indicator. These include donations or sponsorship of things like the Medical facility at UNBC or larger corporate donations through the United Way and the Salvation Army – BC North and Yukon.

CURRENT STATUS

In 2013 Canfor made a number of monetary and product donations to an array of interest groups. Monetary donations totaling $7,700 were made as well as over $2,000 in products.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

Implementing the SFMP indicator strategy will result in benefit flowing to local groups that otherwise might not receive any direct economic benefit from Canfor’s forest operations.

STRATEGY AND IMPLEMENTATION SCHEDULE

As individuals receive requests, or have ideas for donations, requests are made to the plant manager for approval.

The target level is reviewed and may be adjusted annually.

MONITORING PROCEDURE

Once approved, a record of the donation is made and tracked. Progress towards the target is monitored periodically through-out the year to ensure the target is achieved by year end.

LINKAGES TO OPERATIONAL PLANS

Not applicable.

3.45 Local Employment

Criterion 5:	Element(s): 5.2
Economic and Social Benefits	Communities and Sustainability
CSA Core Indicator(s): 5.2.1 Level of investment in initiatives that contribute to community	
Indicator Statement	**Target Statement**
The proportion of dollars spent on local versus non-local contractors	A 5 year rolling average of 65% of local vs. non-local contractors and an annual minimum of 50% local versus non-local
Value(s): Local Employment	
SFM Objective: We will ensure local communities and contractors have the opportunity to share in benefits such as jobs, contracts and sales.	
Canfor common indicator statement: Investment in local communities	

ACCEPTABLE VARIANCE

None. This indicator is applicable only to Canfor operations on the TFL.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Woodlands operations purchase a wide variety of products and services to produce timber and to manage its forestry activities. This indicator is a measure of the proportion of dollars attributed to forestry activities that are spent locally which indirectly is a measure of the local forest employment opportunities associated with forest industry activities, the SFM objective for this element. For the purposes of this objective, local has been defined as those residences or businesses that have mailing addresses or known established businesses located in the legacy Dawson Creek Forest District.

CURRENT STATUS

See Figure 31 for current status of this indicator. The five-year rolling average from 2009 to 2013 saw 83% of expenditures made to local vendors.

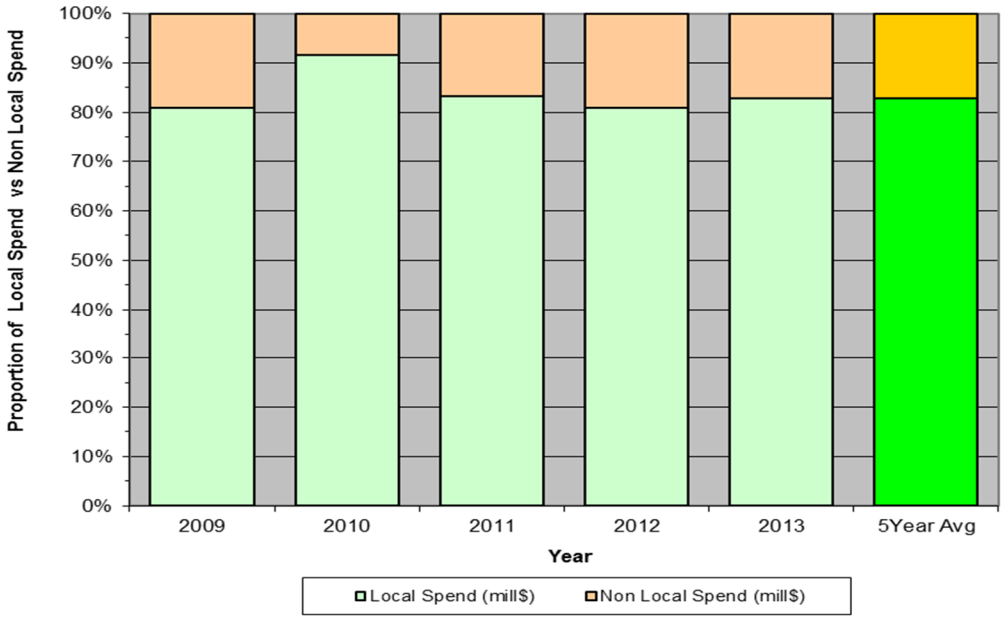


Figure 30: Proportion of Dollars Spent on Local versus Non-Local Contractors (2013)

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

It is anticipated that implementing the SFMP indicator strategy will result in strengthening of the local economy through the local spending of contractors who reside in the Chetwynd area. No quantitative forecasting assumptions are made for this indicator as the dollars to be spent fluctuate annually, depending on the amount of harvesting activity planned.

STRATEGY AND IMPLEMENTATION SCHEDULE

All woodlands costs will be tracked annually and a query will be done identifying the amount of these dollars that are expended in contracts to local contractors. Although this indicator will not ultimately identify local forest employment opportunities directly attributable to our activities it does provide a certain measure of assurance of the amount of dollars that are spent in the local economy, which ultimately leads to employment opportunities. Stumpage has been removed from the calculation, as the expenditure is hard to quantify for local returns. The proportion of local vs. non-local has been tracked since 2000.

MONITORING PROCEDURE

To better define this indicator we must clearly identify those forestry activities that will be defined as a woodland phase. We have included the following activities as an individual phase for the purposes of defining what contributes towards being a woodlands phase.

- Logging and hauling costs
- Road construction and road maintenance, including deactivation
- Reforestation, including seedling cost, site preparation, planting, brushing and all surveys
- Planning and administration, including wages, office overhead, forest development costs, taxes, leases and rentals

LINKAGES TO OPERATIONAL PLANS

Not applicable.

3.46 Summer and Fall Deliveries

Criterion 5:	**Element(s): 5.2**
Economic and Social Benefits	Communities and Sustainability
CSA Core Indicator(s): 5.2.1 Level of investment in initiatives that contribute to community	
Indicator Statement	**Target Statement**
Volume (m^3) of timber delivered annually to Canfor Chetwynd mill between May 1st and October 31st	Minimum of 150,000 m^3 coniferous delivered to Canfor Chetwynd mill
Value(s): Local Employment	
SFM Objective: We will ensure local communities and contractors have the opportunity to share in benefits such as jobs, contracts and sales.	
Canfor common indicator statement: Investment in local communities	

ACCEPTABLE VARIANCE

Allowable variances for minimum deliveries will be proportional to the number of actual operating weeks, divided by the normal fifty operating weeks of the facilities per year.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

This indicator is the volume of logs delivered during the summer and fall months. These deliveries are essential to providing an uninterrupted fibre supply to run major timber processing facilities. Providing for deliveries between May 1st and October 31st (the frost free period) to major facilities reduces the amount of wood that must be decked in mill yards at breakup (i.e. the end of March). This substantially reduces carrying costs, and minimizes fibre value losses associated with excessive drying, which significantly improves the cost competitiveness of the local forest industry.

These deliveries provide summer employment opportunities, which increase the length of the work season for harvesting and road contractors. This improves the contractor's efficiency, and supports more stable employment, thereby also contributing to the stability of local communities.

Variances to the target are required to reflect situations where facilities may be closed for reasons other than lack of fibre supply.

CURRENT STATUS

This indicator was suspended in 2008 and 2009 when the mill was curtailed. There has been consistent achievement of this indicator when the mill is operating. In 2013 there was no significant downtime to mill operations. The only month that had no deliveries was the month of May. Between May 1st and October 31st Canfor delivered 307,611m3 of volume to the Chetwynd mill.

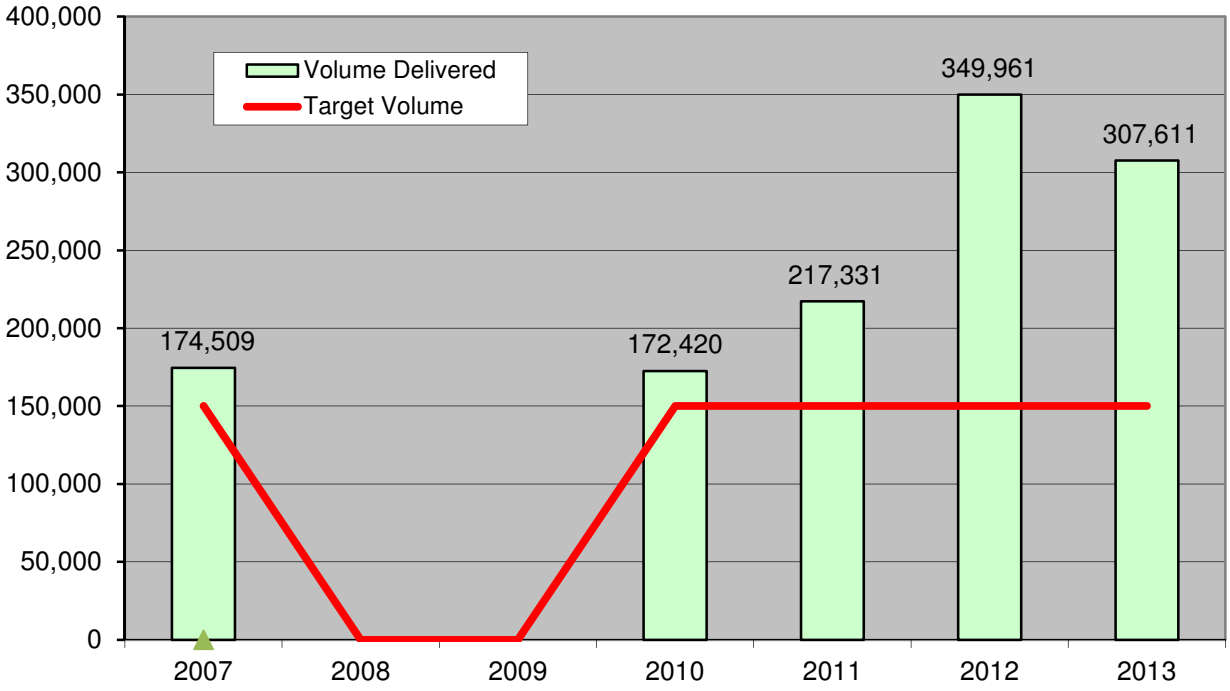


Figure 31 – Summer and Fall Deliveries (2013)

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

It is anticipated that implementing the SFMP indicator strategy will result in summer employment opportunities, which increase the length of the work season for harvesting and road contractors. This improves the contractor's efficiency, and supports more stable employment, thereby also contributing to the stability of local communities.

STRATEGY AND IMPLEMENTATION SCHEDULE

Areas that are suitable for harvesting operations during frost free conditions are relatively limited within the TFL. Harvest planning therefore needs to emphasize the identification and development of these areas.

Implementing this strategy will require careful assessment of all areas that may have potential for summer or fall logging, the identification of potential constraints, and development scheduling to support this strategy accordingly. Management practices on areas planned for summer harvesting will be implemented to ensure site productivity is not compromised by this strategy. Proposed blocks will be assessed to determine if moisture regime, soil conditions, and access opportunities are potentially conducive to operations during frost free periods. In potential summer or fall harvest areas, the following measures will be implemented to minimize environmental risks.

Careful monitoring of ongoing operations will determine when ground conditions become unfavourable due to excessive moisture, at which time harvesting operations will cease until conditions dry out.

Low ground pressure equipment will be used on fine textured soils to reduce compaction risks. This requirement will not apply when sufficient frost conditions or a compressible snow pack exists to prevent compaction.

"Boot survey" ocular site degradation assessments will be implemented where and when needed to monitor site degradation and provide guidance on when to cease operations.

Streams and wet areas will be identified, and measures identified in SP's to protect these areas during summer harvest conditions will be implemented.

If the access conditions are favourable, but site conditions preclude summer harvesting activities on the block, timber may be winter logged and decked in the block on landings or at roadside for summer load and haul.

MONITORING PROCEDURE

The volume delivered to the mills from May 1 to October 31 of each year will be determined from company scale information and reported in annual reports, along with information on the number of weeks of mill operations.

LINKAGES TO OPERATIONAL PLANS

The location of blocks identified in the FDP will, among other criteria, be based on the potential for summer harvesting. The proposed target volumes will provide guidance to the development of these plans.

SP's will note site conditions and the relative opportunities for summer harvesting or hauling in cutblocks, as well as identify potential issues to consider when determining if summer harvesting is feasible.

Annual harvesting plans will utilize information in these plans to assign season and year of harvest to blocks.

3.47 Level of Investment in Training and Skills Development

Criterion 5:	**Element(s): 5.2**
Economic and Social Benefits	Communities and Sustainability
CSA Core Indicator(s): 5.2.2 Level of investment in training and skills development	
Indicator Statement	**Target Statement**
Consistency with training plans and requirements	Training will be 100% consistent with established training requirements
Value(s): Investment in People	
SFM Objective: We will invest resources to enhance safety and environmental knowledge and performance.	
Canfor common indicator statement: Training in environmental and safety procedures in compliance with company training plans	

ACCEPTABLE VARIANCE

No less than 95% of the target will be achieved. Variance considers new employees and the timing of training conducted.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Sustainable forest management provides training and awareness opportunities 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. Training plans that are in place for employees of the forest organizations who work in the forest will be measured against whether the training occurred in accordance with these plans which will confirm the organizations commitment to training and skills development.

CURRENT STATUS

Canfor and BCTS have maintained processes around required training by job function. Training is generally related to safety and or EMS/FMS as these areas are of the upmost importance when maintaining and providing an effective sustainable forest management operation. Contractors that work on the DFA have their own internal processes for safety related training. Canfor and BCTS require contractors to be SAFE Company certified or equivalent, and as such, safety related issues are largely managed by each individual contractor as part of their own internal Occupational Health & Safety Programs. Matters related to EMS/FMS are relayed to contractors through annual contractor meetings, pre-project start-up meetings, and or through individual block pre-works in which the licencee is responsible for providing all relevant information. Individual operator/contractor knowledge of safety and EMS/FMS is verified through the CSA auditing process and periodically through the year or term of the project by a licencee supervisor.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Y e s

Implementation of the SFMP indicator strategy is anticipated to result in a safer and more environmentally conscious work environment which should result in a reduced number of safety and environmental incidents.

STRATEGY AND IMPLEMENTATION SCHEDULE

Documents that contain the required training will serve as the benchmark for training received. The number of staff in the organizational charts for Canfor and BCTS that are allocated to work on the DFA will be the reporting sample. Vacant positions are not accounted for in the analysis.

MONITORING PROCEDURE

Training documents will be reviewed annually and the percentage of staff members that have incomplete training will be reported.

LINKAGES TO OPERATIONAL PLANS

Canfor and BCTS have established training programs that ensure staff receive the appropriate training with respect to their given job function.

3.48 Level of Direct and Indirect Employment

Criterion 5:	**Element(s): 5.2**
Economic and Social Benefits	Communities and Sustainability
CSA Core Indicator(s): 5.2.3 Level of direct and indirect employment	
Indicator Statement	**Target Statement**
Level of direct and indirect employment	AAC* employee multiplier, 3 year rolling average
Value(s): Local Employment	
SFM Objective: We will contribute to local employment.	
Canfor common indicator statement: Level of direct and indirect employment	

ACCEPTABLE VARIANCE

No less than 90% of the target will be achieved. Variance allows for fluctuations to market conditions and uncontrolled setbacks in deliveries due to seasonal weather.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

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.

Note: the supporting figures for the multiplier are 137 million m3 harvest in 2008, 605,400 direct and indirect jobs in 2009 – actual multiplier is 4.42 jobs /1000m3. The specific website links for these two figures are http://canadaforests.nrcan.gc.ca/rpt/profiles (harvest volume) and http://canadaforests.nrcan.gc.ca/rpt/employment (employment).

CURRENT STATUS

The AAC for Canfor is 678,782 cubic meters and 58,630 cubic meters for BCTS. Based on the AAC and the job multiplier the target number of direct and indirect jobs created will be 3244. Changes to the AAC may be required in the future in which these numbers would need to be amended.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

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, which strengthens and diversifies the local economy.

STRATEGY AND IMPLEMENTATION SCHEDULE

Annually the number of jobs created will be reported. Use of a multiplier of 4.4 jobs per 1000 m3 multiplied by the total harvest volume will be used. The AAC in the indicator target statement refers to the allocation for both Canfor and BCTS. The earliest date this indicator can be reported as having been achieved or not achieved will be in the 2014 Annual Report.

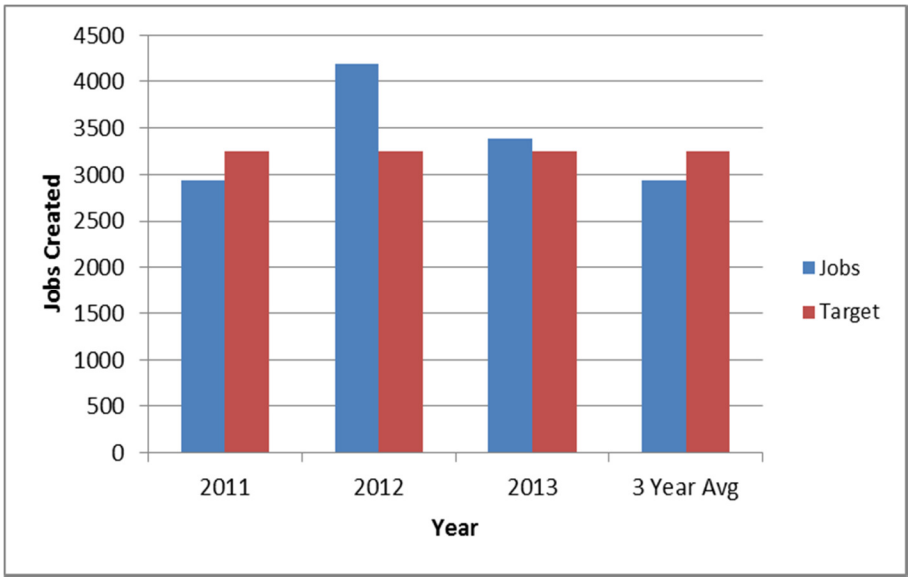


Figure 33 – Employment Created – 3 Year Rolling Average

MONITORING PROCEDURE

Review the national statistics (http://canadaforests.nrcan.gc.ca/rpt/indicators) that support the job multiplier and revise the multiplier every 3 years. Use of the previous two years of statistics will determine the multiplier that will be used for the following 3 year period.

LINKAGES TO OPERATIONAL PLANS

Organizations contribute to direct and indirect employment within the region and to sustainable harvesting by adhering to their apportioned harvest volume. Timber Supply Reviews and Analysis that contribute to the process of determining the AAC for the DFA are the responsibility of the DFA licence holder.

3.49 Level of Aboriginal Participation in the Forest Economy

Criterion 5:	**Element(s): 5.2**
Economic and Social Benefits	Communities and Sustainability
CSA Core Indicator(s): 5.2.4 Level of Aboriginal participation in the forest economy	
Indicator Statement	**Target Statement**
Opportunities available for First Nations to participate in the forest economy	Report annually the number and type of opportunities available to First Nations to participate in the forest economy
Value(s): Forest Economy	
SFM Objective: We will seek Aboriginal participation in the forest economy	
Canfor common indicator statement: # of opportunities for First Nations to participate in the forest economy	

ACCEPTABLE VARIANCE

No more than two reporting periods will show more than a 10% decreasing trend in opportunities provided.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

This indicator and related target looks specifically at First Nation participation in the forest economy, evaluating Licencees' efforts to build capacity within First Nations on matters related to the forest industry. The target was developed recognizing that there are occasions when First Nations after being giving the opportunity, elect not to participate and as such it was more desirable to report the number of opportunities over identifying the number of opportunities pursued.

CURRENT STATUS

Canfor holds a joint venture licence (A57332) with one of the local Aboriginal communities. BCTS was limited in the past in the number of opportunities that could be made available for timber sales on the DFA as there was a 10 year Non-renewable Forest Licence that accounted for 68% of BCTSs' annual allocation. Currently there are no economic opportunities provided for planning and or silviculture activities. There is a slight barrier for Aboriginals becoming active participants with the licensees due to increased industry standards and demands revolved around safety and environmental performance. Example of such a barrier includes the requirement for contractors and companies to be SAFE certified.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

As time progresses it is anticipated that First Nation capacity to participate in the forest economy will increase. Performance for an upcoming reporting period can be estimated with reasonably accurate precision. As an example, determining the amount of BCTS projects and timber sales offered for contract bids can be reasonably forecasted prior to the year those contracts would be awarded in. If it is determined that upcoming performance will be lower than previous reporting periods than a review may be required to see what opportunities could be developed to make up for the shortfall.

STRATEGY AND IMPLEMENTATION SCHEDULE

Annually the number of BCTS timber sales that are put up for sale on the DFA will be reported. BCTS will also report out on the number of opportunities provided for the silviculture contracts for works issued on the DFA. Canfor will report out the number of opportunities provided in all aspects of economic opportunity. The total number of opportunities in which Aboriginals were able to participate in the forest economy will also be reported on annually but will be for information purposes only.

MONITORING PROCEDURE

Annual Reports will indicate the level of performance for the following year. Assessment of the expected number of opportunities provided by both BCTS and Canfor may be done prior to a new fiscal year and beginning of the new reporting period.

LINKAGES TO OPERATIONAL PLANS

Silviculture and harvesting activities/plans can incorporate the use of First Nation contractors where feasible.

3.50 First Nations Awareness Training

Criterion 6:	**Element(s): 6.1**
Society's Responsibility	Aboriginal and Treaty Rights
CSA Core Indicator(s): 6.1.1 Evidence of a good understanding of the nature of Aboriginal title and	
Indicator Statement	**Target Statement**
First Nations awareness training.	100% of Canfor and BCTS staff involved with First Nations shall receive First Nations awareness training.
Value(s): Treaty and Aboriginal Rights	
SFM Objective: We will recognize and respect Treaty 8 Rights.	
Canfor common indicator statement: Employees will receive First Nations awareness training	

ACCEPTABLE VARIANCE

No less than 90% of staff will have received training to achieve the indicator and target. Variance accounts for new hires and the timing training is conducted.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

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 licencees 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.

CURRENT STATUS

All licensee staff have received First Nations awareness training.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

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

STRATEGY AND IMPLEMENTATION SCHEDULE

Companies invest in cultural awareness and skill development by ensuring that employees have received First Nations awareness training. Training to occur as part of training/ orientation program for new employees. Refresher training to occur every 5 years or sooner if training materials substantially changed. Staff members excluded in the implementation of this indicator include clerical, and GIS staff as their duties do not have the potential of impacting First Nations values, or Rights.

MONITORING PROCEDURE

Utilize employee training database to plan and record awareness training for employees of Canfor's. Report the number of active employees working within the DFA that have received the training within the past five years compared to the total number of employees.

LINKAGES TO OPERATIONAL PLANS

Sharing information and communication with First Nations on Forest Stewardship Plans supports the provincial government's legal obligation to consult with First Nations regarding Aboriginal rights and title.

Participating licensees are committed to assisting the Crown in carrying out its duty to consult by sharing information and endeavoring to address concerns.

3.51 Consultation and Information Sharing with First Nations on Management Plans

<table>
<tr><td>Criterion 6:</td><td>Element(s): 6.1, 6.4</td></tr>
<tr><td>Society's Responsibility</td><td>Aboriginal and Treaty Rights; Fair and Effective Decision-Making</td></tr>
<tr><td colspan="2">CSA Core Indicator(s): 6.1.2 Evidence of best efforts to obtain acceptance of management plans based on Aboriginal communities having a clear understanding of the plans
6.4.3 Evidence of efforts to promote capacity development and meaningful participation for Aboriginal</td></tr>
<tr><td>Indicator Statement</td><td>Target Statement</td></tr>
<tr><td>Consultation and Information sharing with First Nations on management plans</td><td>Information Sharing and Consultation will occur with affected First Nations on 100% of Management Plans</td></tr>
<tr><td colspan="2">Value(s): Treaty and Aboriginal Rights, Level of Knowledge for Decision Making</td></tr>
<tr><td colspan="2">SFM Objective:
We will recognize and respect Treaty 8 Rights.
We will provide information to public and First Nations about forest ecosystem values and management.
We will have an effective and satisfactory process that enables public participation of stakeholders and First Nations.</td></tr>
<tr><td colspan="2">Canfor common indicator statement: NA</td></tr>
</table>

ACCEPTABLE VARIANCE

None.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

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. Making those plans available to First Nations for review allows them to have a better understanding of forest management practices enabling them to make informed decisions and review comments.

CURRENT STATUS

The Forest Stewardship Plan (2012-2017) has gone through the consultation process prior to its approval by government. This SFMP and the Tree Farm Licence Management Plan have also been through a public review process which included First Nations participation. Annual Management Plans that are made available to First Nations for information sharing include the Notification of Intent to Treat (NIT) for herbicide applications; the Annual Operating Plan(s) (AOP) for proposed cutblocks, and; the SFMP Annual Report.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

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

STRATEGY AND IMPLEMENTATION SCHEDULE

Consultation and public review processes are largely determined through various Acts and Regulations which apply to any particular Management Plan. Timing of referrals along with referral duration are all pre-determined in forest legislation. Canfor is the primary holder of the various Management Plans that pertain to the DFA and therefore are largely responsible for ensuring those plans are consulted on to the appropriate standard. Not all management plans will require annual review, such as the FSP, therefore only management plans where consultation/information sharing is required to occur will constitute a plan that is applicable to meet the target. Information sharing will occur with designated representatives such as Forest Managers from each First Nations community that falls within the DFA or is impacted by the activities carried out on it.

MONITORING PROCEDURE

Canfor utilizes a web-based application called COPI to track public correspondence. COPI will be utilized to identify which stakeholders were consulted with.

LINKAGES TO OPERATIONAL PLANS

The Forest Stewardship Plan (FSP), Tree Farm Licence Management Plan (MP), Sustainable Forest Management Plan (SFMP), SFMP Annual Report, Pest Management Plan (PMP), Notification of Intent to Treat (NIT), and Annual Operating Plan (AOP) are the plans that will be shared with affected First Nation communities.

3.52 Diversifying the Local Economy

Criterion 6:	Element(s): 6.3
Society's Responsibility	Forest Community Well-Being and Resilience
CSA Core Indicator(s): 6.3.1 Evidence that the organization has co-operated with other forest-dependant businesses, forest users, and the local community to strengthen and diversify	
Indicator Statement	**Target Statement**
Primary and by-products that are bought, sold, or traded with other forest dependent businesses in the local area.	On an annual basis at least 5 first order wood products will be provided for production from trees harvested from the DFA.
Value(s): Strengthening and Diversifying Community Businesses and Business Opportunities	
SFM Objective: We will provide opportunities for local economic development.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

None.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

An economically and socially diverse community is often more sustainable in the long term with it's 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. Making a diversity of products allows the opportunity for other businesses to utilize those products.

CURRENT STATUS

The Chetwynd sawmill produces: lumber, trim blocks, pulp chips, wood shavings, sawdust, and hog fuel.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

It is anticipated that implementation of the SFMP indicator strategy will result in support for local communities through business relationships providing employment diversification and increased local revenue and economic stability.

STRATEGY AND IMPLEMENTATION SCHEDULE

At the time of developing the Annual Report a representative from the mill will be contacted to obtain a list of the products the mill had produced over the reporting period.

MONITORING PROCEDURE

Annually a list of products produced from Chetwynd sawmill will be obtained from a representative from the mill. The number of products that are utilized by other users within the DFA will also be reported for information purposes.

LINKAGES TO OPERATIONAL PLANS

Not applicable.

3.53 Safety Over the DFA

Criterion 6:	Element(s): 6.3
Society's Responsibility	Forest Community Well-Being and Resilience
CSA Core Indicator(s): 6.3.2 Evidence of co-operation with DFA-related workers and their unions to improve and enhance safety standards, procedures, and outcomes in all DFA-related workplaces and affected communities	
Indicator Statement	**Target Statement**
Implementation and maintenance of certified safety program	Canfor and BCTS will implement and maintain certified safety programs
Value(s): Level of Safety Committed to Operations	
SFM Objective: We will maintain safety certification and contribute to improving the safety of operations on the DFA	
Canfor common indicator statement: Implementation and maintenance of certified safety program	

ACCEPTABLE VARIANCE

None.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Canfor's first measure of success is the health and safety of its people. This philosophy is embraced and promoted from the mill floor to the executive offices. This commitment is reflected in the work practices and safety programs employed at all operations.

Canfor implements their safety program 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 forest operations are third party certified to a safety program that meets or exceeds provincial safety programs - SAFE Company in BC.

CURRENT STATUS

Both Canfor and BCTS are SAFE Company certified. All contractors that work on the DFA are required to be recognized by a safety certification body. Sub-contractors who may not be certified to a safety standard conduct their works under a primary contractor which is designated for all work sites. Prime contractors are responsible for the safety of all peoples who access that given work site. The level of safety on the DFA is indirectly measured through the cumulative auditing of all participants (licencees and

contractors) Occupational Health & Safety Programs and processes. Canfor also actively participates in organizations or processes that are safety related and that pertain to the DFA such as the Sukunka Road Users Group as well as the South Peace Road Safety Committee when it was in place.

STRATEGY AND IMPLEMENTATION SCHEDULE

From 1998 to 2005, WorkSafe BC reported an average of nearly 22 harvesting fatality claims each year — the worst in 2005 with 34 claims. After the formation of the BC Forest Safety Council and the charge for industry to become SAFE Company certified, the industry averaged fewer than 14 fatalities from 2006 to 2008. **I**n 2010 Canfor continued to have the lowest injury rate in the Canadian forest industry, it was less than 1/3 of the average injury rate for the forest products industry. 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 is unacceptable.

MONITORING PROCEDURE

Compliance to the SAFE Company certification standard is conducted by an external auditor at a maximum 3 year interval as the certificate is valid for a period of 3 years. Annual audits conducted internally are a requirement of the standard and the audit results are submitted to the BC Forest Safety Council for review.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

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.

LINKAGES TO OPERATIONAL PLANS

The Occupational Health & Safety Program is the plan that guides safe practices and ensures the company is committed to, and improving safety in the forest industry.

3.54 Public Advisory Committee Satisfaction

Criterion 6:	**Element(s): 6.4**
Society's Responsibility	Fair and Effective Decision-Making
CSA Core Indicator(s): 6.4.1 Level of participant satisfaction with the public participation process **6.4.2** Evidence of efforts to promote capacity development and meaningful participation in general	
Indicator Statement	**Target Statement**
PAG established and maintained a satisfaction survey established according to Terms of Reference	80% satisfaction from surveys
Value(s): Level of Knowledge for Decision Making	
SFM Objective: We will provide information to public and First Nations about forest ecosystem values and management. We will have an effective and satisfactory process that enables public participation of stakeholders and First Nations.	
Canfor common indicator statement: PAG established and maintained a satisfaction survey established according to Terms of Reference	

ACCEPTABLE VARIANCE

-10%

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

The SFM Public Advisory Committee was established to assist the participating licencees 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 Advisory Committee 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.

CURRENT STATUS

The PAC's level of satisfaction with the public participation process was assessed using a standardized survey administered at the January 2014 meeting. The average satisfaction score achieved was 4.4 out of 5 or 88%.

STRATEGY AND IMPLEMENTATION SCHEDULE

Participating licensees provide all Advisory Committee members, and interested public who have shown notable interest (written comments or SFM Plan meeting attendance) during the reporting period, a feedback form (survey) to assess their satisfaction with the process. The survey content and process will be described in the Advisory Committee's Terms of Reference. All survey questions will have a 1-5 scoring assessment (1 being poor or ineffective, 3 being generally satisfied and 5 being excellent or highly effective). In order to achieve the target, the survey results of all of the meetings held over the reporting year will be utilized to determine the overall satisfaction with the PAC process.

MONITORING PROCEDURE

After each PAC meeting the survey results will be determined and if the results indicate a rating of less than 80% satisfaction than measures to improve the process will be implemented at subsequent meetings.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

It is anticipated that interaction with the PAC will result in informed public participation in forest planning and operations that is open, inclusive and responsive to public concerns and grounded in science. It is foreseeable that higher satisfaction ratings will translate into a more engaged and committed Committee resulting in higher attendance.

LINKAGES TO OPERATIONAL PLANS

Not applicable.

3.55 Public Advisory Committee

Criterion 6:	**Element(s): 6.4**
Society's Responsibility	Fair and Effective Decision-Making
CSA Core Indicator(s): 6.4.2 Evidence of efforts to promote capacity development and meaningful participation in general **6.4.3** Evidence of efforts to promote capacity development and meaningful participation for Aboriginal	
Indicator Statement	**Target Statement**
Public Advisory Committee	We will establish and maintain Public Advisory Committee and generally hold at least one meeting annually.
Value(s): Level of Knowledge for Decision Making	
SFM Objective: We will provide information to public and First Nations about forest ecosystem values and management. We will have an effective and satisfactory process that enables public participation of stakeholders and First Nations.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

No variances.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

"Public participation is a vital component of SFM in Canada. Members of the public are widely considered to have the right to be involved in the management of publicly owned forests. Through their participation in the process, citizens can expect to enhance their knowledge of SFM in general and of other interests and values related to local forests. They also gain a valuable opportunity to be involved in the decision making for the local forests.

Implementation of a public participation process as specified in this Standard (CSA Z809-08) gives the public an opportunity to be involved proactively in the management of a DFA. Interested parties are invited to have input in the major steps of SFM, and the organization has an obligation to heed such input, either by accepting it and revising management accordingly or by responding with specific reasons for not accepting it." (CSA 2008)

CURRENT STATUS

The Chetwynd Public Advisory Committee was formed and had its first meeting on February 4th, 2000. The following Table 47 summarizes the number of meetings held per year since then.

Table 47: Public Advisory Committee Meetings

Year	Number of PAC Meetings
2000	8
2001	3
2002	3 (+1 field trip)
2003	1
2004	4
2005	5
2006	1
2007	1 (+ 1 field trip)
2008	1
2009	1
2010	1
2011	3
2012	2
2013	0
2014	3 (+1 field trip)

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes
- 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.

STRATEGY AND IMPLEMENTATION SCHEDULE

There are typically 2 separate business objectives that the PAC serves. One is providing input on the Values, Objectives, Indicators and Targets and development of the SFM plan for the DFA. This work typically is more intensive and requires more work as is indicated by the number of meetings in Table 47 for the year 2000. The second role is that of a monitoring performance and implementation through review of annual reports and providing suggestions for improvements where appropriate.

MONITORING PROCEDURE

Performance will be reported in each annual report or SFM plan.

LINKAGES TO OPERATIONAL PLANS

Not applicable.

3.56 Public Advisory Committee Terms of Reference

Criterion 6:	Element(s): 6.4
Society's Responsibility	Fair and Effective Decision-Making
CSA Core Indicator(s): 6.4.2 Evidence of efforts to promote capacity development and meaningful participation in general	
Indicator Statement	**Target Statement**
Terms of reference (TOR) for the Chetwynd TFL 48 DFA public participation process	Obtain PAC acceptance of TOR for public participation process bi-annually (every 2 years)
Value(s): Level of Knowledge for Decision Making	
SFM Objective: We will provide information to public and First Nations about forest ecosystem values and management. We will have an effective and satisfactory process that enables public participation of stakeholders and First Nations.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

No variances.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Canfor is committed to provide ongoing opportunities for the public to be involved in the TFL 48 planning and monitoring activities. A key element in the public oversight component is the establishment of a public advisory committee.

This is a demonstration that the public participation process is designed and functioning to the satisfaction of the PAC.

CURRENT STATUS

The first TOR was agreed to with the PAC on March 7, 2000. The last review was on January 30,2014 where minor changes were made.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

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.

STRATEGY AND IMPLEMENTATION SCHEDULE

The PAC has accepted the TOR. PAC members may recommend revisions at any time. The TOR will be reviewed bi-annually (2 years).

MONITORING PROCEDURE

A bi-annual review of the TOR will be a regular agenda item for PAC meetings. Meeting summaries will be distributed to the PAC and summarized in the annual report.

LINKAGES TO OPERATIONAL PLANS

Not applicable.

3.57 Educational Opportunities

Criterion 6:	Element(s): 6.5
Society's Responsibility	Information for Decision-Making
CSA Core Indicator(s): 6.5.1 Number of people reached through educational outreach	
Indicator Statement	**Target Statement**
The number of forestry related educational opportunities provided to the general public	On an annual basis two or more opportunities will be conducted that will promote forestry awareness to the general public.
Value(s): Level of Knowledge for Decision Making	
SFM Objective: We will have an effective and satisfactory process that enables public participation of stakeholders and First Nations.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

None.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

The participating licensees are committed to working with directly affected stakeholders and members of the public on forest management issues and have a well-established history of participation in community meetings, including local planning processes. The sharing of knowledge and contributes to informed, balanced decisions and plans acceptable to the majority of public. When informed and engaged, members of the public can provide local knowledge and support that contributes to socially and environmentally responsible forest management.

CURRENT STATUS

In 2013 there was 1 activity that was conducted to promote the awareness of forestry to the general public. In October Canfor participated in an annual event sponsored by COFI (Council of Forest Industries) that seeks to educate local grade schools with regard to forest management. A variety of Canfor's supervising foresters presented training on some of the various aspects of forestry duties such as silviculture, ecotyping, navigation (map reading and compassing), and timber cruising activities to a group of 30 students and 2 teachers.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

It is anticipated that achievement of the target will result in an educated and informed public with a broad understanding of forestry that can provide local input and support on matters pertaining to forest planning and operations.

STRATEGY AND IMPLEMENTATION SCHEDULE

Participating licensees maintain their involvement in educational outreach initiatives (e.g., maintaining an open and active public advisory group, hosting field tours and open houses, school classroom visits, etc). Opportunities will be made to the general public who would be most interested in operations that occur within the DFA. Communities that would have a direct interest in the forest management of the DFA include Hudson Hope, Chetwynd, and Tumbler Ridge as well as First Nation communities of the West Moberly First Nations, Saulteau First Nations, and the McLeod Lake Indian Band.

MONITORING PROCEDURE

Track and report the number of educational opportunities provided in the reporting period.

LINKAGES TO OPERATIONAL PLANS

All operational plans identified in Indicator 51 represent an opportunity to link to an educational information session since most of those operational plans have a public review process. It is difficult to separate the commitments to sustainable forest management as indicated in the SFMP with the operational plans that are in place for legislative purposes. As such, discussion of operational plans should be considered as educational opportunities provided for sustainable forest management.

3.58 Response to Public Inquires

Criterion 6:	**Element(s): 6.5**
Society's Responsibility	Information for Decision-Making
CSA Core Indicator(s): 6.5.2 Availability of summary information on issues of concern to the	
Indicator Statement	**Target Statement**
Percentage of timely responses to public inquires	We will respond to 100% of public inquiries concerning our forestry practices within one month of receipt and provide summary to PAC annually
Value(s): Level of Knowledge for Decision Making	
SFM Objective: We will provide information to public and First Nations about forest ecosystem values and management.	
Canfor common indicator statement: NA	

ACCEPTABLE VARIANCE

There is no acceptable variance for responding to public inquiries, and variance should not exceed 10% of the target for responding within one month.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

This indicator tracks the level and timeliness of response to public communications received by Canfor related to forest management activities. It will be the responsibility of Canfor to track comments received through communications, and also track the response to these comments in order to monitor and report on this indicator.

Public participation and communication in SFM are important means by which to incorporate public values in long-term SFM planning. The SFM process encourages open and effective communication of values from a diversity of interests. As such, it is important to ensure that communication from individuals and/or groups representing various interests directed towards forest management plans and activities received by Canfor receive appropriate response. By maintaining effective communication between the public, licensees, managing agencies and other stakeholders, there is a much greater ability to work together to develop mutually compatible objectives on the land base. Maintaining effective communication is not only important for developing the SFM plan, but will also be important in the monitoring, evaluation and continual improvement part of the SFM process.

The indicator performance is reported to the PAC annually to ensure that performance is available to the Public.

CURRENT STATUS

In 2013 there were no inquiries from the public regarding Canfor's operations on the TFL and only one inquiry from another Licensee regarding the TSR data and the AAC uplift Canfor has applied for. The questions were around the model used to project the amount of beetle attack that exists on the TFL as well as the predicted shelf life. A description of the model used was provided in conjunction with a description of the flights and ground recces used to confirm/alter the model assumptions to create a more accurate picture of the MPB infestation and what the expected shelf life is of that timber was provided.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes

It is anticipated that achievement of the target will result in public awareness and understanding of the SFM Plan as well as continuous improvement of the plan.

Analysis Comments/Discussion

Response type (examples):

- Written (letter, fax, e-mail)
- Verbal (conversation) - must be a recorded conversation

Business rules:

- Response is defined as sent
- Reporting period for this indicator will be the calendar year
- Public communications
  - includes First Nations and other interest groups
  - excludes government communications

STRATEGY AND IMPLEMENTATION SCHEDULE

A description of the chosen strategy, including all significant actions to be undertaken and their associated implementation schedule. A summary of all public inquiries received will be included in Annual Reporting as well as auditing findings identified in internal and external auditing processes.

Table 48: Indicator Monitoring Implementation Schedule

Activity	Actions required	Responsibility	Schedule (date/interval)
Set up system to document response	Ensure a system is organized to document comments and responses (COPI)	Woods Manager	July 2005
Monitor and update data	Ensure data is updated	Woods Manager	Annually Month of July
Analysis	Not applicable	Not applicable	Not applicable
Report	Indicator Performance Management for Management Adjustment Purposes (review updated data only)	Woods Manager	Annually since July 2000
Report	Report to Public Advisory Committee Include Indicator Performance in Annual Report	Woods Manager	Annually

MONITORING PROCEDURE

The information provided under this heading summarizes the sources of monitoring information, timing and frequency of monitoring to ensure that Canfor meets the targets.

Table 49: Inventories Needed to Monitor and Analyze Indicator

Inventory	Source	Updating required for future analysis?	Date/interval required
Communication records data will be tracked in COPI	Canfor COPI database. Persons receiving comments will be responsible for entering them into COPI.	Yes	As communications are received and communications are sent

Calculation of Indicator

Formula:

$$\%C_{,\ Canfor\ Chet} = (R_{type,\ Canfor\ Chet} / C_{Canfor\ Chet}) \times 100$$

Variables:

$\%C_{Canfor\ Chet}$	% of comments receiving response by licensee within one month
$R_{Canfor\ Chet}$	Number of responses to comments received by Canfor Chetwynd that were responded to within one month of receipt
$C_{Canfor\ Chet}$	Number of comments received by Canfor Chetwynd

LINKAGES TO OPERATIONAL PLANS

Action Plans resulting from public comments to be incorporated into operational planning processes.

3.59 Distribution/Access to SFM Plan, Annual Reports and Audit Results

Criterion 6:	Element(s): 6.5
Society's Responsibility	Information for Decision-Making
CSA Core Indicator(s): 6.5.2 Availability of summary information on issues of concern to the	
Indicator Statement	**Target Statement**
Distribution/access to SFM Plan, Annual Reports and Audit Results	All SFM plans, annual reports, and audit reports will be made available during open houses, on Canfor's website (http://www.canfor.com/sustainability/certification/csa.asp), others upon request and distributed to PAC members and advisors
Value(s): Level of Knowledge for Decision Making	
SFM Objective: We will provide information to public and First Nations about forest ecosystem values and management.	
Canfor common indicator statement: SFM monitoring report made available to the public	

ACCEPTABLE VARIANCE

None.

WHAT IS THIS INDICATOR AND WHY IS IT IMPORTANT?

Public participation is a vital component of SFM in Canada (CSA 2008). To ensure meaningful public participation members of the public advisory committee and others need to have access to SFM plans, annual reports and audit reports. This ensures that the public is kept informed and knowledgeable about Canfor's commitments and third party audited results.

CURRENT STATUS

The SFM plan for TFL 48 is available on Canfor's website at the following location (http://www.canfor.com/sustainability/certification/csa.asp). Also included are copies of annual reports and summaries of the 3rd party external audits completed on TFL 48. Copies of the above have been circulated to members of the PAC and advisors as well.

TFL 48 was randomly audited in 2012 by the Forest Practices Board. Results of the audit were made publicly available in 2013 by the Forest Practices Board. These audit results were discussed with the PAC during the January 2014 PAC meeting.

FORECASTING ASSUMPTIONS AND ANALYTICAL METHODS

- Does forecasting apply (y/n)? Yes.

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. A continuously improving SFM Plan that has openly informed, included and responded to the public.

STRATEGY AND IMPLEMENTATION SCHEDULE

Copies of the SFM plan, annual reports and audit reports have been available since Canfor first developed a SFM plan registered to the CSA standard in 2000.

MONITORING PROCEDURE

This indicator is documented through the meeting summaries and Canfor's COPI system, which tracks public enquiries. Public inquiries received as part of Indicator 58 will be summarized in each annual report.

LINKAGES TO OPERATIONAL PLANS

This indicator is a process monitoring indicator related to the SFM plan and does not directly link to operational plans.

4 MANAGEMENT OBJECTIVES

Prior to the definition of TFL Management Plan content in the Forest and Range Practices Act, the TFL licence document identified the management objectives that were required to be addressed by the licence holder in a management plan. These management objectives were documented in SFMP 4 and were approved by the MFLNRO.

The legally required management plan content is no longer specified by the TFL licence document, as it is now specified in FRPA. The legally required management plan content has been removed from the SFMP and has been incorporated into a stand alone Management Plan for TFL48 that has been submitted to the MFLNRO for approval.

This section 4 describes the linkage between the SFM objectives identified in this SFMP and the management of forest resources on TFL 48.

4.1 Management and Utilization of Timber Resources

The management objectives regarding management and utilization of the timber resources in the Licence area, including harvesting methods, and utilization suitable to the types of timber and terrain on the TFL are the SFM Objectives listed below:

Table 50: Management and Utilization of the Timber Resource Linkages to the SFMP

SFM Objective	SFMP Section	Indicator
Objective for management and utilization of the timber resources		
We will conserve or restore ecosystem diversity within the natural range of variation within DFA over time. We will sustain forests within the DFA. We will provide opportunities for a feasible mix of timber, recreational activities, visual quality, and non-timber commercial activities.	3.2	Forest Types
	3.21	Harvest Levels/Volumes
	3.22	Allowable Annual Cut
	3.36	Harvest Method
	3.41	Waste

4.2 Protection and Conservation of Non-timber Values and Resources

The management objectives regarding protection and conservation of non-timber values and resources in the Licence Area regarding visual quality, biological diversity, soils, water, recreation resources, cultural heritage resources, range land and wildlife and fish habitats are the SFM Objectives described below:

Table 51: Protection and Conservation of Non-timber Values and Resources Linkages to the SFMP

SFM Objective	SFMP Section	Indicator
Objective for visual quality, recreation resources, and range land		
We will provide opportunities for a feasible mix of timber, recreational activities, visual quality, and non-timber commercial activities.	3.35	Range Opportunities
	3.37	Proportion of Harvesting Consistent with Visual Quality Objective
	3.38	Back Country Condition
	3.39	Recreational Sites
Objective for biological diversity		
We will conserve or restore ecosystem diversity within the natural range of variation within DFA over time. We will sustain sufficient and appropriately distributed suitable habitat elements to maintain native species richness.	3.1	Ecosystem Representation
	3.2	Forest Types
	3.3	Late Seral Forest
	3.4	Patch Size Distribution
	3.5	Snags/Live Tree Retention
	3.6	Wildlife Tree Patches
	3.7	Average Minimum Width of RRZ and RMZ
	3.10	Habitat Supply for Species of Public Concern
	3.11	Species of Management Concern
Objective for soils		
We will protect soil resources to sustain productive forests.	3.23	Soil Degradation
	3.24	Soil Disturbance Surveys
Objective for water		
We will maintain water quality and quantity	3.32	Spills Entering Water Bodies
	3.28	Stream Crossing Quality Index
	3.30	Peak Flow Index

SFM Objective	SFMP Section	Indicator
Objective for cultural heritage resources		
We will implement management strategies appropriate to the long term maintenance of protected areas and sites of special geological, biological, or cultural significance. We will recognize and respect Treaty 8 rights.	3.15	Known Values and Uses Addressed in Operational Planning
Objective for fish and wildlife habitat		
We will maintain water quality and quantity. We will sustain sufficient and appropriately distributed suitable habitat elements to maintain native species richness. We will implement management strategies appropriate to the long term maintenance of protected areas and sites of special geological, biological, or cultural significance.	3.7	Average Minimum Width of RRZ and RMZ
	3.9	Wildlife Habitat Areas, Ungulate Winter Ranges and Dunlevy Creek Management Plan
	3.10	Habitat Supply for Species of Public Concern
	3.11	Species of Management Concern

4.3 Integration of Harvesting Activities with Non-timber Uses

The management objectives regarding the integration of harvesting activities in the Licence Area for purposes other than timber production are the SFM Objectives described below:

Table 52: Integration of Harvesting Activities with Non-timber Use Linkages to the SFMP

SFM Objective	SFMP Section	Indicator
Objective for integration of harvesting activities with trappers, guide outfitters, range tenure holders, and other licensed resource users		
We will sustain sufficient and appropriately distributed suitable habitat elements to maintain native species richness. We will sustain forests within the DFA. We will provide opportunities for a feasible mix of timber, recreational activities, visual quality, and non-timber commercial activities. We will provide information to public and First Nations about forest ecosystem values and management. We will have an effective and satisfactory process that enables public participation of stakeholders and First Nations.	3.10	Habitat Supply for Species of Public Concern
	3.19	Area of Forested Land Lost to Non-Forest Industry
	3.35	Range Opportunities
	3.40	Consistency with Third Party Action Plans
	3.55	Public Advisory Committee

SFM Objective	SFMP Section	Indicator
Objective for integration of harvesting activities with aboriginal people		
We will implement management strategies appropriate to the long term maintenance of protected areas and sites of special geological, biological, or cultural significance. We will recognize and respect Treaty 8 rights. We will provide information to public and First Nations about forest ecosystem values and management. We will have an effective and satisfactory process that enables public participation of stakeholders and First Nations.	3.15	Known Values and Uses Addressed in Operational Planning
	3.55	Public Advisory Committee

4.4 Forest Fire

The management objectives regarding forest fire prevention and suppression, prescribed fire, and fuel management is the SFM Objective described below:

Table 53: Forest Fire Objectives Linked to SFMP

SFM Objective	SFMP Section	Indicator
Objective for forest fire prevention and suppression, prescribed fire, and fuel management		
We will provide opportunities for a feasible mix of timber, recreational activities, visual quality, and non-timber commercial activities.	3.42	Forest Health
	3.43	Proportion of Completed Forest Health Action Plans

4.5 Forest Health

The management objectives regarding forest health, including disease and pest management is the SFM Objective described below:

Table 54: Forest Health Objectives Linked to SFMP

SFM Objective	SFMP Section	Indicator
Objective for forest health including disease and pest management		
We will provide opportunities for a feasible mix of timber, recreational activities, visual quality, and non-timber commercial activities.	3.42	Forest Health
	3.43	Proportion of Completed Forest Health Action Plans

4.6 Silviculture

Silviculture is defined as managing forest vegetation by controlling stand establishment, growth, composition, quality and structure, for the full range of forest resource objectives. On TFL 48, we practice a wide range of silviculture activities designed to improve the productivity and value of our future forests.

We carefully site prepare cutover lands where required, reforest utilizing nursery stock grown from native seed, and control brush and weed species. Superior planting stock will be used when available.

The management objectives regarding silviculture are the SFM Objectives described below:

Table 55: Silviculture Objectives Linked to SFMP

SFM Objective	SFMP Section	Indicator
Objective for silviculture		
We will conserve or restore ecosystem diversity within the natural range of variation within DFA over time. We will conserve genetic diversity of tree stock. We will sustain a natural range of variability in ecosystem function, composition and structure which allows ecosystems to recover from disturbance and stress.	3.2	Forest Types
	3.12	Coniferous Seeds
	3.13	Deciduous Seeds and Vegetative Material
	3.17	Free Growing Stands
	3.18	Regeneration Declaration

4.6.1 Pre-82 Backlog

Section 21.00 of the TFL licence agreement requires Canfor to eliminate all pre-1982 backlog NSR areas prior to November 30, 2008.

Over the period of Management Plan 3, Canfor was able to complete all of its pre-82 backlog NSR commitments included in the TFL 48 licence document.

- Canfor met with the District Manager regarding the outstanding pre-82 backlog NSR commitments contained within the TFL 48 license document.
- A plan to complete Canfor's pre-82 backlog NSR obligations was approved by the district manager on January 19, 2004.
- The last of the outstanding silviculture treatments were completed in June 2004.
- In a letter dated January 20, 2005, the District Manager confirmed that Canfor has completed all of its outstanding silviculture obligations on the pre-82 backlog NSR sites.
- As part of Canfor's commitment to the District Manager, yield curves for these backlog areas are included in the information package as Analysis Units 131 and 132.

4.7 Roads

The management objectives regarding roads are the SFM Objective described below:

Table 56: Road Objectives Linked to SFMP

SFM Objective	SFMP Section	Indicator
Objective for road construction, maintenance and deactivation		
We will sustain forests within the DFA.	3.20	Permanent Access Corridors

5 PUBLIC REVIEW OF SFMP

5.1 Chetwynd Public Advisory Committee

In February 2000 Canfor formed a Public Advisory Committee (PAC) to develop sustainable forest management indicators and objectives for Tree Farm Licence (TFL) 48.

The PAC helps ensure that sustainable forest "decisions are made as a result of informed, inclusive, and fair consultation with local people who are directly affected by or have an interest in sustainable forest management decisions". The PAC represents the diverse range of interests in the TFL and:

- provides input on:
  - values, objectives, indicators and targets as related to CSA
  - design of Sustainable Forest Management (SFM) system, monitoring system, and evaluation process
- reviews performance evaluations and make recommendations for improvement
- provides input to the communication strategy to provide feedback to interested parties about the defined forest area, particularly the results of performance evaluations related to the critical elements of the Canadian Council of Forest Ministers (CCFM) criteria
- refines and implements the public involvement program

Input by the PAC on the values, objectives, indicators and targets as related to CSA have been directly incorporated into the Sustainable Forest Management Plan. The PAC will remain active by meeting at least once annually to be kept apprised of progress on values, objectives, indicators and targets, and to provide input on key forest management activities within the TFL. Canfor will continue to develop news releases so that the general public is aware of the progress in relation to sustainable forest management.

See Appendix 3 – Chetwynd Public Advisory Committee Terms of Reference for the current terms of reference for the Chetwynd Public Advisory Committee.

5.2 First Nations

First Nations with a defined area of interest within TFL 48 include West Moberly First Nation (WMFN), Saulteau First Nation (SFN) and McLeod Lake Indian Band (MLIB). WMFN and MLIB Band participated in the Chetwynd Public Advisory Committee (PAC) and attended meetings dealing with the development of SFMP 4.

Written and verbal invitations to all PAC meetings followed with meeting summaries documenting the results from each meeting were sent to each First Nation. A copy of the draft SFMP 4 was sent to each First Nation and comments and recommendations are encouraged. A meeting was arranged with First Nations to review the draft SFMP 4 on October 3, 2005 prior to the public review and comment process. This meeting was attended by WMFN. A second meeting was organized for November 4, 2005. This meeting was attended by MLIB and WMFN. No written comments were received as a result of these meetings or through the review and comment period. Canfor is pleased to provide an overview of the SFMP at any time with First Nation groups.

During the process to transition SFMP 4 from CSA Z809-02 to the Z809-08 Standard, WMFN was the only band not to participate in the Public Advisory Committee process. This may have been in large part due to the recent departure of their employed forester and thus the decrease in capacity to attend the meetings. The Draft plan was sent out to all First Nation groups for review and comment. After the plan was sent out for review the WMFN indicated that the plan should be consulted on as per the Forests and Range Resource Management Agreement signed between the WMFN and the Provincial Government. Clarification from various provincial government staff indicates the SFM Plan does not need to follow the consultation process as per the Agreement as revisions to the plan do not require government approval.

During the process to transition SFMP 4 to SFMP 5 (remove Management Plan content, update indicator forecast and current condition statements) the WMFN was the only First nation to participate in the Public Advisory Committee process.

Annual reports are developed and provided which report on the conformance and implementation of the SFMP. Opportunities to provide input during this annual review are also encouraged.

6 REFERENCES

Beaudry P and A. Gottesfeld 2001. Effects of Forest-Harvest rates on Stream Channel Changes in the Central Interior of British Columbia. In. Toews, D. and S. Chatwin (editors). 2001. Watershed Assessment in the Southern Interior of British Columbia. Res. Br., B.C. Min For., Victoria B.C. Work Pap. 57/2001.

Bunnell, F.L., L.L. Kremsater and E. Wind. 1999. Managing to Sustain Vertebrate Richness in Forests of the Pacific Northwest: Relationships Within Stands. Environmental Review 7: 97-146.

Bunnell, F.L. 2002. Establishing objectives and evaluating success. Chapter 2 in Sustaining biological diversity on TFL-48. Review draft prepared for Canfor TFL-48. Chetwynd, B.C. 19pp.

Bunnell, F.L. 2005. A Species Accounting System for Northeastern British Columbia. Prepared for Canadian Forest Products Ltd. February 1, 2005. 15pp

Canadian Standards Association. 2002 CAN/CSA-Z809-02 Sustainable Forest Management: Requirements and Guidance. Canadian Standards Association, Mississauga, Ont. pp78 URL: http://www.csa.ca/.

Cooper, J.M., K.A. Enns, and M.G. Sheppard (1997) Status of the Black-throated Green Warbler in British Columbia. Ministry of Environment, Lands and Parks, Wildlife Working Report No. Wr-80 Victoria, BC 24 pp.

Delong, C. 2002. Natural Disturbance Units of the Prince George Forest Region: Guidance for Sustainable Forest Management. Ministry of Forests. Prince George Forest Region. Prince George, B.C.

DeLong, S. Craig. (1998) Natural Disturbance Rate and Patch Size Distribution of Forests in Northern British Columbia: Implications for Forest Management. Northwest Science, Vol 72, Special Issue 1998: 35-48

DeLong, S. Craig. (unpublished manuscript) Natural Disturbance Strategic Plan- Background Document. 15 pp.

DeLong, S.C. and D. Tanner. (1996) Managing the Pattern of Forest Harvest: Lessons from Wildfire. Biod. and Cons. 5: 1191-1205.

Canadian Standards Association. (2002) CAN/CSA-Z809-02 Sustainable Forest Management: Requirements and Guidance. Canadian Standards Association, Ontario, Canada 51 pp.

Grindal, S.D., Weir, R.D., and A. de Vries. In Review. Winter Habitat use by Martens in Young Aspen Stands in British Columbia. Proceedings of the 3rd International Martes Symposium, Cornerbrook, NF, Canada.

Harper, Fred E. 1988. Regional Wildlife Plan for the Peace Sub-region, Northern Region. Wildlife Branch, Ministry of Environment and Parks. March 1988. 212 pp.

Heard, D.C. and K.L. Vagt. 1998. Caribou in British Columbia: a 1996 Status Report Rangifer, Special Issue No. 10.

Hoyt, J.S. and Hannon, S.J. 2002. Habitat association of black-backed and three-toed woodpeckers in the boreal forest of Alberta, Canadian Journal of Forest Research. 32: 1881-1888. URL http://cjfr.nrc.ca/

JS Thrower & Associates (2005) Tree Farm Licence 48 Vegetation Resources Inventory Statistical Adjustment. Prepared for Canadian Forest Products Ltd. J.S. Thrower and Associates Ltd. 25 pp.

Lindgren and Lewis, 1997. Ecological Processes in the McGregor Model Forest: Interactions with Insects and Pathogens. Unpublished http://www.mcgregor.bc.ca/publications/InteractionsWithInsectsAndPathogens.pdf

McElligott., Paul. (1998) Studies of the Biology of Harlequin Ducks in Tree Farm Licence 48, Northeastern British Columbia. Prepared for Canadian Forest Products Ltd. by Aquatic Resources Limited. 89 pp.

Ministry of Forests, 1995. Biodiversity Guidebook Government of British Columbia, Crown Publications.

Ministry of Forests (BC MoF). 1998. Recreation Opportunity Spectrum Inventory – Procedures and Standards Manual. The Province of British Columbia, Resources Inventory Committee Victoria, BC 30 pp URL: http://srmwww.gov.bc.ca/risc/pubs/culture/ros/index.htm

Ministry of Forests (1998) TFL Management Plan Guidelines. Victoria, BC. 147 pp.

Ministry of Forests and Ministry of Environment, Lands and Parks (1999) Landscape Unit Planning Guide. Victoria, British Columbia. 101 pp.

Ministry of Forests (BC MoF). 2001. Watershed Assessment Procedure Guidebook. 2nd ed., Version 2.1. For. Prac. Br. Mon. For., Victoria, BC. Forest Practices Code of British Columbia Guidebook.

Ministry of Forests, 2003. Assigning Strategies to Beetle Management Units. Unpublished http://www.for.gov.bc.ca/hfp/forsite/fhdata/bmucriteria.htm

Ministry of Sustainable Resource Management (2002). Dunlevy Creek Management Plan. Prince George, British Columbia. January 24, 2002. 72pp

Porter, Aswea Dawn, 2002. Habitat selection by American Marten (*Martes americana*) at the Element, Patch and Stand Scales in a Young Deciduous Forest in Northern British Columbia. Thesis, University of Alberta, Edmonton Alberta.

Rocky Mountain Research Station. (1999, February 24). Homepage of Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture, [Online]. Available: http://www.fs.fed.us/rm/main/themes/disturb.html

Schuetz, Robert (2005) Tree Farm Licence #48 Timber Supply Analysis Report in Support of Sustainable Forest Management Plan 4 (Version 1b). Prepared for Canadian Forest Products Ltd. by Industrial Forestry Service Ltd. 82 pp.

Setterington, M and A. de Vries. Yellow Rail Sighting in BC, Rare Birds in Canada in 1997. Birders Journal Vol 7 (5): 257.

Setterington, M. and J. Boulanger (2000) Bird Use of Group Selection Harvested Riparian Management Areas in the Halfway River Watershed, Northeastern British Columbia - The Horseshoe Creek Project – 1999 Report-. Prepared for Canadian Forest Products Ltd. by Axys Environmental Consulting Ltd. and Integrated Ecological Research, April 2000. 78 pp.

Wells, R.W., Houde, I., Kellner, M., and Haag, D., (2003a). Local Level Indicators for Biodiversity: A preliminary evaluation of the McGregor Model Forest. Report prepared for the McGregor Model Forest Association, Prince George, BC.

Wells, R. W., Isabelle, I., Mandy, M. and Haag, D. (2003b). Local Level Indicators for Biodiversity: A preliminary evaluation of the Prince George TSA (McGregor Model Forest).

Wells, Ralph W. and Haag, Devon (2003c) Ecological Representation in TFL 48. Prepared for Canadian Forest Products Ltd. by Center for Applied Conservation Research, Department of Forest Sciences, University of British Columbia, Vancouver, BC. 22 pp.

7 ABBREVIATIONS AND DEFINITIONS

AAC	Annual Allowable Cut
AOA	Archaeological Overview Assessment
AIA	Archaeological Impact Assessment
AUM	An animal unit month (AUM) is the quantity of forage consumed by a 450-kg cow (with or without calf) in a 30-day period.
BEC	Biogeoclimatic Ecological Classification
BWBS	Boreal White and Black Spruce BEC zone
CMI	Change Monitoring Inventory plots used to assess long term performance of managed stands
CMT	Culturally Modified Tree
COSEWIC	Committee on Status of Endangered Wildlife in Canada
DCMP	Dunlevy Creek Management Plan
DFA	Defined Forest Area. Used interchangeably with TFL or TFL 48
ESSF	Engleman Spruce Subalpine Fir BEC zone
FDP	Forest Development Plan
FSP	Forest Stewardship Plan. Replaces FDP under the Forest and Range Practices Act
Genus	Canfor's forest information management system. Includes both spatial and attribute information for our operational data including harvest areas, roads, and silviculture.
GPS	Global Positioning System
GY	Growth and Yield
LRMP	Land and Resource Management Plan
LTHL	Long Term Harvest Level
LTSY	Long Term Sustained Yield
LU	Landscape Unit
MoFR	Ministry of Forests and Range
NDU	Natural Disturbance Units
NVAF	Net Volume Adjustment Factor
OSB	Oriented Strand Board
PAC	• Permanent Access Corridors (also Permanent Access Structures is used) • Public Advisory Committee
Phase 2 plots	Unbiased ground sample plots completed as part of the Vegetation Resource Inventory for TFL 48. http://srmwww.gov.bc.ca/vri/standards/index.html - vri
ROS	Recreation Opportunity Spectrum
RMZ	Riparian Management Zone

RRZ	Riparian Reserve Zone
SBS	Sub Boreal Spruce BEC zone
SFM	Sustainable Forest Management
SP	Site Plan/Silviculture Prescription (Forest and Range Practices Act/Forest Practices Code Act of BC)
TFL	Tree Farm Licence
TSA	Timber Supply Area
TSR	Timber Supply Review
TUS	Traditional Use Study
VQO	Visual Quality Objective
VIA	Visual Impact Assessment
VLI	Visual Landscape Inventory
VRI	Vegetation Resource Inventory
VSC	Visual Sensitivity Class
WCB	Workers Compensation Board
WTP	Wildlife Tree Patch

8 APPENDICES