A SUSTAINABLE FOREST MANAGEMENT PLAN FOR THE MACKENZIE DEFINED FOREST AREA

December 2008

Sustainable forest management is "maintaining and enhancing the long-term health of forest ecosystems, while providing ecological, economic, social and cultural opportunities for the benefit of present and future generations." Natural Resources Canada 2001-2002

EXECUTIVE SUMMARY

The Sustainable Forest Management Plan (SFMP) for the Mackenzie Defined Forest Area (DFA) was developed to document the plan under which the Mackenzie Operations of Canadian Forest Products Ltd. (Canfor) and BC Timber Sales (BCTS) (hereinafter referred to as "the signatories") intend to achieve certification to Canadian Standards Association (CSA) Z809-02 Sustainable Forest Management Standard. Responsibilities and commitments of the signatories to the SFMP focus on achieving the goal of sustainable forest management (SFM) which in turn will satisfy the performance requirements for certification.

As signatories to this plan, Canfor and BCTS believe in conducting business in a fashion that protects the environment while ensuring sustainable development of forests. Their commitments to continual improvement in management actions and realized outcomes with respect to environmental performance and stewardship will be fostered through adherence to the following principles:

- develop and maintain a scientifically credible, structured, yet flexible plan for SFM within the Mackenzie DFA that incorporates strategic-, tactical-, and operational-level requirements;
- manage all operations such that they comply with or exceed legal requirements;
- acknowledge and respect Aboriginal rights, Treaty rights, and Aboriginal title of local First Nations;
- provide opportunities for First Nations, communities, environmental groups, and scientists to participate in planning and implementation in ways that reflects their interests and concerns efficiently in both time and cost and in ways that are effective for both stakeholders and resource managers;
- identify, evaluate and control potential environmental risks and implement appropriate preventative measures;
- communicate, inform, and promote awareness regarding environmental activities with employees, First Nations, and stakeholders;
- develop and maintain a monitoring and evaluation program that supports management decisions through evaluations, feedback, and reports on the sustainability of ecological, economic, and social values;
- use adaptive management to guide knowledge acquisition, monitoring protocols and the incorporation of advances in SFM science and technology such that management plans and practices continually adapt and move towards concurrent sustainability of ecological, economic, and social values;
- commit to evolving processes that ensure work-site health and safety standards provide conditions and safeguards for the health and safety of employees and the public; and
- conduct timely audits of environmental management systems and SFM parameters and implement corrective measures as required.

Within the SFMP, the signatories outline commitments to sustainable forest management by providing:

- a comprehensive description of the Mackenzie DFA and its current conditions;
- a summary of the most recently implemented forest management plan, current practices, resultant outcomes, and conclusions derived from a management review;
- the identification of one or more appropriate forest values and statements of criteria, indicators, measures for each value;
- the targets, and target variance, for each measure and clear time frames for achievement of the target;
- an account for each measure which includes: 1) what the measure is and why it is important, 2) how targets for the measure were established, 2) current condition of the measure, 4) forecasts of the probable trend for the measure, and 5) a description of the monitoring and reporting which will accompany inventory of the measure; and
- clear linkages between short-term operational plans and the SFMP.

Achievement of SFM on the Mackenzie DFA requires the strong commitment of the signatories, public stakeholders, and managing agencies to embrace innovative methods and technology. Novel and innovative approaches are being employed to obtain meaningful public input and participation, and to examine how a diversity of potentially competing values can be accommodated and effectively managed to meet the goal of SFM. This SFMP is a document that will evolve through time in response not just to changes in technology and knowledge but also to changes in socio-economic needs and values, changes in government policy, and to stochastic natural factors such as wildfire and insect infestation. Successive iterations of the SFMP will emphasize the continual improvement of management practices and resultant outcomes on the land base, such that the concurrent sustainability of the social, ecological, and economic values that collectively defines SFM, is achieved.

ACKNOWLEDGEMENTS

The development of this plan could not have happened without the dedicated efforts and hard work of the people and organizations listed below.

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SIGNATURES

The following have committed to implement and maintain on a continuous improvement basis, The Mackenzie Sustainable Forest Management Plan.

DEC. 01, 2008

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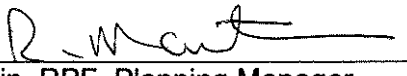

Dec 5, 2008

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TABLE OF CONTENTS

LIST OF APPENDICIES

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

Forests have been valued as a source of natural resources throughout human history. In the past century, forests of British Columbia (BC) have been chiefly valued for the economic potential of timber. Society, however, has become increasingly aware that forests provide a wider set of economic, social, and environmental values. Stakeholders within the forest industry have recently recognized that management of this broader range of values can occur without detriment to the economic potential of timber. Forest development in this context has become known as sustainable forest management (SFM).

> *Sustainable Forest Management has been defined as: "management to maintain and enhance the long-term health of forest ecosystems, while providing ecological, economic, social, and cultural opportunities for the benefit of present and future generations" (Natural Resources Canada 2001-2002).*

SFM requires that all resource values be considered in making decisions about, and managing, forest development. One way to accomplish this is through forest management decisions that are transparent, systematic, predictable, and that include processes for public participation and continual improvement.

Evidence of the importance of SFM comes from consumers of forest products who are increasingly demanding that forests be managed on a sustainable basis. This demand has resulted in the emergence of forest certification as policy in the forest industry. Many forest certification programs work toward assuring the public that forest management is guided by standards considered critical to sustaining multiple forest values. The forest industry of BC is a part of a much larger global forest products marketplace and stakeholders of this industry have increasingly become aware of the importance of certification in maintaining their position in this marketplace. The Sustainable Forest Management Plan (SFMP) for the Mackenzie Defined Forest Area (DFA) was developed to achieve certification to Canadian Standards Association (CSA) Standard Z809-02 and thereby to provide forest managers in the Mackenzie area with a management system enabling sustainable forestry.

Benefits and efficiencies for government, licensees and the public may also be generated by linking the SFMP and operational plans. Licensees may benefit by adopting measures and targets developed through the SFMP process to operational plans; government may benefit by knowing that measures and targets legally established in operational plans have been developed in an open, reasoned, and scientific manner reflective of local values; the public will benefit by having a transparent process by which licensees report annually on their performance and their ability to meet established targets. The result is an increase in public confidence in multi-value forest management. The plan will continue to evolve and expand as forestry practices and values change over time. This evolution of the SFMP is to be expected in a management system predicated upon continual improvement of management activities and forest stewardship.

2.0 DEVELOPMENT OF THE SFMP

2.1 Purpose and Context

Canada's forests represent a significant national and international resource. Recognition of the essential contribution of forests to social, economic, and environmental well being at local, national, and international scales has resulted in a commitment by Canada to maintain forest health and to manage forests in a sustainable fashion. In 1995, and subsequently updated in 2003, the Canadian Council of Forest Ministers (CCFM) established six criteria (i.e., broad management objectives), a list of associated elements (i.e., concepts that define the scope of a criterion), and indicators to gauge SFM (CCFM 1995, 2003) at the national level. To provide a local context to SFM, the CSA adopted the six CCFM criteria but revised the CCFM elements to support their application at the level of a Defined Forest Area. These revised elements and associated values, criteria, indicators, measures, and targets support implementation sustainable forest management at the local level. The CSA set forth CSA Standard Z809-02 (CSA 2002) that defines the requirements and provides guidance for implementing SFM on a Defined Forest Area.

The SFMP provides a structure that links strategic goals and objectives to operational activities under dynamic economic, social, and environmental conditions and values. The SFMP was developed within context of current management planning requirements and legislation such as the Forest Range and Practices Act (FRPA), meets the requirements of CSA certification, and is consistent with provincial funding initiatives (e.g., Forest Investment Account). It provides managers with a process to develop and implement operational strategies, measure response to those strategies, and initiate needed changes to continually improve decision-making and management practices for a wide range of forest values. This commitment to continual improvement is fostered through the application of adaptive management (Section 8.0).

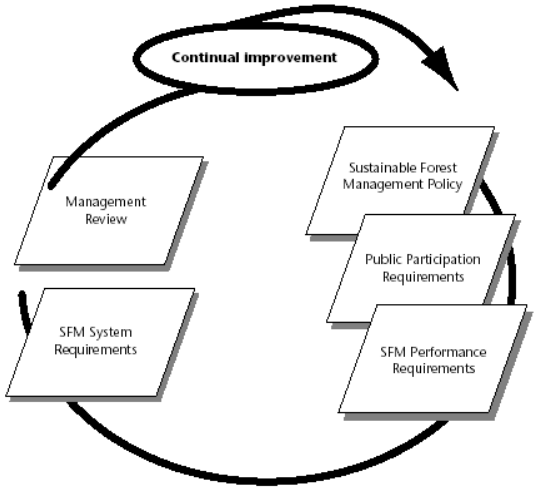


Figure 1. The continual improvement model for SFM (CSA 2002). The steps that define an adaptive management approach should be incorporated within this model.

Adaptive management is a rigorous, formal, iterative approach to learning and improving management from experience (Nyberg 1999). It emphasizes multi-disciplinary input; the development of clear objectives, management plans and measurable indicators; the formulation of conceptual or quantitative models that reflect current understanding of the relationships between actions and outcomes; and the generation of testable hypotheses. Of fundamental importance to adaptive management is the application of monitoring to ensure that management plans are properly enacted. Proper planning involves systematic monitoring, routine assessments of forecasts, and modification of management activities and plans to reflect the experience gained (CSA 2002). An iteration of the adaptive management process can be presented as an ordered series of steps (adapted from CSA 2002) as follows:

Planning:

- Define and describe the Defined Forest Area and determine current conditions.
- Identify and select locally relevant values, objectives, indicators and provisional targets.
- Prepare maps and collate existing inventory records, databases and scientific literature associated with the chosen indicators. Identify data gaps.
- Formulate a model of understanding (conceptual or quantitative) and identify knowledge gaps. Forecast expected future conditions of chosen indicators, comparing a 'no-action' strategy with alternative manipulative strategies.
- Develop a strategy (and its associated indicator forecasts) that best meets the desired targets.

Implementation:

- Implement management actions as prescribed by the selected strategy.

Assessment of Indicators and Determination of Corrective Actions:

- Measure the indicators for all selected values (indicator monitoring).
- Compare implemented actions to planned actions (conformance monitoring), and actual indicator levels to targets (indicator assessment).
- Understand the reasons for observed differences between realized and planned outcomes (i.e., failed conformance with management plans or failure in understanding of functional relationships between management actions and outcomes) and take corrective actions.

Review of Management:

- At set intervals, assess progress towards SFM and implementation of SFM requirements. Return to Planning for next iteration of the adaptive management process.

2.2 CSA Requirements

This SFMP serves as the primary guidance by translating commitments to SFM into management actions and documents the manner in which Canfor and BCTS adhere to the CSA recommended requirements for certification (CSA 2002). The signatories will ensure the SFMP incorporates all relevant information and is readily understandable to interested parties. The specific performance requirements recommended by the CSA standard were adhered to in construction of the SFMP and documentation of this was presented during the registration audit.

3.0 BACKGROUND TO THE SFMP

3.1 Signatories to the SFMP

Each party that is signatory to the SFMP is committed to the development, implementation, and maintenance of SFM on the Mackenzie DFA. Commitments to SFM on the part of the signatories are supported by a Memorandum of Understanding (MOU; Appendix A). The signatories to this SFMP are:

- Canfor – Mackenzie Division
- BCTS – Prince George Business Area

3.1.1 Signatory Background

Based in Vancouver, BC, Canfor is the largest producer of softwood lumber and among the largest producers of northern softwood kraft pulp in Canada. The company also produces additional forest products such as oriented strand board, plywood, paper and remanufactured lumber products. Canfor's Mackenzie Division operates two sawmills with a capacity of 1.4 million m3/year and is an important employer and contributor to economic activity for the nearby town of Mackenzie. The annual allowable cut (AAC) for Canfor's Mackenzie Division is approximately 1.08 million m^3/yr.

BCTS is an independent organization within the Ministry of Forests and Range (MoFR) created to develop timber for auction, to establish market price, and to capture the value of the asset for the public. BCTS has 12 business areas and an operational presence in 33 locations across the province. The organization is a key component of provincial government's plan to revitalize the BC forest economy. BCTS currently manages approximately 20 percent of the provincial AAC. The AAC for BCTS on the Mackenzie DFA is 768,886 m^3/yr.

3.1.2 Commitments to SFM by Canfor

Canadian Forest Products Ltd. (Canfor) believes in conducting its business in a manner that protects the environment and ensures sustainable forest development. The following Forestry Principles and Environmental Policy will detail the commitments to Sustainable Forest Management (SFM) for the Mackenzie Defined Forest Area (DFA). These commitments are communicated and available to the public.

As a preparatory step to CSA SFM certification Canfor has adopted an environmental management system (EMS) certified to the International Organization for Standardization (ISO) 14001 standard for its forest operations. Serving as a vehicle to ensure that public participation and performance requirements are met in a predictable and systematic fashion, a certified EMS is essential to ensure the fulfillment of all CSA SFM requirements (CSA 2002).

Forestry Principles

Canfor's Forestry Principles were developed by a task force of Canfor staff, aided by a panel of outside experts. The Principles are based on the tenets of ecosystem management, continuous improvement, public involvement and third party verification of performance. Canfor views these Principles as a fundamental component in improving its existing sustainable forest management practices, ensuring the transparency of its operations and fulfilling sustainable forest management certification requirements. The Principles were approved and subsequently introduced to all Canfor operations in 1999. The following is a summary of Canfor's Forestry Principles:

- **Ecosystem Management** – We will use the best available science to develop an understanding of ecological responses to natural and human-caused disturbances. We will incorporate this knowledge into higher level and operational plans by applying ecosystem management principles to achieve desired future forest condition.
- **Scale –** We will define objectives over a variety of time intervals (temporal scales), and at spatial scales of stand, landscape and forest.
- **Adaptive Management** – We will use adaptive management to continually improve forest ecosystem management. This will require the development and application of collaborative research and monitoring programs.
- **Old Growth** – We will include old growth and old growth attributes as part of our management strategies and philosophy in the forests where we operate.
- **Timber Resource** – We will ensure a continuous supply of affordable timber in order to carry out its business of harvesting, manufacturing and marketing forest products. Canfor will strive to maximize the net value of the fibre extracted for sustained economic benefits for employees, communities and shareholders.
- **Forest Land Base** -- We advocate the maintenance of the forestland base as an asset for the future.
- **Health and Safety** – We will operate in a manner that protects human health and safety.
- **First Nations** -- We will pursue business partnerships and cooperative working arrangements with First Nations to provide mutual social, cultural, and economic benefits and to address mutual interests.
- **Communities** – We will engage members of the public, communities and other stakeholders in the delivery of the Forest Principles. The process will be open, transparent and accountable.
- **Accountability** – We will be accountable to the public for managing forest to achieve present and future values. We will use credible,

internationally recognized, third party verification of our forestry operations as one way of demonstrating our performance.

Environmental Policy (February 2005)

Canfor is committed to responsible stewardship of the environment throughout our operations.

We will:

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

Canfor's commitments to SFM are available and communicated publicly.

Canfor's Forestry principles may be viewed at:
http://www.canfor.com/sustainability/certification/iso.asp

Environmental Policy may be viewed at:
http://www.canfor.com/sustainability/corporate/policy.asp

A summary of Canfor's EMS may be viewed at:
http://www.canfor.com/sustainability/manufacturing/ems.asp

3.1.3 Commitments to SFM by BCTS

BC Timber Sales (BCTS) is a stand-alone organization within the Ministry of Forests and Range. BCTS was created to develop Crown timber for public auction to establish market price and cost benchmarks, and capture the value of the timber asset for the public. BCTS is responsible for managing 20 percent of the provincial Crown allowable annual cut, or approximately 16.5 million cubic metres of timber. All of BCTS' operating areas have implemented an Environmental Management System (EMS) and are certified under the International Organization for Standardization ISO 14001 standard.

BCTS shares the Ministry's vision of *"diverse and sustainable forest and range values for BC"* and its mission to *"protect, manage and conserve forest and range values through a high-performing organization"*[1]. These shared values, along with BCTS' own Vision Statement, Environmental Policy and Sustainable Resource Management Policy demonstrate BCTS – Prince George Business Area's commitment to Sustainable Forest Management (SFM) for the Mackenzie Defined Forest Area (DFA). These commitments are communicated and available to the public at the links noted.

In the fall of 2005, BCTS, Prince George Business Area, accepted an invitation to join with Canfor – Mackenzie to develop a Sustainable Forest Management Plan for their operations within the Mackenzie Timber Supply Area (TSA). The completion, implementation and maintenance of this SFMP further demonstrate BCTS' commitment to sustainable forest management and help BCTS achieve their vision.

Vision Statement

The vision of BCTS is to be an *"effective timber marketer generating wealth through sustainable resource management".*
In achieving our mandate, we:

- believe unsafe is unacceptable;
- are respected managers of public forests;
- have engaged, skilled, motivated and proud employees;
- have a relentless focus on results;
- continually seek learning, and efficient, effective and innovative business practices; and
- are an integral part of the B.C. economy, providing value to our customers, stakeholders and the Province.

Environmental Policy (August, 2005)

- Comply with all relevant environmental legislation and regulations.
- Strive for excellence in forest management by continually improving the performance of resource management activities and practices.
- Maintain a framework that sets and reviews environmental objectives and targets and promotes the prevention of pollution associated with BCTS forestry activities.
- Monitor and evaluate key BCTS forestry operations.
- Communicate BCTS business activities and policies to all staff and make them available to the public.

[1] Vision Statement and Mission Statement, Ministry of Forests and Range, 2006/07-2008/09 Service Plan, http://www.bcbudget.gov.bc.ca/2006/sp/for/Vision,MissionandValues5.htm.

BCTS is committed to managing and administering forest management activities on our operations through effective measures that ensure sustainable resource management.

Sustainable Resource Management Policy (October, 2005)

It is the policy of the BCTS to:

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

Consistent with a vision to be an effective marketer of timber that generates wealth through sustainable resource management, BCTS is committed to achieving third-party certification of its forestry operations. A certified EMS is a critical tool to aid BCTS in the integration of administrative, planning and operational activities that emphasize environmental impacts and risks. To achieve this goal, BCTS stresses collaboration with licensees and permit holders to encourage full participation in certification initiatives. BCTS has also obtained CSA SFM certification in one business area, is actively pursuing CSA certification in four business areas and is developing a comprehensive strategy for SFM certification. An up-to-date summary of certification initiatives in the Prince George business unit is available at:
http://www.for.gov.bc.ca/bcts/areas/tpg_certification.htm

BCTS' Sustainable Resource Management Policy outlines their commitment to manage their operations through effective measures that ensure sustainable resource management. The policy may be viewed at:

http://www.for.gov.bc.ca/ftp/TPG/external/!publish/EMS2/Manual/SRMP_Oct_21_05.pdf

BCTS' Environmental Policy may be viewed at:
http://www.for.gov.bc.ca/ftp/TPG/external/!publish/EMS2/Manual/EMS_Policy.pdf

3.1.4 Joint Commitments to SFM by the Signatories

Canfor and BCTS support business practices that protect and enhance the environment for the use of current and future generations. They are committed to the goals of SFM and to a process that will continually improve their environmental performance and stewardship. As signatories to this plan, Canfor and BCTS will adhere to the following principles:

- develop and maintain a scientifically credible, structured, yet flexible plan for SFM within the Mackenzie DFA that incorporates strategic level requirements;
- manage all operations such that they comply with or exceed all legal requirements;
- encourage and provide opportunities for local First Nations to become involved in the development of the SFMP and resulting operations, while respecting their rights and interests;
- provide opportunities for communities, environmental groups and scientists to participate in planning and implementation in ways that reflects their interests and concerns efficiently in both time and cost and in ways that are effective for both stakeholders and resource managers;
- identify, evaluate and control potential environmental risks and implement appropriate preventative measures;
- communicate, inform, and promote awareness regarding environmental activities with employees, First Nations, and stakeholders;
- develop and maintain a monitoring and evaluation program that supports decision making through evaluations, feedback and reports on the sustainability of social, ecological and economic values;
- use adaptive management to guide knowledge acquisition, monitoring protocols and the incorporation of advances in SFM science and technology such that management plans and practices continually adapt and move towards concurrent sustainability of social, ecological and economic values;
- commit to evolving processes that ensure work site health and safety standards provide conditions and safeguards for the health and safety of employees and the public; and
- conduct timely audits of environmental management systems and SFM parameters, and implement corrective measures as required.

3.2 The Plan Area

3.2.1 General Area Description

The Mackenzie DFA is situated in the northeast interior of BC wholly within the Mackenzie TSA. Spanning approximately 6.1 million hectares, the Mackenzie TSA is

among the largest TSAs in the province. The TSA lies within the Northern Interior Forest Region and is under the administration of the Mackenzie Forest District Office. Adjacent TSAs include the Cassiar and Fort Nelson TSAs to the north, the Fort St. John and Dawson Creek TSAs to the east and the Prince George TSA to the south and west.

The dominant natural features of the Mackenzie TSA are the Rocky Mountains and the Rocky Mountain Trench. Oriented northwest/southeast through the center of the TSA, the Trench is bordered by the rugged Rocky Mountains to the east and the gentler Omineca Mountains to the west. Construction of the WAC Bennett Dam in the 1960s flooded the lower reaches of the Trench within the southern half of the TSA to create the narrow, 360 km long Williston Reservoir covering approximately 177,000 ha.

A variety of parks, ecological reserves and protected areas occur in whole, or in part, within the TSA. The most notable in size are the provincial parks and associated protected areas: Omineca, Tatlatui, Kwadacha Wilderness, Chase, Finlay-Russel and Dune Za Keyih.

Biophysical Description

Most of the TSA is characterized by diverse mountainous terrain although the southernmost portion is distinguished by relatively flat terrain or low rounded hills, broad valleys and numerous lakes and wetlands. The climate is Continental-Temperate to Sub-Boreal with average daily temperatures below freezing for half the year. Approximately three-quarters of the annual precipitation falls as snow.

Forest are primarily mixed stands with the predominant commercial species being Engelmann spruce (*Picea engelmannii*), white spruce (*Picea gluaca*) [2], lodgepole pine (*Pinus contorta*) and subalpine fir (*Abies lasiocarpa*) [3]. Several deciduous species such as birch and aspen are also present; however, commercial utilization is on a small scale.

Five biogeoclimatic (BEC) zones, which reflect broadly homogenous climatic regimes, occur on the Mackenzie TSA. These BEC zones can be generally described as follows:

- Alpine Tundra (AT) is the uppermost BEC zone. It is essentially void of trees except for dwarf forms that occur in the zone's lower elevations. At upper elevations rock, ice and snow dominate with vegetation limited to shrubs, herbs, mosses and lichens. The climatic is cold and harsh with a short brief growing season.
- Engelmann Spruce – Subalpine Fir (ESSF) is a forested subalpine zone occurring below the AT. Forests are continuous at lower elevations but give way to parkland at upper elevations. Engelmann spruce and subalpine fir are the dominant species although lodgepole pine occurs on drier sites. The climate is severe with cool short growing seasons and long cold winters.

[2] Spruce in the DFA may be white spruce, Engelmann spruce, or a hybrid of the two. Due to difficulties in distinguishing the two species and the hybrids, the term "spruce" is generally used to describe all three.
[3] Although the fir in the DFA is subalpine fir, it is commonly referred to as "balsam", but it is not balsam fir (*Abies balsamea*). .

- Spruce Willow Birch (SWB) is the most northerly subalpine zone in BC and occurs in the northern part of the TSA above the BWBS. Lower elevations of the SWB support open forests of predominantly white spruce and subalpine fir. At higher elevations subalpine fir and deciduous shrubs dominate. The climate is severe with cool brief growing seasons and long cold winters.
- Sub-Boreal Spruce (SBS) zone occurs at lower elevations typically on gently rolling plateaus and valley bottoms in the southern portion of the TSA. Forests are predominantly hybrid white spruce and subalpine fir. Extensive stands of lodgepole pine occur on drier sites due to frequent fires. The climate is characterized by relatively warm, moist but short growing seasons and severe winters with abundant snowfall.
- Boreal White and Black Spruce (BWBS) zone is found in the lower elevations of valleys primarily in the northern and western portions of the TSA. Frequent fires have resulted in extensive successional forests of lodgepole pine and trembling aspen. On gentle terrain stands of white spruce and trembling aspen are interspersed with black spruce bogs. The climate features short growing seasons and long cold winters.

Fish and wildlife are significant features with 319 species of terrestrial and aquatic vertebrates (24 species of fish, 7 reptile species, 55 mammal species, and 233 bird species) occurring on the TSA. Most large carnivore and ungulate species native to BC are present, notably wolves, grizzly bears, black bears, wolverines, fishers, cougars, mountain goats, Stone's sheep, elk, moose and northern caribou.

Communities and Socio-Economic Description

The Mackenzie TSA is sparsely populated with approximately 95% of the total estimated population of 6,360 (BC Gov 2000) situated in the community of Mackenzie. The remaining population is located in small communities including Germansen Landing, Manson Creek, Fort Ware and Tsay Keh or in a few dispersed rural settlements.

The town of Mackenzie is approximately 180 km north of Prince George and is located on the southeast end of Williston Lake. The town offers a variety of professional and retail services, a hospital, access to college and university courses, a recreation facility, accommodation and meeting facilities. The forest sector accounts for approximately 65% of the employment on the TSA and is the main driver of population change for the town. Additional economic activities on the TSA include placer mining operations, tourism and recreation, the Kemess South Mine, trapping and exploration activities for the mining and oil & gas industries.

Several First Nations have communities, claim traditional territories or have social and economic interests within the TSA. These include the Tsay Keh Dene (formerly the Ingenika Band), the Kwadacha Nation (formerly the Fort Ware Band), the Takla Lake Band, the Nak'azdli First Nation, the, the McLeod Lake Band, the Gitxsan Nation, the Wet'suwet'en Nation and members of the Treaty 8 Tribal Council (West Moberly First Nations, Saulteau First Nations, Halfway River First Nation). The Kwadacha Nation and the Tsay Keh Dene have communities within the TSA (Fort Ware and Tsay Keh,

respectively). The Takla Lake Band have members of the Noostel Keyoh residing within the TSA.

The AAC for the TSA is approximately 3,000,000 m^3/yr. The AAC is apportioned to Canfor's Mackenzie Division, Abitibi Consolidate Company of Canada, BCTS and First Nations. Timber revenues to government in the form of stumpage, federal and provincial taxes approximate $105 million annually.

3.2.2 The Mackenzie DFA

The Mackenzie DFA occupies the southwest and east central portions of the Mackenzie TSA and covers approximately 2.12 million ha. The landscape is dominated by the Williston Reservoir with the rugged terrain of the Rocky Mountains to the east and gentler terrain of the Omineca Mountains transitioning to the Omineca Plateau to the west. Although the DFA covers 2.12 million hectares, the Crown Forest Land Base (CFLB) is 1.60 million hectares. Of this, only 922,293 hectares, or 41.9%, is in the Timber Harvesting Land Base (THLB). Table 1 in Appendix I contains a more detailed breakdown of the land classification within the Mackenzie DFA.

Table 1. A summary of land classification in the Mackenzie DFA[4].

Land Classification	Reductions (Ha)	Area (Ha)
DFA Area		2,117,199
Reductions to DFA	521,265	
Crown Forest Land Base		1,595,754
Reductions to CFLB	673,461	
Timber Harvesting Land Base		922,293

Forested areas are dominated by coniferous species, mainly lodgepole pine and spruce, but also a significant component of subalpine fir. Minor amounts of black spruce (*Picea mariana*) and deciduous species – trembling aspen (*Populus tremuloides*), poplar[5] (*Populus balsamifera ssp.),* and white birch (*Betula papyrifera*) are also present. Figure 2 show the species distribution in the THLB in the DFA.

Because of the size of the area and relatively short history of resource development in the DFA, and the TSA in general, there are many areas, particularly the north and west portions of the DFA, that are remote and inaccessible. As a result, there is an abundance of forests that are classified as "old"[6] in the DFA. In excess of 700,000 hectares of forests are considered old, of which about 385,000 hectares are in the THLB. Figure 3 shows the age class distribution in the NHLB and THLB on the DFA.

[4] Based on data used for forest modelling exercise, DFA boundary adjustments were finalized later.
[5] Both balsam poplar (*Populas balsamifera ssp. balsamifera*) and black cottonwood *(Populus balsamifera ssp. trichocarpa*) occur in the DFA and the terms "poplar" and "cottonwood" are often used interchangeably. We will refer to both as "poplar"
[6] Old is defined as per the "Biodiversity Guidebook" and the Mackenzie LRMP

Other ecological features such as wildlife and fisheries, and socio-economic features such First Nations, communities, population characteristics, and economic activity in the DFA mirrors that found in the TSA in general.

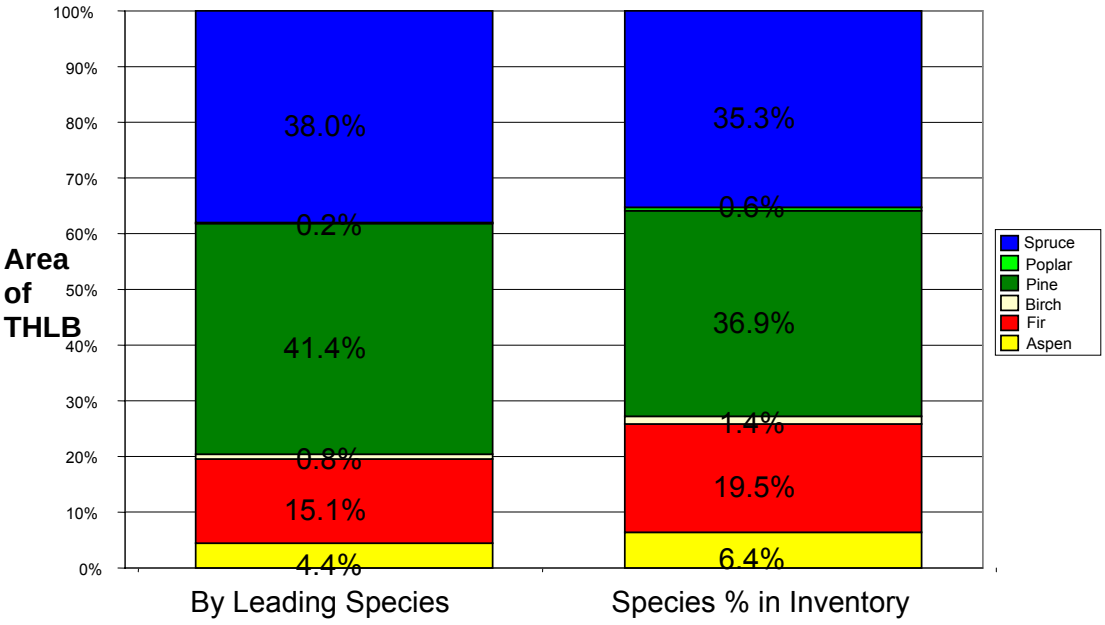


Figure 2. Species distribution in the timber harvesting land base in the Mackenzie DFA.

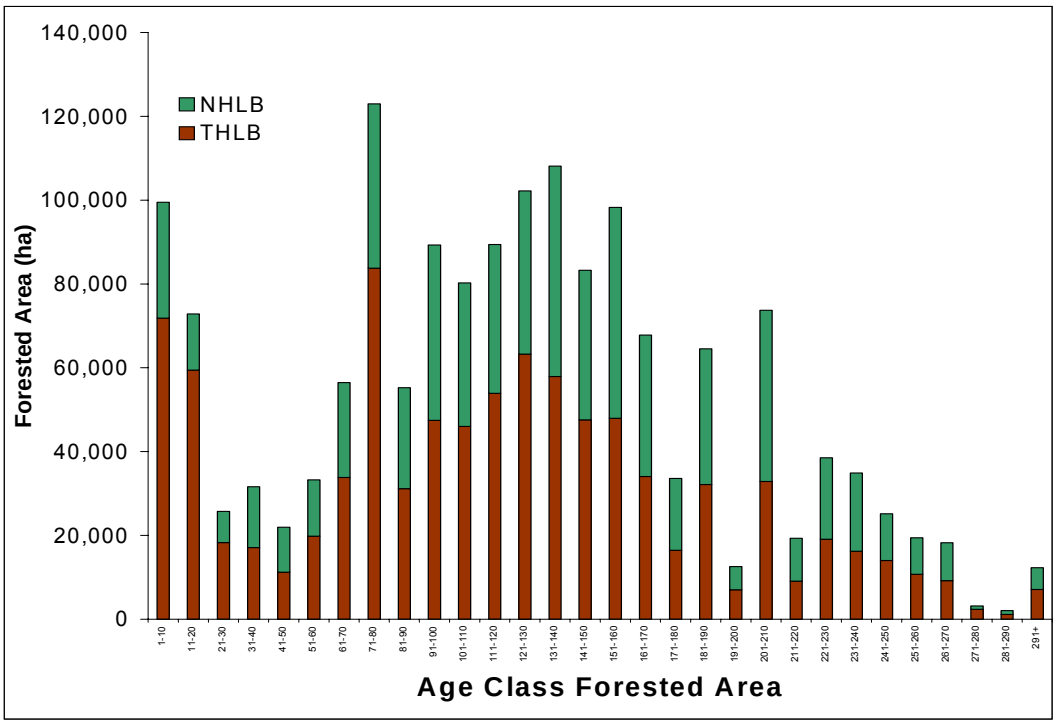


Figure 3. Age class distribution in the non-harvestable and timber harvesting land base in the Mackenzie DFA.

The DFA encompasses several Landscape Units which, for the most part, correspond to their Resource Management Zone (RMZ) designation as outlined in the Mackenzie LRMP. The Mackenzie LRMP designates each RMZ under one of six categories:

- Protected Areas – areas to be protected for their natural, cultural heritage, and/or recreational values. Resource development is prohibited in these areas.
- Settlement – areas reflecting existing community boundaries
- Enhanced – areas managed with an emphasis is on resource development
- General – areas managed for a balance of extractive and non-extractive uses/values
- Special – areas managed with an emphasis on non-extractive values with restricted resource development
- Special: Wildland – areas managed with an emphasis on conservation to the exclusion of timber harvesting

In addition to general objectives that are applicable to all RMZs, each RMZ has specific objectives associated with them. These objectives reflect the various social, economic, and ecological values placed upon the RMZ. To the extent possible, this plan is meant to be consistent with the intent of the Mackenzie LRMP. Table 2 lists the Ecosections, BEC Zones, and RMZs that fall within the DFA and their respective RMZ category.

Table 2. A summary of operating areas within the Mackenzie DFA.

Ecosection	BEC Zone	LRMP RMZ		Designation
Manson Plateau Southern Omineca Mountains Parsnip Trench	BWBS ESSF SBS AT	30	Germansen Mountain	Enhanced
		33	Manson River/Eklund	Enhanced
		35	Gaffney*	Enhanced
		37	Blackwater*	Enhanced
		29	Twenty Mile Creek	General
		34	Klawli	General
		31	South Germansen / Upper Manson	General / Special
		32	Jackfish	Special
Western Muskwa Ranges	ESSF BWBS SWB AT	11	Buffalohead#	Enhanced
		12	Lower Akie	Enhanced
		21	Collins - Davis*	Enhanced
		15	Akie River	Enhanced
		14	Pesika	General
Misinchinka Ranges Peace Foothills	ESSF SBS SWB AT	21	Collins - Davis*	Enhanced
		18	Lower Ospika	General
		24	Nabesche	General
		26	Schooler	General
		38	Parsnip#	General
		39	Clearwater	General
		17	Upper Ospika	Special

		36	Selwyn#	Special
Babine Upland Parsnip Trench Nechako Lowland	ESSF SBS AT	42	Philip	Enhanced
		37	Blackwater*	Enhanced
		35	Gaffney	Enhanced
		41	Nation River	Special
McGregor Plateau Northern Hart Ranges Parsnip Trench	ESSF SBS AT	40	Misinchinka	Enhanced

*Denotes shared RMZ with another Mackenzie DFA Operating Area
#Denotes shared RMZ with Abitibi Operating Area

3.3 Existing Processes within the Mackenzie DFA

3.3.1 Public Processes

An SFMP is not a stand-alone initiative, isolated and insulated from other planning processes. Rather, the SFMP is based on, and extends other existing strategic planning processes such as the Mackenzie Land and Resource Management Plan (LRMP; BC Gov 2000) and more operational plans such as Forest Stewardship Plans developed by both Canfor and BCTS.

The LRMP, while not Government policy, is an integrated resource plan with the objective to provide a publicly approved vision for the use and management of provincial lands and resources in the Mackenzie TSA. Development of the LRMP required the involvement of local stakeholders, representing a wide range of interests and values. Interests and priorities represented by participants included conservation of wildlife including rare or endangered species, economic development, recreation, tourism, hunting, commercial and recreational fishing, guide outfitting, community stability, cultural heritage, agriculture, exploration/mining and forestry. Respect and recognition of different viewpoints were key operating principles which led to consensus among the LRMP participants and eventual approval of the document by Government.

The Mackenzie LRMP provided seminal work towards the SFMP as follows:

- broad zones, defined on digital maps, within which management emphasis was designated as protected (i.e., a de-emphasis of resource development), settlements, enhanced management, general management, special management, and special wild land;
- objectives that guide management of natural resources in each zone;
- strategies for achieving the objectives; and
- a socio-economic and environmental assessment of the plan.

The LRMP Monitoring Committee meets periodically to ensure that the evolution and implementation of the LRMP remains consistent with the original intent.

In keeping with legal requirements, Canfor's Mackenzie Division and BC Timber Sales Prince George Business Area make their Forest Stewardship Plans (FSP) available for

public review and comment. Canfor and BCTS also regularly contact and interact with individual stakeholders that may be affected by their operations.

3.3.2 Other Planning Processes

In addition to the LRMP, there are several other planning processes for the Mackenzie TSA on-going (Table 3). These are generally inter-organizational processes that bring together managing professionals and affected stakeholders to develop broad strategies for particular aspects of the forest resource.

Table 3. Active planning processes on-going in the Mackenzie TSA.

Planning Process	Objective	Status
Landscape Objective Working Group	Development of strategies to achieve landscape-level objectives as they pertain to retention such as OGMAs	The process is on-going and is anticipated to continue into the future. Spatially-defined OGMAs are being developed in identified priority LUs.
Northern Caribou Recovery Implementation Group	Development of a Recovery Plan for northern caribou herds. This process will allow the province to meet its obligations as a signatory of the National Accord for the Protection of Species at Risk in Canada.	A finalized Recovery Action Plan is to be submitted for economic and social impact assessment in fiscal 2006/07.
Mountain Goat Management Team	Development of a habitat supply model and management strategies for Mountain Goats in the Mackenzie TSA.	Project is in the second phase of an adaptive management trial to determine goat disturbance by resource development. Habitat modeling is on-going.
Pine Stem Rust Working Group	Development of management strategies to reduce or mitigate the effect of pine stem rusts on regenerating forests.	Draft management strategies have been developed and implemented. Monitoring for efficacy is on-going.
Silviculture Strategy (Type I and II)	Development of silviculture regimes to address critical issues in timber supply.	A Type I Silviculture Strategy was completed on the TSA in March, 2001. A Type II Strategy was completed in October, 2003.
Ungulate Winter Range	Development of management strategies for areas identified as critical winter range for selected ungulates.	UWRs for stone sheep, elk, mountain goat, and caribou have been designated within the DFA. Additional UWRs for caribou have been identified and are being developed.
Forest Investment Account Land Base Investment	Coordinate spending on non-obligation forest resource	Annually updated through the Land Base Investment

	investments in consideration of the Mackenzie Strategic Resource management Plan (2001-2006)	Rationale.
Forest Investment Account Defined Forest Area Management (DFAM)	Coordinate spending in forest health (mountain pine beetle) investments in consideration with the provincial Mountain Pine Beetle Strategy.	Annually updated.
Mid-term Timber Supply Working Group	Group's objective is to mitigate the falldown in mid-term timber supply due to the MPB epidemic	Work is on-going with potential strategies being identified, analyzed, prioritized, and implemented.

3.4 First Nations

Of the 10 First Nations with interests within the Mackenzie TSA, 8 have traditional territory within the Mackenzie DFA. Traditional values of First Nations found within the DFA include;

- Sites of historical or cultural significance,
- Camp sites or cabin sites,
- Trails and travel corridors,
- Hunting, fishing, and trapping areas,
- Important wildlife habitat area,
- Berries and other food plants,
- Herbs and medicinal plants.

Forestry is the main sources of employment for most First Nations within the TSA, trapping fishing and guiding are also important activities. First Nations within the DFA depend heavily on hunting, fishing and gathering natural foods for sustenance.

3.4.1 Tsay Keh Dene

Tsay Keh Dene's traditional territory spans north to Mt. Trace, west to South Pass Peak, south to the Nation River, and east to Mount Laurier, encompassing a large portion of the central area of the TSA. The Tsay Keh Dene has four reserves in the TSA totalling 201 hectares.

With approximately 380 members, the focus of the Tsay Keh Dene is largely around Tsay Keh, a community of approximately 200 located at the north end of Williston Lake. The community was established in 1968 when the Tsay Keh Dene was displaced by the flooding of the Williston Reservoir. Access to the community is primarily through small-plane air travel, or via an all-weather logging road.

Tsay Keh Dene is currently at Stage 4 of the six-stage treaty negotiation process; however they have been so since 1996.

3.4.2 Kwadacha Nation

The Kwadacha Nation traditional territory occupies the northern portion of the TSA from the Akie river northward with 387 ha. of reserve land. The main community is Fort Ware where many of the bands 442 members reside.

Fort Ware lies at the confluence of the Fox, Kwadacha, and Finlay rivers in the Rocky Mountain Trench and is one of the most remote communities in British Columbia. Access to the community is predominantly through small-plane air travel, or via an all-weather logging road.

The Kwadacha Nation are members of the Kaska Dena Council and are currently at Stage 4 of their treaty negotiations, however negotiations were suspended in 2003 and have yet to resume.

3.4.3 McLeod Lake Indian Band

Encompassing an area from near Takla Lake in the west, north to the Peace Arm of Williston Lake, south to Summit lake, and east to the Alberta border, The McLeod Lake Indian Band traditional territory covers the southern portion of the Mackenzie TSA.

The community of McLeod Lake is located on Highway 97 just south of the TSA boundary. Established as Trout Lake Fort in 1805 by explorer Simon Fraser, McLeod Lake is home to about 200 residents and is known as the first fur-trading post west of the Rockies.

On March 27, 2000, the approximately 450-member band signed the McLeod Lake Indian Band Treaty No. 8 Adhesion and Settlement Agreement. McLeod Lake is pursuing a self government agreement under the BC treaty process and is currently at Stage 2 of that process.

3.4.4 Takla Lake Band

The Takla Lake Band traditional territory in the TSA covers the area surrounding Germansen Landing including the Duckling creek, Nina creek, Jackfish creek, and Twenty Mile creek watersheds. The Noostel Keyoh of the Takla Lake Band reside in the area around Germansen Landing and Manson Creek.

The Takla Lake Band is a member of the Carrier Sekani Tribal Council and is currently in stage 4 of the treaty negotiation process. The main community for this 587-member band is on North Takla Lake Indian Reserve near Takla Landing.

3.4.5 Nak'azdli First Nations

Covering the southwest portion of the TSA, the Nak'azdli First Nations traditional territory spans from Blue Lake in the northwest to the southern-most point of the TSA. Based largely out of the Nak'azdli Indian Reserve adjacent to Fort St. James, the 1560 members of the Nak'azdli First Nations are part of the Carrier Sekani Tribal Council. As

with the Takla Lake Band, the Nak'azdli First Nations is also at stage 4 of the treaty negotiation process.

3.4.6 Halfway River First Nation

The Halfway River First Nation, along with the West Moberly First Nations and Saulteau First Nations, are members of the Treaty 8 Tribal Council. Their traditional territory in the Mackenzie TSA lies to the north of the Peace Arm of Williston Lake following the east side of the Ospika River northward. The main community of the Halfway River First Nation is located on a reserve on the Halfway River, approximately 100 km northwest of Fort St. John.

3.4.7 West Moberly First Nations

From the Akie River in the north, south along the Rocky Mountain trench, then west along the Omineca River, the West Moberly First Nations traditional territory covers the southern and east-central portions of the TSA. The main community is located at the west end of Moberly Lake, approximately 90 km southwest of Fort St. John.

3.4.8 Saulteau First Nations

The Saulteau First Nations traditional territory within the Mackenzie TSA mirrors that of the West Moberly First Nation. Similarly, the Saulteau First Nation is also based out of Moberly Lake. The reserve and community is located at the east end of Moberly Lake about 100 km southwest of Fort St. John on Highway #29.

3.4.9 Treaty 8

Treaty 8 was originally a treaty settlement negotiated between the Government of Canada and First Nations in northern Alberta, northwest Saskatchewan and the southern Northwest Territories. In 1899, the treaty was extended into British Columbia to include eight First Nations bands in the northeast corner of the province.

Six Treaty 8 First Nations - Doig River, Fort Nelson, Halfway River, Prophet River Saulteau and West Moberly - are members of the Treaty 8 First Nations Chiefs, which are negotiating set aside issues at a common negotiations table.

These are issues that were set aside when BC and Treaty 8 First Nations signed a memorandum of understanding in 1998 on oil and gas development and the protection of treaty and Aboriginal rights. In addition to these "set aside" issues, BC and the Treaty 8 First Nations are currently negotiating revenue-sharing arrangements.

In addition, Canada has accepted the Treaty Land Entitlement claim of the Halfway River and West Moberly First Nations and the Blueberry River and Doig River First Nations respecting alleged shortfall in their original Treaty 8 land entitlement. Canada subsequently sought the involvement of B.C. in the negotiations to resolve the claims. B.C. agreed to participate in February 2003.

3.5 Structure and Responsibility for Implementing SFM

3.5.1 Public Involvement

Canada's forests are primarily owned by the public. Participation by an informed public is essential to define the multiple values of SFM desired by Canadians, to ensure that the best available information is acquired, and to promote input to, and acceptance of, the resultant goals and management activities of SFM. The CSA stresses public participation in the development of a SFMP. The participatory process includes broad public consultation during the development of the local Indicators, measures, and targets and management strategies, promotes open discussions and transparent decisions, and helps ensure that complex concepts are expressed in a fashion that is understandable by all.

The public consultation process used for the development of the Mackenzie LRMP contains many of the public participation requirements of CSA Standard Z809-02. To support the development of this SFMP, the signatories have engaged in an enhanced and thorough consultative public process for local stakeholders. Involvement of the public ensured that local perspectives were incorporated into SFM and the SFMP. Additionally, this approach allowed stakeholders the opportunity for ongoing learning and provided a forum for continual stakeholder input and influence on decisions and the resolution of contentious issues.

The consultative public process undertaken by the signatories was composed of: the Mackenzie SFMP Steering Committee consisting of representatives of signatories of this plan; and a public advisory group (PAG) consisting of members recommended by a Stakeholder Analysis[7] conducted by the SFMP Steering Committee. The PAG is referred to as the Mackenzie DFA Public Advisory Group (See Appendix B).

3.5.2 First Nations Involvement

First Nations hold a unique position in Canada and as such, have a legally protected right to participate in the development and review of resource management strategies or plans in areas they assert to be traditional territories, including Crown lands outside areas where treaties apply. Signatories of this plan recognize all First Nations aboriginal and treaty rights, and will facilitate the involvement of First Nations in the SFMP.

As much as possible, First Nations participation was a part of the overall Public Involvement Process. First Nations participation was limited by;

- Geography – many First Nations centers are remote and require extensive travel,
- Capacity – lack of capacity has repeatedly been cited by First Nations as a barrier to effective participation. With the forest, mining, and petroleum industries continuously seeking input, First Nations often lack sufficient technical staff or resources needed to provide input into the many planning processes and development proposals placed before them.

[7] Stakeholder Analysis is a supporting document to the SFM Plan and is maintained by the signatories.

Documentation is provided in PAG Records binder that demonstrates efforts to encourage First Nations involvement.

3.5.3 Responsibilities

Ownership Responsibilities

Canfor's forestry operations on the Mackenzie DFA are managed under a Renewable Forest License Tenure (Forest License A15384) granted by MoFR under authority of the Forest Act of BC. The renewable forest license signed between Canfor and the BC Government represents a legally binding contract with associated rights and responsibilities. Canfor's management of operations must be conducted within provincial forestry legislation and policy.

As an independent organization within MoFR, BCTS is responsible for development and issuance of multiple Forest Licenses under authority of the Forest Act of BC. In conducting its business operations, BCTS meets all legal forestry requirements including silviculture obligations and maintains conformance with all applicable statutes and regulations. The area associated with the operations of Canfor and BCTS within the DFA are show in Table 4. Figure 4 illustrates the extent of operations for Canfor and BC Timber Sales within the DFA as well as the location of areas excluded from the DFA.

Table 4. Area of operations within the Mackenzie DFA[8].

Mackenzie SFMP Signatories	Signatory DFA (gross ha.)	% of Total DFA
B.C. Timber Sales, P.G. Business Area	838,043	39.9%
Canfor, Mackenzie Division	1,255,994	59.8%
(Parks and Protected Areas)	6,629	0.3%
Total Mackenzie DFA	2,100,666	100%

Areas excluded from the DFA include woodlot licence areas and private property. On publicly owned land, responsibility and accountability for adherence to provincial and federal legislation and objectives, rests with the BC Provincial Government including MoFR, the Ministry of Environment (MoE) and Ministry of Agriculture and Lands (MoAL). MoFR, through its district office in Mackenzie, enforces all legal requirements associated with commercial forestry activities on all tenures within the forest district. MoFR is responsible for over-seeing the stewardship of the land base, ensuring compliance with all applicable legislation and regulations and for administration of legal documents submitted by licensees in order to carry out forestry related business.

[8] Based on the final Licensee Operating area coverage produced February 2007 after negotiations completed on delineation of operating areas for BC Timber Sales

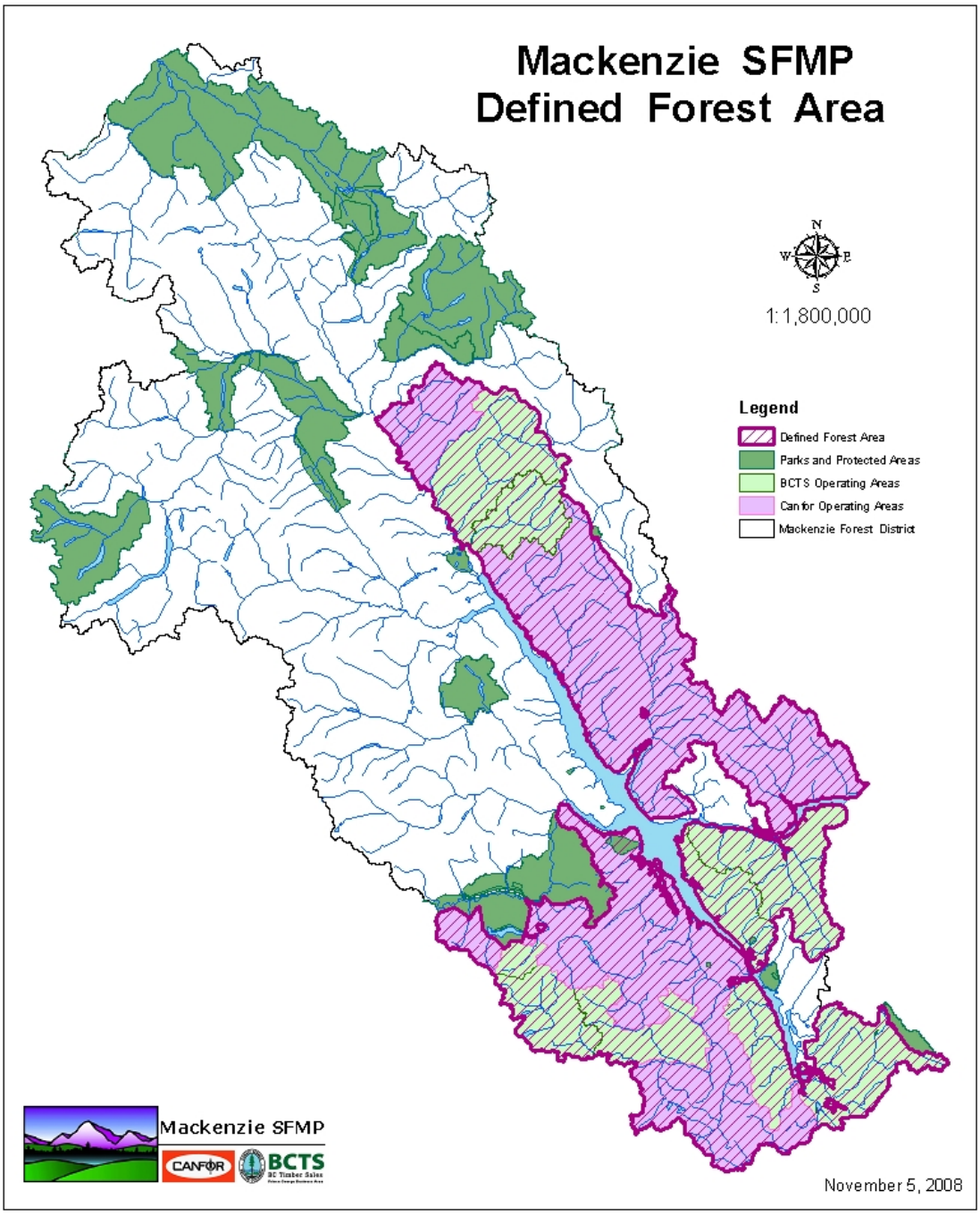


Figure 4. Areas over which BC Timber Sales and Canadian Forest Products Ltd. conduct forest development operations within the Mackenzie Defined Forest Area in north-central British Columbia.

On publicly owned land, responsibility and accountability for adherence to provincial and federal legislation and objectives, rests with the BC Provincial Government including MoFR, the Ministry of Environment (MoE) and Ministry of Agriculture and Lands (MoAL). MoFR, through its district office in Mackenzie, enforces all legal requirements associated with commercial forestry activities on all tenures within the forest district. MoFR is responsible for over-seeing the stewardship of the land base, ensuring compliance with all applicable legislation and regulations and for administration of legal documents submitted by licensees in order to carry out forestry related business.

Shared Responsibilities and User Rights

Canfor operates under a volume-based tenure and BCTS is responsible for making available Timber Sale Licences in the Mackenzie Forest District. An operating area agreement allows the organizations to operate in distinct areas of the TSA with some degree of autonomy. The signatories have no legal recourse to limit the use of the area by other licensed users. The SFMP does not include any areas developed, leased, licensed, or under permit by users other than the signatories. Other users may include:

- Abitibi Consolidated Company of Canada;
- Non-renewable license holders (Tsay Keh Dene and Kwadacha First Nations);
- Woodlot license holders;
- Holders of license of occupation;
- Third party licenses to cut;
- Land leases;
- Mineral and energy tenures;
- Special use permits; and
- First Nation reserves.

Table 5. Mackenzie TSA Apportionment compared to projected DFA harvest.

Forest License	TSA Apportionment (m3)	%	Projected DFA Harvest (m3)	%
Signatories				
Canadian Forest Products Ltd.:	1,082,904	**34.9**	1,082,904	**54.5**
BC Timber Sales (m^3 advertised)	768,885	**24.8**	768,885	**38.9**
Non-Signatories				
Abitibi Consolidated Company of Canada	932,500	**33.5**	0	***0.0***
Kwadacha Natural Resource Agency	53,404	**1.7**	33,624[9]	***1.7***
Tsay Keh Dene Band.	53,404	**1.7**	33,624[11]	***1.7***
Ainsworth Lumber Co. Ltd. (Deciduous)	50,000	**1.6**	31,481	***1.6***
Small Scale Salvage licensees (estimate)	55,000[10]	**0.7**	35,228	***1.8***
TOTAL	**3,102,905**	**100**	**1,963,329**	**100**

[9] Proportional estimate, process described in section 6.1.1 of this plan.
[10] Salvage licences to cut projected for the Mackenzie TSA during 2006/07 year, district correspondence.

The recently completed process of designating operating areas for BCTS to manage development within allowed for some flexibility in the transition period. As a result Abitibi has retained approved and proposed harvesting within the DFA. These operations currently are covered under the Finlay Forest DFA, which is certified to the CAN CSA Z809-02 standard. These transitional areas will likely be harvested within the next few years. Abitibi will be managing, on an ongoing basis, silviculture and other permit obligations for several years. The relationships forged by sharing operating areas will persist into the future. BCTS, in turn, has retained approved development, outside the DFA, in areas traditionally managed by Abitibi. These blocks will be sold and harvested in the next couple of years.

Although there is no legal recourse to limit use, the signatories can and do co-operate with other industrial users, such as the mining and energy sectors, in regards to roads and road use. Although activity in the energy sector has not historically been significant, there has been an increase in recent years. The mining sector has also picked up considerably, although the only large-scale active mining enterprise in the TSA is the Kemess mine.

To the extent possible, the signatories and other industrial users use existing infrastructure to access resources, within terrain and/or safety constraints. This relationship is facilitated by Road Use Agreements among industrial road users assigning responsibilities for road use and maintenance amongst the permitted holder of the road and other road users. In this manner, the holder of the road permit can reduce their liability for a road without deactivating it, precluding the need for reactivation by other industrial users.

Regulations

Section 4 of Canfor's Forest Management System Manual provides a summary of rights, responsibilities and regulations associated with Canfor's operations and are publicly available.

Applicable legislation and regulatory requirements primarily include the following:

- Forest Range and Practices Act (FRPA)
- Forest Stewardship Plans (FSP)
- Forest Act
- Road Permits
- Cutting Permits
- Forest Practices Code (FPC) of British Columbia Act
- Forest Development Plans (FDP)
- Silviculture Prescriptions
- Site Plans
- FPC Regulations

A more thorough list of legislative regulations and associated linkages to the SFMP may be found in Section 3.4 and Appendix D.

SFMP Steering Committee Responsibilities

The Mackenzie SFMP Steering Committee is responsible for assisting in the development, implementation and maintenance of the SFMP. The Steering Committee will provide corporate direction on the development of the MK SFMP. The Steering Committee will be actively involved in the public participation processes, gathering and evaluating data, reporting, continuously improving the plan over time, and ensuring that the MK SFMP commitments are implemented within their organizations. The Steering Committee will meet at least twice per year following the implementation of the plan to review the SFMP, continuous improvement, and any other business related to the MK SFMP.

Although the life span of the Steering Committee is indefinite, the life span of the Memorandum of Understanding guiding the Steering Committee is 4 years. Details on the responsibilities of the Mackenzie SFMP Steering Committee are outlined in the Mackenzie SFMP PAG Terms of Reference (Appendix B), the Memorandum of Understanding (Appendix A), and Table 6.

Public Advisory Group Responsibilities

The terms of reference (TOR) for the Mackenzie DFA Public Advisory Group outlines the:

- structure of the PAG;
- organizational structure used for the development of the SFMP;
- duties of PAG members, its advisors, and the SFMP reviewers;
- schedules for development of the SFMP, including public consultation and communications; and
- basic operating rules for the public involvement process.

Complete details on the responsibilities of Mackenzie DFA Public Advisory Group are provided in the Appendix B.

Manager and Employee Responsibilities

Effective implementation of the SFMP requires that the responsibilities of the signatories be clearly and unequivocally stated. In addition to the responsibilities outlined in each signatory's individual commitments to SFM and the stated joint commitments to SFM, the signatories also commit to the roles and responsibilities for the management and staff of their respective operations outlined in Table Responsibilities of management and staff pertaining to individual indicators/measures is detailed in the signatories' respective Responsibility Matrices.

3.6 SFMP Links to Federal and Provincial Documents

Several policy, marketplace or professional forest management drivers are operative in BC. These initiatives have not been developed in unison, are not linked to a larger planning environment, and do not provide operational tools to address strategic-level forest management. The SFMP is an intensive and comprehensive planning document that integrates provincial legislative requirements, management strategies, and other

forestry initiatives such that the requirements of CSA SFM certification are met. The SFMP is implemented through operational plans. Figure depicts the intent and purpose of the SFMP in terms of addressing the current range of legislation, strategies, initiatives and operational plans.

Legislation and Policy provide a context to develop strategies and conduct forest-harvesting practices. The SFMP follows the legal requirements and policies. These include adherence to Federal Species at Risk legislation and regulations in the Provincial Forest Act or FRPA (Appendix D, Table 1).

Provincial Strategies provide input to SFMP in the development of management scenarios to support indicator targets. Strategic plans influence forest management in the Mackenzie DFA. Some of these strategies may also provide the mechanism to address some SFM performance requirements identified in this plan (Appendix D, Table 2).

Supporting Documents and Initiatives provide guidelines and tools to assist in the implementation of the SFMP. Federal standards provide guidelines for implementing management systems and standards to attain SFM certification. Provincial initiatives provide avenues to develop SFMP's and provide the financial support fundamental to applying and improving SFM (Appendix D, Table 3).

Operational Plans are the key to the implementation of the SFMP. The general linkages between operational plans and the SFMP are provided in Appendix E. The SFMP typically represents a 20 – 25 year planning window. The time horizon of the SFMP precludes specific details of management activities on an annual basis. Short-term plans that prescribe specific management activities will be developed in the context of contributing to the goals and implementation schedules of the SFMP. Linkages between the short-term plans that implement activities on the land base and the achievement of the longer-term SFM targets are clearly demonstrated in section 5.2.

Table 6. Roles and responsibilities for the management and staff of the signatories to the Sustainable Forest Management Plan (SFMP) for the Mackenzie Defined Forest Area.

Senior Management – Canfor & BCTS	
	develop, implement and maintain commitments to SFM
	assign appropriate level of resources to implement the SFMP
	define, document and communicate the roles, responsibilities and authority to implement and maintain the SFMP
	conduct periodic management reviews of SFM – including the SFMP, monitoring results, annual reports, and internal/external audits
	implement appropriate changes to SFM due to the results of the management reviews
SFM Representative – Canfor & BCTS	
	coordinate the development, implementation and maintenance of an effective PAG
	participate within the PAG following the agreed TOR
	respect the roles, responsibilities, rights and ownership of all parties, both those involved and those not actively involved
	provide/receive information to affected or interested parties concerning all aspect of SFM
	track internal and external communication concerning SFM
	develop, implement and maintain the SFMP – including participation in the development of local Indicators, measures, and targets
	develop/deliver appropriate training for staff to implement and maintain SFM
	develop/deliver appropriate training for contractors to implement and maintain SFM
	develop, implement and maintain appropriate procedures (operational controls, monitoring, checking and corrective actions) to ensure effective delivery of the SFMP
	develop, implement and maintain an effective adaptive management process to ensure continual improvement of the SFMP
Operational Staff – Canfor & BCTS	
	develop operational plans that reflect the SFMP's goals and implementation schedules
	implement operational plans
	implement inspections, monitoring and corrective actions as per the specific requirements outlined in the respective plans and operational controls
	attend applicable training session to ensure effective implementation of SFMP
	be knowledgeable about, and have access to, the SFMP and applicable supporting documents
	follow applicable operational controls and procedures to ensure effective delivery of SFMP

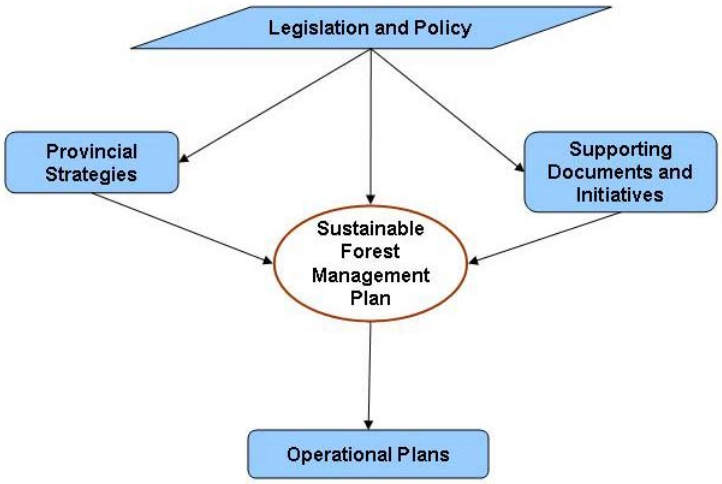


Figure 5. A schematic depiction of the linkages between the Sustainable Forest Management Plan for the Mackenzie Defined Forest Area, government led legislation, strategies, initiatives, and operational plans.

4.0 ESTABLISHING THE FOUNDATION FOR SFM PLANNING

The foundation for SFM planning was built upon the identification of stakeholders, determination of key management issues derived from stakeholder input and other planning processes, consideration of current management practices, inventory analysis, and determination of data and knowledge gaps. Ultimately, this foundation assisted in the determination of locally appropriate description of forest values, criteria for sustainability and indicators upon which to assess the criteria, specific measures for indicators, targets for indicators, forecasting approaches, and associated decision support tools.

4.1 Stakeholder Analysis

Individuals and groups were selected for inclusion in the stakeholder analysis database based on their participation in past planning processes (e.g., the Mackenzie LRMP), their status as tenure holders (e.g., guiding, trapping), or through their identification as affected individuals and organizations (e.g., First Nations, property owners, government officials). A total of 326 individuals or organizations were identified during the process. Due to the relatively small population base and number of stakeholders identified, the Steering Committee determined that a formalized analysis was not required. Invitations to participate in the public planning process were delivered to all 326 identified stakeholders resulting in 16 attendees at the inaugural PAG meeting. Membership was then reviewed on the basis of specific criteria (e.g., involvement, affectedness, influence, and contact priority). As a result of this review a list of sectors (e.g., commercial tourism, forestry, government, outdoor recreation) and PAG members were identified.

The selection of stakeholder representatives through this process supports a balanced and representative mix of interests that are represented within the Mackenzie DFA's public process. The identification of stakeholders is, however, an ongoing process. New stakeholders will be identified in response to changes in values, ecological conditions, socio-economic opportunities, or management activities on the Mackenzie DFA. The results of the stakeholder analysis is described more fully in Appendix C.

A number of key forest management issues in the Mackenzie DFA were identified during other initiatives and processes such as the LRMP and from stakeholder input through the PAG. Key management issues provide a foundation for establishing measures and targets that are addressed within the SFMP.

4.2 Practices Analysis

A summary of current land management practices has yet to be completed for the Mackenzie DFA by the SFMP Steering Committee. These land management practices may function as inputs to spatially explicit landscape simulation models that will quantify and forecast the long-term impact of current management practices on indicators identified for the Mackenzie DFA. In the absence of such an analysis, the SFMP Steering Committee relied on TSR data with modifications to reflect current practices as outlined in Section 6.2 and Appendix H. Current practices specific to each indicator are identified in Section 5.2.

4.3 Inventory Analysis and Knowledge Gaps

There are two components of an inventory analysis: 1) the collation or assembly of the required data available for developing an SFMP; and 2) the assessment of the quality and appropriateness of the data with respect to its end use. Over the years, a number of land base inventories or assessments have been completed on all, or portions of, the Mackenzie DFA. While not necessarily directed to indicators identified in this SFMP, these inventories collectively provide support for knowledgeable management decisions and SFM. Completed inventories and assessments are summarized in Table 7.

Table 7. A summary of existing resource inventories and assessments that have been conducted on the Mackenzie Defined Forest Area.

MoFR TSR	Canfor	Peace/Williston	Other	Known Maps
Forest Cover Timber Harvesting Land Base Merchantable Land Base	Amphibian Inventory Coarse Woody Debris Vegetation Resources Inventory Terrain stability Stream/Lake Assessments Archaeological Overview Archaeological Impact Forest Health	Amphibian Inventory Passerine Birds Raptors Inventory Fisher Project Elk Census Sheep Census Goat Census	Passerine Birds Caribou Census Moose Census Wolverine Project Goat Census	Biogeoclimatic Ecosystem Classification Natural Disturbance Types Natural Disturbance Units Riparian Management Zones Protected Areas Strategy Caribou Management Zones Caribou Habitat Goat Habitat Mineral Licks Ungulate Winter Ranges Grizzly Bear Habitat Moose Habitat

Given that the SFMP is a living document, it is expected that there will be changes over time. In a proficient management system, changes to the document or strategies will be consistent with the objectives of continual improvement in management activities and outcomes. Identification of current gaps in data or functional relationships, and the development of strategies to address these deficiencies is a primary step to enable improvement. The establishment of local level indicators and targets for the Mackenzie DFA supports the identification of required data and functional relationships.

4.4 Decision Support Tools

In order to effectively predict the outcome of a strategy or alternative forest practice, a variety of forecasting approaches and decision support tools are necessary. Forecasting approaches include conceptual models derived from expert judgment, quantitative models built with data, and the development of alternative future scenarios to drive spatial and temporal simulations. Decision support tools facilitate the decision making process which is often complicated by uncertainties in data, understanding and future events.

Canfor's Mackenzie Division has participated as an expert or as a stakeholder in a variety of Working Groups /Technical Committees including:

- Northern Caribou Recovery Implementation Group for North Central BC;
- Mackenzie Mountain Goat Management Team;

- Landscape Objective Working Group; and
- Pine Stem Rust Working Group.

These technical committees have conducted several modeling scenarios including:

- habitat supply models for caribou, moose, wolves, goats, and grizzly bear;
- forecasting scenarios for patch size and seral stage forest harvesting strategies; and
- a riparian assessment model.

Forecasting approaches, future scenarios and decision support tools specific to each indicator are identified in Section 5.2.

5.0 STRATEGIC LEVEL PLANNING

5.1 Values, Criteria, Indicators

Criteria and Indicators (C&I) form the basis of a hierarchical framework developed to assist in the assessment of progress toward SFM and therefore, adherence to CSA Standard Z809-02 (CSA 2002). Criteria are essentially strategic-level management objectives intended to be applied to large areas (e.g., 100,000 to 5 million ha) over long time frames (i.e., from 100 to 300 years) and collectively they characterize the three forest values addressed by SFM: 1) ecological, 2) economic, and 3) social. Criteria are intended to be assessed through repeated, long-term measurement of their associated indicators.

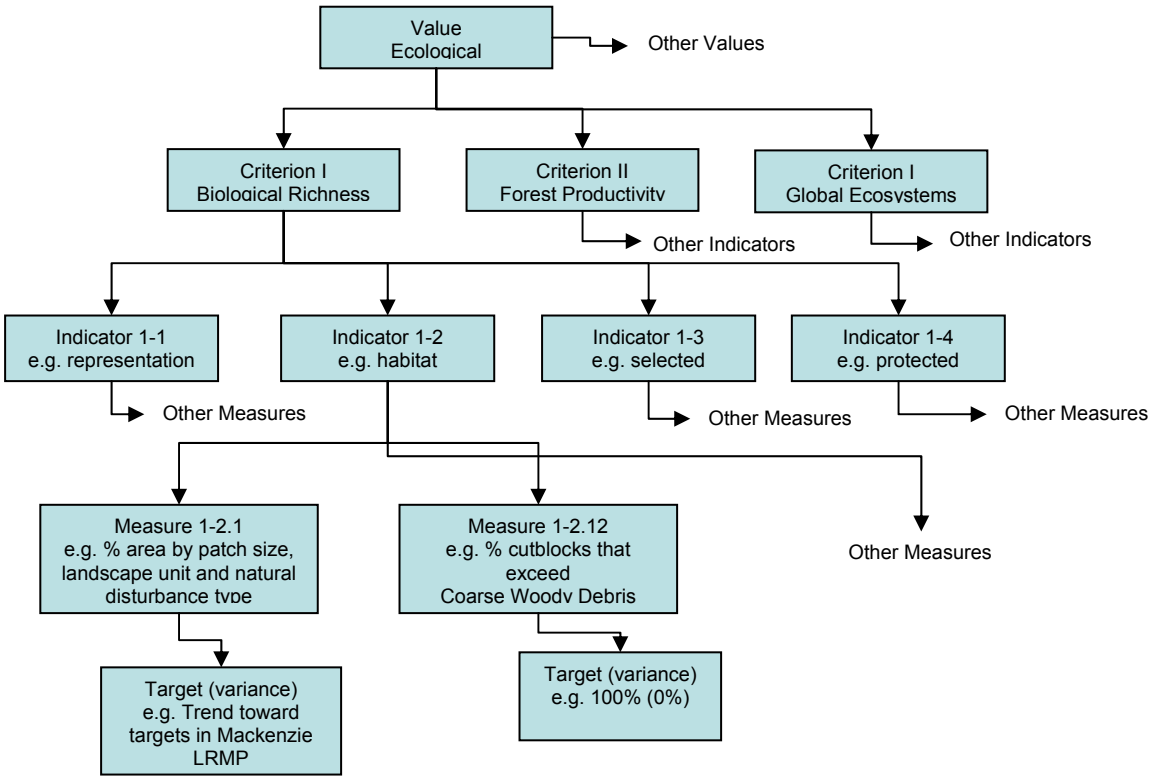


Figure 6. An example of the hierarchical framework of values, criteria, indicators, measures, and targets developed to assist in the assessment of progress toward sustainable forest management in the Mackenzie Defined Forest Area of north-central British

Indicators are variables chosen to represent each criterion and therefore need to be measurable and to have a strong association with the criterion. Indicators provide information about present, or future, conditions of criteria and repeated measures or simulation modeling can be used to establish the actual or predicted direction and magnitude of change in criteria over time. In this way, indicators provide a foundation for the analyses required in the assessment of SFM.

Table 8. Forest values, strategic objectives criteria, and evaluation indicators chosen to assist in the assessment of progress toward sustainable forest management in the Mackenzie Defined Forest Area in north-central British Columbia.

Ecological Values	
CI. Biological richness and its associated values are sustained in the defined forest area (DFA)	
1-1	Ecologically distinct habitat types are represented in an unmanaged state in the DFA to sustain lesser known species and ecological function.
1-2	The amount, distribution, and diversity of terrestrial and aquatic habitat types, structure and elements important to biological richness are sustained.
1-3	Productive populations of selected species or species guilds are well distributed throughout the range of their habitat.
1-4	Government designated protected areas and sites of special biological significance are sustained at the site and sub regional level
C II. The productive capability of forest ecosystems within the Timber Harvesting Landbase (THLB) is sustained.	
2-1	Biological components of forest soils are sustained.
2-2	Productive land-base loss as a result of forestry activities is minimized.
2-3	Total growing stock of merchantable and non-merchantable tree species on forest land available for timber

	production.
2-4	No net detrimental loss in productivity as a result of forestry-related slope instability.
2-5	Natural disturbance levels and risk levels are managed for such that resistance to catastrophic change and the ability to recover on the landscape level is sustained.
C III. Forest ecosystem contributions to global ecological cycles are sustained within the DFA.	
3-1	The forest ecosystem carbon pool for the defined management area is maintained or increased.
3-3	The processes that take carbon from the atmosphere and store it in forest ecosystems are sustained.
Economic Values	
C IV. The flow of economic benefits from forests through the forest industry is sustained.	
4-1	Timber harvesting continues to contribute to economic well-being.
4-2	The public (stakeholders, residents and interested parties) continues to receive a portion of the benefits.
4-3	Governments continue to receive a portion of the benefits.
4-4	Opportunities to receive a portion of the benefits exist for First Nations.
4-5	A competitive, diversified forestry sector exists.
4-6	Levels of forest damaging events or agents are managed such that their economic impact is minimized.
C V. The flow of marketed non-timber economic benefits from forests is sustained.	
5-1	Amount and quality of marketed non-timber forest resources does not decline over the long-term.
C VI. Forest management contributes to a diversified local economy.	
6-1	Employment and income sources and their contribution to the local economy continue to be diversified.
Social Values	
C VII. Decisions guiding forest management on the DFA are informed by and respond to a wide range of social and cultural values.	
7-1	Forest management planning adequately reflects the interests and issues raised by the public (stakeholders, residents and interested parties) in the DFA through an effective and meaningful (to the participants) public participation process.
7-2	Information is effectively exchanged between DFA forest resource managers and the public through a varied and collaborative planning approach to facilitate mutual understanding and recognition.
7-3	An adaptive management program is implemented for all levels of the Framework (Strategic, Tactical, Operational).
C VIII. Forest management sustains or enhances the cultural (material and economic), health (physical and spiritual) and capacity benefits that First Nations derive from forest resources.	
8-1	Forest management recognizes and respects First Nations rights and Treaty rights.
8-2	First Nations are provided with detailed, meaningful, and reciprocal knowledge pertaining to forest use as well as forest management plans prior to government approval and implementation.
8-3	The relationship between forest management and First Nations' culture and tradition is acknowledged as important.
8-4	Local management is effective in controlling their impact on the maintenance of and access to resources for First Nations.
C IX. Forest management sustains ongoing opportunities for a range of quality of life benefits.	
9-1	Resources and opportunities for recreation (including quality of experience) are maintained or enhanced.
9-2	Visual quality of harvested/managed landscape is acceptable to a broad range of stakeholders/visitors.
9-3	Forest management conserves unique and/or significant places and features of social, cultural or spiritual importance.

The SFM Framework has developed an initial set of Criteria and Indicators that measure and demonstrate the sustainability of social, ecological and economic values at the DFA level. This initial set has been used as “seed” information to assist with the development of a local set of C&I. These local C&I have been adapted to reflect the ecological and socio-economic conditions of the Mackenzie DFA as determined by strategic analysis and stakeholder input through the Mackenzie SFMP PAG. The indicators and their associated measures, targets and variances as recommended by the PAG are listed in Appendix G: Indicator/Measure Status Report.

A multi-criteria analysis was conducted by PAG members to determine desired future forest management activities and outcomes. Analyses were conducted to determine sustainability of each of the criteria based on how indicators responded to simulated forest development. PAG members were asked to indicate their priorities and tolerance to risk by choosing between competing criteria. Results of this strategic level planning will be used to direct lower levels of planning (i.e., the tactical- and operational-level activities).

5.1.1 Criteria and Indicators for Ecological Values

Criterion I	Biological richness and its associated values are sustained in the defined forest area (DFA)

Sustaining biological richness is proposed as an interim surrogate for sustaining biodiversity because of the inherent complexity in defining biodiversity. Biological richness can be simply defined as 'the number of species'. Using this definition of biological richness as a proxy for biodiversity provides a clear and measurable goal: a commitment to sustaining all known native species in a defined management area. The intent is not limited to ensuring species presence but to maintaining productive, well-distributed populations of native species in the DFA. The retention of species in this manner is intended to maintain the genetic variation among individuals and species, thereby providing greater chance that species will persist in changing environments (Bunnell 1998).
A multi-filter (i.e., coarse-, medium-, and fine-textured) approach was used to develop indicators and measures of biological richness in forested landscapes. Indicator 1-1 (ecological representation) is a coarse-textured indicator because it assumes that poorly understood species and ecosystem functions can be maintained if all distinct habitat types are represented in the unmanaged land base. Indicator 1-2 (habitat elements and landscape structure) is a medium-textured indicator based on the principle of managing forest structure to provide important habitat. While Indicator 1-1 provides for a diversity of habitats, Indicator 1-2 maintains a diversity of habitat structures. Indicator 1-3 (species) is a fine-textured indicator used to monitor the response of species to changes in habitat structure and pattern. Managing for, and monitoring, certain species can provide a means to assess effectiveness of Indicators 1-1 and 1-2 while ensuring persistence of individual species or species guilds of special importance.

Indicator 1-1	Ecologically distinct habitat types are represented in an unmanaged state in the DFA to sustain lesser known species and ecological function.

Maintaining representation of a full range of ecosystem types is a widely accepted strategy to conserve biodiversity in protected areas (e.g., Margules and Pressey 2000) and has been suggested for landscapes managed for forestry (e.g., Lindenmayer and Franklin 2002). This strategy is 'precautionary' in that it is intended to sustain those species for which knowledge is sparse or absent by ensuring that some portion of each distinct ecosystem type is represented in a relatively unmanaged state. Unmanaged areas also help to sustain poorly understood ecosystem functions and provide an ecological baseline against which the effects of human activities can be compared.

Ecosystem representation can be determined by the proportion of productive crown forest found in the non-harvestable land base (NHLB), including parks and protected areas, but also including areas excluded from harvest for other reasons such as operability constraints. Results from an ecosystem representation analysis can help us to: 1) identify priorities for reserves or special management of rare or under-represented ecosystems; 2) set context for management related to Indicator 2 (e.g., emphasize snag management or coarse woody debris objectives in under-represented ecosystems); and 3) focus effectiveness monitoring efforts related to Indicator 3.

Indicator 1-2	The amount, distribution, and diversity of terrestrial and aquatic habitat types, structure and elements important to biological richness are sustained...

Managing forest structure has long been recognized as an important strategy to maintain habitat for species in forested landscapes (reference). This medium-textured indicator is intended to capture general habitat requirements of many species. Hence, the kinds, amounts, and variability of forest structures are addressed that are assumed necessary to sustain a wide variety of organisms in managed stands and landscapes. Similar to the case for Indicator 1-1, maintaining diversity of habitat structure should provide for a broad range of organisms, including many that are poorly known. Landscape pattern and structure (i.e., edge habitat) are also covered by Indicator 1-2. Indicator 1-2 is intended to incorporate all known taxa, including aquatic, terrestrial, and avian vertebrates, invertebrates, vascular and non-vascular plants, and fungi.

Indicator 1-3	Productive populations of selected species or species guilds are well distributed throughout the range of their habitat.

Indicator 3 is the "fine-filter" of the three indicators, focusing on species and most directly linking back to the criterion. It is intended to monitor the presence and trends of species in response to changes in habitat structure and pattern. Indicator 3 tests the broader approaches of Indicators 1 and 2. Monitoring Indicator 3 primarily helps to assess whether or not the provision of habitat structure in the management area (Indicator 2) and in reserves (Indicator 1) can actually result in persistent populations of species. The maintenance of productive populations of species and species guilds is based on three assumptions:

- species distributions and productivity are affected by availability and quality of habitat;
- populations of species will be maintained if their habitat requirements are maintained;
- a large portion of the vertebrate species can be maintained by managing the main forest structural components with which these species are likely associated.

Monitoring Indicator 3 is important for three reasons. First, monitor species is intended to ensure that the generative, adaptive capacity of the forest is sustained. Variability among individuals, populations, species, and ecosystems allows for adaptation to change, which ultimately makes possible the generation of new biodiversity. Sustaining species across their distribution is the simplest and most effective way to sustain the values of biological diversity. Second, monitoring Indicator 3 helps evaluate the habitat benchmarks used, and helps verify the assumptions (Indicator 1 and 2) on which the maintenance of productive species and species guilds is based (Indicator 3). Finally, monitoring Indicator 3 is important because the public sees sustenance of species as the ultimate measure of success or failure. The public tends to associate biodiversity with species richness (i.e., the number of species in a given area), and the loss of biodiversity is often equated with the loss of species. In addition to maintaining habitat through Indicators 1-1 and 1-2, specific habitat requirements may be managed to maintain productive populations of species of special management concern. These species include resource species (game species), red- or blue-listed species and other species of conservation or social concern.

Indicator 1-4	Government designated protected areas and sites of special biological significance are sustained at the site and sub regional level

The combination of indicators 1-1 to 1-3 may not provide enough protection to ensure the maintenance of biological richness. Sites known to be important for the survival of endangered species may be addressed through designation as protected areas or may be discovered during the process of planning forest management activities. Identification and proper management of these sites will ensure that a targeted approach is used to sustain these species and the sites they rely upon.

Criterion II	The productive capability of forest ecosystems within the Timber Harvesting Landbase (THLB) is sustained.

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

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

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

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

Indicator 2-1	Biological components of forest soils are sustained.

Many biological components can be negatively impacted by management activities. Indicator 2-1 is designed to ensure that management activities do not exceed the resilient capacity of a given forest ecosystem. Resilience is a function of the extent to which ecosystem processes are disrupted, their rate of recovery, and the time over which those processes operate before another disturbance event. Resilience is assessed using surrogates of site quality.

Indicator 2-2	Productive land-base loss as a result of forestry activities is minimized.

In addition to maintaining the resources necessary for sustaining the resiliency of forest ecosystems, a stable land base within which productive capability is assessed is also required.

Indicator 2-3	Total growing stock of merchantable and non-merchantable tree species on forest land available for timber production.

Maintenance of growing stock depends upon successful regeneration of harvested areas combined with an adequate productivity in regenerating stands (as monitored using Indicator 2-1). Growing stock is a fundamental element in determining the productive capacity of the area identified as forest available for timber production. Knowledge of growing stock of the various species that make up the forest and how it changes over time is central to considerations of a sustainable supply of wood for products and the sustainability of the ecosystems that provide those (USDAFS 2003)

Indicator 2-4	No net detrimental loss in productivity as a result of forestry-related slope instability.

Loss in productivity occurs when a site is no longer able to regenerate to its original state following a disturbance. Landslides are mass movements of soil or debris that can result in non-productive areas or reduced productivity for forested sites. In both the NHLB and THLB, landslides can occur as a result of many natural processes. In the THLB, activities such as timber harvesting and road building can create conditions that initiate slides especially when these activities occur on unstable or potentially unstable terrain. Loss of soil productivity will be minimized through proper development of and implementation of terrain management requirements as part of tactical and operational planning.

Indicator 2-5	Natural disturbance levels and risk levels are managed for such that resistance to catastrophic change and the ability to recover on the landscape level is sustained.

Natural disturbance levels and risk levels are managed for resistance to catastrophic change and to ensure that the ability to recover on the landscape level is sustained. The process of renewal restores productive capability between disturbance events. It is important to ensure that effective strategies are in place in order address the impacts of large natural disturbance events on the range of forest related values in the DFA.

Criterion III	Forest ecosystem contributions to global ecological cycles are sustained within the DFA.

Forest ecosystems are an integral part of the global carbon cycle as trees and soils absorb and release carbon dioxide (CO2) through carbon uptake and decomposition. Trees can store carbon in their plant tissues through the process of photosynthesis and could potentially exist as a significant carbon pool, particularly old forests. When trees are harvested or when a natural disturbance such as fire occurs, the carbon is released back into the atmosphere. The recognition that forests are a carbon sink, and that land-use, land-use change and forest activities can have an effect on this sink requires consideration of forest carbon values in sustainable forest management planning.

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

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

Indicator 3-1	The forest ecosystem carbon pool for the defined management area is maintained or increased.

This indicator assesses the "contribution of forest products to the global carbon budget" by measuring the role that forest products play in the sequestration, cycling, or emission of carbon. Harvested wood releases its carbon at rates dependent upon its method of processing and its end-use. Provided the forest is fully regenerated, forest harvesting could result in a net reduction in carbon emissions if the wood that is harvested is used for long-term products such as lumber. Among the scientific community, there are no agreed-upon standards and guidelines for forest products carbon accounting.

What is generally involved is the chain of custody or the tracking of forest carbon from trees once harvested to the mill and to the end-use. At each step of the tracking system, the amount of wood (volume, biomass and/or carbon) is determined. For example, the

amount of wood allocated to each forest product category or carbon pool (i.e. lumber, veneer, pulp, paper) would have to be determined. Once the wood or carbon enters into a pool, it may follow a yet to be determined carbon decay rate or the expected lifetime of that product. However, some of the wood particularly, waste wood may be burned, recycled or entered into the landfill. Carbon in these pools must also be accounted for as emissions or storage. Some estimates of decay rates and assumptions to the fate of the products may be made and are available in the literature. A detailed assessment may be made during each step to verify the carbon assumption or to develop the carbon decay rates. There is little work that is available at the operational forest management level. The Canadian Forest Service is developing the Carbon Budget Model for use as part of operational planning. This is addressed by the locally developed measures.

Indicator 3-3	The processes that take carbon from the atmosphere and store it in forest ecosystems are sustained.

Indicator 3-3 ensures that the biological processes that contribute to the uptake of carbon and the role of forests as a sink are measured as part of sustainable forest management. The measures developed under this indicator address two significant practices that increase carbon sequestration on forest land; minimizing deforestation, and prompt reforestation of harvested areas (Stavins et. al.2005). By ensuring that the conversion of forest land to other uses such as roads and landings, it is believed that the amount of forest area available to act as a carbon sink is maximized. Likewise, by ensuring that harvested blocks are reforested promptly and growing vigorously, it is believed that carbon uptake will be maximized, particularly during the early seral stages where carbon uptake is the greatest.

By addressing both deforestation and reforestation, the locally developed measures minimize carbon losses while maximizing carbon uptake.

5.1.1 Criteria and Indicators for Economic Values

Criterion IV	The flow of economic benefits from forests through the forest industry is sustained.

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

The concept of “flow” is used to highlight that there are a number of different types of economic benefits for different groups. The emphasis for this criterion is on using forests only for wood production. Other criterion, indicators and measures place emphasis on using the forests for other values.

In order to determine if the economic benefits from the forest industry are sustained or not, indicators must be chosen that reflect what the benefits are and where they are

going. An indicator for the portion of the economic value that is distributed to 'corporate' interests is not included because this information (profit and depreciation) is not publicly available.

Criterion 2 and its associated indicators in part measure the ecological sustainability of forest productivity, which is strongly linked to 4-1 – contribution to economic well-being and 4-5 – the resilience indicator. One of the measures of economic well-being is the actual harvest, which will be related to the allowable annual cut, which in turn is related to the ecological sustainability of forest productivity. As well, one of the resilience measures relates to the actual harvest compared to the allowable annual cut, which would again be linked to Criterion 2.

In some cases the indicators (e.g. 4-5) are not in the control of the forest industry but are included in this plan due to their importance to the community. The resilience of the community to sustain itself outside of the forest industry is still an important indicator for the forest industry in terms of its ability to attract and maintain a skilled workforce. Targets for such indicators have not been set.

Indicator 4-1	Timber harvesting continues to contribute to economic well-being.

This indicator measures the 'augmented income' or economic value of timber products from the DFA. It reflects the total economic value of timber products harvested from the area. Timber products are measured at the log yard stage, not as final products, as tracing log flows and production costs is generally proprietary information.

Valuing how timber harvesting contributes to economic well being can be as simple as tracking the number of jobs created or as complex as attempting to value standing trees in relation to products they can create.

A simplistic way to value the harvest is to determine what someone is willing to pay for the trees.

Indicator 4-2	The public (stakeholders, residents and interested parties) continues to receive a portion of the benefits.

This indicator measures the 'distribution' of the economic value of timber harvesting to the public. The employment and income generated by forestry operations locally, regionally and provincially indicates the portion of the log value that employees receive.

Indicator 4-3	Governments continue to receive a portion of the benefits.

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

Indicator 4-4	Opportunities to receive a portion of the benefits exist for First Nations.

This indicator measures whether First Nations have opportunities to share in a portion of forestry related economic benefits. First Nations have not built up full capacity to capture economic benefits in every management unit in the province and in some cases have no

interest in managing forestry related businesses. The forest industry and the provincial government have a direct influence on the opportunities First Nations have to receive a portion of the benefits once their capacity to do so has been developed.

Indicator 4-5	A competitive, diversified forestry sector exists.

This indicator measures the 'resilience' of the forest sector to continue to produce timber values using the approaches outlined in the local SFM Plan. The forest industry must first be competitive, which is measured by certainty of timber supply, and competitiveness of delivered wood costs. Diversity is measured by the size and types of forestry businesses in the TSA.

Indicator 4-6	Levels of forest damaging events or agents are managed such that their economic impact is minimized.

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

Criterion V	The flow of marketed non-timber economic benefits from forests is sustained.

The forests of British Columbia provide a host of commercial uses across the province. Commercial uses are those for which there is a marketplace and thus those that generate economic benefits. This criterion measures the economic benefits from identified non-timber products. Forest management must recognize the existing, and potential, economic benefits that can be derived from area forests beyond the primary forestry industry including tourism, mining, guiding, trapping and botanicals. SFM plans and practices have the potential to substantially impact the economic value of non-timber products from an area.

In general in British Columbia, there is a lack of information about the non-timber resource coming from forests. There would have to be a substantial effort required to collect relevant information for this criterion. There is also uncertainty about what organization or level of government is best suited and should be responsible for collecting information and reporting on marketed non-timber benefits.

With that in mind, only one indicator has been developed for this criterion. This criterion and indicator link very closely with C&I for social values. Many of the attributes on a particular land base are not marketed or commercial, such as recreation, subsistence uses, or domestic watersheds. These values are very important by both those who directly benefit from these values, and by those who benefit from knowing these values exist. There is a strong link between marketed and non-marketed attributes, especially in terms of how forest management can impact them.

Indicator 5-1	Amount and quality of marketed non-timber forest resources does not decline over the long-term.

In the absence of readily available information about non-timber resource values, this indicator requires only an assessment of the 'units' of marketed products that would be incorporated in an estimate of values. Cooperative efforts with the commercial interests marketing non-timber resources are needed to accurately define the units, values, distribution and resilience factors for each interest. This work has not been undertaken as part of this project as it was seen to be inappropriate without an operational SFM planning effort underway.

Criterion VI	Forest management contributes to a diversified local economy.

This criterion focuses on the 'resilience' aspect of SFM, at the community economy level, using diversification as a measure of resilience. The collective implication of SFM on the economy of local British Columbia communities is recognized as an important element of diversification. Commercial uses result in the creation of financial benefits that are distributed to corporations, labour and governments. These benefits influence community sustainability through their impact on community economies, quality of life and social conditions at a range of geographic scales. Forest management can have both a positive and negative impact on other economic opportunities. As well, business practices (i.e. buying locally where available and economically practical) of the forest industry and government agencies can have an impact on the ability of the local economy to become diversified. Thus this issue warrants its own criterion.

The diversity of employment and income sources is a measure of the diversity of a community's economy. Communities can better withstand shocks in one sector of the economy if there are other sectors that buffer the effects. While the forestry industry does not control or even directly influence other sectors of local economies, the sustainability of communities in terms of amenities is directly tied to their ability to provide a diversity of work opportunities. Thus the ability of the forest industry to attract and keep a skilled workforce is linked to the diversity of the local economy. Although this indicator does not appear to be directly related to forestry, it is important nonetheless in terms of assessing the overall sustainability of local communities.

Employment and income information is relatively easy to access through government sources.

This indicator links to the two previous economic value indicators. Information gathered under those indicators will fill in knowledge gaps for this indicator as well.

Indicator 6-1	Employment and income sources and their contribution to the local economy continue to be diversified.

This indicator measures the resilience of a community to economic shocks in various sectors. The forest industry is one sector within a local community's economic system. The sustainability of communities is important to SFM in terms of their ability to attract and maintain a skilled workforce for the forest industry. In turn a healthy forest industry provides employment opportunities, income and tax bases and thus opportunities to attract other businesses and amenities to a community. The indicator tracks employment

and income in each sector of the local economy. Examples of what "local" means include those businesses and people who have an address in a community (rural or urban based) within the Mackenzie TSA or defined forest area.

5.1.1 Criteria and Indicators for Social Values

Criterion VII	Decisions guiding forest management on the DFA are informed by and respond to a wide range of social and cultural values.

The role of social sciences in determining what SFM means is crucial, because many of the questions in forest management are questions about human uses and relative values, not fundamentals of natural science (Webb, 2001). However, it is widely recognized that social C&Is have until recently been given less weight than ecological and economic C&Is, and that the state of our knowledge on these systems is weaker (Burley, 2001).

As forest management recognizes a broader range of forest values, particularly on public land, it is increasingly important that all stakeholders have input into management concerns. . Current certification guidelines (e.g. Canadian Standards Association) require public participation and have become increasingly important to forest companies for maintaining access to global markets. There are also practical advantages to including the public in the planning process, such as accessing local knowledge and increasing public understanding and support for sustainable forest management.

In general, successful public involvement provides fair, effective, open, and accountable processes that take into account the multiple and sometimes competing social values the public have identified as important. Public processes which enable input from a wide range of stakeholders and interests, and which promote an improved and shared understanding of sustainable forest resource management, can lead to greater public support and potentially more streamlined implementation of SFM plans. Participation in decision-making processes guides forest management and promotes awareness and capacity building on all sides.

The indicators selected in Criterion 7 address both procedural issues (e.g. the forms of public involvement used) and true performance measures of process outcomes and public satisfaction. Many other systems of C&I used in Canada fail to address this last aspect (Sheppard, 2003), and thus continue to leave industry vulnerable to disconnects between positive sustainability results measured on the ground and negative public opinion.

Indicator 7-1	Forest management planning adequately reflects the interests and issues raised by the public (stakeholders, residents and interested parties) in the DFA through an effective and meaningful (to the participants) public participation process.

There is a long history of stakeholder and public involvement in forestry related planning in BC. However, involvement processes have not always been satisfactory, either for the participants or the planners. Key stakeholders are sometimes overlooked, and participation approaches are sometimes inappropriate for the time, resources, and

interests of stakeholders. Decision makers are seldom provided with information outlining the number of stakeholders with particular interests when deciding on forest management plans.

This document is the first SFM Plan, and set of criteria, indicators, measures and targets developed for the Mackenzie DFA. As it is implemented over the coming years, and as new information is gathered and analyzed, the SFM Plan and its related measures and targets will improve. The SFMP Annual Report will summarize all the work completed to fill in current knowledge gaps and describe how we are achieving the stated targets. Public participation in the development and continued improvement of the SFM Plan is an important aspect in ensuring that the SFM Plan reflects local issues and needs.

This indicator is meant to measure the opportunities for, and effectiveness of, public (defined as area residents, stakeholders and interested parties) participation in the development of forest management strategies. This is addressed within the list of nine measures that follow.

Indicator 7-2	Information is effectively exchanged between DFA forest resource managers and the public through a varied and collaborative planning approach to facilitate mutual understanding and recognition.

This indicator measures how information is exchanged in the DFA, as well as the effectiveness of the information exchange. This is accomplished by the following six measures:

Indicator 7-3	An adaptive management program is implemented for all levels of the Framework (Strategic, Tactical, Operational).

This indicator measures how the SFM Plan is continually improved. The following measures are all part of the adaptive management strategy to be included in the SFM plan.

Criterion VIII	Forest management sustains or enhances the cultural (material and economic), health (physical and spiritual) and capacity benefits that First Nations derive from forest resources.

Broadly defined goals such as secure access to resources, the equitable sharing of benefits, and participation in decision-making are found to be important in almost every forest context where there are First Nations interests involved. The rationale behind Criterion 8, as described in the SFM Framework, recognizes the importance of the physical and economic dependence of indigenous people on forest resources, as well as the normative and spiritual elements. The proposed indicators represent a blend of legal commitments and the obligations resource managers have in ensuring that First Nations unique cultural, spiritual and economic needs are addressed within the SFM Framework.

Social Criteria 7 and 9 and their related indicators also deal with issues that likely are considered important to local First Nations and other area citizens. Indicators for both of these criteria deal with all citizens for a management unit, including First Nations.

Indicator 8-1	Forest management recognizes and respects First Nations rights and

	Treaty rights.

This indicator is meant to ensure that recognized and legal First Nations and treaty rights are identified, managed for and monitored. This is addressed in the following measures.

Indicator 8-2	First Nations are provided with detailed, meaningful, and reciprocal knowledge pertaining to forest use as well as forest management plans prior to government approval and implementation.

This indicator and its associated measures reflect the extent of which First Nations participate in forest management. Ultimately, active participation reflects the relationship of people with the land. This is addressed with the following measure.

Indicator 8-3	The relationship between forest management and First Nations' culture and tradition is acknowledged as important.

This indicator recognizes the breadth of values that First Nations place upon forests including economic, cultural, spiritual and aesthetic values, and the need to accommodate those values when managing the forest resources. This is addressed in the following measures.

Indicator 8-4	Local management is effective in controlling their impact on the maintenance of and access to resources for First Nations.

This indicator is intended to ensure that management of forests should provide and improve access to resources for maintenance of traditional values and heritage. This is addressed through the following two measures.

Criterion IX	Forest management sustains ongoing opportunities for a range of quality of life benefits.

The forest provides many values to our society beyond basic needs (e.g. food, water, employment). Research has established that issues such as cultural identity (of aboriginal and non-aboriginal people), community recreation opportunities, and scenic resources contribute to the desirability, the potential for tourism and therefore viability of communities

The range of quality of life benefits considered were (1) outdoor recreation, (2) visual quality, (3) unique or significant places and features of social, cultural and spiritual importance, (4) worker safety and (5) public health and safety sustained or improved.

While social values, such as outdoor recreation and visual quality contribute to quality of life and a tourism based economy; they can be difficult forest amenities to manage. There is the perception that these values are not only subjective and hard to define, but also that they constrain timber values. Social values like visual quality do not necessarily need to be at odds with timber supply; instead they can be components of a sustainable forest management.

Indicator 9-1	Resources and opportunities for recreation (including quality of

	experience) are maintained or enhanced.

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

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

This indicator addresses a range of outdoor recreation opportunities, settings, and experiences provided by forests that respond to the diverse motivations, expectations and desires of people pursuing recreation activities. The following measure has been identified to monitor outdoor recreation opportunities and resources.

Indicator 9-2	Visual quality of harvested/managed landscape is acceptable to a broad range of stakeholders/visitors.

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

This indicator measures the degree of visual impact on the landscape and the level of aesthetic satisfaction in viewers of public lands. The measures address outcomes by means of expert methods of analysis by trained landscape specialists, as well as public perceptions gathered from representative area users. One measure also addresses procedures for improving public perceptions of forestry within the landscape unit, based on research findings on visible stewardship. It is believed that development in the forestry sector can occur while managing for visual quality associated with scenic areas, important recreational areas, rivers and streams and important natural features. This is addressed in the following two measures.

Indicator 9-3	Forest management conserves unique and/or significant places and features of social, cultural or spiritual importance.

The conservation of unique features is often carried out for social and not just ecological reasons. The intent of this indicator is to capture social values that reflect social, cultural or spiritual needs and an important legacy of historical or traditional uses, heritage values and local knowledge. This indicator is meant to address both aboriginal and non-aboriginal cultural values in the landscape. Research is establishing the importance of these sense-of place values in community resilience, property values, and tourism, although they are often hard to capture or express without ethnographic methods.

This indicator measures how well unique or significant places and features are identified and protected for Aboriginal and non-Aboriginal users of the DFA. Local people, landscape/cultural professionals and forest managers can identify social, cultural and spiritual features and places. These locations represent the sense of place and other

important social and historical values of the communities and users in the area. This is addressed with the following measure.

Indicator 9-4	Worker safety is maintained.

Worker safety can be impacted by forest management strategies. The provincial government sets acceptable safety limits for forest workers.

This indicator is meant to measure the impact of forest management strategies in relation to safety incidences for forest workers. Safety incidents arising as a result of machine or operator error are not included unless directly attributable to forest management strategies. This indicator attempts to measure procedures followed to maintain safety at acceptable levels, and actual safety outcomes. This is addressed with the following two measures.

Indicator 9-5	Forest management considers public health and safety implications.

The provincial government sets acceptable safety limits for forest workers but other guidelines identify other forms of risk potentially affecting communities and forest visitors, such as slope instability or fire. Monitoring public health and safety within the SFM Framework will assist in refining forest management strategies that accomplish their intended function minimizing the risk to the public.

This indicator is meant to measure the impact of forest management strategies in relation to safety incidences for community residents and area users. This indicator attempts to measure procedures followed to maintain health and safety at acceptable levels, and actual health and safety outcomes.

5.2 Measures and Targets

Using criteria and indicators to measure and assess the sustainability of forest values over time and space requires that appropriate measurement units be selected so that managers, and ultimately agency and public stakeholders, have confidence that the indicators are an accurate gauge of effectiveness of the approaches to meet specified criteria. These variables, called measures, provide quantitative information about the status and/or trends of an indicator when monitored over time. Measures of indicators represent the actual “things” or land-based resources that are tracked over time and space. They provide the on-the-ground link to indicators, criteria, and values, and signal the trend for each resource.

In order for measures to be meaningful, desired levels of resources, reflecting desired future conditions and thus sustainability, must be identified. Inevitably, this translates into specific quantitative objectives for individual measures. That quantitative objective is called a target. Ideally, a range of conditions around the target level is generally acceptable. The extent of this range is referred to as a variance. When resource levels fall outside the variance, this may be a stimulus for management action.

Quantitative assessment and reporting on the achievement of measures through defined targets, and thus indicators and criteria, and their linkage to an adaptive management

process that facilitates continual improvement of the SFM plan is an integral component of sustainable forest management. Appendix K includes a matrix of the criterion and indicators that form the basis for this plan. A detailed discussion of each measure is included in the following section.

5.2.1 Measures and Targets for Ecological Values

Measure 1-1.1 Old Forests

Measure:	Target (variance):
1-1.1 Percent area of old and mature+old seral stage by landscape unit group and BEC variant for CFLB within the DFA.	Targets as per the Mackenzie TSA Biodiversity Order.(0%)

What is this measure and why is it important?
This measure was chosen to monitor the amount of mature and old forest within each Landscape Unit group. It is assumed that maintenance of all seral stages across the landscape will contribute to sustainability because doing so is more likely to provide habitat for multiple species as opposed to creating landscapes of uniform seral stage. Emphasis is placed on old forest because many species use older forests and the structural elements found therein (e.g. large snags, coarse woody debris, and multilayer canopies). These structural elements are difficult to regenerate in younger forests. The focus on old seral forests is also supported by Government's recent decision to legalize old seral targets through the provincial non-spatial old growth order (NSOG).

How are targets established?
The targets for Mackenzie TSA draft biodiversity order are based on the targets in the provincial order in that a Biodiversity Emphasis Option (BEO) is assigned to LU groups. Instead of reporting the current percentages by each Landscape Unit (LU) and BEC variant, the draft order combines smaller landscape units with larger ones and also combines certain BEC units for the practicality of providing a reasonable landbase area on which to achieve the targets.

The signatories have also committed to managing for mature forest through targets for mature + old forest (Appendix G), which were developed by the Landscape Objectives Working Group (LOWG) -DMAT in the process of establishing the Mackenzie landscape biodiversity order.

Targets for early or immature forest have not been set, however the status of those seral stages will be monitored in terms of percent in early or immature forest for each LU BEO. Table 9 shows the age class range for each seral stage, for each NDT and BEC zone combination.

Table 9. Seral stage definition by Natural Disturbance Type (NDT) and Biogeoclimatic Ecosystem Classification (BEC) Zone.

NDT	BEC Zone	Early	Immature	Mature	Old
1	ESSF	<40	40 -120	121 - 250	>250
2	ESSF	<40	40 -120	121 - 250	>250
2	SBS	<40	40 -100	101 - 250	>250
2	SWB	<40	40 -120	121 - 250	>250
3	BWBS (decid.)	<20	20 – 80	81 - 100	>100
3	BWBS (conif.)	<40	40 -100	101 - 140	>140
3	SBS	<40	40 -100	101 - 140	>140
5	AT, Parklands	-	-	-	-

Current condition:
The 2005-2006 current status and targets for old forest and mature + old hectares are compiled as percentages in Appendix G. This table will be used to steer the planning of new harvest areas.

Previous disturbances (i.e., both natural and man made) have influenced the current condition of old forests to the point that the LU-BEC target cannot be immediately met everywhere. Our objective, therefore, will be to work toward the target within the context of continued harvest and natural disturbance. A seral stage analysis will be undertaken as part of the FDP/FSP development and management for old targets taken into consideration when planning future development in areas having a deficit of old forests.

There are currently no spatially identified old-growth management areas (OGMAs) within Canfor's operating areas and none within the DFA that have been vetted through a government sanctioned process (i.e. Integrated Land Management Bureau's LOWG-District Manager Advisor Team - DMAT).

Canfor and BC Timber Sales have been participating in the LOWG process for many years. Going forward, the signatories have committed to sharing the responsibility of delineating OGMAs for priority LUs within their operating areas. Similarly, ACCC and ILMB have also committed to OGMA work in their priority LU's. The proper delineation of OGMAs is time consuming and iterative. Therefore, it is expected that OGMA delineation work in the DFA will not be completed during 2007.

Collectively, the current strategy is to complete OGMA work at the south end of the TSA where MPB and harvesting impacts are greatest. The mapping work will then proceed, as individual LU's are completed or new priorities established.

Forecasting and probable trends of measure:
Seral stage can be measured directly from standard forest cover information and can be forecasted through standard modeling techniques using a variety of tools that adjust forest age based on simulated disturbances. Over the DFA, forecasting indicates that the amount of old forest will increase in the short term as old forest is recruited from the mature seral class. Over the mid-term, the amount of old forest will decline as recruitment equals successional losses in the NHLB and forest is harvested in the THLB (Figure 7). Simulated natural disturbances in the NHLB does not significantly affect the %-old seral in the DFA because the NHLB is significantly smaller (673,461 ha) compared to the THLB (880,790 ha), and the amount of mature forest for recruitment in both the NHLB and THLB is sufficient to compensate for successional losses. However,

due to natural variation and existing forest characteristics, it may not be possible to achieve targets on all LU Groups because of successional losses (Figure 8).

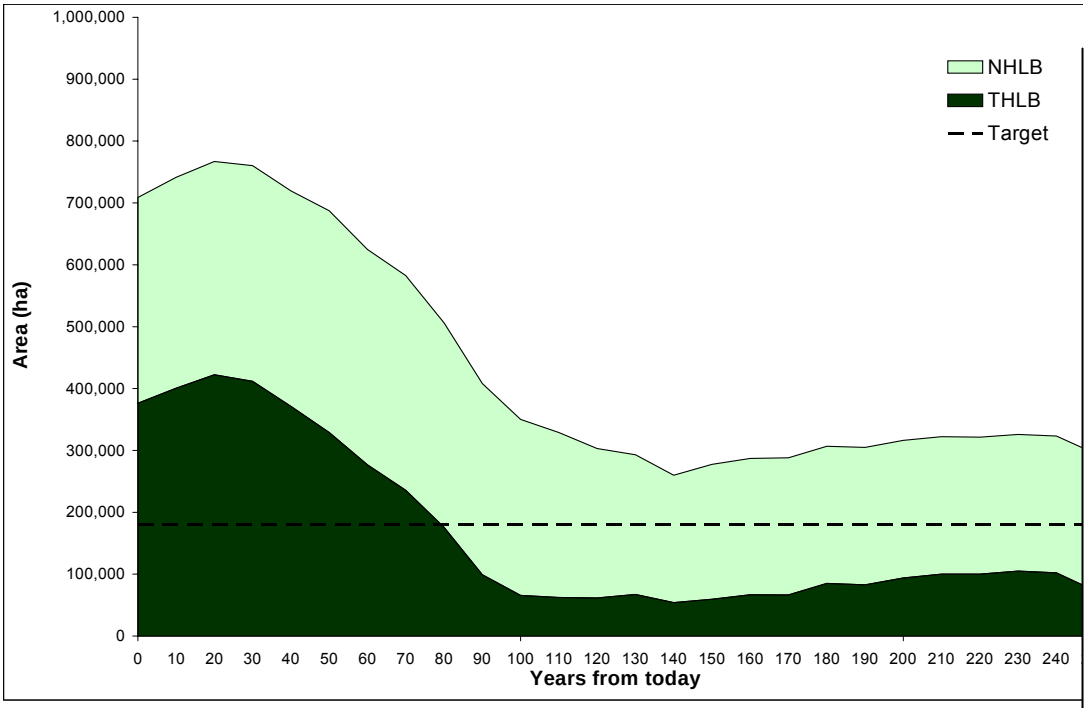


Figure 7. Old forest across the DFA versus target and relative contribution from NHLB and THLB, base case.

The total amount of old forest bottoms out at about 140 years and levels off over the planning horizon. It is anticipated that old + mature seral stages will mirror that of old. Forecasting indicates that there is sufficient old and old + mature forest available across the DFA to meet targets, however, as noted previously, targets may not be achieved on individual LU Groupings. Forest dynamics, such as catastrophic disturbance, and shifting priorities may also direct forest management in such a way that may preclude achievement of targets in individual LU Groupings.

Monitoring and reporting:
Seral stage will be monitored by conducting seral stage analyses as required. We conduct analyses of seral stage by intersecting timber harvest schedules with standard forest cover information. Tabular and map-based results are presented for seral conditions, given the 5-year harvest projections in the FDP

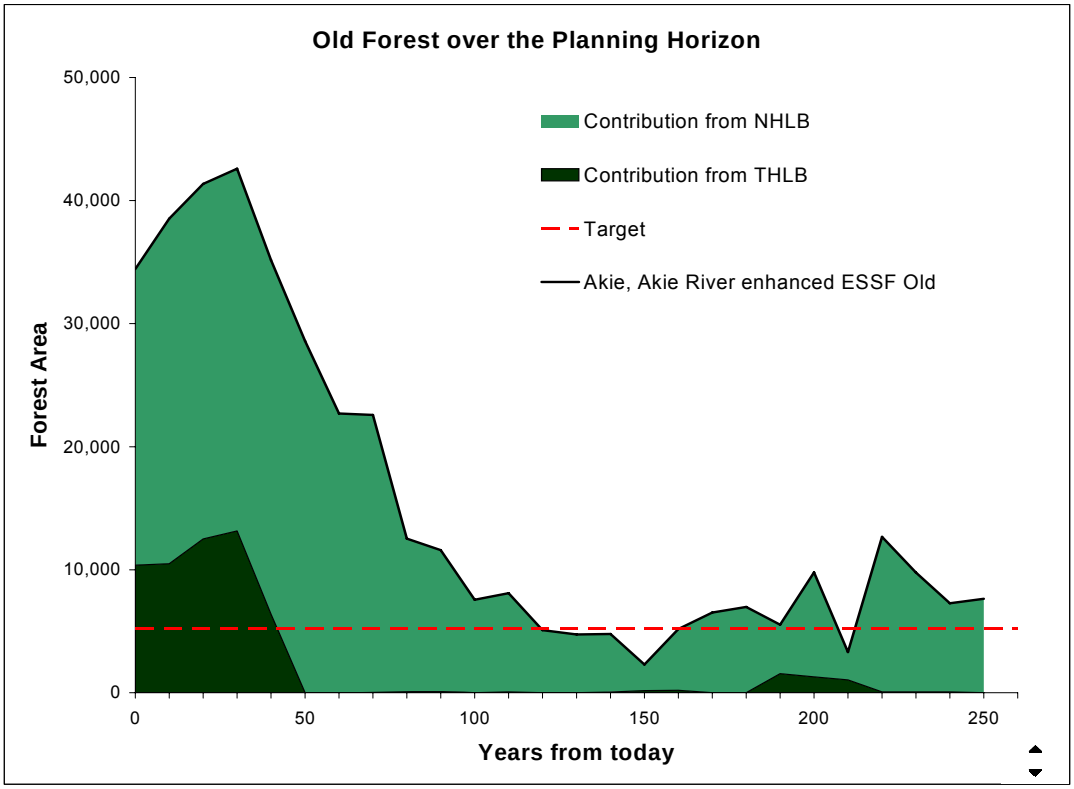


Figure 8. Old forest in the Akie LU Grouping ESSF BEC zone, enhanced biodiversity emphasis option (BEO).

or FSP. The information is then achieved in standard formats using commonly available software capable of meeting specifications for standard data sharing agreements with Government. The position/person responsible for monitoring and reporting measure 1-1.1 is identified in the Responsibility Matrix of the respective signatories.

Measure 1-1.2 Interior Forest

Measure:	Target (variance):
1-1.2 Percent of interior old forest by landscape unit group and BEC variant for CFLB within the DFA.	Targets as per the Mackenzie TSA Biodiversity Order. (0%)

What is this measure and why is it important?

Interior forest conditions refer to a situation where climatic and biotic characteristics are not significantly affected by adjacent and different environmental conditions (e.g., other seral stages, other forest or non-forest types, etc.). This measure is important because provision of habitat for old-forest dependent species (see measure 1-1.1) can only occur if old forests are not significantly affected by adjacent environmental conditions. Historically, natural disturbance events such as fire, insects, and wind led to diverse landscapes characterized by forests having these interior old forest conditions. Thoughtful planning of harvesting patterns can minimize "fragmentation" of the forested

landscape and help create interior old forest conditions. Furthermore, the intent of this measure is to have interior old forest conditions represented within all ecosystem types to further enhance ecosystem resilience.

How are targets established?
Targets for this measure were derived from recommendations from the Biodiversity Guidebook (BC MoF, 1995a). A summary of these targets are summarized in (Table 10).

Table 10. Targets for interior forest by Natural Disturbance Type and Biodiversity Emphasis Option as a percentage of Old Forest targets.

NDT 1			NDT 2			NDT3			NDT4		
L	I	H	L	I	H	L	I	H	L	I	H
25	50	50	10	25	25	10	25	25	25	50	50

Current condition:
We used a buffered distance (200 m), from edges of existing openings and younger age classes, to estimate old interior forest conditions within the Mackenzie DFA. Interior forest analysis was not completed on a LU Grouping basis as per measure 1-1.1 due to time constraints and difficulty in modeling interior forest. However, analysis was completed at the DFA level (Figure 10).

Since interior forest targets are expressed as a percent of old forest targets, it is apparent that failure to achieve old targets on a given LU grouping must necessarily mean that interior targets are not met. As such, the current condition at the LU level will be similar to that of old forest (Appendix G).

Forecasting and probable trends of measure:
Due to the complexity of calculating interior old forest, forecasting results were only simulated for 20 years from present on the DFA. Results of the simulation indicated that the amount of interior old forest will remain well above target levels on the DFA (Figure 10). However, as in the measure 1-1.1, and for the same reason, it will be impossible to meet this target immediately or on all NDUs so our objective is to trend toward the target over time. The strategy in the immediate future will be to minimize fragmentation of mid-aged (60-100 year old) forests, as these are the stands that will provide the old interior forest conditions in the future.

Monitoring and reporting:
The LOWG will convene as required to update the current and future amount of old interior forest and the licensee apportionment (update harvested blocks, newly planned blocks, aging of forest, and licensee operating area changes). The LOWG will assess current and anticipated future performances of the signatories in meeting old interior forest targets and proposed recruitment strategies if targets cannot be met as required.

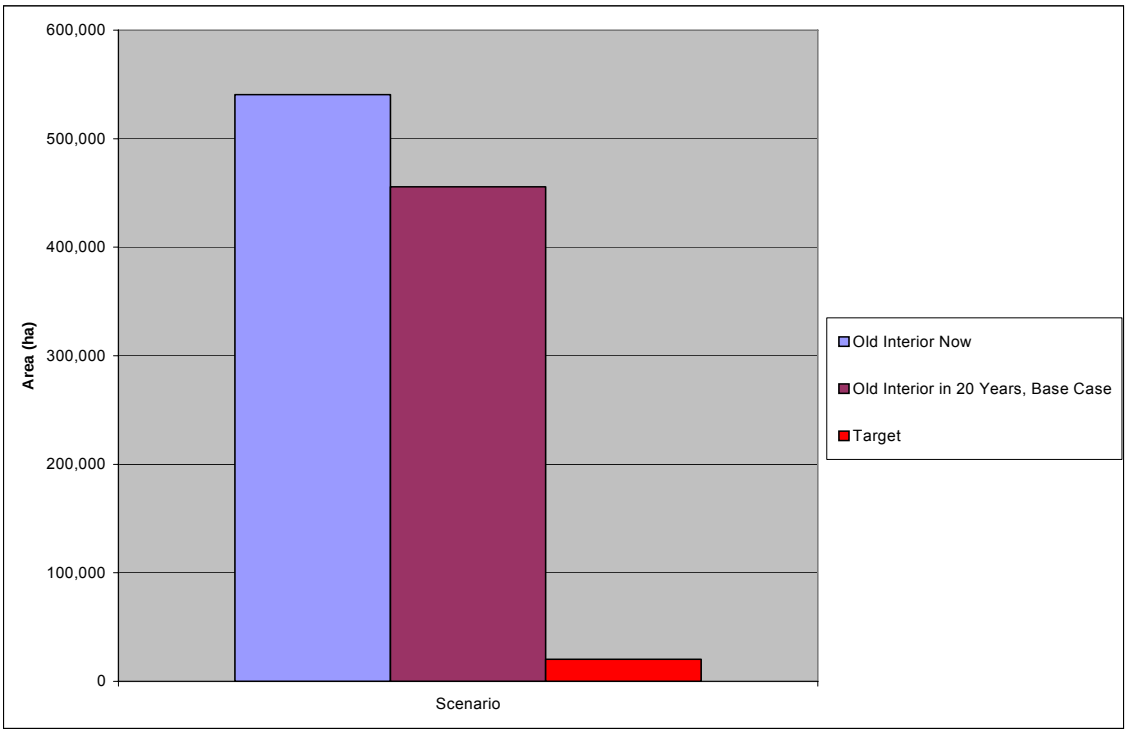


Figure 9. Old interior forest (ha) in the Mackenzie DFA at present and in 20 years versus target.

Measure 1-1.3 Biodiversity Reserves

Measure:	Target (variance):
1-1.3. The amount of established landscape-level biodiversity reserves within the DFA.	> area set aside across the DFA. (-0.5%)

What is this measure and why is it important?

We assume that, by distributing land reserves (i.e., areas managed for minimal disturbance) throughout the managed forest, we can provide for a mix of ecological conditions (e.g., vegetation age, structure, and composition) capable of supporting a wide variety of species. Doing so, would therefore provide for ecosystem diversity by creating a variety of different forest types, ages, structures, and composition across a broad area. Maintaining landscape level reserves promotes the distribution of a variety of unmanaged biogeoclimatic variants across the planning area and therefore ensures that a variety of forest stand types are maintained. We also assume this same variety will include a mix of species and diversity within species that will promote genetic diversity. By providing for ecosystem and genetic diversity, forest ecosystem productivity is enhanced from a wide range of species and habitats all contributing to a well functioning and resilient system.

We classify two kinds of reserves based on their relative size and hence the spatial resolution at which they are most effective: 1) the stand level, including mapped wildlife tree patches and riparian reserve areas and 2) the landscape level, including provincial parks and all other large reserve areas that are removed from the timber harvesting land base. This measure is used to evaluate the amount of productive forest reserved within each biogeoclimatic variant.

How are targets established?
Landscape level reserves are calculated as a ratio of the total productive forest area allocated as landscape-level reserves to the total productive forest area within the Mackenzie DFA. Government has classified landscape level retention through higher level and strategic planning initiatives where examples of this include Crown Land Plans and the Parks and Protected Areas Strategy. Therefore, targets for each of the ecological variants were established from a review of the current status of parks/ protected, wildlife/habitat reserves from the Crown Land Plan, and other large-scale reserves from the Timber Supply Review process.

Current condition:

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
The target for this measure is to maintain the amount (ha) of reserves identified in the Mackenzie Timber Supply Review by avoiding forestry activities within the reserves.

Monitoring and reporting:
We will maintain and update spatial data of all landscape-level reserves consistent with land-use and boundary designations from Government. Where significant changes to the designation of reserve areas or inventories have occurred, a query of the resulting data will be used to assess performance relative to the stated target. In addition, we will continue to work with Government to promote the designation of landscape level reserves. Performance relative to the stated target will be assessed and reported in the annual SFMP report for the operating year April 1st to March 31st.

Measure 1-1.4 Biodiversity Reserve Effectiveness

Measure:	Target (variance):
1-1.4. Hectares of unauthorized forestry-related harvesting or road construction within protected areas or established old growth management areas (OGMA).	0 ha (0%)

What is this measure and why is it important?
Landscape level biodiversity reserves/ Protected Areas are areas protected by legislation, regulation, or land-use policy to control the level of human occupancy or activities (Canadian Standards Association, 2003). These include Old Growth Management Areas (OGMAs), parks, and new protected areas. As forestry activities may occur near these areas the chance exists for unauthorized harvesting or road construction to happen within these sites. In addition to being an obvious violation of

legislation, such an act would also damage sites and organisms that were set aside for protection. Such an event would be a serious failure of sustainable forest management. Tracking the number of unauthorized hectares will allow forest managers to determine if there are flaws in the planning and implementation of forestry activities.

How are targets established?
A target of 0 ha of unauthorized forestry related harvesting or road construction within protected areas and old growth management areas has been established, as there should be no tolerance for errors of this nature. Operational plans have to be prepared with the knowledge of the locations of protected areas and OGMA's, and their implementation must be supervised to ensure their objectives are met. Licensees will monitor the location of protected areas and OGMA's,over time.

Current Condition:
The area of landscape level biodiversity reserves in the DFA is described in the indicator Landscape Level Biodiversity Reserves. Current practice is to adhere to all legislative requirements, including the respecting of protected areas. Using GIS and spatial databases, operational plans are planned and reviewed to ensure no forestry activities are planned within protected areas or OGMA's. EMS checklists and active supervision of road construction and harvesting are currently used to ensure operational plans are implemented correctly in the field. There currently are no government-sanctioned, spatially defined OGMAs in the DFA at this time, although work is on-going amongst all Licensees in the Mackenzie TSA, BCTS, MoFR, and the Integrated Land Management Bureau (ILMB) to spatially define OGMAs on a priority Landscape Unit basis.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Licensees have established a target of zero tolerance for trespasses within protected areas and OGMA's and at this time that target is expected to be met. This measure is not easy to quantifiably forecast, however, it is important to identify what the accepted targets mean to Sustainable Forest Management. To forecast this measure, a "what if" scenario analysis can be used to help identify the importance of the stated target to overall SFM within the DFA. The current target is set at 0 ha of unauthorized forestry related harvesting or road construction within protected areas and OGMA's. The following "what if" scenario is used in this analysis:

a) What if a target of <10ha of unauthorized forestry related activities was established?

In the terms of landscape level biodiversity, 10 ha or less would represent a very small area to be harvested or disturbed by road construction. However, ecologically it could be quite serious. The area disturbed could be an extremely rare plant community or important habitat for a Species at Risk. Unauthorized road construction could create access to previously inaccessible sites that could suffer from poaching, all terrain vehicle use, and other human activities.

Ensuring the target of 0 ha of unauthorized forestry related harvesting within protected areas and OGMA's is met will help ensure the ecological function of these reserves and preserve the values that society places on them.

Monitoring and reporting:
Monitoring will occur with ongoing supervision of forestry operations, as a component of EMS inspections, and analysis of spatial coverages. The Licensees will ensure the protected areas and OGMA's coverage will be updated on an annual basis. The measure status will be included in the annual SFMP report for the operational year April 1st to March 31st.

Measure 1-1.5 Productive Forest Representation

Measure:	Target (variance):
1-1.5. Percent productive forest by BEC variant represented within the Non-harvestable land base.	Target to be established following analysis (Sept. 2007).

What is this measure and why is it important?
Maintaining representation of a full range of ecosystem types is a widely accepted strategy to conserve biodiversity in protected areas (e.g., Margules and Pressey 2000) and is suggested for landscapes managed for forestry (e.g., Lindenmayer and Franklin 2002). Most species, 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 act as a precautionary buffer against errors in efforts intended to sustain species in the managed forest. Unmanaged areas also help to sustain poorly understood ecosystem functions and provide an ecological baseline against which the effects of human activities can be compared
Based on the approach developed by Huggard (2001; 2004), ecosystem representation is determined by evaluating the proportion of productive crown forest found in the non-harvested land base (NHLB), including parks and protected areas, but also including areas excluded from harvest for other reasons such as operability constraints.
An evaluation of ecological representation allows managers to identify the 'management footprint' on ecological units within a forest management unit. This in turn allows managers to prioritize management objectives (such as which units to emphasize OGMA placement, Wildlife Tree Patch targets and riparian reserves) and where to focus monitoring efforts.

How are targets established?
Targets have yet to be established for this measure. Targets will be established following completion of analysis in September, 2007.

Current condition:
Current condition for this measure is not known. The current condition will be known following completion of analysis in September, 2007.

Forecasting and probable trends of measure:
With the current status and targets unknown, forecasting for this measure is that an analysis of the percent productive forest by BEC variant represented within the non-harvestable land base will be completed by September, 2007. Forecasting and trends may be updated following completion of analysis and setting of targets.

Monitoring and reporting:
A copy of the results of the analysis detailing the percent productive forest by BEC variant represented within the non-harvestable land base will be made included in the SFM Plan's annual report. Monitoring and reporting may be updated following completion of analysis and setting of targets.

Measure 1-2.1 Patch Size

Measure:	Target (variance):
1-2.1. Percent area by patch size class by landscape unit group and Natural Disturbance Types.	Trend towards targets in LRMP

What is this measure and why is it important?
A patch is defined in this SFMP as combined areas of harvesting within 20 years of age that are generally within 400 metres of each other including unharvested areas in-between. Patches often consist of even aged forests because most are the result of either a natural disturbance such as fire, wind or pest outbreaks, or from harvesting timber in a cutblock. Patches may be created through single disturbance events or through a series of events (i.e. a combination of natural disturbance and harvesting). Mature forests and younger forest patches represent a land base created from a history of disturbances, natural and otherwise. As such, forest stands and patches are often composed of a variety of species, stocking levels and ages. Currently, forest management practices have reduced the occurrence of many natural disturbance events, such as wildfire. In the absence of natural disturbance, timber harvesting is employed as a disturbance mechanism and thus influences the distribution and size ranges of forest patches in the same fashion as historical natural disturbance events.

Harvesting activities serve to mimic natural disturbance events characteristic within the Mackenzie DFA. Past social constraints associated with harvesting and resulting patch size have lead to fragmentation of the landscape beyond the natural ranges of variability, which has developed over centuries from larger scale natural disturbance. In order to remain within the natural range of variability of the landscape and move toward sustainable management of the forest resource, it is important to develop and maintain patch size targets based on historical natural patterns. This measure will monitor the consistency of harvesting patterns compared to the landscape unit group and the natural patterns of the landscape.

How are targets established?
The targets come directly from the Mackenzie LRMP. Certain factors will limit how effective Steering Committee members will be at trending toward patch size targets. These include historical harvesting patterns that have fragmented portions of the DFA and natural disturbance events such as the mountain pine beetle epidemic and occurrences of wildfire. Table 12 categorizes the patch size distribution that will be applied according to the type of resource management zone and NDT.

Table 11 Patch size categories for resource management zones.

RMZ	NDT	Patch size distribution		
General + Special	1	<40 ha	40-80 ha	80-250 ha
	2	<40 ha	40-80 ha	80-250 ha
	3	<40 ha	40-250 ha	250-1000 ha
Enhanced	1	<40 ha	40-80 ha	80-250 ha
	2	<40 ha	40-80 ha	80-250 ha
	3	<40 ha	40-250 ha	250-5000 ha
Caribou Management Strategy Areas	2	<40 ha	40-250 ha	250-5000 ha
	3	<40 ha	40-250 ha	250-5000 ha

Current condition:

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:

Early seral patch sizes were predicted using a spatially explicit timber supply model. The model was used to report on the patch size distributions achieved using a harvest schedule from the SFM Scenario. There was no attempt to use a spatial model to create specific patch distributions. Table 16 shows predicted early seral patch distributions over time for NDT's.

Table 12. Early seral Patch Size Distribution now and 20 years from now in the Mackenzie DFA

Natural Disturbance Type	Patch Size Category	Target (%)	Forecasting Results (20 years from now)
NDT 2	<40 ha	30 - 40 %	9.4%
	40 - 250 ha	30 - 40 %	21.5%
	250 - 5,000 ha	20 -40 %	42.7%
	>5,000 ha	0%	26%
NDT 3	<40 ha	10 -20 %	7.3%
	40 - 250 ha	10 -20 %	14.3%
	250 - 5,000 ha	60 -80 %	44.4%
	>5,000 ha	0%	34.0%

Monitoring and reporting:

Forest cover information is updated every 5 years in preparation for timber supply analysis

Forest cover inventory information with updates from Licensees based on harvesting activities will be analysed on a bi-annual basis to ensure forest management is trending towards patch size targets identified in the Mackenzie LRMP.

Measure 1-2.2 Coarse Woody Debris

Measure:	Target (variance):
1-2.2. Percentage of cutblocks that exceed coarse woody debris requirements.	100% (0%)

What is this measure and why is it important?
Coarse woody debris (CWD) as a habitat element provides: 1) nutrients for soil development, 2) structure in streams to maintain channel stability, 3) food and shelter for animals and invertebrates, and 4) growing sites for plants and fungi,. Past forestry practices have encouraged the removal of CWD from sites for a number of economic and/or safety reasons, presumably to the detriment of biological diversity. We use this measure following harvesting to quantify CWD retained in blocks, wildlife tree patches, riparian areas, and in areas of unsalvaged timber. Within the NHLB we assume that natural processes will result in the maintenance of appropriate levels of CWD.

How are targets established?
The interim target for CWD was taken from the FRPA *Forest Planning and Practices Regulation, Sec. 68* default requirements (BC. Reg 14/2004). Although the PAG members felt that this number was inadequate to protect this element of biodiversity, they recognized that insufficient information exists to determine either the amount of CWD left behind after harvesting or the amount of CWD that occurs in natural pre-harvest stands. Even so, we expect significantly more CWD than the target is retained after harvest and have committed to developing a more comprehensive CWD strategy pending availability of more data.

Current condition:
The Ministry of Forests Coarse Woody Debris Database contains some baseline information for the province. Unfortunately there are a limited number of samples within the Mackenzie DFA. CWD is not operationally monitored within the Mackenzie DFA but limited information is available from other sources (e.g. Sulyma, 2006). A monitoring and baseline establishment plan will be developed by June, 2007.

Currently, Canfor rarely specifies CWD targets because of its predominantly cut-to-length harvesting methods and processing of trees at the stump. Since tops are bucked at approximately 11 cm and left on site, this guarantee's that the CWD levels specified in Section 68 of the Forest Practices and Planning Regulation.
BC Timber Sales will ensure that all blocks which were harvested in the reporting period have a residue and waste survey completed. Dispersed waste was correlated to CWD requirements outlined in the Forest Development Plan, Silviculture Prescription or Site Plan.
The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Forecasting of this measure could be possible using models however, only a limited amount of data are available. A monitoring plan for CWD will be developed by June,

2007, and the data gathered during monitoring will ensure that more robust and accurate forecasts will be available in the future. It is anticipated that the level of CWD in both the NHLB and THLB will meet targets.

Monitoring and reporting:
Post-harvest CWD levels will be measured as a standard component of either the silviculture survey or residue and waste survey. The average amount of CWD present in blocks will be monitored annually at which time revisions to targets and/or prescribed management practices may need to be implemented in order to achieve the intent of Indicator 1-2. In addition, we have identified the need for a baseline project for investigating the feasibility of surveying coarse woody debris volumes that occur naturally to assess whether or not current targets are effective. This project will be completed by March 2008.

Records to satisfy this measure will be stored as per standard document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

Measure 1-2.3 Wildlife Trees

Measure:	Target (variance):
1-2.3. Percentage of cutblocks that meet or exceed wildlife tree patch requirements.	100% (0%)

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

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

Stand level retention in harvested stands also contributes to a landscape level pattern that attempts to recreate aspects of wildfire disturbance. As a result of a fire event, large areas may be burned and undamaged or lightly burned patches may exist in areas within the burn boundary. Residual unburned patches vary substantially in size, shape

and composition. Thus it is essential to design stand level retention to maintain the variability of these characteristics.

How are targets established?
The target is a legal requirement. Overall targets are specified in the *Forest and Range Practices Act Regulation, Sec. 66* (BC Reg 14/2004) unless site specific targets are detailed in the operational plan (FDP or FSP). These targets are generally based on the Biodiversity Guidebook (BC MOF, 1995a). The target value of 100% has been established to reflect this and to ensure that wildlife tree patch retention targets continue to remain consistent with government objectives.

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

Canfor currently assigns retention on a block-by-block basis, which may include external WTPs. These are spatially defined on the landscape although may not be delineated in the field. Canfor has also undergone a retention "top-up" wherein WTPs are spatially defined but not associated with any particular cutblock. These "landscape level" WTPs were assigned to compensate for blocks harvested "pre-Code" that did not contain retention.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Meeting stand-level retention requirements is a legal obligation of the signatories, modeling does not apply to this measure. Forecasting for this measure is that, once developed, 100% of harvested blocks will meet or exceed wildlife tree patch requirements.

Monitoring and reporting:
This measure has a signatory specific target. As such, information for stand level retention is found in Site Plans and the signatories' respective information tracking systems. Block-specific requirements will be measured using the respective signatories EMS. The results will be reported to as part of the SFMP annual report. Stand retention data will be updated as future blocks are harvested, and then reviewed to ensure targets are being achieved.

Measure 1-2.4 Riparian Area Management Effectiveness

Measure:	Target (variance):
1-2.4. The percentage of forest operations consistent with riparian management area requirements as identified in operational plans and/or site plans.	100% (0%)

What is this measure and why is it important?
Riparian areas are adjacent to lakes, streams, and wetlands (Figure). They encompass the area covered by continuous high moisture content and the adjacent upland vegetation. In BC, Riparian Management Areas (RMAs) consist of a Riparian Management Zone (RMZ) and, where required, a Riparian Reserve Zone (RRZ).

The widths of RMAs vary with attributes of streams, wetlands, lakes, and adjacent terrestrial ecosystems and were legislated in FRPA Forest Planning and Practices Regulation, Sections 47-49. The RRZ, if required, is immediately adjacent to the stream and is a no-harvest zone. RRZs are identified in cutblocks and road construction areas and continue to exist after harvest until a mature stand has been re-established. We use this measure to ensure that post-harvest RMAs are consistent with pre-harvest prescriptions.

Identifying and managing RMAs provides for the maintenance of species diversity by conserving riparian and aquatic environments, key to the survival of those species dependent on riparian conditions. In addition to providing habitat, RMAs also function to conserve water quantity and quality features by reducing risk of damage induced by forest harvesting.

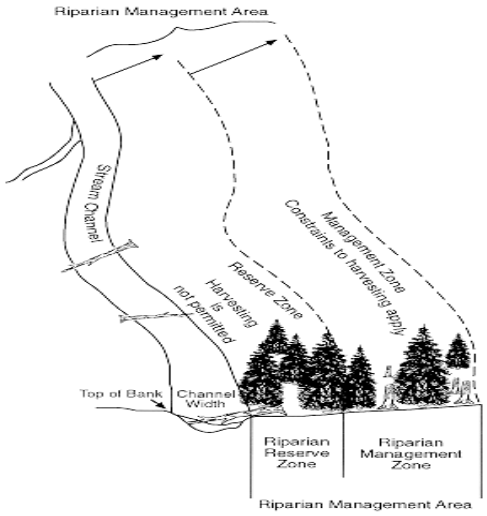


Figure 10. Riparian management area showing the application of a management zone and a reserve zone along the stream channel.
(http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/riparian/rmafig01.htm).

How are targets established?
The target is a legal requirement. The target value of 100% has been established to reflect this and to ensure that all riparian management practices, specifically RRZ

designation and management, continue to remain consistent with the pre-harvest operational plans.

All streams, wetlands, and lakes in or immediately adjacent to planned harvest areas will be classified prior to development. RRZs that meet or exceed the target will be clearly marked in the field. Management practices will be prescribed to protect RRZs from significant windthrow where needed.

Current condition:
Riparian features found in the field are assessed during the block lay-out stage to determine its riparian class and associated RRZ/RMZ. Appropriate buffers are then applied, considering other factors such as operability and windfirmness. Prescribed measures, if any, to protect the integrity of the RMA are then written into the Site Plan.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
Carrying out activities specified in an Operational Plan and/or Site Plan is a legal obligation of the signatories, modeling does not apply to this measure. Forecasting for this measure is that, once developed, 100% of riparian management area requirements are adhered to.

Monitoring and reporting:
RRZs and RMZs will continue to be documented at the Site Plan stage. Final harvest inspections will continue to be performed where riparian management area (including riparian reserve) consistency with operational plan strategies will be confirmed. Areas of inconsistency will be noted during these inspections and will be entered into an incident tracking database. Annually, inconsistencies will be reported in the SFMP annual report for the operating year of April 1st to March 31st.

Measure 1-2.6 Caribou Ungulate Winter Range Effectiveness

Measure:	Target (variance):
1-2.6. The percentage of forest operations consistent with approved provincial Caribou Ungulate Winter Range requirements.	100% (0%)

What is this measure and why is it important?
Caribou populations are highly sensitive to disturbance and predation within their habitat. Caribou numbers have been in decline due to a variety of causes. Disturbance within critical habitat can put severe downward pressure on productivity of caribou populations through the loss of habitat and by increasing the potential for predation of mountain caribou populations. Predation is mainly a result of an increase in early seral vegetation that attracts deer and moose that in turn attracts predators such as wolves and cougars. Increased road access into critical habitat has also resulted in increased disturbance from motorized and non-motorized recreation. The caribou's low rate of reproduction results in the population's inability to cope with the increased predation and other pressures mentioned above.

With respect to the conservation of biological diversity, sustainable forest management must consider the flora and fauna native to the DFA and the potential impacts it can have on sensitive species. Having viable caribou populations will also maintain forest ecosystem function as they are a long established species that utilize certain plant communities and are prey for carnivores. Maintaining critical ecosystems that are capable of supporting caribou is therefore crucial in meeting the objectives of this indicator.

An "Ungulate Winter Range (UWR)" is defined as an area that contains habitat that is necessary to meet the winter habitat requirements of an ungulate species (*Operational and Site Planning Regulation, BC Reg 107/98 (Repealed)*). Caribou were one of the ungulate species considered in the creation of UWRs. As many UWRs can be directly and indirectly affected by forest harvesting activities it is important that licensees in the Mackenzie DFA track their location and management objectives. Much of the key habitat (UWR and summer range) has been mapped for over 20 years and has been excluded from the THLB in successive TSRs.

How are targets established?
Due to the declining populations of caribou in the DFA, the signatories are committed to 100% of forest operations to be consistent with approved ungulate winter range order #U-7-009. Signatories will continue to prepare and implement Site Plans consistent with the management objectives outlined in that order.

These objectives can be obtained in more detail from the following website.
http://www.env.gov.bc.ca/wld/uwr/ungulate_app.html

Current condition:
The B.C. Conservation Data Center has placed caribou on the provincial red list. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) have listed caribou in the southern mountains of BC as threatened. All cutblocks in approved ungulate winter ranges will be consistent with the management guidelines in the approved Order for Ungulate Winter Range #U-7-009. The order prescribes specific objectives to maintain mountain caribou winter range, to provide high suitability snow interception, cover, and foraging opportunities. Site plans prepared for these areas will reflect these objectives.

There are no approved UWRs in Canfor's area of operations, therefore 100% percent of forest operations are consistent with approved provincial Caribou Ungulate Winter Range requirements as identified in operational plans.
The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This is a legal obligation of the signatories, modeling does not apply to this measure, although it is anticipated that caribou populations would be negatively impacted if targets are not achieved. Forecasting for this measure is that 100% of blocks will be consistent with approved provincial Caribou Ungulate Winter Range requirements.

Monitoring and reporting:
Licensees and BCTS will conduct pre-work meetings prior to the start of projects, monitoring inspections as the work is progressing and final inspections once the work is complete to ensure the commitments specified in the Site Plan are met. These initial, interim and final checks are part of each Licensee's/ BCTS' Environment Management System (EMS). If a non-conformance with the Site Plan occurs in the field, this information will be recorded on an activity inspection form and then entered into an incident tracking database or other similar system so issues can be tracked and mitigated as required. The percentage of forest operations consistent with caribou winter range management requirements will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Measure 1-2.7 Sedimentation

Measure:	Target (variance):
1-2.7. The percentage of identified unnatural sediment occurrences where mitigating actions were taken.	100% (<5%)

What is this measure and why is it important?
Sedimentation can damage water bodies by degrading spawning beds, increasing turbidity, and reducing water depths. Forest management activities can create unnatural inputs of sedimentation into water bodies. This may occur at stream crossings, or from roads adjacent to water bodies. In addition to the effects of roads, sedimentation may also occur from slope failures that are a result of forestry activities. Once sedimentation occurrences are detected, mitigating actions are taken to stop further damage and to rehabilitate the site. Tracking these mitigation actions contributes to sustainable forest management by evaluating where, when and how sedimentation occurs and the success of correcting it.

How are targets established?
The signatories recognize the potential damage sedimentation can inflict on water bodies and are committed to taking mitigative actions on 100% of occurrences. A variance of 5% has been established to recognize those situations where it is not operationally feasible or practical to address sedimentation incidents. The signatories will continue monitoring field operations to ensure sedimentation does not occur, and where necessary, will continue to take prompt action to mitigate its impact if it does.

Current condition:
Sedimentation occurrences are detected by forestry personnel during stream crossing inspections, road inspections, silviculture activities, and other general activities. In addition, Company supervisors routinely fly their operating areas annually following spring freshet to look for any such occurrences. While in some situations the sites may have stabilized so that further sedimentation does not occur, in other cases mitigating actions may have to be conducted. This may involve re-contouring slopes, installing siltation fences, re-directing ditch lines, grass seeding, or deactivating roads.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
The measure target is expected to be achieved, but the exact degree of success is not easy to quantifiably forecast. However, it is important to identify what the accepted target means to SFM. Correcting unnatural sedimentation problems for all known occurrences is important to conserve water quality objectives. A "what if" scenario analysis will identify the importance of the target for this measure to SFM within the DFA. This measure and the following "what if" scenario will help to substantiate the proposed target:

a) What if only 50% of known unnatural sedimentation occurrences received any corrective actions?

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

The signatories are committed to achieving the stated target for the indicator and long term trends are anticipated to show that all known sedimentation events will be acted upon as required.

Monitoring and reporting:
All field personnel are responsible for detecting sedimentation occurrences, regardless of the location in the DFA. When sedimentation is detected, the signatory that is responsible for the crossing, road, or cutblock will be notified. The responsible signatory will then take corrective actions and document the occurrence in their EMS database. The percentage of unnatural known sedimentation occurrences will be tracked, as well as the steps taken to rehabilitate damage. This percentage will be reported in the annual SFMP report for the operating year of April 1st to March 31st.

Measure 1-2.8 Stream Crossings

Measure:	Target (variance):
1-2.8. Percentage of stream crossings appropriately designed and properly installed and/or removed.	100% (<5%)

What is this measure and why is it important?
This measure evaluates the procedures used to ensure that stream crossings are installed, maintained, and removed properly so that sediment inputs are minimized. This process involves inspections during installation/removal and routine maintenance inspections at a predetermined frequency based on the overall risk of the area.

Forestry roads can have a large impact on water quality and quantity when they intersect with streams, particularly by increasing sedimentation into water channels. Sediment is a

natural part of streams and lakes as water must pass over soil in order to enter a water body, but stream crossings can dramatically increase sedimentation above normal levels. Increased sedimentation can damage spawning beds, increase turbidity, and effect downstream water users. When stream crossings are installed and removed properly, additional sedimentation may be minimized to be within the natural range of variation. Erosion control plans and procedures are used to ensure installations and removals are done properly. To calculate the success of this measure it is important to ensure that a process is in place to monitor the quality of stream crossings, their installation, removal, and to mitigate any issues as soon as possible.

How are targets established?
The measure was assigned a target of 100% based on an assessment of current and past management practices. The target demonstrates the signatories' commitment to sustaining water quality and quantity in the DFA. A variance of 5% has been established to allow for some human error, and to recognize that specific site conditions may prevent the plans and procedures from being implemented.

Qualified professionals will assess when an erosion and sediment control plan is required, and experienced personnel will supervise during installation and removal activities.

Current condition:
Streams and crossing structures are both currently identified during operational plan preparation. Prework forms are completed for all projects, including stream crossings, as part of EMS/Standard Operating Procedures (SOP). Stream crossing installations are planned for timeframes when conditions are favorable (i.e. fish windows). Appropriate erosion control devices are also installed during the installation process, such as silt fences.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
The measure target is expected to be achieved, but the exact degree of success is not easy to quantifiably forecast. However, it is important to identify what the accepted target means to SFM. Stream crossings can impact overall water quality that in turn can effect the organisms that rely on that water. A "what if" scenario analysis will identify the importance of the target for this measure to SFM within the DFA. This measure and the following "what if" scenario will help to substantiate proposed targets:

What if only 50% of stream crossings were installed or removed properly?

If only 50% of stream crossings were installed and removed properly, both water quality and safety could be severely compromised. Excessive amounts of sediment could enter many important fish bearing streams, disrupting spawning and reducing water depths. Crossings are also designed to allow safe vehicle passage over water features. Crossings that are not installed correctly could pose a threat to both the public and to forest industry workers using the crossings.

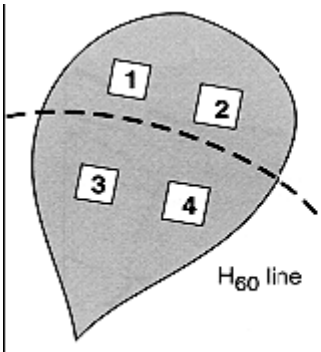
Sustainable forest management could be impacted in other ways by a failure to achieve the target. If sedimentation was severe enough, fish populations may decline. In addition to the ecological costs, there could be costs to the local economy from a decline in sport fishing and reduced recreational values. Downstream water users may also be negatively affected. Many people in the DFA enjoy fishing and would resent the forest industry if sedimentation reduced their fishing opportunities. Therefore, the measure target will meet ecological, environmental, and social values of sustainable forestry.

Monitoring and reporting:
The percentage of stream crossings installed and removed consistent with design standards, contractual standards, legal requirements, and/or erosion control plans, along with inspection results and proposed mitigation measures will be tracked in the signatories' respective EMS databases.

Measure 1-2.9 Peak Flow Index

Measure:	Target (variance):
1-2.9. Percent of watersheds containing approved or proposed development with Peak Flow Index calculations completed.	100% by Sept 2007 (+ 7 mths)

What is this measure and why is it important?
Peak flow is the maximum flow rate that occurs within a specified period of time, usually on an annual or event basis. The peak flow index is a measure that indicates the potential effect of harvested areas on water flow in a particular watershed. The H60 is the elevation for which 60% of the watershed area is above. Figure 11 shows how the peak flow index is calculated for a hypothetical watershed.



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

Total ECA = **72.5**

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

Figure 11. Peak flow index calculations (BC Min. of Forests).

The ECA or "Equivalent Clearcut Area" is calculated from the area affected by logging and the hydrologic recovery of that area due to forest regrowth. After an area has been harvested, both winter snow accumulation and spring melt rates increase. This effect is

less important at low elevations, since the snow disappears before peak flow. Harvesting at high elevations will have the greatest impact and is, therefore, of most concern. As a result, areas harvested at different elevations are weighted differently in the calculation of peak flow index.

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

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

How are targets established?
The signatories have determined that 100% of PFIs can be calculated by September, 2007 for watersheds were the signatories have approved or proposed development. Once the PFI calculations are complete, the results will be reported back to the PAG. Watersheds will then be evaluated to establish PFI targets. Once these targets are established, harvesting plans will have to consider the impact harvesting will have on the watershed in which it occurs. The goal is to maintain peak flows within the target PFI to avoid excessive amounts of peak flow runoff.

Current condition:
Peak flow index calculations are not due until September, 2007. There are currently no watersheds with PFI calculations available.

Forecasting and probable trends of measure:

The target completion date of September, 2007 is expected to be met. However, in the event of unforeseen complications it may require more time to complete the calculations. An additional 7 months has been allowed for meeting the target. While it is expected the measure target will be achieved, the results if it is not are difficult to predict. However, it is important to identify what the accepted target means to SFM. Completing PFI calculations is important for maintaining water quality and overall forest sustainability. A "what if" scenario analysis will identify the importance of the target for this measure to SFM within the DFA. This measure and the following "what if" scenario will help to substantiate the proposed target:

a) What if only 50% of watersheds in the DFA had their PFI calculated by September 2007?

Failure to complete Peak Flow Indices by the target date could delay the development of PFI targets for watersheds in the DFA. This would result in only 50% of the watersheds in the DFA being managed at the appropriate PFI. Developing PFI targets has been identified as a crucial component to ensuring water quality and quantity is properly maintained in the DFA. Although current management is required to account for watershed values, this delay would result in forest practices that are not conducted based on the best available information on watersheds and therefore may impact water quality and quantity in the long term. If peak flows are not managed based on the most

current and up to date information and science then peak flows may significantly increase, resulting in excessive erosion and failures at downstream culverts and bridges. This may degrade fish habitat and impact society by restricting recreational access and reducing water quality to downstream users.

To maintain values of sustainable forest management, the signatories are committed to the target date of September 2007.

Monitoring and reporting:
Once the PFIs for the watersheds in the DFA are calculated and targets have been developed, the signatories will develop systems to monitor future planned harvesting to achieve them. Planners will primarily be responsible for ensuring targets are met. This may be achieved by using several sources of information such as forest cover and biogeoclimatic maps that are updated either by the Provincial Government or by Forest Licensees under contract with the Government. These data sources are usually only updated / replaced in five to 10 year intervals. Adjacent site information is obtained from other Licensees that share the same land base. Databases such as GENUS, or similar systems, will be maintained to provide up to date planning information.

Measure 1-2.10 Road Re-vegetation

Measure:	Target (variance):
1-2.10. Percentage of road construction or deactivation projects where prescribed re-vegetation occurs within 12 months of disturbance.	100% (<10%)

What is this measure and why is it important?
This measure was chosen as a way to assess our ability to minimize or at least reduce the anthropogenic effect of forest roads on adjacent ecosystems. In keeping with the common assumption of coarse-and medium-resolution biodiversity, our underlying assumption with this measure was – re-vegetating roads will reduce the potential anthropogenic effects that roads have on adjacent ecosystems by minimizing potential for silt runoff or slumps, the amount of exposed soil, the potential for invasive plants to become established, and returning at least a portion of forage and other vegetation to conditions closer to those existing prior to management.

How are targets established?
Targets for this measure were established through PAG consensus. Proposed FSPs also contain objectives for revegatation of disturbed sites. Timber Sales Licences issued by BCTS generally have a term of less than 1 year but in some cases may have a term of 2 or more years to complete harvesting. This may prove to be challenging, operationally, for licensees to complete revegetation within 12 months. The variance in the target should provide enough flexibility to deal with these situations.

Current condition:
Canfor currently completes revegetation on an ad hoc basis, with priorities for revegetation being determined by field staff. As such, the need for revegetation as prescribed, and the completion of such work is not currently tracked nor is the number of road construction/deactivation projects that prescribed revegetation and the number of

such areas seeded is not known. Areas such as bridges and stream crossings (installation and/or removal) are targeted for immediate revegetation whereas other areas are targeted based on immediate need. All revegetation is completed using appropriate seed mixtures.
Similarly, BC Timber Sales is managing the completion of revegetation as an on-the-ground decision and, as such, has seen inconsistent application of contractual and timber sale licence requirements. The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
The target of 100% of prescribed revegetation requirements within 12 months of disturbance is expected to be met. However, in the event of unforeseen circumstances such as acess or timing issues, a variance of 10% has been allowed for meeting the target. While it is expected the measure target will be achieved, the results if it is not are difficult to predict. However, it is important to identify what the accepted target means to SFM. Completing revegetation where prescribed is important for maintaining water quality, aquatic habitat, and overall forest sustainability. A "what if" scenario analysis will identify the importance of the target for this measure to SFM within the DFA. This measure and the following "what if" scenario will help to substantiate the proposed target:

a) What if only 50% of prescribed re-vegetation occurred on road construction or deactivation projects within 12 months of disturbance?

The use of vegetation in minimizing soil erosion is a widely accepted practice throughout the world. Failure to complete prescribed revegetation requirements within 12 months of disturbance would result in prolonged exposure of mineral soil to the elements, greatly increasing the likelihood of erosion and consequently sedimentation. Increased erosion would negatively impact forest productivity, while increased sedimentation would threaten water quality, and aquatic and riparian ecosystems. To maintain these values of sustainable forest management, the signatories are committed to achieving 100% of prescribed revegetation requirements within 12 months of disturbance.

Monitoring and reporting:
The percentage of forest operations consistent with the road re-vegetation requirements will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Measure 1-2.12 Road Environmental Risk Assessments

Measure:	Target (variance):
1-2.12. Percentage of planned roads that have an environmental risk assessment completed.	100% (<10%)

What is this measure and why is it important?
Environmental risk assessments provide a measure of "due diligence" in avoiding accidental environmental damage that has potential to occur from forest development in conditions of relatively unstable soil. Through the implementation of risk assessments, we expect to maintain soil erosion within the range that would normally occur from

natural disturbance events under unmanaged conditions. Our assumption was – the more we can resemble patterns of soil erosion existing under unmanaged conditions, the more likely it will be that we do not introduce undue anthropogenic effects, from road construction, on adjacent ecosystems.

How are targets established?
The target for this measurable was established through PAG consensus.

Current condition:
The completion of environmental risk assessments on roads is completed by field staff during road layout and is inputted into the signatories' respective databases. At Canfor, assessments are also being completed on roads constructed prior to any environmental risk assessment being required. The assessments provide the basis for future road inspection requirements and highlight areas of special concern that may require professional geotechnical or design work. All assessments are completed in accordance to documented procedures.

BCTS has not done environmental risk assessments at the layout stage. An environmental risk assessment is completed for each timber sale licence and road construction contract prior to works commencing. Thus, all roads have a risk assessment over them prior to construction. These risk assessments determine the minimum number of inspections for each timber sale or road project. All of BCTS roads have been designed and professional geotechnical reviews have been completed if signs of instability are found or the slopes are over 60%.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
It is difficult to predict the success of achieving the targets for completing environmental risk assessments on roads. However, it is important to identify what the accepted targets mean to SFM. In order to forecast this measure, a "what if" scenario analysis can be used to help identify the importance of the stated target to overall SFM within the DFA. The following "what if" scenario consists of one scenario as the current target is set at 100%:

a) What if only 50% of roads had an environmental risk assessment completed on them?

If only half of the roads had environmental risk assessments, there would be a significant possibility that areas of high risk are overlooked. This could potentially result in roads being constructed that are not to required standards. Roads that are not constructed to required standards may pose a risk to water quality, aquatic ecosystems, and riparian habitat through excessive erosion and sedimentation. It may also pose a safety risk to road users. By completing risk assessments, the signatories are able to ensure that required standards for road construction are met and focus attention on areas of higher risk, thus detecting and addressing problems earlier than might occur if risk assessments are not completed and inspections are scheduled haphazardly.

Monitoring and reporting:
The signatories' respective databases will be queried for roads completed during the specified time period and there associated risk rating, which is deemed to be evidence that an assessment has been completed. Any roads without an environmental risk rating will be noted. The percentage of forest operations consistent with the road environmental risk assessment requirements will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Measure 1-3.1 Caribou Ungulate Winter Range

See Measure 1-2.6.

Measure 1-3.2 Species at Risk Identification

Measure:	Target (variance):
1-3.2. Percent of appropriate personnel trained to identify Species at Risk in the DFA.	100% (<10%)

What is this measure and why is it important?
Identification of those animal and bird species and plant communities that have been declared to be at risk by appropriate personnel is crucial if they are to be conserved. Appropriate personnel are key staff and consultants that are directly involved in operational forest management activities. By implementing training to identify Species at Risk the potential for disturbing these species and their habitat decreases. Maintaining all populations of native flora and fauna in the DFA is vital for sustainable forest management, as all organisms are components of the larger forest ecosystem.

How are targets established?
The target of 100% of appropriate personnel to be trained to identify Species at Risk was established to reflect the importance the signatories place on managing Species at Risk. A 10% variance was included to allow for the possibility that new staff may not have training at the time the annual report is prepared. It is also possible that new employees may be under the direct supervision of a person trained in Species at Risk or if the risk is low due to the timing of employment or the type of job.

Current condition:
Training to identify Species at Risk commenced in June of 2005 for key personnel in BCTS. Canfor has yet to implement Species at Risk identification training. Bi-annual refresher training is planned once initial training is complete. Newly hired staff will have training needs evaluated and receive training if required. Training records will be reviewed annually to identify training needs and to ensure appropriate personnel are trained.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
It is difficult to predict the success of achieving the targets for training key personnel over a defined time period. However, it is important to identify what the accepted targets

mean to SFM. In order to forecast this measure, a "what if" scenario analysis can be used to help identify the importance of the stated target to overall SFM within the DFA. The following "what if" scenario consists of one scenario as the current target is set at 100%:

a) What if only 50% of key personnel were trained to identify Species at Risk?

If only half of the people directly involved in operational forest management activities are aware of Species at Risk then there is significant risk that these species or their habitat could inadvertently be disturbed. Many of these species are inconspicuous (particularly the plant species) and could be easily overlooked. Otherwise conscientious staff may plan road construction and harvesting that damage or destroys Species at Risk simply because they were unaware of them. By having 100% of key personnel trained to identify them the likelihood of inadvertent disturbance is dramatically reduced. Training will also ensure appropriate management strategies are implemented and ensure habitat is maintained to support flora and fauna in the DFA.

Monitoring and reporting:
The signatories will track training information through training records. Such records are currently maintained as part of EMS programs, and are updated as more staff completes the training program. The signatories will recognize training from other sources as long as the training is applicable to the DFA. The measure percent will be reported in the annual SFMP plan for the operating year April 1st to March 31st.

Measure 1-3.3 Species at Risk Management

Measure:	Target (variance):
1-3.3. Percent of Species at Risk in the DFA that have management strategies developed by April 2007.	100% (0%)

What is this measure and why is it important?
Identification of those animal and bird species and plant communities that have been declared to be at risk is crucial if they are to be conserved. Species at Risk have been discussed previously in this document see Appendix F for the listing of endangered or threatened species in the DFA. For the purposes of this SFMP Species at Risk are currently derived from the following sources:

- Endangered or Threatened Species: As identified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the Species at Risk Act. Committee on the Status of Endangered Wildlife in Canada (COSEWIC): This committee is comprised of representatives from federal, provincial territorial and private agencies as well as independent experts in order to assign national status to species at risk in Canada.
- Red Listed Animal Species, Forested Plant Communities and Plants: Defined as taxa being considered for or already designated as extirpated, endangered or threatened. Extirpated taxa no longer exist in the wild in British Columbia, but they do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed.

- Blue listed Animal Species and Forested Plant Communities: Defined as taxa considered being of Special Concern in British Columbia. Taxa of Special Concern have characteristics that make them particularly sensitive to human activities or natural events. Blue listed taxa are at a lower level of risk than red listed species.

Provincially Identified Wildlife: Refers to those Species at Risk and Regionally Important Wildlife that the Minister of Water, Land and Air Protection designates as requiring special management attention under the Forest and Range Practices Act.

Definitions:
Plant Community: A plant community is a unit of vegetation with a relatively uniform species composition and physical structure. Plant communities also tend to have characteristic environmental features such as bedrock geology, soil type, topographic position, climate and energy, nutrient and water cycles (Conservation Data Center, 2001). Rare plant communities are, almost without exception, climax (old) plant communities. Younger successional stages are quite often considered to be different plant communities, though they eventually develop into climax plant communities. For more information on successional status of the plant communities see the Conservation Data Center's website http://srmwww.gov.bc.ca/cdc/

Some Species at Risk in British Columbia are found in areas of forestry development. Sustainable forest management must consider their needs when preparing and implementing operational plans. Appropriate management of these species and their habitat is crucial in ensuring populations of flora and fauna are sustained in the DFA. In the Mackenzie DFA the application of landscape and stand level biodiversity management measures contribute to the maintenance of most biodiversity needs. These management approaches are "coarse filter", i.e. they represent general measures to conserve a variety of wildlife species.

However, coarse filter guidelines may not be sufficient to ensure the conservation of Species at Risk (see Appendix F for a list of Species at Risk in the Mackenzie DFA). Specific management strategies are required to ensure that Species at Risk are maintained within the DFA. To this end, this measure will ensure that appropriate management strategies are developed to conserve and manage Species at Risk and maintain flora and fauna native to the DFA.

How are targets established?
April 2007 was chosen as the date to have completed the development of management strategies because it would allow sufficient time to develop strategies but also expedite the process to complete it in a timely manner.

Most Species at Risk habitat requirements are sufficiently known to allow the development of special management areas, or prescribe activities that will not interfere with the well being of these species. The Management strategies will be based on information already in place (e.g., National Recovery Teams of Environment Canada, IWMS Management Strategy) and on recent scientific literature. Management strategies will be implemented in operational plans such as site plans to ensure the protection of species' habitats.

Current condition:
Development and implementation of management strategies for Species at Risk requires knowledge of how many forest dependant species inhabit a managed area. While the concept of biodiversity includes all organisms of a particular region, assessing forest dependant species at all trophic levels is neither feasible nor operationally practical. A review of Species at Risk flora and fauna in relation to the Mackenzie DFA should ideally consider all forest dependent species. For this indicator, the review of fauna will generally focus on vertebrates such as fish, mammals, birds, amphibians and reptiles currently identified as provincial red and blue listed species. Provincially Identified Wildlife, red and blue listed Plant communities, and Red listed plants will also be reviewed for the DFA based on a summary listing from the BC Conservation Data Center.

Licensees are collaborating on the development of management strategies for species at risk in the DFA on or before April of 2007. BC Timber Sales has developed a - comprehensive manual for identification and management of species and plant communities at risk. Of the 13 animal and 20 plant species listed in appendix F (2006) all 33 have management strategies included in the document. For more information on Species at Risk refer to the Conservation Data Center's "BC Species and Ecosystems Explorer" website: http://srmwww.gov.bc.ca/atrisk/toolintro.html
This website is maintained by the Ministry of Environment.

Forecasting and probable trends of measure:
Forecasting for this measure will be that management strategies for species at risk will be developed by April 2007. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
Interim Measures: Until management strategies are developed, available and fully implemented, Species at Risk will be managed through the following.

- Consult with wildlife specialists within government agencies and within the private sector when preparing Forest Development Plans, Forest Stewardship Plans, and Site Plans as appropriate.
- Protect wetlands and other water bodies adjacent to forest operations with riparian management practices.
- No harvesting or constructing roads within Class A Parks, Protected Areas, or ecological reserves.
- Be consistent with the objectives of Wildlife Habitat Areas, Ungulate Winter Ranges, and General Wildlife Measures where established by government.
- The signatories are committed to training appropriate staff on how to identify and manage for Species at Risk in the DFA.

An annual review of the management strategy implementation procedure will be completed and reported in the annual SFMP report for the operating year of April 1st to March 31st. The management strategies will be designed so a qualified professional can determine whether or not a particular strategy is implemented, not implemented, or is not applicable to the situation. Developed management strategies will be implemented within Forest Development Plans and eventually Forest Stewardship Plans as part of a continual improvement/research strategy for a particular species.

Measure 1-3.4 LRMP Wildlife Management

Measure:	Target (variance):
1-3.4. Percent LRMP Resource Management Zone (RMZ) specific wildlife species with management strategies by April 2007.	100% (0%)

What is this measure and why is it important?
The Mackenzie LRMP established strategic direction for the conservation of regionally significant wildlife species within each Resource Management Zone in the Mackenzie Timber Supply Area. In principle, these strategic directions are consistent with the maintenance of productive populations of selected species and therefore provide a measure of our trend toward biological richness. We assume that maintaining individual species contributes directly to biological diversity. Concurrently, through the use of this measure we also subscribe to the social balance of ecological, economic, and social values created through consensus at the Mackenzie LRMP.

How are targets established?
Targets for this measure were first established by consensus at the Mackenzie LRMP and adopted through consensus by the PAG.

Current condition:
The Mackenzie LRMP prescribes objectives for 14 different species, either as general management directions applicable throughout the TSA, or as direction applicable only to specific RMZs. (See April 25, 2006 handout to PAG). The following species are listed in the LRMP as having specific management objectives; arctic grayling, bull trout, eagles, elk, lake trout, marten, moose, mountain goat, northern goshawk, osprey, peregrine falcon, rainbow trout, stone sheep, and trumpeter swan. Of these, bull trout, arctic grayling, eagles, osprey, peregrine falcon, northern goshawk, and marten are subject to general management direction.

Canfor currently has a policy dealing with “Wildlife Features”, which are consistent with management direction in the LRMP, particularly pertaining to stick nests of eagles, osprey, and goshawk (Caldwell, 2006). As a result, Canfor has management strategies in place for 3 of the 14 species listed, or 21.4%. In addition, Canfor has helped fund through FIA, habitat mapping for mountain goats, another management direction from the LRMP.

This measure is not due until April of 2007. Going forward, the signatories are collaborating on the development of management strategies for site of biological significance in the DFA by April of 2007.

Forecasting and probable trends of measure:
Forecasting for this measure will be that management strategies for RMZ specific wildlife species will be developed by April 2007. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
The percentage of forest operations consistent with the LRMP wildlife management requirements will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Measure 1-3.5 Species at Risk Management Effectiveness

Measure:	Target (variance):
1-3.5. Percentage of forest operations consistent with Species at Risk in the DFA management strategies as identified in operational plans, tactical plans and/or site plans.	100% (<5%)

What is this measure and why is it important?
The measure is intended to monitor the consistency between forest operations with approved provincial Species at Risk Notice/ Orders requirements as identified in operational plans. Being consistent with these requirements will ensure that the habitats that are required to support these Species at Risk will be maintained. Overall ecosystem productivity will be maintained by ensuring these species continue to play their roles in the healthy functioning of the DFA's forests.

Notices and Orders are legal entities created through Government Regulations. As such, approved species at Risk Notice/ Orders requirements identified in operational plans must be adhered to.

Currently, the DFA has two Species at Risk Orders, "Category of Species at Risk", which took effect in May, 2004 and another which took effect June 2006. These provincial orders provide a list of species at risk that may be affected by forest or range management on Crown Land and require protection in addition to that provided by other mechanisms (Government of BC, 2004a). The orders are shown in more detail in Appendix F. The DFA also has one Notice, "Indicators of the Amount, Distribution, and Attributes of Wildlife Habitat Required for the Survival of Species at Risk in the Mackenzie Forest District", designed to manage northern caribou in the DFA (Government of BC, 2004b). This notice is shown in more detail in Appendix F.

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

Current condition:
Current practice is for all forest operations to be consistent with these orders and notices.

1 The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

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

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

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

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

Monitoring and reporting:
Final harvest inspections will continue to be performed where consistency with approved provincial Species at Risk Notice/ Orders requirements as identified in operational plans, tactical plans and/or site plans will be confirmed. Areas of inconsistency will be noted during these inspections and will be entered into an incident tracking database. Annually, inconsistencies will be reported in the SFMP annual report for the operating year of April 1st to March 31st

Measure 1-3.6 LRMP Wildlife Management Effectiveness

Measure:	Target (variance):
1-3.6. Percentage of forest operations consistent with LRMP Resource Management Zone (RMZ) specific wildlife species	100% (<5%)

management strategies as identified in operational plans, tactical plans and/or site plans.	

What is this measure and why is it important?
Through use of this measure we extends that of 1-3.4 by addressing actual implementation of strategic direction identified within the Mackenzie LRMP for the conservation of specific wildlife species. In principle, these strategic directions are consistent with the maintenance of productive populations of selected species and therefore provide a measure of our trend toward biological richness. We assume that maintaining individual species contributes directly to biological diversity. Concurrently, through the use of this measure we also subscribe to the social balance of ecological, economic, and social values created through consensus at the Mackenzie LRMP.

How are targets established?
Targets for this measure were established through PAG consensus.

Current condition:
Management strategies for all species listed are not due to be completed until April 1, 2007. However, Canfor currently has management strategies in place for three of the fourteen species.

Forecasting and probable trends of measure:
Carrying out activities specified in an Operational Plan and/or Site Plan is a legal obligation of the signatories, modeling does not apply to this measure. Forecasting for this measure is that, once developed, 100% of Resource Management Zone (RMZ) specific wildlife species management strategies are adhered to.

Monitoring and reporting:
The percentage of forest operations consistent with the LRMP wildlife management effectiveness requirements will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Measure 1-3.7 Mugaha Marsh Report

Measure:	Target (variance):
1-3.7. Report out on the annual results from the Mugaha Marsh bird banding station.	Report out on

What is this measure and why is it important?
This measure was proposed by the PAG and accepted as a measure in part to recognize the important work that is being completed at the banding station and the data that is resulting from it. The bird-banding station at Mugaha Marsh has been a long-standing (since 1995) monitoring station collaboratively operated by the Mackenzie Nature Observatory and the Canadian Wildlife Service. Through operation of the station, trends in migratory birds can be assessed locally and contribute to a broader program at national and international levels. The data help provide a measure of species, and therefore, biological richness under the assumption that maintenance of individual species contributes directly to biological diversity.

How are targets established?
Targets for this measure were established through PAG consensus.

Current condition:
The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This measure is to report the results of the banding program at Mugaha Marsh, forecasting is not applicable. The results of the program will continue to be reported as long as the program is in existence.

Monitoring and reporting:
The signatories will request a copy of the Mugaha Marsh bird banding station's annual report be made available to them for inclusion in the SFM Plan's annual report.

Measure 1-4.1 Biodiversity Reserves

See Measure 1-1.3.

Measure 1-4.2 Biodiversity Reserve Effectiveness

See Measure 1-1.4.

Measure 1-4.3 Sites of Biological Significance Identification

Measure:	Target (variance):
1-4.3. Percent of appropriate personnel trained to identify sites of biological significance in the DFA.	100% (<10%)

What is this measure and why is it important?
Sites of biological significance are sites that may support red and blue listed plant communities and rare ecosystems (see Appendix F for definitions of red and blue list criteria). Sites of biological significance also include protected areas which the Canadian Standards Association defines as "an area protected by legislation, regulation, or land-use policy to control the level of human occupancy or activities" (Canadian Standards Association, 2002). Protected areas can include national, provincial parks, multiple use management areas, and wildlife reserves. Sites of biological significance also include such features as bald eagle or osprey nest, mineral licks, species at risk habitats and other habitats designated by government. Appropriate personnel include key signatory staff and consultants that are directly involved in operational forest management activities. Having appropriate personnel trained to identify sites of biological significance will reduce the risks of forestry activities damaging these sites. The protection of all forest components is an integral aspect of Sustainable Forest Management, which recognizes the value of all organisms to the health of the forest ecosystem. Tracking the percent of personnel trained to identify sites of biological significance will allow licensees to ensure their knowledge is used appropriately to protect these sites in the DFA.

How are targets established?
A target of training 100% of appropriate personnel to identify sites of biological significance was established to ensure these sites were properly identified and managed. Persons preparing Forest Stewardship Plans, Forest Development Plans, and Site Plans that receive this training should create operational plans that manage significant sites where needed. By implementing this measure, forest management should become more aware of these unique sites and dramatically reduce accidental damage to these valuable features. As training programs are completed, Licensees/BCTS will significantly increase the number of key personnel able to improve the protection of sites of biological significance.

Current condition:
While Canfor staff are generally aware of sites of biological significance, no formal training program has been implemented. Training is to be developed and delivered in accordance with Canfor's FMS by May of 2007, prior to the summer field season. Training to identify Sites of Biological Significance for BCTS commenced in June of 2005 (in conjunction with Species at Risk training) for key personnel. Bi-annual refresher training is planned once initial training is complete. Newly hired staff will have training needs evaluated and receive training if required. Training records will be reviewed annually to identify training needs and to ensure appropriate personnel are trained.

Forecasting and probable trends of measure:
A review of current types of sites of biological significance and their management must be conducted. There is a wide range of these sites, in terms of size, location, legislative protection, significance, and management techniques. Training will reflect this diversity. Once this review is complete, this measure will not be easy to quantifiably forecast over a defined time frame, as it is operational in nature. However, it is important to identify what the accepted targets mean to Sustainable Forest Management. To forecast this measure, a "what if" scenario analysis can be used to help identify the importance of the stated target to overall SFM within the DFA. The current target is set at 100% of appropriate personnel are to be trained to identify sites of biological significance. The following "what if" scenario is used in this analysis:

What if only 50% of appropriate personnel received training?

Appropriate personnel should include both planning personnel and field personnel. Planning personnel develop operational plans such as Forest Stewardship Plans, Forest Development Plans, and Site Plans. While these personnel are important in developing management strategies for sites of biological significance, they can only achieve this if they have accurate information to work from. If the staff in the field is not able to identify these sites and communicate their existence to planners then operational plans will not appropriately manage for them. Field staff may accidentally include sensitive plant communities in high traffic areas, include valuable wildlife trees in harvesting units, or fail to recognize denning sites for bears or other mammals.

This loss of biological diversity is inconsistent with sustainable forest management. In addition to a potential loss of biological diversity, there are other potential impacts to SFM. Society may suffer unquantifiable spiritual losses if it felt it was witnessing the destruction of sites of biological significance.

The signatories realize the potential losses to the ecological, economic, and societal values from a failure to manage sites of biological significance properly could be unacceptable. Training all appropriate personnel will reduce the risk of these events happening.

Monitoring and reporting:
Licensees and BCTS will track training information through training records. Such records are currently maintained as part of EMS programs, and are updated as more staff completes the training program. This information will be reported in the annual SFMP plan for the operating year April 1st to March 31st.

Measure 1-4.4 Sites of Biological Significance Management

Measure:	Target (variance):
1-4.4. Percent of sites of biological significance that have management strategies developed by April 2007.	100% (0%)

What is this measure and why is it important?
In the Mackenzie DFA the application of landscape and stand level biodiversity management measures contribute to the maintenance of most biodiversity needs. These management approaches are "coarse filter", i.e., they represent general measures to conserve a variety of wildlife species. However, coarse filter guidelines may not be sufficient to ensure the conservation of sites of biological significance. Specific management strategies may be required to ensure that these sites are maintained within the DFA. This measure will ensure that specific management (fine filter) strategies are developed to conserve and manage sites of biological significance. Many types of sites of biological significance are sufficiently known to allow the development of special management areas, or prescribe activities that will appropriately manage these areas. The management strategies will be based on information already in place (e.g., National Recovery Teams of Environment Canada, IWMS Management Strategy), legislation (provincial and national parks), Land and Resource Management Plans (LRMPs), and recent scientific literature. Management strategies will be implemented in operational plans such as site plans to ensure the protection of these sites.

How are targets established?
A target of 100% was established for this measure to reflect the importance the signatories place on developing management strategies for sites of biological significance. Once these strategies are in place, personnel responsible for operational plan development can use them in the preparation of those plans.

Current condition:
Canfor currently has a policy dealing with “Wildlife Features”, all of which fall within the description of a site of biological significance, including stick nest of eagles, osprey, and goshawk, mineral licks/wallows, animal trails, and denning sites (Caldwell, 2006). Of the nine features identified in the document, seven have management strategies developed for them,

This measure is not due until April of 2007. Going forward, the signatories are collaborating on the development of management strategies for site of biological significance in the DFA by April of 2007.

Forecasting and probable trends of measure:
Forecasting for this measure will be that management strategies for sites of biological significance will be developed by April 2007. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
Once the review of the current types of sites of biological significance is completed those sites that do not have management strategies will receive the highest priority to meet the target date of April 2007. Once the target date has arrived a report will be prepared describing the level of achievement and, if required, a description of those types of sites that still require management activities to be developed.

Measure 1-4.5 Sites of Biological Significance Effectiveness

Measure:	Target (variance):
1-4.5. Percentage of forest operations consistent with sites of biological significance management strategies as identified in operational plans, tactical plans and/or site plans.	100% (<5%)

What is this measure and why is it important?
This measure evaluates the success of implementing specific management strategies for sites of biological significance as prescribed in operational, tactical and/or site plans. As discussed in previous measures, various sites of biological significance exist in the Mackenzie DFA and the signatories have set a target date of April 2007 to develop management strategies for these sites. Once these strategies are in place, operational plans such as site plans describe the actions needed to achieve these strategies on a site specific basis. Once harvesting and other forest operations are complete, an evaluation is needed to determine how well these strategies were implemented. Developing strategies and including them in operational, tactical and/or site plans are of little use if the actions on the ground are not consistent with them. Tracking this consistency will ensure problems in implementation are identified and corrected in a timely manner.

How are targets established?
After April of 2007 a target of 100% of blocks that have sites of biological significance management strategies in their operational, tactical and/or site plans should have forest operations consistent with those strategies. A variance of 5% has been set to allow for human error. As these strategies will be new there will be a period of implementation when errors may occur. Also, there may be old Site Plans that were completed prior to the strategies. Existing inspection checklists, EMS procedures, and internal audits will continue to ensure Site Plans and other operational plans are implemented to achieve prescribed management strategies. If these methods are proving ineffective in achieving desired results the signatories will implement new procedures to meet objectives.

Current condition:
The signatories currently have systems in place to evaluate the consistency of forest operations with operational plans. Inspections occur during forestry activities to ensure consistency with Site Plans, legislation, and EMS programs. Once operations are complete a final inspection is performed to evaluate consistency with operational plans. Any management strategies identified in operational plans for Sites of Biological Significance are monitored concurrently with other activities.

Canfor has taken measures to address several kinds of sites of biological significance for several years, however this has generally been on a block-by-block basis with strategies being developed for each specific circumstance. As noted in measure 1-4.4, Canfor currently has strategies developed around seven identified sites of biological significance.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Carrying out activities specified in an Operational Plan and/or Site Plan is a legal obligation of the signatories, modeling does not apply to this measure. Forecasting for this measure is that 100% of management strategies for sites of biological significance are adhered to.

Monitoring and reporting:
Monitoring will occur with ongoing supervision of forestry operations and as a component of EMS inspections. The measure status will be included in the annual SFMP report for the operational year April 1st to March 31st.

Measure 2-1.1 Coarse Woody Debris

See Measure 1-2.2.

Measure 2-1.2 Soil Conservation Effectiveness

Measure:	Target (variance):
2-1.2. The percentage of forest operations consistent with soil conservation standards as identified in operational plans and/or site plans.	100% (0%)

What is this measure and why is it important?
Conserving soil function and nutrition is crucial for sustainable forest management. To achieve this, forest operations have limits on the amount of soil disturbance they can create. These limits are described in legislation in the Forest Planning and Practices Regulation, section 35. Soil disturbance is defined in this SFM plan as disturbance caused by a forest practice on an area, including areas occupied by excavated or bladed trails of a temporary nature, areas occupied by corduroy trails, compacted areas, and areas of dispersed disturbance. Soil disturbance is expected to some extent from timber harvesting or silviculture activities, but these activities are held to soil conservation

standards in Site Plans (where they are more commonly known as "soil disturbance limits"). The Site Plan prescribes strategies for each site to achieve activities and still remain within acceptable soil disturbance limits.

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

How are targets established?
The target for this measure was set at 100% in order to maintain soil productivity and the signatories will strive to meet this standard.

Current condition:
Soil information is collected as a component of site plan preparation, and soil conservation standards are established based on the soil hazards for that block. To be within those limits there are several soil conservation strategies currently used. Forest operations may be seasonally timed to minimize soil disturbance. For example, fine-textured soils such as clays and silts are often harvested when frozen to reduce excessive compaction. EMS prework forms require equipment operators to be aware of soil conservation measures outlined in the site plans. Once an activity is complete the final EMS inspection form assesses the consistency with site plan guidelines. If required, temporary access structures are rehabilitated to the prescribed standards. Road construction within blocks is minimized, and low ground pressure equipment may be used where very high soil hazards exist

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Carrying out activities specified in an Operational Plan and/or Site Plan is a legal obligation of the signatories, modeling does not apply to this measure, although it is anticipated that forest productivity would be reduced if obligations are not met. If obligations are not met, a rehabilitation plan to restore productivity will be completed. Forecasting for this measure is that 100% of soil conservation standards are adhered to.

Monitoring and reporting:
Data sources for calculating and monitoring this measure include Site Plans and completed EMS prework and final harvest inspection forms. Final harvest and site prep inspections will use an ocular survey to determine if the soil conservation standards stated in the site plan were met. If the initial ocular estimate indicates that site disturbance limits may have been exceeded, a transect soil disturbance survey as defined in the Soil Conservation Survey Guidebook will be completed on the site to determine if the limits have actually been exceeded and if rehabilitation work is required. Ocular survey information (and transect survey data if required) will be tracked so that

annual reports can be generated. Results for this indicator will be included in the annual SFMP report for the operating year of April 1st to March 31st.

Measure 2-1.3 Terrain Management Effectiveness

Measure:	Target (variance):
2-1.3. The percentage of forest operations consistent with terrain management requirements as identified in operational plans and/or site plans.	100% (0%)

What is this measure and why is it important?

Some areas subject to forest operations occur on slopes that warrant special terrain management requirements in operational plans (usually the site plan). These unique actions are prescribed to minimize the likelihood of landslides or mass wasting. Site specific actions may involve harvesting methods, road location, or construction. Terrain management requirements in the block Site Plan or road layout and design plan may be the results of recommendations from a terrain stability assessment (TSA). A TSA is an assessment that is carried out by a certified terrain stability specialist (usually a professional geo-scientist / engineer) on areas determined at risk from landslides. TSAs must be conducted in all areas with a moderate or high likelihood of landslide initiation after harvesting or road building. Other areas may not require TSAs, but still warrant specific actions to manage slopes. These areas' recommendations are determined by a qualified assessor and are included in the appropriate operational plan.

Areas at risk from landslides are determined from information collected on site, or from aerial overview mapping carried out by a professional geo-scientist / engineer. The TSA is a detailed ground assessment that identifies the hazard, risk, and consequence of forest development activities, and provides recommendations for managing landslide hazards.

Landslides and mass wasting are normal parts of the geological cycle and occur through natural processes. However, forest activities such as harvesting and road construction can accelerate these processes causing detrimental and long-term effects to soil productivity, water systems, and habitat. The TSA is intended to use professional judgment to determine levels of risk, followed by recommendations to reduce or eliminate the occurrence of slope failures as a result of forest operations. Forest operations that remain consistent with these recommendations will have fewer, if any, landslide or mass wasting events caused by harvesting or road development.

How are targets established?

The signatories will continue to strive for 100% of forestry activities to be consistent with the terrain management requirements in operational plans and/or site plans. This target was established to reflect the signatories' commitment to soil conservation in the DFA. The use of professional geo-scientists, engineers and other qualified personnel to conduct overview mapping and TSAs is expected to prevent future slope failure events resulting from forest operations.

Current condition:
The entire DFA has various types of terrain stability mapping (detailed or reconnaissance) or has been GIS themed (based on TRIM II contours) to identify slopes greater than 60%. The detailed terrain stability mapping (TSM) identifies 5 to 6 terrain classes while the reconnaissance TSM identifies three categories: Stable terrain, potentially unstable terrain, and unstable. The detailed TSM terrain stability classes are:

- I - no stability issues
- II - low likelihood of landslides following timber harvesting or road construction
- III - minor stability problems can develop, low likelihood of landslide initiation following timber harvesting or road construction
- IVR - Moderate likelihood of landslide initiation following road construction but low following timber harvesting
- IV - moderate likelihood of landslide initiation following either road construction or timber harvest
- V - high likelihood of landslide harvesting following timber harvest or road construction.

Terrain Stability Assessments (TSAs) are completed on any harvest or road building proposal that the TSM has identified as either unstable or potentially unstable or as terrain stability classes IVR, IV, and V. Slopes greater than 60% are used to identify areas where TSAs may be required in the absence of TSM. Indicators of slope instability may also be found by field crews outside of areas identified by TSM or slopes classified as greater than 60%.

The TSA is usually completed with the Site Plan or road layout and design. The recommendations of the TSA are then integrated into the Site Plan or road layout and design and implemented during forest operations. Other areas that still require special slope management, but don't require a TSA have their management requirements in the appropriate operational plan. To ensure the recommendations are carried through, the signatories have internal checks prior to the development project (pre-work meeting), during the project (interim inspections),and after completion of the project (final inspection). Inconsistencies with requirements are reported and tracked through the signatories' respective EMS.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Carrying out activities specified in an Operational Plan and/or Site Plan is a legal obligation of the signatories, modeling does not apply to this measure, although it is anticipated that forest productivity would be reduced if obligations are not met. Forecasting for this measure is that 100% of terrain management requirements are adhered to.

Monitoring and reporting:
Several data sources will be used to calculate and monitor the measure. These include Site Plans, TSAs, various terrain stability mapping (including slopes greater than 60%), and road layout and design documents.

This information will be stored in databases such as GENUS and the indicator success for the operational year of April 1st to March 31st will be included in the annual SFMP report.

Measure 2-1.4 Reportable Spills

Measure:	Target (variance):
2-1.4. The number of EMS reportable spills.	0 (<5)

What is this measure and why is it important?
The Hazardous Waste Regulation of the Environmental Management Act requires any spill in excess of the reportable level for that substance be immediately reported by the person involved or an observer to the Provincial Emergency Program (PEP) by telephoning 1-800-663-3456 or 387-5956. Table 17 outlines the volumes reportable under the Environmental Management Act:

Table 13. Reportable spill substances and volumes.

Substance	Legally Reportable Quantity Spilled*	BCTS EMS Reportable Quantity Spilled*	Canfor EMS Reportable Quantity Spilled*
Petroleum Products	100 L	25 L	20 L
Antifreeze (undiluted)	5 kg	5 L	5 L
Battery acid	5kg	5kg	5kg
Grease	100 L	25 L	20 L
Paints and solvents	100 L	25 L	20 L
Pesticides	5 kg	1 kg	5 kg

*Spill: any concentrated spill greater than the quantity indicated in table, or any amount spilled into or immediately adjacent to a stream, lake or running water.

This measure is intended to monitor the number of spills that occur from forest operations and evaluate the success of measures to reduce such spills. The use of heavy equipment for forest operations can result in accidental petroleum/ antifreeze release into the environment. As these materials can be toxic to plants, animals, fish and downstream domestic and agriculture users, their proper containment contributes to sustainable forest management. By tracking spill occurrence, guidelines and procedures can be adjusted to improve weaknesses in their handling and transportation.

How are targets established?
The establishment of the target was a result of the regulatory requirements and EMSs already in place. In addition to the legal requirements for 100% compliance, the target also recognizes the danger these substances pose to soil and water resources. However, despite the efforts made to control these materials, people and machinery are fallible and spills may still occur. For these reasons a variance of 5 or less reportable

spill incidents per year has been established. Signatories will continue to implement their EMS programs for spill prevention and if targets are not being met they will take a coordinated approach to determine procedures to do so.

Current condition:
All signatories currently have procedures in place for reducing and reporting spills. EMS checklists and monitoring procedures require the proper storage, handling, and labelling of controlled products. Such measures include proper storage tank construction, the use of shut off valves, availability of spill kits, and the construction of berms where required. EMS plans also include the measures to be taken in the event of a spill.

The spill events below the legally reportable amounts are tracked differently by each of the signatories. Previous to the SFM planning process there was inconsistencies in spill tracking and it is difficult to determine what historical practices have been. However, as a result of this SFMP, the number of reportable spills will be monitored and reported in the future.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
The measure target is expected to be achieved, but the exact degree of success is not easy to quantifiably forecast, as the success of meeting the target is at least partially subject to the unpredictability of machinery. However, it is important to identify what the accepted target means to SFM. Reducing the number of reportable spills will protect soil and water resources during forest operations and 100% compliance is an obvious objective. The use of a "what if" scenario is beneficial in identifying future trends if the target for this measure was not in place. As the target for this measure is set at 100%, with a variance of 5 or less reportable spills annually, the analysis of one other potential scenario is useful:

a) What if there were more than 5 reportable spills of petroleum or antifreeze a year?

A reportable spill event is a major release of toxic materials into the environment and the subsequent damage to plants, animals, fish and downstream domestic and agriculture users could be extensive and costly to rehabilitate. The loss of such materials at a level higher than 5 spills a year represents a significant failure in the management of petroleum and/ or antifreeze, and represents serious flaws in current practices. While 5 or less reportable spills annually may be the result of unavoidable accidents, more than 5 reportable spills would probably represent human error and suggest procedures need to be improved. It is the intent of this measure to monitor the success of current procedures and to reduce human errors to an absolute minimum.

Monitoring and reporting:
Monitoring procedures are outlined in the standard operating procedures of the signatories' respective EMSs. The use of EMS checklists is designed to ensure handling and storage of chemicals, petroleum products, and other controlled substances is as per regulations and the EMS requirements. If a reportable spill occurs corrective and preventative actions will be identified to improve consistency. Signatories will track spill

events in their EMS databases and their combined performance will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Measure 2-1.5 Site Index

Measure:	Target (variance):
2-1.5. Variance between average preharvest and post harvest Site Index (at Free Growing) by inventory type group for cutblocks.	>0 (0%)

What is this measure and why is it important?
Sustaining forest ecosystem productivity requires determining and designing forest practices that will maintain key soil resources so that harvesting does not cause continual degradation of site quality over time. Managing for the highest productive capability was identified as a key strategy in the LRMP.

Site index is an expression of the forest site quality of a stand, defined as the height of the dominant or codominant trees in a stand at a specified age. Site index equations are calculated for individual species using mensuration data. It is commonly used as an indicator of site productivity as it infers that trees or stands with greater growth at a given age have access to more key resources required for biomass production. The higher the site index for a given species in a given region, the higher the productivity or the quality of the site. Site index is sensitive to changes in ecological variables including soil nutrients, soil moisture, and others.

This measure provides a relative comparison of a post-harvest average site index (at free growing) compared to the pre-harvest site index (as represented by inventory estimates) in the THLB.

How are targets established?
The strategy for establishing the target for this measure is to use data describing the current condition of pre-harvest SI. As the data is collected and the database for both pre- and post-harvest SI at the block level is built, the targets will be revisited.

Current condition:
Current condition for this measure is not known on a block-by-block basis as pre-harvest site index data is not readily available for blocks that are currently becoming free growing. The signatories are taking steps to remedy this and pre-harvest site index data now being tracked.

Although the current condition is not known on a block-by-block basis, in 2004 and 2005, Canfor undertook a site index adjustment project in the TSA (J.S. Thrower, 2006). Results of this project indicate that site indices on managed stands are significantly higher than previously believed because previous estimates were based on unmanaged stand characteristics. Table 18 shows the results of this project for the more common BEC zones/subzones.

Table 14. Predicted site index (PSI) versus inventory site index (Inv. SI) for selected biogeoclimatic zones/subzones in the Mackenzie TSA

Subzone	Pine				Spruce			
	PSI (m)	Inv. SI (m)	Diff. (m)	Diff. (%)	PSI (m)	Inv. SI (m)	Diff. (m)	Diff. (%)
SBS mk1	19.9	15.7	4.2	27	21.1	13.6	7.5	56
SBS mk2	22.0	16.9	5.1	30	22.0	14.2	7.9	55
SBS wk1	21.5	19.2	2.3	12	22.1	15.7	6.4	41
SBS wk2	21.4	16.8	4.6	27	22.7	14.0	8.7	62
BWBS dk1	18.8	15.0	3.7	25	17.8	12.3	5.5	45
ESSF mv3	16.5	14.1	2.4	17	16.7	10.3	6.4	62
ESSF mv4	16.1	13.9	2.2	16	15.9	10.3	5.6	54

The project indicates that on average, site index on managed pine stands is 24% higher than current inventory estimates, and 56% higher on spruce stands.

Forecasting and probable trends of measure:
Site index is a fundamental value used in the modeling of growth and yield of stands to forecast future stand volume and timber supply. It is assumed that site index of a stand will not change over time, with or without disturbance. As such, site index measures are not explicitly forecasted or projected, but are built into planning scenarios as part of timber supply projections. However, as noted above, management of stands can increase site index. Based upon this, it is believed that the target of post-harvest site index exceeding that of the pre-harvest site index will be achieved as unmanaged stands become managed stands until second rotation is reached.

Monitoring and reporting:
The data that is required to monitor this measure is post-harvest site index (SI) by block during free growing silviculture surveys on previously harvested areas within the THLB. Pre-harvest data will be obtained as part of inventory information by the planning and/or operations forester. The monitoring and analysis of post-harvest SI will occur annually through the individual licensees' silviculture survey program. Currently, the pre-harvest data exists as part of forest cover labels as part of the VRI or Forest Cover Map. Individual site index measurements for blocks are aggregated into larger Inventory Type Group measurements to produce the Mackenzie results described above. As post-harvest data will be obtained on a block basis, it will be necessary to extract the individual pre-harvest data measurement from the aggregated database to make direct comparisons. The pre-harvest SI in each block will be compared to the recorded post-harvest SI, and this information will be reported in the SFMP Annual Report. Records to satisfy this measure will be stored within the respective signatories' offices, as per their document control procedures. The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in the respective signatories' Responsibility Matrix.

Measure 2-2.1 Site Conversion

Measure:	Target (variance):
2-2.1. Area of THLB converted to non-forest land use through forest management activities.	<5% (0%)

What is this measure and why is it important?
In addition to maintaining the resources necessary for sustaining the resiliency of forest ecosystems, a stable land base within which productive capability is assessed is also required. In order to assess the maintenance of the productive capability of the land base, this measure specifically tracks the amount of productive land base loss due to various non-forest uses. Removal of the productive land base occurs as a result of permanent access structures, including roads, landings and gravel pits, as well as converting forested areas to non-forest land use, such as range, seismic lines and other mineral exploration.

Conversion of the THLB to non-forest land also has implications for carbon sequestration. A permanent reduction in the forest means that the removal of carbon from the atmosphere and carbon storage will be correspondingly reduced.

How are targets established?
The target is established based on the current assumptions in TSR2 for the TSA. The SFM Plan accounts for a 5% reduction in the THLB allowing for future road construction.

Current condition:
Based on analysis completed during SFM forecasting and scenario design (Section 6.2) , there are 6,829 ha in roads and landings, amounting to 0.7% of the THLB (Appendix I, Table 1). The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This measure is not explicitly forecasted however the assumption that a certain percentage of the THLB will continue to be converted to non-forest use (i.e. roads) are assumed in modeling. From the forecast and scenario design process, an estimated 41,503 ha of additional roads, trails and landings are assumed to be removed from the THLB in the future. This amounts to 5.5% of the estimated future THLB, exceeding target amounts and amounts anticipated through the TSR2 process. This assumption will be monitored against the performance of the signatories. .

Monitoring and reporting:

The data that is required for monitoring is the number of hectares of productive forest area lost due to conversion to a non-forest use. This data collection and analysis is essentially a GIS exercise that can be completed at 5 year intervals concurrently with the Timber Supply Review process. Forecast of future reductions will be run at that time to determine if the signatories are trending towards target levels. Records to satisfy this measure will be stored within the respective signatories' offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and placed in the information management system will be identified in the respective signatories' Responsibility Matrix.

Measure 2-2.2 Permanent Access Structures

Measure:	Target (variance):
2-2.2. The percentage of gross cutblock area occupied by total permanent access structures.	<5% (1%)

What is this measure and why is it important?
This indicator measures the amount of area developed as permanent access structures (PAS) within cutblocks, in relation to the area harvested during the same period. Limits are described in legislation in the Forest Planning and Practices Regulation, section 36. Permanent access structures include roads, bridges, landings, gravel pits, or other similar structures that provide access for timber harvesting. Area that is converted to non-forest, as a result of permanent access structures and other development is removed from the productive forest land base and no longer contributes to the forest ecosystem. Roads and stream crossings may also increase risk to water resources through erosion and sedimentation. As such, minimizing the amount of land converted to roads and other structures protects the forest ecosystem as a whole.

How are targets established?
The current target of 5% has been determined from current base line data as indicated previously. The signatories expect that current PAS will be maintained and potentially decrease in the future and have used the current status as the target for this measure.

Current condition:
The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
The < 5% target is anticipated to be achieved by all signatories. Future achievements are not easy to quantifiably forecast because this measure is operational in nature. However, it is important to identify what the accepted target means to SFM. The amount of area that exists as permanent access contributes to ecological, economic and social values throughout the DFA. Therefore, the use of a “what if” scenario is beneficial in identifying anticipated future trends for a measure such as this. As this target identifies a value equal to or less than 5.0%, one other scenario should be identified:

a) What if considerably more than 5.0% of the average annual cutblock area was occupied by permanent access structures?

Impacts to all three aspects of SFM (ecological, economic, and social) could be expected if considerably more than 5.0% of the annual cutblock area within the THLB was in permanent access. Since permanent access structures remove productive forest area from the THLB, the increase in roads would decrease the future available timber supply and forestry economic returns. While there may be greater recreational access to the DFA, wildlife populations may decrease from an increase in hunting. Water quality and quantity may also decrease as more stream crossings are constructed, which may increase sedimentation. The cumulative effects of economic and environmental deterioration could impact social values, as society relies on a sustainable economy and environment. It is not possible to have a forest industry without permanent access

structures. However, this "what if" scenario analysis implies that a balance of values can be achieved through sustaining a minimal level of permanent access within the DFA. The signatories are committed to achieving the identified target that, for now, is the maximum percentage.

Monitoring and reporting:
All road planning and construction information is maintained within the signatories' respective databases such as GENUS. Each year the databases are queried to report the overall area of in-block road that has been constructed that year and presented as a percent of the area harvested within the same period. The query will be used by forest planners to ensure that the total amount of planned road, compared to the area planned for harvest is maintained within the target. The operational year is between April 1st and March 31st, and the above information will be contained in the annual SFMP report for that period.

Measure 2-2.3 Access Management Communication

Measure:	Target (variance):
2-2.3. Inclusion of access management in communication strategies with stakeholders.	100% (0%)

What is this measure and why is it important?
Lack of coordinated plans for access to resources among multiple proponents seeking a range of resource development opportunities can lead to excessive and inefficient road networks. In turn, such road networks can lead to reduced forest productivity among other anthropogenic effects. Our assumption with this measure is simply that – by increasing communication about access plans among stakeholders, we can increase the efficiency of access to resources and thereby reduce any negative subsequent effects on forest productivity. Through use of this measure we expect to track our performance in this communication and hence our "due diligence" in indirectly maintaining forest productivity.

How are targets established?
Targets for this measure were established through PAG consensus.

Current condition:
Currently, access is coordinated to some extent between the major licensees, BCTS, and MoFR. However, because the major licensees and BCTS have discreet operating areas in the TSA, coordination is less onerous as operations seldom overlap. Where multiple industrial use of roads, road use agreements are entered into by whomever is responsible for the road and the user.

Communication strategies had yet to be developed in cooperation with stakeholders interested in BCTS' operations.

Forecasting and probable trends of measure:
Forecasting for this measure will be that access management will be included in communication strategies with stakeholders. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
The percentage of stakeholder communication strategies that address access management will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Measure 2-3.1 Regeneration Delay

Measure:	Target (variance):
2-3.1. Percent of harvested blocks declared Stocked prior to the regeneration date consistent with operational plans.	100% (<5%)

What is this measure and why is it important?
The Forest Development Plan (FDP) is a landscape plan providing operational planning direction for an entire planning area. The FDP also includes all relevant stocking standards that relate to site level planning (i.e. Site Plans). Forest Stewardship Plans (FSPs) will replace FDPs once FRPA is fully implemented and will serve a similar function as the FDP for this measure.

Regeneration delay is defined in this SFM plan as the time allowed in a prescription between the start of harvesting in the area and the earliest date by which the prescription requires a minimum number of acceptable, well-spaced trees per hectare to be growing in that area. There is a maximum permissible time allowed and comes from standards developed and/or approved by government. The regeneration delay period is usually within two years, where planting is prescribed and five years where the stand is expected to reforest naturally. Ensuring that all harvested stands meet the prescribed regeneration delay date within the specified time frame is an indication that the harvested area has maintained the ability to recover from a disturbance, thereby maintaining its resiliency and productive capacity. It also helps to ensure that a productive stand of trees is beginning to grow for use in future rotations.

How are targets established?
The target for this measure is established at 100% in order to ensure that all harvested areas within the DFA are reforested within specified timelines. Achievement of regeneration delay is an integral part of all silviculture management activities so it is vital to have an overall performance target of 100%.

Current condition:
A regeneration survey is completed after planting to ensure adequate stocking of harvested blocks. The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This is a legal obligation of the signatories, modeling does not apply to this measure, Forecasting for this measure is that 100% of blocks will be reforested prior to the regeneration delay date.

Monitoring and reporting:
Silviculture obligations such as regeneration delay dates for each harvested stand are recorded and maintained in each Steering Committee member's databases. Each cutblock is surveyed a certain number of years after harvest to ensure reforestation has occurred and that the stand is fully stocked and performing successfully. The results of all surveys are also summarized and maintained in licensee databases. If a survey indicates that the stand has not regenerated successfully, corrective actions will be prescribed immediately in order to remedy the situation while still meeting regeneration delay deadlines. Despite all efforts, some areas will not meet regeneration delay targets and the Site Plan must be amended to extend the critical dates so that continued treatments can be applied to try and regenerate the area.

Once regeneration delay has been achieved, the licensee must submit a report to the Ministry of Forests that will update the status of the cutblock on the government database. These reports are tracked internally by licensees and this measure can be easily tracked and monitored through government reports submitted annually.

Measure 2-3.2 Free Growing

Measure:	Target (variance):
2-3.2. Percent of harvested blocks declared Free Growing prior to the late free growing assessment date.	100% (<5%)

What is this measure and why is it important?
A free growing stand is defined in this SFM plan as a stand of healthy trees of a commercially valuable species, the growth of which is not impeded by competition from plants, shrubs or other trees (refer to glossary in Appendix L). The free growing status is somewhat dependent on the regeneration delay date of a forest stand and could be considered the next reporting phase. A free growing assessment is conducted on stands based on a time frame indicated in the Forest Development Plan. The late free growing dates are established based on the biogeoclimatic classification of the site and the tree species prescribed for planting after harvest.

In order to fulfill mandates outlines in legislation, standards are set for establishing a crop of trees that will encourage maximum productivity of the forest resource (BC MOF 1995b). The free growing survey assesses the fulfillment of a Licensee's obligations to the Crown for reforestation and helps to ensure that the productive capacity of the forest land base to grow trees is maintained. Continued ecosystem productivity is ensured through the principle of free growing. This indicator measures the percentage of harvested blocks that meet free growing obligations across the DFA. This will help to sustain the productive capability of forest ecosystems.

How are targets established?
The target for this measure is established at 100% in order to ensure that all harvested areas within the DFA achieve free to grow status within specified timelines. Once cutblocks reach the free to grow standard the area reverts back to Crown land and all Licensee obligations are considered complete. A performance target of 100% is not only achievable; it is in the licensee's best interest as the finalization of silviculture obligations is an important cost benefit for the Licensee.

Current condition:
Silviculture obligations, including a free growing standard, for all harvested areas of Crown land have been legally in place since October 1987. A review of signatories' free growing areas revealed that all stands under obligation are currently meeting the defined free growing time period designated within the Site Plan. However, small areas within a limited number of blocks are currently at risk of not meeting prescribed late free growing dates. As such, these areas will be assessed and corrective actions will be implemented where possible in order to ensure the stands will reach free to grow status by the amended free growing dates.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This is a legal obligation of the signatories, modeling does not apply to this measure, Forecasting for this measure is that 100% of blocks will be declared free growing prior to the late free growing date.

Monitoring and reporting:
Silviculture obligations such as free growing dates for each harvested stand are recorded and maintained in each signatory's databases. Each cutblock is surveyed when the free growing dates approach to ensure the free growing standard has been met and that the stand is fully stocked and performing successfully. The results of all surveys are also summarized and maintained in licensee databases. If a survey indicates that the stand has not achieved free growing by the required date, corrective actions will be prescribed immediately in order to remedy the situation while still meeting the late free growing deadlines. Despite all efforts, some areas will not meet the free growing standard by the late date and the Site Plan must be amended to extend the critical dates so that continued treatments can be applied to try and fulfill the free growing obligation.

Once free to grow status has been achieved, a report is submitted to the Ministry of Forests that updates the status of the cutblock on the government database. All blocks with a submission will be cross-referenced with its late free growing date to determine if the late free growing date has been achieved. These will be summarized and reported annually.

In accordance with accepted practice, a block is deemed free growing on the date of the survey confirming its free growing status.

Measure 2-3.3 Stocking and Species Composition

Measure:	Target (variance):
2-3.3. Percent compliance with stocking levels and species composition requirements contained in operational plans.	100% (0% - info in spreadsheet says ≤5% but PAG CI Matrix says 0%)

What is this measure and why is it important?
Regeneration standards exist to ensure that appropriate species are reforested on harvested areas to within acceptable numbers. The Ministry of Forests sets out what species are preferred and acceptable for specific biogeoclimatic site series. Natural ingress of species that are not preferred or acceptable may occur. The stocking standard is linked to AAC calculations in terms of meeting the desired density and species composition of future stands.

Compliance with this measure is an important surrogate for carbon sequestration. Reforesting harvested areas quickly to their full capacities ensures continued removal of carbon from the atmosphere and its storage in growing trees.

How are targets established?
The legal requirements identified by the operational plan (FDP or FSP) serve as the target for this measure.

Current condition:
Stocking standards used for current FDP's are those recommended by the Chief Forester for the biogeoclimatic zone and site series present in the Mackenzie DFA. Average Stocking Standards for conifer blocks in the Mackenzie DFA, are listed in Table 16 below. Table 19 represents an average of BEC zones across the DFA and may vary somewhat at higher elevations or at the extremes of a BEC (i.e. on xeric, hygric, or hydric sites), however these sites are generally avoided due their sensitivity and difficulty in reforesting. Stocking standards for specific sites are found in the approved Operational Plan under which the respective signatories operate.

Table 15. General stocking standards in the DFA.

Moisture Regime	Species		Stocking (stems/ha)		
	Preferred	Acceptable	Target	Minimum	Minimum Preferred
Xeric	Pl		1000	500	400
Sub-mesic	Pl, Sx	Bl	1200	700	600
Mesic	Pl, Sx	Bl	1200	700	600
Sub-hygric	Pl, Sx	Bl	1200	700	600
Hygric	Sx	Bl	1000	500	400
Hydric	Sx	Bl	400	200	200

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This is a legal obligation of the signatories, modeling does not apply to this measure, although it is anticipated that forest productivity would be negatively impacted is targets are not achieved. Forecasting for this measure is that 100% of blocks will be reforested in compliance with stocking levels and species composition requirements contained in operational plans.

Monitoring and reporting:
Once harvested, each cutblock is surveyed to ensure reforestation has occurred and that the stand is fully stocked with acceptable species. The results of all surveys are maintained in the signatories' respective databases. If a survey indicates that the stand has not regenerated successfully, corrective actions will be prescribed immediately in order to remedy the situation while still meeting regeneration delay deadlines. This information is also tracked in the signatories' respective databases.

Once regeneration has been achieved, the signatories must submit a report to the Ministry of Forests that will update the status of the cutblock on the government databases. The signatories and the MoFR track these reports internally. This measure can be tracked and monitored through government reports submitted annually at the end of May.

Reporting will also occur annually within the SFMP Annual Report. This information is required by block but will be reported as an average for all blocks regenerated annually.

Measure 2-4.1 Terrain Management Effectiveness

See Measure 2-1.3.

Measure 2-5.1 Accidental Fires

Measure:	Target (variance):
2-5.1. Number of hectares (area) damaged by accidental forestry-related industrial fires.	<100 ha (+5 ha)

What is this measure and why is it important?
This measure calculates the number of hectares lost to industrial forest fires. As fire can result in catastrophic losses to the timber supply, wildlife, and private property, a high value has been placed on reducing the impact of these fires in the DFA. Accidental industrial fires can be caused by various sources, including escapes from the use of prescribed fire (e.g. burning slash piles) or from human induced error (e.g. machinery, cigarette smoking, etc.).

Industrial fires are usually brought under control quickly due to the availability of fire fighting equipment and the signatories Fire Preparedness Plans. In contrast, naturally caused fires have the potential to quickly grow in size before fire control efforts can be undertaken. However the area and extent of accidental industrial fires must be minimized throughout the DFA in order to contribute to the overall health of the forest and long-term sustainability of the resource.

How are targets established?
Targets are established from a review of past performance within the DFA. Licensees and BCTS are committed to minimizing the area of accidental industrial fires and will continue efforts to prevent wildfire and control their spread through EMS procedures, training, and prompt initial attack strategies as part of their fire preparedness plans.

Current condition:
The main cause of accidental industrial related fires in the DFA is the burning of slash piles and operating industrial machinery. All Licensees and BCTS take precautions to prevent accidental fire ignitions and to reduce the spread of fires once they start. These precautions include EMS checklists and inspections of on-site fire equipment, Fire Preparedness Plans, and fire fighting training for some personnel. The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
This measure is not easy to quantifiably forecast as the ignition and spread of wildfires is dependant on many factors such as weather, slopes, and forest types. However, it is important to identify what the accepted target means to SFM. Accidental forestry related fires affect ecological, economic and social values of SFM. Therefore, the use of a "what if" scenario is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has the target set at less than 100 hectares, one other scenario should be identified:

a) What if there were significantly more than 100 hectares of accidental forestry related fires throughout the DFA?

If there were more than 100 hectares of accidental forestry related fires throughout the DFA ecological values may benefit due to the historic nature of ecosystems in the DFA. However economic and social values could both be negatively impacted. At the worst, loss of human life and property damage may occur. Timber supply, resource values and visual quality may also be compromised, thereby affecting overall economic benefits and social values from forests in the DFA. Failure to achieve the indicator target could also potentially reduce quality of life values for the public within the Mackenzie DFA. For example, if an accidental forestry related fire destroyed a popular campsite, public recreation values could be reduced.

Negative influences from an increase in accidental forest industry related fires would likely outweigh the potential positive ecological gain. Therefore, The signatories will continue to place high importance on minimizing the impact of accidental industrial fires. Based on historic information, accidental fires have often been less than 100 cumulative hectares across the DFA.

Monitoring and reporting:
The British Columbia Ministry of Forests and Range (MoFR) maintains a database of all fires that occur in the province, which includes their cause and their specific location. The signatories (through the MoFR Protection Branch) will likely be involved in fire suppression activities for fires that occur within the DFA. Therefore, the signatories will contact the MoFR annually in order to confirm the number of hectares reported as burned along with identification of the source of ignition. The number of hectares of accidental, industrial related fire damaged area will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Measure 2-5.2 Risk Factor Management

Measure:	Target (variance):
2-5.2. Percentage of identified risk factors with updated	100% (0%)

management strategies.	

What is this measure and why is it important?
Natural disturbance levels due to biotic and abiotic factors and associated risk levels are managed for resistance to catastrophic change and to ensure that the ability to recover on the landscape level is sustained. It is important to ensure that effective management strategies are in place in order to address the impacts of forest health factors on the range of forest related values in the DFA.

How are targets established?
Targets for this measure were established through PAG consensus.

Current condition:
Currently an annual Forest Health Strategy and Tactical Plan (BC MoFR, 2006) is produced by the Ministry of Forest and Range in conjunction with major licensees and BCTS through the Defined Forest Area Management (DFAM) program. Although the Plan identifies 24 risk factors, strategies are focused on mountain pine beetle and spruce bark beetles. Management strategies have also been developed through the Pine Stem Rust Working Group for western gall rust, stalactiform blister rust, and commandra blister rust. Signatories also have management strategies in place for such abiotic factors as windthrow, fire (fire preparedness plans), and landslides (terrain stability requirements, see Measure 2-1.3). The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Forecasting for this measure will be that management strategies for identified risk factors will be developed by April 1, 2007 and updated annually. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
The percentage of identified risk factors with updated management strategies will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Measure 3-1.1 Site Conversion

See Measure 2-2.1.

Measure 3-1.2 Coarse Woody Debris

See Measure 1-2.2.

Measure 3-1.3 Regeneration Delay

See Measure 2-3.1.

Measure 3-1.4 Free Growing

See Measure 2-3.2.

Measure 3-1.5 Stocking and Species Composition

See Measure 2-3.3.

Measure 3-1.6 Soil Conservation Effectiveness

See Measure 2-1.2.

Measure 3-2.1 Site Conversion

See Measure 2-2.1.

Measure 3-2.2 Stocking and Species Composition

See Measure 2-3.3.

Measure 3-2.3 Regeneration Delay

See Measure 2-3.1.

Measure 3-2.4 Free Growing

See Measure 2-3.2.

5.2.2 Measures and Targets for Economic Values

Measure 4-1.1 Harvest Volume

Measure:	Target (variance):
4-1.1. Actual harvest volume compared to the apportionment across the DFA over each 5 year cut control period.	100% (+/-10%)

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

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

How are targets established?
A common method for establishing targets is to benchmark the current harvest levels and extrapolate to the next 5 to 10 years. However, the existing mountain pine beetle epidemic in the DFA and the potential for increased harvest levels make benchmarking difficult and unpredictable.

The Chief Forester apportions AAC within the DFA and the signatories are committed to fulfill 100% of their timber harvesting obligations.

Current condition:
As stated above, the Chief Forester makes a determination of the rate of harvest for a particular TSA. The licensee then by law must achieve the AAC within the specified thresholds. In the case of BC Timber Sales, they are mandated to offer timber sale licenses matching the allocated AAC. Each truckload of wood is assessed and accounted for at an approved Ministry of Forests and Range (MOFR) scale site. The MOFR uses this information to apply a stumpage rate to the wood, and monitors the volume of wood harvested and compares it to the AAC thresholds. BC Timber Sales tracks volume for timber sale licenses issued based on volume cruised, and compares this to its AAC allocation.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Refer to Appendix I for a summary of the current apportionment within the Mackenzie TSA.

Forecasting and probable trends of measure:
The actual volume harvested by the Licensees and sold by BCTS will be directly related to the forecasted volume over time as per the Mackenzie SFM Indicator Forecasting project. The results of the harvest levels forecasting under current Base Case assumptions are shown in Figure 12.

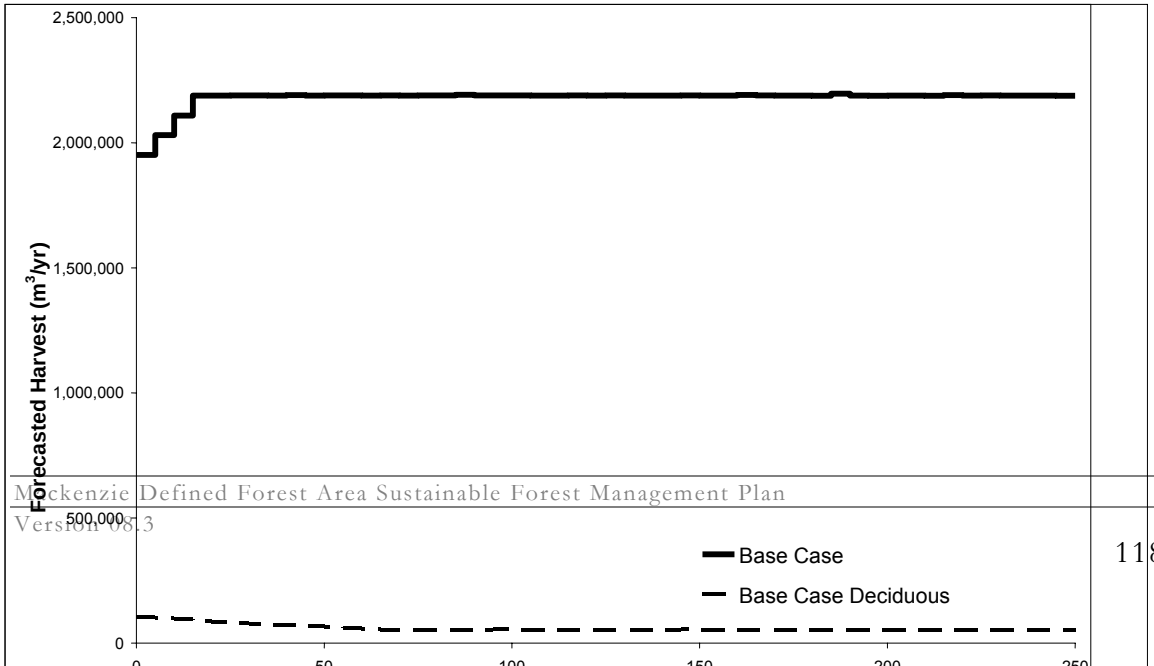


Figure 12. Forecasted harvest of timber in the Mackenzie Defined Forest Area of north-central British Columbia.

The current annual allowable cut in the Mackenzie DFA is 1,950,520 m^3/year as estimated during the forecasting and scenario design project.

As seen in the harvest volume forecast figure, the short-term harvest level increases 5% every five years until it levels off at about 2,200,000 m^3/year.

Additional forecasting of this measure will occur during future indicator supply analyses, which are anticipated to be at five-year intervals.

Monitoring and reporting:
The volume of timber actually harvested within the DFA will be determined annually by a review of MOFR timber scale billing summaries for the period of January 1st to December 31st each year, on an annual basis. BC Timber Sales will track the volume sold annually, and together with the Licensees the cut level as a percentage of apportionment for the most recent 5-year cut control period will be reported in the annual SFMP report.

Measure 4-1.2 Waste and Residue

Measure:	Target (variance):
4-1.2. Percent compliance with waste and residue standards.	100% (<5%)

What is this measure and why is it important?
The purpose of this measure is to ensure that the use of wood fiber is maximized given reasonable consideration of fiber quality and milling efficiency, Government has set targets on allowable waste and residue for forest harvesting operations. This measure simply allows us to monitor compliance with already established standard targets under the assumption that these targets adequately minimize any loss of economic potential from undue waste and residue of wood fiber.

How are targets established?
This target was established by Government through the Provincial Logging Residue and Waste Measurement Procedures Manual (BC MoFR, 2005). The target was agreed to by PAG consensus.

Current condition:
Assessments of harvested blocks for levels of residue and waste are required under the *Forest Act, Sec 103.1*. The signatories currently sample every block harvested, or a sub-sample of blocks harvested, in accordance with methods approved by the Ministry of Forests and Range for levels of waste and residue. Levels of waste and residue are reported to the MoFR and, if required, payment made on any excess levels.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This is a legal obligation of the signatories, modeling does not apply to this measure, although it is anticipated that failure to achieve targets would negatively impact economic and social values. Forecast for this measure is that 100% of blocks will be compliant with waste and residue standards.

Monitoring and reporting:
The percentage of forest harvest operations that meet regulated waste and residue standards on a per hectare basis will be reported in the annual SFMP report for the operating year April 1st to March 31st. Percentage will be based on blocks assessed for waste and residue as it is impossible to determine compliance until the block is assessed. All assessments must be completed to Ministry of Forests and Range standards.

Measure 4-2.1 Wood Purchases

Measure:	Target (variance):
4-2.1. Canfor to provide opportunities to purchase wood from private enterprises.	Opportunity exists (N/A)

What is this measure and why is it important?
This measure is intended to address the ability of small businesses to sell wood in the DFA. Ensuring that businesses can sell their wood in the DFA provides a measure of economic diversification. It also ensures that timber harvested within the DFA has the opportunity to be processed within the DFA, providing further economic benefit.

How are targets established?
The target that the PAG was comfortable with was the fact that the opportunity exists currently. BCTS provides some purchase wood to the mills and the amount of wood available fluctuates annually.

Current condition:
Currently, the capacity of Canfor's two sawmills exceeds the current volume allocated to Canfor under its Forest License. The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
Forecasting for this measure is that Canfor will continue to provide opportunities to purchase wood from private sources. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
Canfor tracks the amount of wood it purchases. Records to satisfy this measure will be stored within Canfor's office, as per their document control procedures. This amount will be summarized and reported in the SFMP Annual Report.

Measure 4-2.2 First-order Wood Products

Measure:	Target (variance):
4-2.2. The number of first order wood products produced from trees harvested from the DFA.	5 (-2)

What is this measure and why is it important?
This measure monitors the number of first order wood products that are produced within the DFA. First order wood products are items directly produced from trees. Examples of first order wood products include:

- lumber/ custom cut lumber/ trim blocks
- pulp chips/ OSB chips
- plywood / veneer
- house logs/ raw logs
- railway ties
- poles
- wood shavings
- sawdust
- hog fuel

This measure helps to show how forest management activities can contribute to a diversified local economy based on the range of products produced at the local level. Forest management's contribution to multiple benefits to society is evident through this measure, as well as an indication of the level of diversification in the local economy. First order wood products are often used to supply value-added manufacturers with raw materials for production, such as pre-fabricated houses components. These provisions help to maintain the stability and sustainability of socio-economic factors within the DFA. By ensuring a large portion of the volume of timber harvested in the DFA is processed

into a variety of products at local facilities, the local economy will remain stable, diverse, and resilient.

How are targets established?
The target is established from a review of current practices and any reasonable expectation for growth or for fluctuations from year to year. Over the long-term, the signatories expect to produce the same number and diversity of first order forest products within the DFA. However the signatories do not have direct control over the number of forest products demanded by the value added industry, nor the market for first order products themselves. This market variability is the reason for the -2 products variance from the target of 5.

Current condition:
Canfor currently produces a variety of forest products with different grades and sizes of dimensional lumber being the primary products. BCTS is limited to providing raw logs for sale through an open competitive bid process. Canfor also produce specialty wood products such as Japanese select lumber, Machine Stress Rated lumber, and a variety of special order lumber products. A value-added manufacturer in the DFA purchases certain by-products from Canfor mills to produce finger-jointed lumber and an adjacent pulp mill also purchases wood chips from Canfor. Other mill by-products utilized by the adjacent pulp mill are wood shavings and sawdust. In the future, there is also the potential that hog fuel will be supplied to a bio-energy plant proposed for the area. The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This measure is not easy to quantifiably forecast over a defined time frame as it is dependent on variables such as markets, harvesting levels and availability of raw material. However, it is important to identify what the accepted target means to SFM. The number of first order forest products produced within the DFA affects economic and social values within the DFA. Therefore, the use of a “what if” scenario is beneficial in identifying anticipated future trends. As this measure currently has a target set at 5, one other scenario should be identified:

a) What if significantly less than five first order wood products were produced within the DFA?

If significantly less than five different first order wood products were produced within the DFA economic diversity within the Mackenzie area could decrease. Timber harvested from the DFA may not achieve full returns of revenue because local utilization of harvested logs would likely decrease. Employment would also likely decrease within the DFA, which could in turn reduce the quality of life. In light of the mountain pine beetle infestation, this indicator is increasingly important. In the short-term, harvesting levels will likely increase in an attempt to salvage as many timber values as possible before they are lost. Therefore, it will be important to achieve maximum utilization of this wood and maximize economic returns.

Due to the significant impact this measure could potentially have on important values of SFM, the signatories are committed to achieving 5 different first order wood products produced in the DFA.

Monitoring and reporting:
In order to track and evaluate this indicator, the signatories will report on the number of first order wood products produced. The total number will be included in the annual SFMP report for the operating year April 1st to March 31st.

Measure 4-2.3 Local Investment

Measure:	Target (variance):
4-2.3. The percent of money spent on forest operations and management on the DFA provided from northern central interior (NCI) suppliers (Stumpage not included).	Report out on

What is this measure and why is it important?
Forests provide many ecological benefits but they also provide substantial socio-economic benefits. In order to have sustainable socio-economic conditions for local communities associated with the DFA, local forest related businesses should be able to benefit from the work that is required in the management of the DFA. Furthermore, for small forestry companies to contribute to and invest in the local economy there must be assurances that there will be a consistent flow of work. In the same way that larger licensees depend on a secure flow of resources to justify investment in an area, small businesses depend on a sustained flow of opportunities to develop and invest in the local community.

The north central interior is defined in this SFMP as the region that includes communities from 100 Mile House to Fort St. John (south to north) and from Smithers to McBride (west to east). The total dollar value of goods and services considered to be local will be calculated relative to the total dollar value of all goods and services used. This calculation will be used to derive the percentage of money spent on forest operations and management of the DFA from suppliers in north central BC.

How are targets established?
At this point, the target is to report out on the performance of the signatories. The measure will be monitored and analyzed for trends reflecting their commitment to supporting North Central Interior businesses.

Current condition:
A query of the financial data stored within the signatories' individual accounting systems allows for an indication of the current status of this indicator and serves as a methodology to track monies spent within the DFA to benefit the North Central Interior.

Canfor does not currently have a methodology for tracking this measure other than manual tabulation. A process has been instituted that will allow Canfor to identify businesses within the NCI with which Canfor does business. The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
Forecasting for this measure will be that the signatories will report out on the amount of money spent in the NCI. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
This measure will be monitored and reported from the signatories' accounting systems. The signatories will conduct a financial query of expenditures for suppliers and contractors within the North Central Interior compared to the total dollars spent. The indicator percentage will be included in the annual SFMP report for the signatories' respective fiscal years.

Measure 4-2.4 Support of Public Initiatives

Measure:	Target (variance):
4-2.4. The number of support opportunities provided to the public (stakeholders, residents and interested parties).	Report out on

What is this measure and why is it important?
This measure was considered by the PAG to be an appropriate index of the more general economic benefits received by local people from the forest industry and the sustainability of those benefits. Generally, we assume - the greater the industry is able to create opportunities for the public, the healthier the local economy is as a result of sustainable forestry.

How are targets established?
Targets for this measure were established through PAG consensus.

Current condition:
Current condition for this measure still needs to be assessed.

Forecasting and probable trends of measure:
Forecasting for this measure is that support opportunities will be provided to the public. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
The number of support opportunities provided to the public will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Measure 4-2.5 Support of Environmental Projects

Measure:	Target (variance):
4-2.5. Report out on the amount of money directed towards environmental projects.	Report out on

What is this measure and why is it important?
Project that focus on testing, monitoring, or general inventory of environmental factors are often fraught with a lack of tangible economic return. Rather most benefit from these projects is tangible in non-economic measures and for this reason, most environmental projects require support funding from a wide variety of sources. We used this measure to reflect the magnitude of support for these projects from the forest industry under the assumption that environmental information will directly contribute toward forest stewardship, toward forest sustainability, and therefore, economic stability.

How are targets established?
This measure was proposed by the PAG and accepted through PAG consensus.

Current condition:
Most of the money directed towards environmental projects, as defined below in "Monitoring and Reporting", are funded through provincial programs such as the Forest Investment Account (FIA), Forest Sciences Program (FSP), or Forest Innovation Investment (FII). These funds are provided to eligible recipients to complete a variety of activities. Although there are guidelines on what activities may be completed, how the money is spent is largely at the discretion of the recipient. Over the years, Canfor has spent a considerable amount of money in support of environmental projects through the FSP, FIA, and its predecessor, Forest Renewal BC (FRBC). The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
As the PAG was interested only in trying to improve awareness of the amount of money being spent by the signatories on environmental projects, the measure is to report out on the amount of money being spent. Forecasting is not applicable.

Monitoring and reporting:
Environmental projects are defined as projects intended to enhance or improve the knowledge, understanding, quality, or current status of plants, animals, ecological communities, and the forest as a whole, and are not an obligation of the signatory. Projects that meet the above criteria will be identified and accounting records scrutinized to determine the amount of money spent on such projects. The total amount will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Measure 4-3.1 Taxes

Measure:	Target (variance):
4-3.1. Municipal taxes paid to governments.	100% (0%)

What is this measure and why is it important?
Payment of taxes (including Federal, Provincial, and local government taxes) by the signatories is a quantifiable indicator of how the public is receiving a portion of the economic benefits derived from forests. It is important to note that the signatories do not control how municipal and other taxes are spent and whether the public within the DFA receives these benefits or not. However, it should be assumed that a portion of the monies received from taxes will be returned to communities within the DFA.

The DFA's forests provide many ecological benefits and they also provide significant socio-economic benefits. In order to ensure sustainable socio-economic conditions will continue for local communities associated with the DFA, all taxes will be paid on time.

How are targets established?
The target is a legal requirement of the signatories. The target value of 100% has been established to reflect this.

Current condition:
Landowners are invoiced for municipal taxes on an annual basis. The invoice is directed to its accounting and payroll departments for immediate processing. The signatories' respective accounting and payroll departments also track all provincial sales taxes and federal Goods and Services taxes received and expended and provide money owing to the governments on a monthly basis. Business tax forms are filed annually and business taxes are paid as an annual lump sum or in quarterly instalments.

Currently, Canfor has no mechanism to track payment of corporate taxes and GST at the divisional level as corporate taxes and GST are paid through Canfor's head office. BCTS, as a division of the provincial government is GST exempt and is not subject to corporate taxes. In addition, BCTS does not own property but leases property for it's offices and therefore does not control payment of taxes by the owner. The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
This is a legal obligation of the signatories, modeling does not apply to this measure, although it is anticipated that economic values would be negatively impacted if targets are not met. Forecasting for this measure is that the signatories will continue to pay 100% of taxes owed on time.

Monitoring and reporting:
The tax information will be monitored as available on each signatories' accounting system and future tracking of this measure will be completed through an annual analysis of accounting records. The measure percent will be included in the annual SFMP report for the operating year of April 1st to March 31st.

Measure 4-3.2 Stumpage

Measure:	Target (variance):
4-3.2. Stumpage paid to government.	100% (0%)

What is this measure and why is it important?
The payment of stumpage owing on the timber harvested by Licensees is a quantifiable measure of how the public in the Mackenzie DFA is receiving a portion of the economic benefits derived from forests. It is important to note that Licensees do not control how stumpage royalties are spent across the province or whether the public receives benefits from stumpage or not. However, it should be assumed that a portion of the royalties received from stumpage would be returned to communities within the DFA.

Forests provide many ecological benefits to areas that surround them and also generate significant socioeconomic benefits. In order to ensure continual sustainable socio-economic conditions for local DFA communities, all stumpage billings will be paid on time.

How are targets established?
The target is a legal requirement of Licensees. The target value of 100% has been established to reflect this.

Current condition:
Each month, the provincial government invoices the Licensees for stumpage. For Canfor this invoice is directed to the accounting and payroll departments for immediate processing. BCTS does not have direct control of payments of stumpage from tenures issued by the Timber Sales Manager.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This is a legal obligation of the signatories, modeling does not apply to this measure, although it is anticipated that economic values would be negatively impacted if targets are not met. Forecasting for this measure is that the signatories will continue to pay 100% of stumpage owed on time.

Monitoring and reporting:
The stumpage payment information that will be monitored is available through the Licensee's accounting system and future tracking of this measure will be completed through a yearly analysis of accounting records. The measure percent will be reported in the annual SFMP report for the operating year of April 1st to March 31st.

Measure 4-4.1 Support of First Nations

Measure:	Target (variance):
4-4.1. The number of support opportunities provided to First Nations with Treaty area and/or asserted traditional territory within the DFA.	Report out on

What is this measure and why is it important?
This measure indicates how the Steering Committee member companies provide economic and social benefits to First Nations over and above wages, taxes and stumpage fees through donations and involvement in local First Nations communities. Types of support opportunities within the DFA vary from providing personnel, equipment and/or facilities, to providing cash and product donations. This measure is an important component of a community's economic and social stability, but it is also difficult to quantify as support opportunities often go unrecorded. Support opportunities help to increase awareness of sustainable forest management and its role within the DFA. This can indirectly lead to building a strong community and creating a viable labour force.

How are targets established?
This is a reporting measure and no target will be established.

Current condition:

Each Steering Committee member will determine the current status of support opportunities provided to the First Nations and report out on a collaborated total (

20). In the last two years, Canfor provided 88 support opportunities through funding agreements with First Nations. The agreements, called the Community Economic

Development Fund are in place to provide funding for a variety of worthwhile causes from clearing of trails, hardship grants, and financial assistance for students to purchasing wheelchairs for the elderly. The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Forecasting for this measure is that the number of support opportunities provided to First Nations will be reported. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
Support opportunities will be tracked and reported by each Steering Committee member annually, and reported collectively for the DFA.

Measure 4-4.2 Contract Opportunities to First Nations

Measure:	Target (variance):
4-4.2. The number of contract opportunities provided to First Nations with Treaty area and/or asserted traditional territory within the DFA.	Report out on

What is this measure and why is it important?
This measure is intended to monitor the impacts of forest industry and government activities on the ability of First Nations to access forestry related economic opportunities. At present, this measure is not intended to assess how successful First Nations are at taking advantage of the opportunities.

BCTS provides opportunities for all eligible bidders including First Nations. Canfor has explored forestry related opportunities with First Nations in the past. Capacity amongst the First Nations to take advantage of opportunities will likely have to be addressed in order for available opportunities to be acted upon. This measure tracks the existence of opportunities available.

How are targets established?
This is a reporting measure and no target will be established.

Current condition:
All BCTS bids are open to eligible bidders, including First Nations and there currently is no system in place for identifying the First Nations status of bidders. Canfor has worked on agreements with some of the First Nations outside of the SFM/CSA process. The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Forecasting for this measure is that the number of contracts entered into with First Nations will be reported. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
This is a process measure and monitoring will consist of reporting out on the measure. The status and trend for this measure will be summarized and reported in the SFMP Annual Report.

Measure 4-4.3 Value of Transactions with First Nations

Measure:	Target (variance):
4-4.3. The total value of transactions undertaken with First Nations with Treaty area and/or asserted traditional territory within the DFA.	Report out on

What is this measure and why is it important?
With this measure we intend to monitor the impacts of forest industry and government activities on the ability of First Nations to access forestry related economic opportunities. At present, this measure is not intended to assess how successful First Nations are at taking advantage of the opportunities.

BCTS provides opportunities for all eligible bidders including First Nations. Canfor has explored forestry related opportunities with First Nations in the past. Capacity amongst the First Nations to take advantage of opportunities will likely have to be addressed in order for available opportunities to be acted upon. This measure tracks the existence of opportunities available.

How are targets established?
Targets for this measure were established through PAG consensus.

Current condition:
Canfor currently does not track data for all aspects of this measure, such as individual purchases particularly when they are expensed. However, data is available for most aspects. The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
Forecasting for this measure is that the value of transactions entered into with First Nations will be reported. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
The value of transactions with First Nations will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Measure 4-5.1 Competitive Sale of Timber

Measure:	Target (variance):
4-5.1. The percentage of DFA volume advertised for sale through open competitive bid.	40% (-5%)

What is this measure and why is it important?
Most of the timber harvested in the DFA is collectively cut under major licenses held by Forest Licensees. However, a percentage of the annual volume cut is advertised for sale through open competitive bid. This volume is sold by the Crown through BC Timber Sales (BCTS). BCTS develops and sells publicly owned timber to establish market prices and optimize net revenue to the Crown. Reliant on the highest bid, BCTS sells units of timber across the DFA to a variety of customers, including sawmill operators, small-scale loggers, and timber processors.

In addition to helping establish market prices and providing revenue to the Crown, BCTS provides the opportunity for customers to purchase timber in a competitive and open market. In this way people who might not have access to Crown timber have an opportunity to purchase it in an equitable manner.

The measure will evaluate the volume of timber advertised for sale through open competitive bid. This process contributes to the social and economic aspects of SFM by creating opportunities for forest sector employment, and by providing revenue to the Crown that reinvests the money back into the DFA through government programs and institutions. Tracking the measure will ensure that the volume of timber offered for sale in this manner is sufficient to meet the goals of sustainable forest management.

How are targets established?
Bill 28 set the target of 20% of a TSA's volume advertised for sale through open competitive bid. It was determined that 20% was the value required to statistically determine market prices, one of the main objectives of the open bid concept. Although BCTS's apportionment across the TSA is slightly higher than this (23%), their apportionment when applied to the DFA amounts to approximately 40% of the volume available. The exact volume of timber cut may differ from the volume advertised as the amount sold relies on markets, operating costs, and other variable factors.

Current condition:
Prior to the passing of Bill 28 (the "Forest Revitalization Act") in 2003, the Chief Forester set the BCTS allocation for each forest district in the province. Bill 28 enabled the reallocation of timber from major licensees to BCTS, and resulted in roughly 20% of the provincial timber allocation being administered by BCTS. Although the exact percentage varies from region to region, in the Mackenzie DFA, BCTS develops and auctions roughly 46% of the DFA volume allocation.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
It is anticipated that the target of 40% of DFA volume will be advertised for sale through open competitive bid. However, the exact level of consistency is difficult to forecast. It is important to identify what the accepted target means to SFM. Selling 40% of DFA volume through open competitive bid creates important opportunities for smaller forestry operators, and provides revenue to the Crown. Therefore, the use of a "what if" scenario is beneficial in identifying anticipated future trends for the measure. As the measure currently has a target of 40%, one other scenario should be identified:

a) What if significantly less than 40% of DFA volume was advertised for sale through open competitive bid on an annual basis?

Failure to meet the target of 40% could impact economic and social values. It would reduce the opportunities for individuals who do not have a major forest license to have access to Crown timber. This in turn would reduce the economic diversity of the DFA and potentially discourage the development of new forest related businesses. Advertising significantly less than 40% of DFA volume through open competitive bid may also result in an overall decrease in revenue to the Crown. This revenue is reinvested in communities through government spending on education, health care, and social programs. Therefore, a decrease in government revenue may lead to a decrease in social values in the DFA.

Advertising significantly less than 40% of the DFA volume through open competitive bid would likely have a significant impact on the raw material supply to lumber manufacturers in the DFA. This would have the effect of limiting their business success, and their ability to provide direct and indirect employment which would in turn negatively affect associated social values.

The above "what if" scenario helps to identify some of the potential future impacts of not achieving the stated target for this measure. Therefore, BCTS will continue to ensure that 40% of DFA volume will be advertised for sale through open competitive bid. The measure will remain at the target of 40% if all processes and protocols are followed.

Monitoring and reporting:
BCTS will track and monitor the volume of timber they annually advertise for open competitive bid. Calculated against the volume harvested annually by Licensees, the percentage of DFA volume advertised for sale through open competitive bid will be included in the annual SFMP report for the operating year April 1st to March 31st.

Measure 4-5.2 Primary Milling Facilities

Measure:	Target (variance):
4-5.2. A competitive primary milling facility is sustained.	>2 (0)

What is this measure and why is it important?
The existence of a forest industry primary processing facility can have a stabilizing affect on the economy of a DFA. A primary processing facility attracts other businesses and provides revenue to all level of government. The economic sustainability of many parts of BC, including Mackenzie depends in part on a competitive primary processing facility.

How are targets established?
The target assumes that at least two forestry-related primary processing facilities are in place in the DFA.

Current condition:
Currently, Canfor operates two sawmills in Mackenzie – A-Mill and C-Mill.

Forecasting and probable trends of measure:
Forecasting for this measure is simply stating that at least two primary processing facilities exist.

Monitoring and reporting:
This is a process measure and monitoring will consist of reporting out on the measure. Status of the mills will be reported in the SFMP Annual Report.

Measure 4-6.1 Risk Factor Management

See Measure 2-5.2

Measure 4-6.2 Forest Stand-damaging Agents

Measure:	Target (variance):
4-6.2. Areas with stand damaging agents will be prioritized for treatment.	100% (-10%)

What is this measure and why is it important?
Damaging agents are considered to be biotic and abiotic factors (fire, wind, insects etc.) that reduce the net value of commercial timber. To reduce losses to timber value it is necessary to ensure that if commercially viable timber is affected by damaging agents, that the timber is recovered before its value deteriorates. At the time of this SFMP's preparation, the most serious stand damaging agent in the Prince George DFA is the Mountain Pine Bark Beetle, which has killed millions of mature, commercially viable lodgepole pine. Prioritizing infested stands for treatment can contribute to sustainable forest management in several ways. Removing infested trees can slow the spread of beetles to adjacent uninfested stands and allow Licensees to utilize trees before they deteriorate. Also, once harvesting is complete the area can be replanted, turning an area that would have released carbon through the decomposition of dead trees into the carbon sink of a young plantation.

It should be noted that prioritizing a stand for treatment might not guarantee the stand would be treated. The size of the stand, the threat the agent poses, the location, and the merchantability of the timber all have to be considered when prioritizing which stands will be treated first. Some stands may have such a low priority that the only "treatment" is to monitor the area until such a point when more active operations are deemed necessary.

Treating areas with stand damaging agents will provide other societal benefits. Burned and diseased killed stands may be aesthetically unpleasing, and their harvesting and reforestation will create a more pleasing landscape. Windthrown stands restrict recreational use and can foster the growth of insect pests such as the spruce bark beetle. Thus, prioritizing areas with stand damaging agents for treatment will help to maintain a more stable forest economy and achieve social benefits through enhanced aesthetics and recreational opportunities.

How are targets established?
The target for this measure has been established at 100% to ensure that all areas with stand damaging agents are prioritized within the DFA. The current Mountain Pine Beetle

epidemic is, and will remain for the short-term, the focus of Licensees stand damaging agent prioritization. Licensees will continue conduct annually reviews of planning areas to identify areas with stand damaging agents.

Current condition:
Prioritizing stands with damaging agents for treatment is part of an overall forest health strategy. Treatment of stands with damaging agents may take several forms. These may include silviculture treatments on plantations with blister rust problems, or falling and burning individual stems to control bark beetles. However, the main treatment employed to manage stand damaging agents is harvesting dead or dying stands, followed by prompt reforestation where required.

All Licensees and BCTS target damaged stands in a similar manner. Each year the volume of damaged timber is assessed within the DFA. Of this volume, licensees prioritize planning and harvesting activities based on levels of attack, stage of attack, wood quality and milling capacity/needs. This indicator reports out on the Licensees' and BCTS' success in ensuring areas with stand damaging agents have been assessed and have been prioritized for treatment if required and thereby minimizing value losses.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
The unpredictability of agents such as fire make it difficult to accurately forecast the success of meeting the measure target. However, it is important to identify what the accepted target means to SFM. By targeting damaged stands forest managers are able to reduce the spread of forest health agents to adjacent stands, parks, private lands, etc., utilize timber before it deteriorates, and reforest areas with healthy young plantations. Use of a "what if" scenario is beneficial in helping to identify anticipated future trends for a measure such as this. As the stated target for this measure is 100%, one other potential scenario will be analyzed:

a) What if only 50% of areas with stand damaging agents are prioritized for treatment?

Failure to prioritize 50% of areas with stand damaging agents for treatment means forest managers are allowing significant areas to either lose economic value, or to allow existing problems to become much worse. For example, by choosing to harvest green, undamaged stands while other stands are affected or dead, the opportunity to prevent further spread of the stand damaging agent is lost. Dead, unsalvaged stands will start to decay, losing economic value that could have been realized if they were prioritized for harvesting. In addition to economic losses, there could be ecological costs to failing to treat stands with damaging agents. As these stands die and decay, they will release carbon dioxide into the atmosphere, thereby contributing to global climate change. Prioritizing these stands for harvesting will not only improve economic values but will allow a healthy, young, carbon-sequestering plantation to become established.

Other costs may come from failing to treat damaged stands. Allowing dead and diseased stands to persist on the landscape may result in more severe wildfires that destroy or damage property in the DFA. This will negatively affect land owners and communities. Thus, achieving the measure's target may protect societal values in addition to providing ecological and economic benefits.

Monitoring and reporting:
Each year a Forest Health Strategy is prepared for the Mackenzie TSA for use by licensees, BC Timber Sales and the Forest District to prioritize and coordinate activities to address the forest health factors impacting the forests I the TSA. To provide an effective allocation of resources, forest health factors relative to the Mackenzie TSA are ranked. These rankings are used by forest managers to create an action plan clarifying treatment targets and areas of responsibility.

Measure 4-6.3 Accidental Fires

See Measure 2-5.1.

Measure 5-1.1 Non-timber Benefits

Measure:	Target (variance):
5-1.1. List of existing and documented potential for marketed non-timber benefits.	Report out on

What is this measure and why is it important?
The measures of this indicator will highlight trends in the marketed non-timber economic benefits from local forests and assist in developing strategies for sustaining these benefits over time, within the limitations of the signatories' current forest management activities. The goal for the signatories is to not degrade the current or future potential for marketed non-timber benefits as a result of forest management activities and that they contribute to improving the potential, where possible.

The term "marketed" implies that the non-timber forest resource is available for a viable business and information on it is readily accessible. The term "benefit" implies an economic benefit.

The list for this measure will establish a baseline that the signatories can use when developing management strategies. These management strategies will ensure that the signatories are not degrading current or potential marketed non-timber benefits.

How are targets established?
This measure is a process measure meant to ensure that the report is developed within an appropriate time frame. Target was established through PAG consensus.

Current condition:
The report will be developed as a priority project under Canfor's FIA program in 2007. The following list describes the known marketed non-timber economic activities in the DFA:

Guide outfitters who operate within specific guiding territories.
Lodges
Trapping
Wilderness Trek guides

Forecasting and probable trends of measure:
Forecasting for this measure entails that the report will exist on or before June 30, 2007. Once that is in place, this measure will no longer be needed.

Monitoring and reporting:
This is a process measure and monitoring will consist of ensuring there is a report for this measure. The report will be contained in the SFMP Annual Report.

Measure 5-1.2 SFM Implication on Non-timber Values

Measure:	Target (variance):
5-1.2. Description of potential implications of SFM practices on the amount and quality of marketed non-timber values.	Report out on

What is this measure and why is it important?
This measure will highlight the potential affects of implementing SFM practices on the quantity and quality of marketed non-timber economic benefits from local forests. This measure takes the information provided from measure 5-1.1 and places it within the continuous improvement/adaptive management framework of the SFM Plan by identifying how forest management under the SFM Plan may impact non-timber economic benefits. The information derived will then be used in consultation with stakeholders in determining what, if any, changes may be required to current strategies and the potential trade-offs involved. The goal for the signatories is to not degrade the current or future potential for marketed non-timber benefits as a result of forest management activities and that they contribute to improving the potential, where possible.

How are targets established?
This measure is a process measure meant to ensure that the report is developed within an appropriate time frame. Target was established through PAG consensus.

Current condition:
Currently there is no comprehensive list of marketed non-timber resources nor a description of potential implications of SFM practices on them. A report will be developed as a priority project under the signatories' FIA program in 2007.

Forecasting and probable trends of measure:
Forecasting for this measure is that a description of potential implications of SFM practices on the amount and quality of marketed non-timber values will be developed. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
This is a process measure and monitoring will consist of reporting out on the measure. Data supplied may be used to guide subsequent management strategies. Further descriptions may be developed and/or updated as new information becomes available at the discretion of the signatories and PAG.

Measure 5-1.3 Range Management Effectiveness

Measure:	Target (variance):
5-1.3. The percentage of forest operations consistent with range requirements as identified in operational plans and/or site plans.	100% (0%)

What is this measure and why is it important?
The livestock industry has been an important part of British Columbia's economy for over a century. Historically, ranchers have used Crown range resources as a source of feed for their animals. Conservation of identified range resources will help to assure their availability to future generations and aid in diversifying the local economy. Range resources can include grazing or hay cutting permits, or areas with potential for these ventures. Range managers and forest managers share the forest for their particular purposes, and must work cooperatively in order to achieve sustainable development and management of its resources. The measure is designed to ensure that operational plans with identified range requirements have those requirements implemented on the ground. Maintenance of range resources is an important aspect of sustainable forest management because it contributes to the social and economic needs of people who traditionally and currently use the DFA for purposes other than forestry. This measure will help to ensure that various range values are conserved for current and future generations

How are targets established?
The target is a legal requirement. The target value of 100% has been established to reflect this and because the identification, conservation and co-management of range resources are consistent with Sustainable Forest Management. Forest operations will have to implement operational and/or site plan requirements for range management objectives to meet the social and economic needs of other users of Crown land.

Current condition:
The Ministry of Forests and Range regulates range use under the Forest and Range Practices Act. The principal operational plan used to manage Crown range has been the Range Use Plan. Range Use Plans are developed by range users approved by government and contain management specifics governing the range resource. The Forest Development Plan/ Forest Stewardship Plan contains general management strategies to mitigate negative impacts to range where harvesting is proposed within a range tenure. Site level specific detail is contained within subsequent Site Plans.

Once a strategy to conserve range resources is included within a Site Plan document, there is a legal obligation for the Licensee or BCTS to implement and adhere to the strategy. Harvesting and silviculture inspections ensure that strategies are implemented as stated in the operational plan.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
Carrying out activities specified in an Operational Plan and/or Site Plan is a legal obligation of the signatories, modeling does not apply to this measure. Forecasting for this measure is that, once developed, 100% of range requirements are adhered to.

Monitoring and reporting:
Information that is collected during EMS checklist reviews and harvesting inspections is stored in the signatories' respective databases and other filing systems. If a non-conformance with the operational plan occurs in the field, this information will be recorded on an activity inspection form and then entered into an incident tracking database or other similar system so that issues can be tracked and mitigated as required.

The measure percent will be included in the annual SFMP report for the operational year of April 1st to March 31st.

Measure 6-1.1 Employment

Measure:	Target (variance):
6-1.1. Employment supported by each sector of the local economy (actual and percentage of total employment).	Report out on

What is this measure and why is it important?
Although the forest industry cannot directly control the diversity of the economy for the community in which it operates, understanding the impact of that diversity is an important component of SFM. If the community is not economically diverse, it will not be resilient to economic shocks. Services could decline and thus skilled workers and their families may move to more stable areas. As important economic players, the signatories can potentially influence local policies that would encourage economic diversity in their communities.

How are targets established?
As most of the economic diversity of a community is out of the direct control of the forest industry, a target has not been set for this measure. Data will be reported out and trends monitored.

Current condition:
The data was derived from "2001 Economic Dependency Tables for Forest Districts" available at http://www.bcstats.gov.bc.ca/pubs/econ_dep/tab_fd.pdf. This information will be updated with the latest census information when it has been compiled, which is not anticipated until March, 2008.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Forecasting for this measure is that the employment supported by each sector of the local economy will be reported. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
This is a process measure and monitoring will consist of reporting out on the measure. Statistics Canada Census Data will be used to monitor this measure. Status and trends

will be reported in the SFMP Annual Report as new Statistics Canada Census Data becomes available.

Measure 6-1.2 Income

Measure:	Target (variance):
6-1.2. Contribution of income sources from each sector of the local economy (actual and percentage of total income).	Report out on

What is this measure and why is it important?
This measure is directly related to 6-1.1 and is meant to measure the contribution of income sources as part of the economic benefit derived from each sector of the local economy. This information can be used to analyze the economic diversity for the DFA.

How are targets established?
As most of the economic diversity of a community is out of the direct control of the forest industry, a target has not been set for this measure. A summary will be presented by April, 2007

Current condition:
Currently, neither signatory tracks the contribution of income from each sector of the local economy. This information will be updated with the latest census information from Statistics Canada when it has been compiled, which is not anticipated until March, 2008.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Forecasting for this measure is that the contribution of income sources from each sector of the local economy will be reported. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
This is a process measure and monitoring will consist of reporting out on the measure. Statistics Canada Census Data will be used to monitor this measure. Status and trends will be reported in the SFMP Annual Report as new Statistics Canada Census Data becomes available (i.e. every 5 years).

Measure 6-1.3 Business Opportunities

Measure:	Target (variance):
6-1.3. The number of opportunities given to businesses within, or immediately adjacent to the TSA to provide non-tendered services to forest management activities.	Report out on

What is this measure and why is it important?
As previously mentioned, woodlands operations of the signatories purchase a wide variety of products and services in order to produce timber and to manage forestry activities. This measure identifies the number of opportunities given to businesses

within, or immediately adjacent to the TSA to provide non-tendered services to forest management activities. This measure is important as some goods and services required in forest management are not put up for tender, instead they are directly purchased or awarded. This measure identifies opportunities for the local private sector to secure work and opportunities for direct access to both timber and non-timber benefits. This measure also indirectly looks at the diversity of the local forest employment opportunities associated with forest industry activities. For the purposes of this SFMP, local is defined as those residences or businesses that have mailing addresses within or immediately adjacent (i.e. McLeod Lake) to the TSA.

How are targets established?
This is a reporting measure and no target will be established.

Current condition:
The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
This measure is a reporting measure. The forecast is that the report will be completed by April, 2007

Monitoring and reporting:
The signatories identified forestry activities that are considered as non-tendered forest management activities and these activities will be tracked annually. Each signatory will provide a summary of this information to include in the SFMP annual report. Although this measure will not directly identify local forest employment opportunities attributable to forest management activities, it does provide a certain level of assurance for the sustainability of the local economy, which ultimate leads to future employment opportunities.

Measure 6-1.4 First-order Wood Products

See Measure 4-2.2

Measure 6-1.5 Support Opportunities

Measure:	Target (variance):
6-1.5. The number of support opportunities provided within, or immediately adjacent to, the TSA.	Report out on

What is this measure and why is it important?
This measure indicates how economic and social benefits to the public over and above wages, taxes and stumpage fees through donations and involvement in local community organizations are provided. Types of support opportunities within the TSA vary from providing personnel, equipment and/or facilities, to providing cash and product donations. This measure is an important component of a community's economic and social stability, but it is also difficult to quantify as support opportunities often go unrecorded.

Support opportunities help to increase awareness of sustainable forest management, its role within the TSA, and the quality of life in the DFA. This can indirectly lead to building a strong community and creating a viable labour force.

How are targets established?
This is a reporting measure and no target will be established.

Current condition:
The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
Forecasting for this measure is that the number of support opportunities provided in and immediately adjacent to the TSA will be reported. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
Support opportunities will be tracked and reported by each signatory annually, and reported collectively for the TSA.

5.2.3 Measures and Targets for Social Values

Measure 7-1.1 List of Affected Parties

Measure:	Target (variance):
7-1.1 Implement and update a comprehensive list of stakeholders and affected or interested parties.	1 (0)

What is this measure and why is it important?
As forest management recognizes a broader range of forest values, particularly on public land, it is increasingly important that all stakeholders have input into management concerns. The public, through a public participation process, has an opportunity to be involved proactively in the management of a DFA. Effective sustainable forest management planning for public land requires appropriate involvement of stakeholders and the general public in the development and implementation of plans.

In order for a public process to be effective, a comprehensive list of affected and interested parties must be considered. A Stakeholder Analysis ensures that all the interests in a defined area of forest are considered. A stakeholder analysis provides the structured, explicit identification of human uses and interests in a particular management unit. By identifying the organizations and individuals associated with those uses and interests it allows a fresh, transparent assessment of the stakeholders who should be included in these processes.

This measure ensures that an objective and transparent identification of a wide variety of stakeholders' interests exists. It also helps define appropriate public input processes for the sustainable forest management plan for the DFA. This measure is directly linked to the subsequent measures listed.

How are targets established?
This measure was established by PAG consensus. It is a process measure established to ensure that a Stakeholder List is completed and updated. Additional targets are not required. A variance for this target is not considered appropriate.

Current condition:
Triton Environmental Consultants Ltd. developed a list of stakeholders in July 2003. This list was subsequently updated in August 2003 and again in January 2006.

For the Mackenzie DFA, an Excel spreadsheet was created listing all the interests and stakeholders. Contact lists were gathered from a variety of sources, including forest companies, government agency consultation lists, tenure holders listings and other process participant lists, such as LRMP. Groups and stakeholders were categorized according to primary interest, geographic area of interest and previous level of process participation. Details and contact information have not been included for privacy reasons so the categories of groups invited to participate are listed below.

Current categories of interest include, but are not limited to:

- First Nations
- Forest contractors/workers
- Commercial recreation
- Oil & gas industry (contractors/producers)
- Tourism
- Non-commercial recreation – fishing/hunting
- Range/agriculture
- Guide outfitting
- Non-Timber Forest Products
- Trapping
- Commercial non-forestry
- Communities
- Ministry of Forests and Range
- Labour
- Ministry of Environment
- Cultural and Historical
- Ministry of Agriculture and Lands
- Environment/conservation

The database also contains typical contact information for personnel who are linked to the various measures to facilitate communication with external parties.

Forecasting and probable trends of measure:
Forecasting for this measure is that the Stakeholder Analysis be updated regularly. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
The data required to monitor and report out on this measure is that an updated database reflecting current contact information exists. The frequency of monitoring will be annual. Records to satisfy this measure will be stored within the respective Canfor and BCTS

offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

Measure 7-1.2 SFMP Review (PAG)

Measure:	Target (variance):
7-1.2 The number of opportunities for PAG to review and provide comment on the SFMP.	>1 (0)

What is this measure and why is it important?
This measure is one of a group of measures that will help to increase the overall understanding of SFM. This SFMP and the resulting annual reports will be communicated to the public at least once per year through a public open house and by posting them on a publicly accessed internet site Internet.

How are targets established?
The target for this measure was based on past practice with other public plans and open house processes. Past performance indicates that 1 function each year is enough to accomplish the required tasks, it is anticipated that this will be accomplished through a PAG meeting. However, if future monitoring and reporting exercises indicate that the target is set too low, steps will be taken to adjust the target to better suit the needs of the PAG and the Steering Committee.

Current condition:
To date, the PAG has had two opportunities to review and provide comment on the SFMP. The first opportunity occurred at a PAG meeting on October 17, 2006 and a subsequent opportunity occurred at the March 28, 2007. Subsequent annual PAG meetings will provide similar opportunities. The SFMP will also be posted on a website hosted by one of the signatories.

Forecasting and probable trends of measure:
Forecasting for this measure is that the PAG will be provided with opportunities to comment and provide input on the SFM Plan annually. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
Monitoring and reporting tasks will depend on the method of public review chosen by the Steering Committee. It is anticipated that the opportunity for PAG to review and provide comment will occur initially through a PAG meeting. Meeting summaries will be reviewed for reference to providing an opportunity for review and comment and the total number of opportunities provided will be reported in the SFM Annual Report.

Measure 7-1.3 Meetings (PAG)

Measure:	Target (variance):
7-1.3. Number of Public Advisory Group meetings per year.	> 1 (0)

What is this measure and why is it important?
The Mackenzie PAG is made up of a diverse set of representatives that have various defined interests, values or specific uses of the forest resource within the DFA. The PAG provided valuable input on the initial development of values, indicators, measures and targets for this SFMP. PAG members helped to identify local issues and values for the Mackenzie DFA for forestry managers to consider during management and planning processes. The PAG will continue to provide guidance, input and evaluation throughout the SFMP process, including all aspects of implementation and continual improvement of the plan over time. This measure provides information regarding how often the PAG will meet on an annual basis.

How are targets established?
The target for the Mackenzie DFA PAG was established from a review of other similar PAG processes. Scheduled meetings one or more times a year will allow opportunities for the PAG to have input into the SFMP, input and comment regarding continual improvement of the plan and feedback regarding adaptive management processes that are developed over time. Requirements to convene the PAG will be dependent on the tasks that occur that may require the guidance, input and/or evaluation of PAG members. One or more meetings per year are considered necessary to keep the PAG informed and up to date on issues regarding SFM in the Mackenzie DFA.

Current condition:
Continual interaction with the PAG is considered extremely beneficial for efficient progression towards SFM. PAG participation with the SFMP will also help to demonstrate the achievement of public participation requirements, which will also help in achieving performance audit requirements. As a result, the Licensees will continue to build a positive working relationship with the PAG by committing to keeping the PAG well informed of the SFMP process by holding at least one PAG meeting each year.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Forecasting for this measure is that meetings of the PAG will continue to occur annually. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
PAG meetings will be scheduled a minimum of once a year, with more meetings conducted if required. During these meetings, a summary will be recorded indicating the date of the meeting and the members in attendance, along with the items discussed during the meeting. Meeting summaries will be tracked and filed to ensure that Licensees/ BCTS are meeting target requirements. The number of meetings will be reported in the SFMP annual report for the operating year of April 1st to March 31st.

Measure 7-1.4 Satisfaction (PAG)

Measure:	Target (variance):
7-1.4. The level of satisfaction of the PAG members with the process.	100% (-20%)

What is this measure and why is it important?
The PAG is one of the key elements of public involvement in the SFM process. The Mackenzie PAG provides guidance, input and evaluation during development of the SFMP. It is also instrumental in maintaining links to current local values and forest resource uses within the DFA. Therefore, it is important that the signatories have a positive and meaningful working relationship with the PAG, where the signatories are able to respond to all issues and concerns the PAG may have during the process. This measure will use an average of the PAG meeting evaluation forms to determine the level of satisfaction of the PAG with the public participation process.

At the local level, people who use or otherwise value the forest resources within the DFA should have insight and involvement into the SFM process. This is particularly applicable in British Columbia where the majority of the forest is publicly owned. The need for public involvement is fundamental and in order to gain the support of the public and develop effective working relationships with the PAG, the Licensees need to be responsive to the satisfaction level of the PAG. Both the PAG and the Licensees can recognize the benefits of a well-developed public process. The signatories gain insight into local values and objectives and the PAG participants learn about the SFM process and the overall goals of sustainable development.

How are targets established?
The target is to achieve 100% of the PAG to be satisfied with the public participation process. Using the survey ranking system, this translates to a "5", or "very good" score for all PAG meetings. Using the current survey methodology, 100% satisfaction would be reflected in a rating of "5", or "very good". The variance of -20% is a reflection of the reality that it is very difficult to achieve full satisfaction in a group of diverse interests. This would translate to a satisfaction rating of 4.0 out of 5. The variance still requires that over two-thirds of the PAG should be satisfied with the PAG process.

Current condition:
Following all PAG meetings to date, PAG participants completed meeting evaluations. One question is in the PAG meeting evaluation form to address this measure which asked participants “Your overall satisfaction with PAG process?”

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G. A list of questions on the meeting evaluation forms and charts summarizing the questions and answers from meeting evaluations are in the PAG Records binder which is among the Plan’s supporting documents.

Forecasting and probable trends of measure:
Forecasting for this measure is that the trend (established through monitoring) for satisfaction will be maintained or increased. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
Meeting evaluations will be conducted after each PAG meeting. The results will be made available before or during the next meeting. The average of the summary of the PAG meeting evaluation forms will be used to determine this indicator percent. It will be

determined annually for all meetings between April 1st to March 31st and reported in the annual SFMP report.

Measure 7-1.5 TOR Review (Process)

Measure:	Target (variance):
7-1.5. Maintain and review at least annually and as required the Mackenzie SFMP PAG TOR, to ensure a credible and transparent process.	>1 (0)

What is this measure and why is it important?
This measure indicates that a Terms of Reference document has been developed in consultation with the PAG, and that these Terms of Reference have been accepted for use in all future PAG meetings. The Terms of Reference document is an important part of the public participation component of this SFMP. SFM requires public participation and the PAG Terms of Reference ensure these requirements are met in a credible and transparent fashion. The Terms of Reference document will be reviewed annually unless consensus from the group suggests otherwise.

Because Canadian forests are primarily publicly owned, it is vital that a SFM initiative involves the public extensively in the forest management planning process. The Mackenzie PAG represents a diverse range of interests specific to the DFA of this plan. Therefore, the PAG is necessary to ensure that sustainable forest management is achieved. Each member of the PAG must be able to have effective and fair interaction or communication with one another, as well as with members of the Steering Committee, to ensure all identified values receive adequate consideration. The Terms of Reference document is intended to provide the necessary framework and proper protocol to ensure effective input from PAG representatives.

How are targets established?
The target for this measure was identified from a review of other public participation processes and from consultation with the Mackenzie PAG. Annual review of the PAG Terms of Reference will allow the document to remain timely and achieve its purpose within the PAG.

Current condition:
The initial Terms of Reference document was developed by the PAG and accepted as part of the SFMP process on January 31, 2006. It will be reviewed annually to ensure it is up to date with the present day context of SFM. The Steering Committee will ensure that PAG members are given adequate notice as to when the Terms of Reference document will be reviewed. This review should be part of a scheduled PAG meeting so that all participants are aware of review timelines. The Steering Committee will maintain the Terms of Reference document so that any revisions resulting from an annual review will be made and a new document will be distributed to PAG members.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Forecasting for this measure is that the PAG ToR will be maintained and reviewed at least annually. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
As the review of the PAG Terms of Reference is set to be a part of a scheduled PAG meeting, this will be evident in the PAG meeting summary. Review of the PAG Terms of Reference and any identified changes to the document will be reported annually to PAG and Steering Committee members.

Measure 7-1.6 Satisfaction (Affected Parties)

Measure:	Target (variance):
7-1.6. Survey residents, stakeholders and First Nations regarding their satisfaction with forest management (process and outcomes).	once in year 1, every 3 years thereafter (0)

What is this measure and why is it important?
This measure was developed in order to provide information relating to the level of satisfaction of residents, stakeholders, and First Nations people with forest management activities conducted by the signatories. Satisfaction levels will be determined through the use of a survey, to be conducted every third year, which will be widely distributed to randomly selected households with residents in, or near (eg. McLeod Lake) the DFA. While the signatories recognize the value of the interactions with the public during such activities as the PAG or during planning processes, these interactions are generally with those people that have a specific interest in the forest resource. The signatories believe that it is also important to solicit input from the general public to determine their perception of forest management in the DFA. By doing so, we can;

- Guage the effectiveness of the SFMP by measuring satisfaction level,
- Identify areas for improvement, and
- Identify trends in shifting ecological, economic, and social values.

The DFA currently provides numerous opportunities for individuals to use the forest resource for a variety of marketed and non-marketed benefits. In managing the DFA towards SFM principles, it is important to be able to effectively interact and respond to the needs of the primary users of the resource base. Throughout time the categories of uses and values within the DFA will change and it is equally important for the signatories to be able to respond to these changes and encourage a diversity of user groups. Current and future needs and values of the various user groups of the DFA will need to be incorporated into SFM planning strategies.

How are targets established?
Targets for this measure were set at one survey in year one, then a survey every three years thereafter. The initial survey in year one will serve as a baseline for the public's perception of forest resource management and their satisfaction with it.

Perceptions often change slowly amongst the general population, particularly when it involves the broad values this SFMP is intended to address. Because of this, it is

believed that conducting a survey every third year after the initial survey will give the public adequate time to experience and absorb any changes in societal values or in forest management practices

Current condition:
There is currently no formal method to solicit information regarding the satisfaction of residents, stakeholders, and First Nations with forest management in the DFA, however a project which was initiated which saw the initial survey completed by March 31, 2007. Previously, members of the public could state their concerns with forest management practices by submitting formal letters stating concerns based on public plans. While this is an adequate means of receiving public feedback, the development of this survey solicits both positive and negative feedback from a much larger public group. This measure proposes a survey to gather information from users of the DFA regarding their satisfaction with forest management practices occurring in the DFA.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Forecasting for this measure is that the trend (established through monitoring) for satisfaction will be maintained or increased. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
As no current survey exists, implementation of this measure will involve the development and distribution of a survey that will gauge the level of satisfaction of residents, stakeholders and First Nations people in the DFA to forest management activities. Members of the public who reside in or adjacent to the DFA will be randomly selected to receive a survey. The results of the survey will then be collated and analysed for future improvement measures. The results of the analysis will also be presented to the PAG. The survey will be distributed and the results tabulated and reported at three year intervals. It is anticipated that the initial survey will be completed and distributed in March, 2007.

Measure 7-1.7 Representation (PAG)

Measure:	Target (variance):
7-1.7. Percentage of the public sectors as defined in the Terms of Reference (ToR) invited to participate in the PAG process.	100% (0%)

What is this measure and why is it important?
The Mackenzie PAG is comprised of a variety of representatives that have various defined interests, values or specific uses of the forest resource within the DFA. An important component of the PAG is the representatives from the various public sectors as defined in the Terms of Reference (see Appendix B, "PAG Terms of Reference - February 20, 2007, Appendix A" for a list of these sectors).

Their involvement in the PAG process is crucial for the success of the SFMP as they represent a broad range of interests, both commercial and non-commercial, within the DFA. They also possess experience and expertise that the signatories can draw on in achieving the SFMP objectives. Their participation will enhance the co-operation between the forest industry and other parties interested in the management of public lands in the DFA to meet the social, economic, and ecological goals of sustainable forest management.

This measure is designed to evaluate the success in encouraging this cooperation by tracking the percent of the public sectors, as defined in the Terms of Reference that are invited to participate in the PAG process. The PAG cannot force participation by any organization, but it can provide the opportunity to do so through such invitations.

How are targets established?
The target percent was established to reflect the importance the signatories place on the participation of the public sector in the PAG process. Those public sectors eligible for participation as defined in the Terms of Reference will continue to be invited to all future PAG meetings.

Current condition:
The process for inviting representative from the defined public sectors for participation in the PAG is detailed in section 6.1.2 of the PAG ToR. The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
This measure is not easy to forecast as it is dependent on implementation and future improvement of this SFMP. However, it is important to identify what the accepted target means to SFM. The percentage of public sectors, as defined in the Terms of Reference, invited to participate in the PAG process may influence the success of the SFMP. Therefore, the use of a “what if” scenario is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has a target set at 100%, one other scenario should be identified:

a) What if 50% of the public sectors, as defined in the Terms of Reference, were invited to participate in the PAG progress?

If only half of the eligible public sectors were invited to participate in the PAG progress, the social acceptance of the SFMP may be weakened. Without seeking the input of a diverse range of public sector interests, it may appear that the plan is overly dominated by the forest industry. In the future, the evolution of the plan may rely on the concerns, knowledge and experience found within these public sector interests. Their representatives will be able to provide a different perspective of SFM and assist in updating the plan to reflect a wide variety of views in the DFA. A PAG that has provided an opportunity for public sector participation has met the need to encourage a wide range of participation in SFM.

Due to the importance in providing the opportunity for the public sectors, as defined in the Terms of Reference, to participate in the PAG process, the signatories are committed to achieving the target of 100%.

Monitoring and reporting:
The number of invitations made to the public sectors to participate in the PAG progress will be compared to the number of public sectors outlined in the Terms of Reference. The measure percent will be reported in the annual SFMP report for the operating year of April 1st and March 31st.

Measure 7-1.8 Communication (PAG)

Measure:	Target (variance):
7-1.8. Percentage of PAG satisfaction with amount and timing of information presented for informed decision-making.	100% (-20%)

What is this measure and why is it important?
The PAG is one of the key elements of public involvement in the SFM process. The Mackenzie PAG provides guidance, input and evaluation during development of the SFMP. It is also instrumental in maintaining links to current local values and forest resource uses within the DFA. In order for the PAG to make decisions in regards to the content of the SFMP, such as indicators, targets, and levels of responsibility, they must have the information to support those decisions. This information must be sufficient in amount and quality and delivered in a timely manner for the PAG to make sound decisions for the SFMP process.

This measure is intended to measure and report the level of satisfaction the PAG has with the amount and timing of information presented for informed decision making. While it is hoped that there will be high satisfaction with the information, it is also acknowledged that with any group of diverse backgrounds and opinions that it is difficult to achieve unanimous satisfaction in any regard. However, if the SFMP is to succeed, the people who are involved in its evolution must have a certain level of satisfaction with the information they are using to direct that development.

How are targets established?
The target of 100% satisfaction was established to reflect the signatories' commitment to providing the best information possible in a timely manner to the PAG to aid in their decision making. Using the current survey methodology, 100% satisfaction would be reflected in a rating of "5", or "very good". The variance of -20% is a reflection of the reality that it is very difficult to achieve full satisfaction in a group of diverse interests. This would translate to a satisfaction rating of 4.0 out of 5. The variance still requires that over two-thirds of the PAG should be satisfied with the information provided.

The PAG participants will complete evaluation forms for each PAG meeting that will survey their opinion on the summaries of previous meetings, agendas, background information, and sources of additional information. The evaluation forms will also survey their level of satisfaction with the timing of this information. An average will be calculated using the summary of the meeting evaluation forms.

Current condition:
Two questions are in the PAG meeting evaluation form to address this measure

1) Your overall satisfaction with the amount & timing of information presented?

2) Your overall satisfaction with the information?

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:

Forecasting for this measure is that the trend (established through monitoring) for satisfaction will be maintained or increased. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:

The average of the summary of the PAG meeting evaluation forms will be used to determine this indicator percent. It will be determined annually for all meetings between April 1st and March 31st and reported in the annual SFMP report.

Measure 7-1.9 SFMP Consistency with LRMP

Measure:	Target (variance):
7-1.9. Report out on consistency of Indicators or measures with LRMP objectives.	Report out on

What is this measure and why is it important?

The Mackenzie LRMP represents a substantial effort to balance ecological, economic, and social values within the Mackenzie TSA and stands as a record of consensus among the diverse social structure of the local area. Many of the people who are members of the current PAG also worked long hard hours in developing the LRMP. This measure acknowledges the importance of that work and will be used to guage the extent to which the SFMP aligns with the objectives developed in the LRMP. The closer the SFMP indicators and measures reflect the resource management objectives of the LRMP, the closer we will be to the same social consensus arrived at through the LRMP.

How are targets established?

This measure was proposed by the PAG to determine how well aligned the indicators and measures associated with this SFMP are with objectives stated in the LRMP. Targets for this measure were established through PAG consensus.

Current condition:

A Table cross-referencing SFMP indicators with LRMP objectives has been completed and presented to PAG. The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:

This measure is to reported out on, forecasting and trends are not applicable. However, it is anticipated that where overlaps occur between the LRMP and SFMP, there will be a strong consistency between the two.

Monitoring and reporting:

The SFMP consistency with LRMP objectives will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Measure 7-2.1 Concerns (Affected Parties)

Measure:	Target (variance):
7-2.1. The number of opportunities given to the public and stakeholders to express forestry-related concerns and be involved in our planning processes.	6 (-2)

What is this measure and why is it important?
Forestry activities can impact a wide section of the public and individual stakeholders within the DFA. This measure was designed to monitor the signatory's success at providing effective opportunities to residents and stakeholders to express concerns and be proactively involved in the planning process. This involvement may include the identification of areas of interest, definition of the nature of their interest in the land base, and any specific forestry activity that may impact their specific interests. This process ensures that when forestry activities are planned, information is exchanged in an effective and timely manner, so as to resolve potential conflicts before they occur. This process will help to identify the public values, interests and uses of the forest that will be considered within the Mackenzie Licensees' and BCTS' planning framework.

How are targets established?
The current target is based on a general estimate of the number of opportunities given to the public to express forestry related concerns and be involved in the planning process. Once baseline data is available and collected over 2006 and 2007, the target may be adjusted accordingly to better reflect the needs of the Mackenzie DFA. Future planning processes will focus stakeholder input on a strategic level, as opposed to current stand level referrals. The signatories anticipate the input will be relevant to landscape level planning concerns. Incorporating this strategic/landscape level stakeholder input is expected to reduce the individual number of site specific referrals necessary. Until baseline data has been obtained from future planning processes, the signatories have chosen a target that represents a significant number of opportunities to express concerns.

Current condition:
There are many opportunities for the public and stakeholders to express forestry-related concerns and to be involved in the planning process. These include Forest Stewardship Plan (FSP) public reviews, FSP amendments, letters to stakeholders soliciting input, Pesticide Management Plan reviews, field tours, newsletters, and websites.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Forecasting for this measure is that the public will be given six opportunities to provide input into the planning processes of the signatories. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
Each signatory will track the number of opportunities for the public and stakeholders to express forestry-related concerns and be involved in planning processes. Each Licensee and BCTS will be required to review and summarize this information, with the total

number of opportunities for the DFA included in the annual SFMP report for the operating year of April 1st to March 31st.

Measure 7-2.3 Response to Concerns

Measure:	Target (variance):
7-2.3. The percent of timely responses to written and documented concerns.	100 (-5%)

What is this measure and why is it important?
All signatories solicit feedback for their public forest management plans in the DFA. They also receive ongoing general comments and inquiries regarding practices and management of forest lands. These inquiries represent a public concerned with how forest resources are managed, and as such should receive a timely response by all signatories. This measure has established that a timely response is one that is made within 30 days of written inquiry.

As mentioned in previous measures, public involvement is an important aspect of SFM as it promotes inclusiveness in how Crown forests are managed. Considering a diverse range of opinions and concerns will result in forest management decisions that consider views other than those of the forest industry. Responding to written public inquiries is not only respectful of the public, it also forces the forest industry to evaluate their actions and commit to them. A forest industry that respects public input will maintain the support of the public, creating a more economically stable and open forest economy.

How are targets established?
The target percent was established to reflect the importance the signatories place on ensuring that concerns from First Nations, stakeholders, and the public are addressed in a responsive and timely manner. A 5% variance was established, as there are often factors that delay a response. Information may be unavailable that is required for the response, or personnel who may be able to provide input for a response may not be present. Public input is an important aspect of the SFM process. Therefore, it is paramount to ensure that written and documented concerns are dealt with in a timely and thorough fashion. With future reviews and annual reports for this plan, the signatories will have a better knowledge of how this target will apply to this measure. If the target is not met in the future, strategies will be developed to improve practices, or targets will be adjusted to better reflect practices in the DFA.

Current condition:
Comments from the public may be provided in many ways, including written letters, e-mails, or faxes to the signatories. There may also be written comment made during an in-person or telephone meeting between a staff member and the person providing comment.

Currently, signatories respond in a timely fashion to all public concerns in the DFA that involve forest management or practices. Each signatory has its own protocol for answering inquiries and methods of recording this correspondence.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:

It is the intent of all signatories to meet the target, and it is anticipated this goal will be met. The exact level of success is not easy to quantifiably forecast as it relies on unpredictable factors such as human error. However, it is important to identify what the accepted target means to SFM. The percent of timely responses to written concerns directly affects social values and indirectly affects economic values of SFM. Therefore, the use of a "what if" scenario is beneficial in identifying anticipated future trends for an measure such as this. As this measure has a stated target of 100%, one other potential scenario should be developed:

a) What if there were only 50% of timely responses to all written public inquiries?

If there were only 50% of timely responses to all written and documented concerns, adequate attention would not be made to valuable public input. Public input into the SFM process is required to adequately consider other resource values within the DFA. If only 50% of concerns were addressed, public participation into SFM could decrease and impacts to other resource values such as cultural heritage, agriculture, non-timber forest resources and biological richness could potentially occur. If these other forest values are not fully realized, economic values could also potentially decrease. For example, a lodge owner may make a written enquiry to learn when hauling is occurring so he knows when to book guests. If he does not receive a response, he may lose his guests and suffer the economic consequences.

The above "what if" scenario analysis implies that a balance of values can be achieved through maintenance of full response to identified public concerns. Therefore, the signatories will continue to provide timely responses to written public inquiries within 30 days of receipt.

Monitoring and reporting:

A review of the number of written public inquiries received versus the number of timely responses put forth by the signatories will be analyzed on an annual basis. This information will be recorded and reported in the annual SFMP report for the operating year of April 1st to March 31st.

Measure 7-2.4 SFMP Availability (Affected Parties)

Measure:	Target (variance):
7-2.4. Distribution/access to SFM Plan, annual reports and audit results.	1 (0%)

What is this measure and why is it important?

With this measure we intend to monitor our effort to ensure effective and comprehensive distribution of the SFMP, annual reports, and audit results for the Mackenzie DFA. In order to gain trust and confidence in the SFMP process, it must be an open and transparent process. By ensuring access to the Plan, annual reports, and audit results, the results of our efforts in achieving sustainable forestry and continuous improvement can be clearly seen and monitored by the public, stakeholders, and First Nations. In this

manner, the public, stakeholders and First Nations can hold the signatories accountable for achieving the desired results and have confidence that forest resources are being managed sustainably.

How are targets established?
Targets for this measure were established through PAG consensus.

Current condition:
The PAG Terms of Reference document developed on January 31, 2006 provides for an opportunity for the PAG to review the SFM Plan and that annual reports and audit results also be prepared and presented to the PAG. In addition, the signatories each have a website through which the Plan, annual report, and audit results may be accessed by the public;

- http://www.for.gov.bc.ca/bcts/areas/TPG/TPG_SFM.htm
- http://wwwmirror2005.canfor.ca/sustainability/certification/csa.asp

Pertinent documents will be posted following review and/or ratification by the PAG

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This measure is not easy to forecast as it is dependent on implementation and future improvement of this SFMP. However, it is important to identify what the accepted target means to SFM. Distribution and access to the SFM Plan, annual reports and audit results may influence the success of the SFMP. Therefore, the use of a "what if" scenario is beneficial in identifying anticipated future trends for a measure such as this. As this measure currently has a target set at 1, one other scenario should be identified:

a) What if there was no access or distribution of the SFM Plan, annual reports, or audit results?

If there was no distribution or access to the SFM Plan, annual reports, or audit results the social acceptance of the SFMP may be weakened. The public, stakeholders, and First Nations would be unable to monitor our success in achieving the targets or our efforts to improve. In the absence of proof, confidence and trust in the SFM Plan will erode and acceptance of the Plan or the SFMP process will decline. With low acceptance comes an unwillingness of the public, stakeholders, and First Nations to provide input into the Plan. Without seeking the input of a diverse range of public sector interests, it may appear that the plan is overly dominated by the forest industry. In the future, the evolution of the plan may rely on the concerns, knowledge and experience found within these public sector interests. Their representatives will be able to provide a different perspective of SFM and assist in updating the plan to reflect a wide variety of views in the DFA. A PAG that has provided an opportunity for public sector participation has met the need to encourage a wide range of participation in SFM.

Due to the importance of the distribution and access of the SFM Plan , annual reports, and audit results are to ensuring the public's, stakeholder's, and First Nations' confidence, trust, and acceptance of the SFMP and the SFM process, the signatories are committed to achieving the target of 1.

Monitoring and reporting:
Review of the SFM Plan, annual reports, or audit results with the PAG will be noted in the PAG meeting summary. Meeting summaries are sent to all PAG representatives, alternates, and observers as well as all stakeholders who have expressed interest in receiving PAG documents. This information will be recorded and reported in the annual SFMP report for the operating year of April 1st to March 31st.

Measure 7-2.5 SFMP Training (Affected Parties)

Measure:	Target (variance):
7-2.5. The number of SFM educational opportunities and interactions provided.	2 (0%)

What is this measure and why is it important?
This measure was designed to monitor the signatories' success at providing training and educational opportunities in sustainable forest management. SFM relies on residents and stakeholders making informed decisions on forest management. To achieve this, it is incumbent on the signatories to ensure the public are sufficiently informed about SFM to make the choices we request of them. The measure is intended to ensure that the signatories provide the required opportunities for residents and stakeholders to learn about SFM. Such opportunities may include field tours, training programs, presentations regarding aspects of SFM, etc.

How are targets established?
Target was determined by PAG consensus. Target was based on current practices of the signatories. The signatories recognize that at the initial stages of development, more than two opportunities may be required, however, as the SFM Plan develops, it is likely that less opportunities will be required on an annual basis as the PAG and other stakeholders become more familiar with the concept of sustainable forest management.

Current condition:
To date, the signatories have supplied 6 opportunities including an Open House (1), press release (1), and presentations (4). Currently, educational opportunities and interactions are supplied to the PAG as required or at the PAG's request. It is anticipated that this will continue. Other opportunities that currently exist include involvement in the High School Woodlot program, the Mackenzie Trade Fair, and field tours of the signatory's operations.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Forecasting for this measure will be that at least two SFM educational opportunities and interactions provided will be provided annually. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
Educational opportunities or interactions with the PAG will be noted in the PAG meeting summary. Other opportunities will be recorded, documented, and reported in the annual SFMP report for the operating year of April 1st to March 31st.

Measure 7-2.6 Communication Strategy Effectiveness

Measure:	Target (variance):
7-2.6. Percentage of mutually agreed upon communication strategies met.	100% (-5%)

What is this measure and why is it important?
The signatories maintain a list of interested parties that they notify when forestry operations/ developments are to occur. These interested parties may be private landowners, lodge operators, trappers, or hunting guides. Strategies have been designed to ensure that information is communicated to these individuals in a timely and efficient manner. This communication considers non-timber users and inhabitants of the DFA and realizes that forestry operations can disrupt lives and businesses. As sustainable forest management includes non-timber values, it is important that the forest industry works with these individuals to minimize impacts and to plan operations that consider their concerns. This measure is intended to calculate the success of meeting communication strategy requirements that are designed to achieve these goals.

How are targets established?
The signatories recognize the importance of meeting communication strategies and have set a target of 100% to reflect this commitment. A -5% variance has been established because occasionally contact cannot be made with some interested parties. This may be the result of changes in addresses, absentee stakeholders, or outdated contact information.

Communication strategies will be mutually agreed upon by each signatory's and the interested parties to ensure information is received in a timely manner. Specific issues will have their own communication strategies developed. For example, stands with forest health concerns (such as bark beetles) that are adjacent to private land will have their management discussed with the landowner.

The signatories will continue to try and keep contact lists accurate and up to date and will strive to meet all communication strategy requirements.

Current condition:
When communication strategies are developed, the signatories will contact various stakeholders and members of the public when forestry operations are to commence in a given area or when preparing FSPs, FDPs and associated amendments. Typically this communication is done by letter, but contact is also made by telephone or face to face meetings. There are specific strategies and protocols to direct this communication to ensure the right information is supplied to all interested parties at the right time. The signatories use a variety of tracking systems to record this communication but have not historically reported the percentage of communication strategies that have met

requirements. BCTS has not negotiated any formal communication strategies with interested parties at this time.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
It is the intent of all signatories to meet the target, and it is anticipated this goal will be met. The exact level of success is not easy to quantifiably forecast as it relies on unpredictable factors such as human error. However, it is important to identify what the accepted target means to SFM. The percent of communication strategy requirements that are met directly affects social values and indirectly affects economic values of SFM. Therefore, the use of a "what if" scenario is beneficial in identifying anticipated future trends for a measure such as this. As this measure has a stated target of 100%, one other potential scenario should be developed:

a) What if only 50% of communication strategy requirements are met?

If only 50% of communication strategy requirements were met, a variety of interested parties would be unaware of the commencement of forest operations. This could damage the economic interests of some of these parties. For example, a lodge may plan to take clients to a lake for fishing. Unfortunately, a Licensee failed to notify them that harvesting was occurring adjacent to the lake and the fishing experience was diminished. Socially, there may be impacts as well. Forestry operations can involve large machinery, large volumes of logging trucks, and high noise levels. All of these can be serious intrusions for people using the forest for recreational purposes, or for nearby landowners.

Communication strategies can prepare them for these activities and allow them to make comments if they wish to question the planned forestry operations.

The above "what if" scenario analysis implies that a balance of values can be achieved through meeting communication strategy requirements. Therefore, the signatories will continue to meet these requirements to respect the needs of other inhabitants and stakeholders in the DFA.

Monitoring and reporting:
The signatories will track and monitor this measure using databases such as GENUS. For every area in which forestry operations occur, the list of appropriate interested parties that were contacted in accordance with communication strategy requirements will be reviewed. This information will be reported in the annual SFMP report for the operating year of April 1st to March 31st

Measure 7-3.1 Adaptive Management

Measure:	Target (variance):
7-3.1. Adaptive Management strategy is developed, documented, acted upon and reviewed.	1 (0)

What is this measure and why is it important?
Adaptive management (AM) is the process by which a commitment to learning is used to adjust management strategies so as to better cope with change while simultaneously seeking to better understand how management goals can be achieved. An adaptive management approach recognizes change as a constant factor. Therefore it is necessary to understand the root causes of what has, and may be changing. To do so requires learning as to how the economic, social and ecological systems are constantly moving through a cycle that involves change and reconfigurations in response to human attempts to manage them. If the system is resilient, then it can absorb a degree of change without a major reconfiguration. The first step is to understand the current state of the systems in terms of their existing resiliency. A desired concept of resiliency is then defined for each system, including an acceptable range of variation. This does not preclude society choosing to undergo a major reconfiguration, or that such a significant change is required in order to get the system to a point where it can be resilient. The concept of resiliency is then used to socially define sustainability across the three systems through an iterative process that considers trade-offs in terms of impacts to system resiliency within selected spatial and temporal scales.

This measure ensures that a structured adaptive management strategy is developed and implemented as part of this SFM Plan.

How are targets established?
This measure was established as part of the SFM Framework and accepted by the PAG. It is a process measure established to ensure that an adaptive management strategy exists. Additional targets are not required. A variance for this target is not considered appropriate.

Current condition:
The adaptive management strategy for this version of the SFM Plan is made up of the monitoring, analysis and reporting strategies articulated throughout the SFM Plan. Currently, adaptive management processes are in place for components of resource management but they are ad hoc and are not documented as part of an AM process.

A formal assessment of knowledge gaps will be completed as part of the development of the adaptive management strategy. Based on this assessment, the Steering Committee will prioritize those indicators/measures that will be addressed.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This is a process measure and modeling is not applicable. Adaptive management is implicit throughout this SFM Plan however a formal AM process will be developed by August, 2007. It is the intent of the signatories to meet the target, and it is anticipated this goal will be met.

Monitoring and reporting:
The current requirement for reporting and monitoring is the establishment of a strategy for adaptive management. The frequency of monitoring is dependant on the forecasting and monitoring plans for each individual measure. Records to satisfy this measure will

be stored within the signatory's respective offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

Measure 7-3.2 Monitoring Plan

Measure:	Target (variance):
7-3.2. Monitoring plan for indicators is developed, documented, acted upon and reviewed.	1 (0)

What is this measure and why is it important?
As local public advisory groups select indicators and measures of sustainability, credible and cost effective monitoring plans for each are developed. The information gathered during monitoring is used in modeling/forecasting and assists in the development of management scenarios. The monitoring data also allows managers to determine if their management activities are effectively achieving the targets set out in SFM plans, LRMPs, FSPs, etc.

How are targets established?
This measure was established as part of the SFM Framework and accepted by the PAG. It is a process measure established to ensure that a monitoring plan for each measure is developed and implemented.

Current condition:
A monitoring plan for each measure is articulated in the Current Status Table. They have (or will have) documented procedures as to how to monitor the key characteristics of operations and activities that demonstrate progress towards SFM on the DFA.

A summarized monitoring plan for each measure will be completed by April, 2007 and included as a support document. The summary will include the following parameters:

- Measure
- Threshold/ Targets
- Measurement unit
- Spatial/Geographic scale
- Frequency of collection
- Data source
- Knowledge gaps
- Cost

This detailed plan includes monitoring the measures for comparison against the forecasts. For evaluating compliance with relevant legislation, and regulations, and conformance with relevant policies applying to the DFA the signatories will utilize their established EMS.

Forecasting and probable trends of measure:
This is a process measure and modeling is not applicable, however the probable trend of this measure is that the monitoring plan will exist and be implemented as per the plan

and the adaptive management strategy. It will continue to be improved as new information is collected and analyzed.

Monitoring and reporting:
The data required to monitor and report out on this measure is a current monitoring plan of applicable measures. The frequency of monitoring is dependant on the monitoring plans for each individual measure. Records to satisfy this measure will be stored within the respective signatories' offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

Measure 7-3.3 Annual Report

Measure:	Target (variance):
7-3.3. Reports and analysis of monitoring information – Annual Report	1 (spreadsheet has 100% but PAG CI Matrix has 1)(0)

What is this measure and why is it important?
Analysis of the results of status and trend monitoring is an important aspect of adaptive management. It is a component of accountability and allows the public to see how progress is being made in implementing resource management strategies. Analysis of monitoring data will be reported to area resource managers and the public so that changes to the SFM Plan, to practices or to measures can be evaluated. The SFMP Annual Report will provide the reports and discussion on analysis of the measures. The development and use of the SFMP Annual Report will assist with the improving of the measures and improving with SFM in an ongoing basis.

How are targets established?
This measure was established as part of the SFM Framework and accepted by the PAG. It is a process measure established to ensure that monitoring information is analyzed and reported. Additional targets are not required. A variance for this target is not considered appropriate.

Current condition:
The SFMP Annual Report is the overarching document for this measure. SFMP Annual Reports will provide the current status of measures based on monitoring results. To date, monitoring of measures has not occurred and therefore, analysis and reporting has not been completed. The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
This is a process measure and modeling is not applicable, however the probable trend of this measure is that the reporting and analysis will occur in accordance with the monitoring plan and adaptive management strategy.

Monitoring and reporting:
This is a process measure and monitoring will consist of reporting out on the measure. Records to satisfy this measure will be stored within the respective Canfor and BCTS

offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

Measure 8-1.1 Heritage Conservation

Measure:	Target (variance):
8-1.1. Percentage of forest operations consistent with the Heritage Conservation Act.	100 (0%)

What is this measure and why is it important?
The protection of cultural heritage values assures they will be identified, assessed and their record available to future generations. A cultural heritage value is a unique or significant place or feature of social, cultural or spiritual importance. It may be an archaeological site, recreation site or trail, cultural heritage site or trail, historic site or a protected area. Cultural heritage values often incorporate First Nation's heritage and spiritual sites, but they can also involve features protected and valued by non-Aboriginal people. Maintenance of cultural heritage values is an important aspect to sustainable forest management because it contributes to respecting the social and cultural needs of people who traditionally and currently use the DFA for a variety of reasons.

The measure is designed to ensure that operational plans with identified strategies to conserve cultural heritage values have those strategies implemented on the ground. Tracking the level of implementation will allow the signatories to evaluate how successful this implementation is and improve procedures if required.

How are targets established?
The target for this measure was established at 100% because the identification and conservation of cultural heritage values is paramount to First Nations and many others in the DFA. The signatories will continue to take measures to ensure forest operations are consistent with cultural heritage requirements as identified in operational plans.

Current condition:
Canfor currently uses input from First Nations at the planning stage and staff training in to identify potential areas with archaeological values. Sites with evidence of archaeological resources then undergo an Archaeological Impact Assessment (AIA) by a qualified professional to develop a prescription for the area, which is then incorporated into the Site Plan and implemented.

Archaeological sources are primarily related to First Nations within the Mackenzie DFA, as they were the first inhabitants of the area. However, an AIA is not biased toward Aboriginal features. Archaeological features that relate to non-Aboriginal people may include artifacts from historical trappers and prospectors, or evidence of old trails and remnants from inhabitants of old lakeside cabins. Features such as these are also identified in AIA surveys and management strategies are developed where appropriate to conserve cultural heritage for both Aboriginal and non-Aboriginal interests.

Conservation strategies are implemented at the site level during harvesting operations so that all identified cultural heritage values will be conserved for future generations. If a non-conformance with the operational plan occurs in the field, this information will be

recorded on an activity inspection form and then entered into an incident tracking database or other similar system.

Once a strategy to conserve cultural heritage values is included within an operational plan, there is a legal obligation for the licensee to implement and adhere to the strategy. Harvest and subsequent silviculture inspections ensure that these strategies are implemented as stated in the operational plan.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This is a legal obligation of the signatories, forecasting does not apply to this measure, although It is anticipated that 100% of forest operations will be consistent with cultural heritage requirements. The exact level of success is not easily predicted as it is operational in nature and is dependent on the nature of the site, and human oversight.

Monitoring and reporting:
The information that is required to monitor this measure includes a summary of the number of forest management operations conducted under operational plans that are consistent with the strategies identified to conserve cultural heritage values. This information is collected during EMS checklist reviews and harvesting inspections and is stored in the signatories' respective databases such as GENUS. The measure percent will be included in the annual SFMP report for the operational year of April 1st to March 31st.

Measure 8-1.2 TOR Review (First Nations Rights)

Measure:	Target (variance):
8-1.2. Maintain and review at least annually and as required the Mackenzie SFMP PAG Terms of Reference to recognize that First Nation participation in the public process will not prejudice First Nation rights and Treaty rights.	>1 (0%)

What is this measure and why is it important?
It is the intent of the signatories to respect all duly established First Nations and Treaty rights. This measure was designed to ensure the PAG Terms of Reference respects First Nations treaty right and participation without prejudice.

How are targets established?
The target for this measure was established at 100% because at no time would it be acceptable to achieve anything less than that. The PAG is an open and transparent process and will continually ensure that First Nations participation will occur without prejudice to First Nations or treaty rights within the PAG process.

Current condition:
The Mackenzie SFMP PAG Terms of Reference was approved January 31, 2006 This document speaks directly to the issue of First Nations and treaty rights and that First Nations people's participation in the PAG process will not prejudice these rights.

Participation in all aspects of the PAG by First Nations people in the DFA is an important part of the SFM process. Steering Committee members and members of the PAG will continue to work together to ensure that First Nations participation will never prejudice current and future First Nations or treaty rights within the DFA.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This measure is a process measure and forecasting is not applicable. The measure is present to ensure that the ToR continues to reflect respect towards First Nations and Treaty rights and acknowledges that First Nations participation in the SFM process will not prejudice those rights.

Monitoring and reporting:
Monitoring of this measure will occur with the annual review of the PAG Terms of Reference and will be duly noted in the meeting summary. Upon each review, the Terms of Reference will be analysed to ensure that First Nations participation will not prejudice First Nations or treaty rights as these rights continually develop over the DFA. This measure will be reported to the Steering Committee prior to each annual report of the SFMP so that the annual report can be released with the confidence that prejudice against First Nations or Treaty rights within the PAG process has not occurred.

Measure 8-2.1 Participation (First Nations)

Measure:	Target (variance):
8-2.1. The number of opportunities for First Nations to provide meaningful input into our planning processes.	>2 per First Nation (0%)

What is this measure and why is it important?
This measure was designed to list and report out on all documented opportunities provided to First Nations people to be involved in forest management planning processes. Incorporation of First Nations people and their unique perspective into the forest planning process is an important aspect of SFM. This measure will contribute to respecting the social, cultural and spiritual needs of the people who traditionally and currently use the DFA for the maintenance of traditional aspects of their lifestyle.

The Mackenzie SFM PAG is a process designed to identify public values and objectives within the DFA. Within the PAG process, First Nations has been identified as an important sector for representation. The First Nations sector, as identified in the PAG ToR, remains unfilled despite representation from 3 of 8 First Nations. This is to continually remind the PAG to actively seek participation from First Nations in accordance with Measure 7.1-7. Ensuring that First Nations communities are involved in the PAG processes will provide the ability to recognize unique interests of First Nations communities on a strategic level.

How are targets established?
First nation communities have been reluctant to participate in these planning processes, due to the sensitivity surrounding treaty negotiations, the extent of travel, or lack of resources. However, the current target is set to ensure that the signatories continue to provide at least 2 opportunities per First Nation for involvement per year. This target was based on the opportunities that arose from the SFM PAG process as well as from the FSP process.

Current condition:
The signatories currently have individual working relationships with local First Nations in the DFA and three specific First Nations have had representation at the Public Advisory Group table. All of these First Nations communities have had the opportunity for participation and input in the SFM planning process. In order to maintain a high level of participation and response, the signatories have also engaged First Nations in their communities as requested, in order to provide an opportunity for involvement in the Mackenzie SFMP. The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
Forecasting for this measure is that the number of opportunities given to First Nations people to become involved in the planning process will be sustained at a level of 2 opportunities per First Nation or greater over time, as the First Nations people become more involved with the SFM process. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
FSPs prepared under the premise of this SFMP will provide First Nations communities within the DFA with an opportunity to actively participate in the SFM planning process. This type of public involvement is generally initiated through a request to provide input prior to the submission of the FSP. If First Nations communities express an interest in the FSP planning area, subsequent opportunities are made to ensure communication around identified areas of concern occurs and is fully documented. Efforts to solicit input from First Nations through the PAG process are also documented.

Measure 8-3.1 Concerns (First Nations)

Measure:	Target (variance):
8-3.1. Percentage of issues raised by First Nations peoples evaluated and responded to in a timely manner by Canfor and BCTS.	100% (10%)

What is this measure and why is it important?
Ensuring issues of concern raised by First Nations as a result of forest management decisions are evaluated by the signatories demonstrates respect for their unique perspective and historical connection with the forest. Recognition of First Nations forest values, knowledge, and uses is an important component of sustainable forest management. Monitoring issues of concern raised by First Nations with respect to the forest operations is the intent of this measure.

Incorporating management strategies into the planning process in order to resolve issues raised by First Nations leadership is a key aspect to sustainable forest management. This measure contributes to respecting the social, cultural heritage and spiritual needs of people who traditionally and currently use the DFA for the maintenance of traditional aspects of their lifestyle.

Monitoring how issues raised by First Nations are addressed reflects the signatories' commitment to SFM.

How are targets established?
The measure's target of 100% demonstrates the signatories' commitment to addressing issues raised by First Nations during the planning process. A 10% variance was established, as there are often factors that delay response such as, communication or logistical difficulties, the need for further research, or a misunderstanding of the issues. All public input is an important aspect of the SFM process however, the signatories recognize that the concerns of First Nations deserve special attention. Therefore, it is paramount to ensure that all issues raised by First Nations are addressed. If the target is not met in the future, strategies will be developed to improve practices, or targets will be adjusted to better reflect practices within the DFA.

Current condition:
Concerns from First Nations generally arise during the planning processes and are included in the "Comments" section of the FDP/FSP along with Canfor's response to the concern and any strategies that will be employed to address the concern. Failure to adhere to the operational plan would be considered an Incident under Canfor's EMS and is tracked in that manner. In 2006, there were no incidents pertaining to failure to address First Nations concerns noted.

Canfor currently does not formally track the number of issues and response to First Nations' concerns, nor is there a mechanism to track the timeliness of responses. Canfor will develop a communication framework similar to the "Creating Opportunities for Public Interest Process" management system currently in use in Prince George. The framework assists in establishing goals that support good communication, defining how the communications process will operate, defining who will be responsible, and measuring system performance through the use of key performance indicators. It is anticipated that the database to support the framework will be completed by January 15, 2007.

"Keeping in Touch" (KIT) tracks communications between BC Timber Sales and all interested parties that they notify when forestry operations/ developments are to occur. These interested parties include private landowners, lodge operators, trappers, or hunting guides and First Nations with interest on the land. Strategies have been designed to ensure that information is communicated to these individuals in a timely and efficient manner. This communication considers non-timber users and inhabitants of the DFA and realizes that forestry operations can disrupt lives and businesses. BC Timber Sales is currently in the process of enhancing its communications strategy and exploring possibilities of incorporating it into its existing woodlands information management system, Genus.

The following key performance indicators apply to this measure and will be applied to communication strategies:

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Procedures are also in place specifically for First Nations to review and provide feedback on the signatories' forest operations. These procedures also provide timelines and lay out who is responsible for addressing the issues raised.

Forecasting and probable trends of measure:
Forecasting for this measure is that the 100% percent of issues raised by First Nations peoples are evaluated and responded to in a timely manner and it is anticipated this goal will be met. The exact level of success is not easily predicted as it relies on unpredictable factors such as human error. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
All communications will be documented within Canfor's and BC Timber Sales's databases, which will enable tracking of all communication and responses. A summary of the percentage compliance with the procedures will be reported on an annual basis for the operating period of April 1 to March 31.

Measure 8-3.2 Participation Effectiveness (First Nations)

Measure:	Target (variance):
8-3.2. Percentage of issues raised by First Nations' Chief & Council or their authorized representative developed into mutually agreed upon strategies.	100% (50%)

What is this measure and why is it important?
Our intent with this measure is to monitor actual resolution to concerns that arise through measure 8-3.1. In this way, the measure becomes an effectiveness monitoring measure and we make the assumption that more resolution to concerns raised by First Nations contributes to social value in general.

How are targets established?
Targets for this measure were established through PAG consensus. A variance of 50% was applied to recognize the difficulty in developing strategies that are mutually agreed to by both sides, the relative priority of a given issue, and the time and effort required to develop an agreed upon strategy.

Current condition:
Currently, Canfor does not formally track the number of issues that are developed into mutually agreed upon strategies. However, in accordance with Measure 7-2.6, Canfor will develop a communication strategy, including with all First Nations that can effectively document and track specific issues.

"Keeping in Touch" (KIT) tracks communications between BC Timber Sales and all interested parties that they notify when forestry operations/ developments are to occur. These interested parties include private landowners, lodge operators, trappers, or

hunting guides and First Nations with interests on the land. Strategies have been designed to ensure that information is communicated to these individuals in a timely and efficient manner. This communication considers non-timber users and inhabitants of the DFA and realizes that forestry operations can disrupt lives and businesses. BC Timber Sales is currently in the process of enhancing its communications strategy and exploring possibilities of incorporating it into its existing woodlands information management system, Genus.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Forecasting for this measure is that the 100% percent of issues raised by First Nations' Chief & Council or their authorized representative are developed into mutually agreed upon strategies, and it is anticipated this goal will be met. The exact level of success is not easily predicted as it relies on factors such as the relative priority of the issue, the time and resources required, and the real or perceived sensitivity around some issues. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
The participation effectiveness (First Nations) requirement will be reported in the annual SFMP report for the operating year April 1st to March 31st.

Measure 8-4.1 Participation Effectiveness (First Nations)

Measure:	Target (variance):
8-4.1. Incorporation of mutually agreed upon strategies to address First Nation peoples' values, knowledge, and uses into SFMP, operational plans, tactical plans and/or site plans.	100% (0%) (spreadsheet says 50% var, PAG CI Matrix says 0% var)

What is this measure and why is it important?
The development of mutually agreed upon management strategies is only the first step in SFM. Incorporation of those strategies into the SFMP, operational plans, tactical plans and/or site plans demonstrates recognition of First Nations forest values, knowledge, and uses. Monitoring adherence to these strategies is a measure of the success of these strategies to address the issues they were developed for.

This measure will report on the incorporation of the strategies that were developed to address First Nations issues. As these strategies are put into place tracking of plans incorporating these strategies will begin to determine whether these concerns are being addressed appropriately and the process developed to do so is working.

How are targets established?
The targets were established through PAG consensus. The signatories are committed to incorporating all of the mutually agreed upon strategies as stated in the SFMP, operational plans, tactical plans and/or site plans. This commitment is demonstrated by the target of 100% (variance 0%). It is anticipated that these targets will be met once mutually agreed upon strategies are in place.

Current condition:
Currently, Canfor does not formally track the number of mutually agreed upon strategies that are incorporated into the SFMP, operational plans, tactical plans and/or site plans. Canfor is involved in creating opportunities to exchange information with interested parties, including First Nations, and incorporating this information in the development of the SFMP, operational, tactical and/or site plans. However, the incorporation of these strategies was on an ad hoc basis and not tracked.

BCTS has been initiating dialogue with First Nations in the DFA to bring concerns into consideration when conducting it's forest development activities.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
Forecasting for this measure is that the 100% percent of mutually agreed upon strategies to address First Nation peoples' values, knowledge, and uses are incorporated into SFMP, operational plans, tactical plans and/or site plans, and it is anticipated this goal will be met. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
Canfor's development of a communication strategy (Measure 7-2.6) capable of tracking issues will be able to identify those issues that were developed into mutually agreed upon strategies. Incorporation of these strategies into plans will be tracked through Genus. A summary of the percentage compliance with the procedures will be reported on an annual basis for the operating period of April 1 to March 31.

Measure 8-4.2 Implementation Effectiveness (First Nations)

Measure:	Target (variance):
8-4.2. Percentage of forest operations consistent with mutually agreed upon strategies developed with First Nations.	100% (0%) (spreadsheet says 50% var, PAG CI Matrix says 0% var)

What is this measure and why is it important?
The consistency of forest operations with mutually agreed upon strategies "closes the loop" by taking the strategy and ensuring that it has been implemented as intended. Monitoring adherence to the implementation of these strategies is a measure of the success of the process outlined in Measures 8-3.1, 8-3.2, and 8-4.1 and monitors the success of these strategies to address the issues they were developed for.

This measure will report on the implementation of the strategies that were developed to address First Nations issues. As these strategies are put into place tracking of forest activities compliance with these strategies will begin to determine whether these concerns are being addressed appropriately.

How are targets established?
The targets were established through PAG consensus. The signatories are committed to implementing all of the mutually agreed upon strategies as stated in the SFMP, operational plans, tactical plans and/or site plans. This commitment is demonstrated by the target of 100% (variance 0%). It is anticipated that these targets will be met once mutually agreed upon strategies are in place.

Current condition:
The signatories currently incorporate strategies developed in consultation with First Nations into the SFMP, operational plans, and tactical plans and or site plans. However, these are generally addressing issues as identified in measure 8-3.1. Tracking compliance with requirements outlined in the SFMP, operational plans and tactical and/or site plans is done using each signatories respective EMS. This process will continue to be used for this measure.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Forecasting for this measure is that 100% percent of forest operations will be consistent with mutually agreed upon strategies, and it is anticipated this goal will be met. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
Tracking compliance with requirements outlined in the SFMP, operational plans and tactical and/or site plans is done using each signatories respective EMS. A summary of the percentage compliance with the procedures will be reported on an annual basis for the operating period of April 1 to March 31.

Measure 9-1.1 Recreation

Measure:	Target (variance):
9-1.1. The percentage of harvest operations consistent with results or strategies for recreation values as identified in operational plans, tactical plans and/or site plans.	100% (0%)

What is this measure and why is it important?
This measure was designed to monitor the signatories' success at implementing planned requirements for recreation. Areas used for industrial forestry are also important to many others for their recreational values. Resources and opportunities for recreation include; berry picking, wildflowers (sensitive), bird watching, hiking, snowmobiling, canoeing, hunting, fishing, camping, skiing, etc. Plans, such as Site Plans, describe the activities forest operations must be consistent with to meet recreation objectives. By monitoring and tracking the consistency of operations with operational plans, forest managers can assess the success of their activities and take steps to improve operations if required. The consideration of non-timber values such as recreation is important to sustainable forest management as it recognizes the multiple benefits forests can provide to society.

How are targets established?
The target was established by PAG consensus. The target for this measure was established at 100% because the identification and conservation of recreational values is important to many in the DFA. The signatories will continue to take measures to ensure harvest operations are consistent with recreation requirements as identified in operational plans.

Current condition:
The signatories currently solicit public and stakeholder input during Forest Development Plan/ Forest Stewardship Plan development. Land and Resource Management Plans (LRMPs) can also provide direction for planning for recreational interests. The Site Plan for a cutblock provides the site-specific requirements that operations have to achieve to meet the needs of recreational users.

Once a recreation strategy is included within an operational plan, tactical plan, and/or site plan, there is a legal obligation for the signatory to implement and adhere to the strategy. Pre-works and inspections of harvesting operations ensure that these strategies are implemented as stated in the operational plan.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This is a legal obligation of the signatories, modeling does not apply to this measure, although it is forecast that 100% of harvest operations will be consistent with recreation results or strategies as identified in operational plans, tactical plans and/or site plans. The exact level of success is not easily predicted as it is operational in nature and is dependent on such factors as the nature of the site, weather, and human oversight.

Monitoring and reporting:
The indicator will be monitored through EMS inspections and performance will be recorded in EMS databases such as GENUS. The percentage will be included in the annual SFMP report for the operating period of April 1st to March 31st.

Measure 9-2.1 Visual Quality

Measure:	Target (variance):
9-2.1. The percentage of harvesting and road building operations consistent with visual quality requirements as identified in operational, tactical and/or site plans.	100% (0%)

What is this measure and why is it important?
Forests can provide intangible benefits in addition to their economic and ecological values. The perceived beauty of certain areas in the DFA is one of these benefits and must be considered in forest management. Protection and maintenance of visual quality helps give assurance that these values will be available for current and future generations. A Visual Quality Objective (VQO) is a resource management objective established by the MoFR District Manager, or contained in a higher level plan that

reflects the desired level of visual quality. It is based on the physical characteristics and social concern for the area. The five categories of VQOs commonly used are:

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

The measure is designed to ensure that those operational plans with identified strategies to conserve visual quality have those strategies implemented on the ground. The maintenance of visual quality in scenic areas is an important aspect of sustainable forest management because this measure contributes to overall landscape condition and social acceptance of industrial forestry. Monitoring the success of the requirements of the operational, tactical and/or site plans to meet VQOs will help to ensure that visual quality is conserved for future generations.

How are targets established?
The target was established through PAG consensus. The target for this measure has been established at 100% because the identification and conservation of visual quality is important to various stakeholders within the Mackenzie DFA. The signatories will continue to prescribe management activities to achieve VQOs where required.

Current condition:
Visually sensitive areas are defined as viewscapes that have been identified through a previous planning process. During Forest Stewardship Plan preparation, scenic areas are identified on a map and if harvesting operations are planned for an area that contains VQOs, information will be further identified in a Site Plan. Visual Impact Assessments (VIAs) help determine block shape, location and internal retention options. At the site level, strategies are included in the Site Plan to minimize visual impacts.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This is a legal obligation of the signatories, forecasting does not apply to this measure, although it is anticipated that 100% of harvest operations will be consistent with visual quality objectives as identified in operational plans, tactical plans and/or site plans. The exact level of success is not easily predicted as conditions vary from one site to another and circumstances, such as forest health and fire, may arise that prevent the requirements from being achieved.

Monitoring and reporting:
The measure will be monitored through EMS inspections and performance will be recorded in an EMS databases such as GENUS. The percentage will be included in the annual SFMP report for the operating period of April 1st to March 31st.

Measure 9-2.2 Green-up Buffers

Measure:	Target (variance):
9-2.2. Percentage of harvest operations consistent with visually effective green-up buffer along roads as identified in the Mackenzie LRMP.	100% (0%)

What is this measure and why is it important?
The public generally has a negative perception of large disturbance events regardless whether they are unmanaged-natural events or those associated with resource development. Often these events change our view of landscapes over large areas for long periods of time. The magnitude of anthropogenic change, both spatially and temporally, can be mitigated by retaining visual barriers (e.g., along road ways) in the form of green trees and other vegetation. There is also a safety hazard associated around FSRs and main haul roads where blowing snow can hamper visibility. Our intent with this measure is to monitor our commitment to minimizing the safety hazard and the apparent negative visual effect of large disturbances caused by forest harvesting, in those locations referenced in the Mackenzie LRMP.

How are targets established?
Targets for this measure were established through PAG consensus. The target for this measure has been established at 100% because the maintenance of visually effective green-up buffers is important from both a safety and aesthetic aspect to various stakeholders within the Mackenzie DFA. This is borne out by its inclusion in both the LRMP and in the SFMP. The signatories will continue to plan harvesting to maintain visually effective green-up buffers along roads identified in the LRMP.

Current condition:
The signatories currently plan and design their cutblocks so as to maintain visually effective buffers along roadsides identified in the Mackenzie LRMP and have done so since the LRMP was approved in 2000. However, compliance with this LRMP strategy has not been monitored. Any blocks found within the 200 metre buffer were harvested prior to the development of the LRMP and the buffer.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
It is anticipated that 100% consistency with visually effective green-up buffers along roads as identified in the LRMP will continue to be achieved. The exact level of success is not easily predicted as conditions vary from one site to another and circumstances, such as forest health and fire, may arise that prevent the requirements from being achieved. However, it is important to identify what the accepted target means to SFM. Conservation of visual quality primarily influences social and economic values within the DFA. Reduction in a safety hazard directly relates to social values, Therefore, the use of a “what if” scenario is beneficial in identifying anticipated future trends for this measure. As this measure currently has a target set at 100%, one other scenario should be identified:

What if only 50 % of operations were consistent with visually effective green-up buffer requirements along roads identified in the LRMP?

If only 50% of operations were consistent with the green-up buffer requirements along identified roads, it could lead to social and economic impacts. Visual quality helps businesses that cater to various forms of recreation including lodges, guiding and hunting, fishing and backcountry tours. By not retaining green-up buffers, these businesses could potentially lose customers dissatisfied with the state of the visual resource, particularly along main travel corridors. Social values attributed to visual quality could also decrease if only 50% of the operations were consistent with the green-up buffer. Evidence that LRMP objectives are not being met undermines the LRMP process and its credibility – which could spill over into other public planning processes such as the SFMP. This could negatively public participation in planning processes. The increased driving hazard associated with blowing snow can also have serious social and economic impacts. Tourists may be discouraged from visiting by road conditions. The overall quality of life in the DFA would also be affected by an increased driving hazard.
.
The signatories will continue to ensure that 100% of operations are consistent with the visually effective green-up buffer along roads identified in the LRMP. This will be done through detailed development planning, pre-work meetings prior to the start of projects, monitoring inspections as the work is progressing and final inspections once the work is complete to ensure the commitments specified in the operational plan are met. These initial, intermediate and final checks are part of each signatories' EMS, and the future trend of this measure will remain at the target of 100% if all processes and protocols are followed.

Monitoring and reporting:
The green-up buffers requirement will be monitored through EMS inspections and performance will be recorded in an EMS databases such as GENUS. Spatial coverages will also be used to determine if any blocks infringe on the 200 metre buffer. The percentage will be included in the annual SFMP report for the operating period of April 1st to March 31st.

Measure 9-3.1 Resource Features

Measure:	Target (variance):
9-3.1. Percent of unique and/or significant places and features of social, cultural or spiritual importance that are managed or protected.	100% (0%)

What is this measure and why is it important?
Resource features are site-specific elements that have a unique importance because specific ecological factors exist in combination at one place and don't often occur similarly elsewhere. Examples are caves, Karst, or culturally modified trees but in general can be declared through regulation as any of the following:

- Karst;
- A range development;
- Crown land used for research;

- Permanent sample sites;
- A cultural heritage resource;
- An interpretive forest site or trail;
- A recreational site or trail; or
- A recreational feature.

These features are generally considered to have value to society so we assume that through conservation of these features we are contributing to social value. Our intent with this measure is to monitor our commitment to manage and protect regulated resource features.

How are targets established?
Targets for this measure were established through PAG consensus. The target for this measure has been established at 100% because the maintenance of known resource features is important to various stakeholders within the Mackenzie DFA. The signatories will continue to manage or protect resource features as they become known.

Current condition:
The signatories currently plan and design their activities and/or cutblocks so as to manage or protect adequately resource features when they become known. Once a resource feature becomes known, means of managing or protecting the feature are either iterated in the operational plan, or tactical and/or site plans. These requirements are tracked and managed through the respective signatories' EMS.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
This measure is a legal obligation of the signatories under the *Forest and Range Practices Act Regulation, Sec 70(1)* (BC Reg. 14/2004), modeling does not apply to this measure. Forecasting for this measure is that 100% of identified resource features will be protected and/or managed.

Monitoring and reporting:
The measure will be monitored through EMS inspections and performance will be recorded in an EMS databases such as GENUS. The percentage will be included in the annual SFMP report for the operating period of April 1st to March 31st.

Measure 9-4.1 Safety Policies

Measure:	Target (variance):
9-4.1. Written safety policies in place and full implementation is documented.	2 (0%)

What is this measure and why is it important?
Written policies ensure workers have proper training and guidance prior to commencing work. SOPs and safety policies have interviews/checks at some stage to confirm effectiveness.

How are targets established?
The target agreed to by the PAG will be compliance with safety policies as evidenced through safety audits and certification as a SAFE company. Safety audits reveal whether safety policies are required, if existing policies are being implemented and if the policies are effective. The results of the annual Safety Audits will be used to determine the signatories compliance with the measure.

Current condition:
Each signatory has a written safety policy in place which is reviewed by the safety committee a minimum of once every year and revised as necessary and approved by management. If an incident occurs the cause of the incident is determined and recommendations are put forward. These recommendations may result in a change to a specific policy. Annual audits will be conducted and Action Plans developed for any item that requires attention detailing the person responsible for the item and the deadline for completion.

The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
Forecasting of this measure is that Canfor will achieve 100% compliance with written safety policies. This is a process measure and modeling is not applicable.

Monitoring and reporting:
The data required to monitor this measure is the written policy, proof it was administered to the workers, proof that the worker understands the policy, and proof of certification as a SAFE Company.

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

Measure 9-4.2 Accidents

Measure:	Target (variance):
9-4.2. Number of lost time accidents in woodlands operations.	0 (0%)

What is this measure and why is it important?
Health and safety of forest workers and members of the public is an important quality of life objective that is essential to SFM. All signatories consider employee and public safety as a primary focus of all forestry related operations. Evidence of this high priority can be seen in various company mission statements and individual EMS policies. This measure was developed to track and report out on the number of lost time workplace accidents that occur within Canfor's woodlands division and the field operations of BCTS. Operations conducted outside the woodlands division and field operations have been excluded from this measure; however the signatories currently promote safety in all aspects of forest management operations. Two types of workplace accidents are the most common within the forest industry including lost time accidents (LTA) or incidents

where medical aid or treatment was necessary but no loss of work time was experienced by the employee. Through this measure, only LTA will be tracked and monitored.

How are targets established?
The target for this measure was established so that all signatories would operate toward a goal of no woodlands lost time accidents. A variance of 0 accidents is applied to stress the importance placed on safety in the work place and to demonstrate that no work place accident is acceptable.

Current condition:
The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.
Forecasting and probable trends of measure:
This measure is not easy to quantifiably forecast over a defined time frame because it is operational in nature. However, it is important to identify what the accepted target means to SFM. The number of company related, forestry management operation accidents each year relates directly to social values within the DFA. Therefore, the use of a "what if scenario" is beneficial in identifying anticipated future trends for a measure such as this. As this measure states a target of zero, one other scenario should be analysed:

a) What if more than the target amount of company related forestry management operation accidents occurred each year?

If more than the target amount of company woodlands LTAs occurred each year social values including quality of life would likely decrease throughout the DFA. Lost time accidents are usually directly related to safety issues in the workplace. If an employee's risk of being injured on the job increased, there would be less incentive to do the required work. Increased risk in the workplace would likely decrease the overall quality of life in the DFA and community stability would also likely decrease. For the Licensee, WCB and other related costs due to accidents in the workplace would likely increase. This would result in a potential decrease of economic values because full economic returns would not be realized from the forest resource. Licensee members are committed to maintaining worker and public safety as a high priority and will work towards achieving the stated target for this measure.

The "what if scenario" illustrates that a variety of social values and certain economic values could potentially be affected if the target for this measure were not achieved. In the future, the signatories anticipate that the number of company related forestry management operation accidents each year will remain at or below the target.

Monitoring and reporting:
Each signatory's woodlands operation has a safety committee that is responsible for ensuring that standards are in place to promote safe work practices. All accidents are reported to a member of the safety committee once they occur and this is how LTAs will be tracked and monitored for reporting purposes. Monitoring and reporting the number of workplace LTAs will help signatories identify problems with procedures and increase overall awareness in order to prevent future injuries and LTAs.

Measure 9-5.1 Signage

Measure:	Target (variance):
9-5.1. Signage on FSRs and main haul roads to be kept current.	100% (-5%)

What is this measure and why is it important?
People value being informed of most activities that take place on public lands including those associated with industrial forestry. Signage establishes a standard for safety and otherwise helps inform public about the nature and extent of industrial activity. Conversely, if signage is not kept current, credibility of the signs declines resulting in a potential safety hazard. With this measure we will monitor our commitment to making information about our activities current and available to those traveling the roads and trails of the Mackenzie DFA.

How are targets established?
Targets for this measure were established through PAG consensus.

Current condition:
Signage is posted as required by the signatories. Canfor's EMS Harvest Inspection Form refers to posting of adequate signage, including removal following completion.
Currently the signage requirements (truck turning/active hauling) are not specifically enforced or enforceable when BCTS staff conducts conformance inspections. Enhancements to SFMS have been recommended and will be considered during planned and periodic change.
The status of this measure for the initial reporting period – 2005-2006 is included in Appendix G.

Forecasting and probable trends of measure:
Forecasting for this measure is that signage on FSRs and main haul roads will be kept current. Modeling is not applicable to this measure as it is a process measure.

Monitoring and reporting:
Each of the signatories have an Environmental Management System through which they will track and report out on the posting and removal of signs. The signage requirement will be reported in the annual SFMP report for the operating year April 1st to March 31st.

5.3 Monitoring and Reporting

The position/person responsible for ensuring the information needed is gathered and placed in the appropriate information management system will be identified in the Responsibility Matrix. The Responsibility Matrix will also indicate who is responsible for reporting on the various measures. In accordance with measure 7-3.2, a monitoring plan will be developed and implemented for each measure. The monitoring plan will identify;

- The measure
- The threshold/ targets for the measure
- The measurement unit to be used
- The spatial/geographic scale to be used
- How frequent the data is to be collected
- The source of the data

- Knowledge gaps
- The estimated cost of monitoring

6.0 TACTICAL LEVEL PLANNING

This section describes the aspects of SFM Planning that occur at the tactical planning level for the DFA, as outlined in the SFM Framework document. The objective of the tactical level is to establish a detailed forest management strategy or scenario that is sustainable for a range of forestry related values. This level localizes planning to meet the broad goals developed in the strategic planning level.

Tactical planning includes defining the forest area and its present conditions as well as identifying and selecting values to be maintained in a sustainably managed forest. At this level of planning, inventories are prepared and future forest conditions are forecasted. If current conditions do not meet the goals of sustainability, a range of alternative strategies are designed and forecast to assess their effectiveness in meeting sustainability targets and goals. The strategy that best meets the goals of sustainability is selected in consultation with the stakeholders.

It is at this level that the DFA specific decision support tools for planning are implemented. The decision support tools include: indicator mapping, scenario design, forecasting, natural disturbance strategies, multi-criteria analysis (MCA), and trade-off analysis. The results of the implementation of these tools are used to assess the sustainability of current conditions and to design an alternative sustainability scenario, if necessary.

Tactical level assessments and planning will identify strategies and best management practices that are considered sustainable. The operational level is the place where those practices are described and implemented to meet sustainability targets. Operational level plans such as Forest Development Plans (FDPs), Forest Stewardship Plans (FSPs), and internal site plans are currently used for this purpose in the DFA. The measures and targets detailed in Section 5.2 provide direction for the development of sustainability practices that are included within the SFM Plan and future FSPs.

The process by which tactical level planning is undertaken includes:

- Assessing the current conditions, those that are external and those that are controllable by the signatories;
- Implementing the multi-criteria analysis and assessing sustainability values;
- Forecasting out current conditions under alternative scenarios; and
- Assessing the outcome against sustainability targets to develop a preferred scenario in an adaptive management framework.

6.1 Assessment of Current Conditions

The following provides an assessment of the current conditions for the Mackenzie DFA to determine if the current management strategies are sustainable (i.e. if the current practices and rules will result in the desired future ecological and socio-economic conditions for the DFA over the long term).

This process by which assessment is undertaken includes:

- Identifying external impacts;
- Identifying and incorporating natural disturbance,
- Identifying/describing current practices;
- Linking the practices to indicators and measures through indicator mapping[11].

The information outlined in this section influences the MCA process, the forecasting, and the final determination of sustainability at this point in time – the preferred scenario

6.1.1 External Impacts

At this point, external impacts are limited to three non-replaceable forest licenses (NRFLs) holders in the TSA which may operate within the DFA. These NRFLs are:

Kwadacha Natural Resource Agency;	53,404 m^3
Tsay Keh Dene Band ;	53,404 m^3
Ainsworth Lumber Co. Ltd.	50,000 m^3 (deciduous leading)
Total:	106,808 m^3

Because the volume is apportioned on the TSA and not the DFA, it was determined that the best alternative was to determine a proportional cut that would likely occur within the DFA. Based on volume, the proportional amount of volume attributable to the DFA was determined to be 98,730 m^3. This was the volume that was incorporated into the current and forecasted analyses.

It is recognized that the potential for other external impacts to occur in the future exists. When and if such impacts arise, these will be analyzed for their affect and influence on assumptions and the ability of the signatories to achieve their targets.

6.1.2 Natural Disturbance Regime

Natural disturbance plays an important role on all forest values at the stand and at the landscape level. Within the SFM Framework, natural disturbance is considered an input to forest management, not a driver. For this reason, natural disturbance plays a role in the assessment of current practices.
In order to understand the effects of natural disturbance on the DFA, the first step is to identify natural disturbance agents that have historically, and currently affect the ecosystems being managed by the signatories of this SFMP. In order to integrate natural disturbance regimes into SFM, parameters and assumptions are to be made about the potential impact of natural disturbance regimes on resource levels.
Natural disturbance regimes for such agents as fire, insects and disease, are summarized below but the specific details can be found in the Development of a Natural Disturbance Strategy for Sustainable Forest Management which describes the Historic

[11] Indicator mapping has not been completed for all measures included in the Mackenzie SFM Plan at the time of writing.

Fire Trends and Data gaps as well as historic trends in insect and disease activity for the Mackenzie DFA.

Fire

Fire, has a significant impact on forest ecology and the resulting landscape. Fire damage has been recorded in the Mackenzie TSA in five (5) of the past nine (9) years. The lowest amount of area affected was in 2007, 38 ha and the largest amount of area affected was 2006, 9, 361 ha. The majority of damage occurs in June, July, and August. In BC lightening is the cause of 50% of forest fires (Ministry of Forest and Range 2008). Human-caused fires account for the other 50% and usually start close to communities, where they are reported quickly and dealt with quickly (Ministry of Forest and Range 2008, Natural Resources Canada 2007). Fire damage is not equal across tree types, conifers burn 5 to 10 times faster than deciduous trees as a result of resin in the bark and needles whereas deciduous trees are considered more resistant to fire after leaf flush. Fire disturbance can be frequent in boreal forest types because of the combustible nature of the trees and its warm, dry climate which permits severe fire weather. Fires in the boreal forest typically kill most trees (Natural Resources Canada 2007).

Insects and Disease

Aerial overview surveys conducted by the Ministry of Forests and Range (MoFR) between 1999 and 2005 detected a variety of forest health agents including bark beetles, defoliators, abiotic damage, and animal damage. Despite the fact that the province is currently experiencing a mountain pine beetle epidemic of historical proportions, it is the western balsam bark beetle that has the greatest hectares of incidence over that time period (Table 30). Other forest health agents that affected more than 1000 ha in 2005 as recorded in the aerial overview flights are large aspen tortrix and fire. Spruce beetle, while very low in 2005, has also had serious large-scale outbreaks occur historically in the TSA.

Table 16. 1999-2005 Mackenzie TSA Aerial Overview Results

	Hectares of Incidence[12]					
Forest Health Factor	2000	2001	2002	2003	2004	2005
Western Balsam Bark Beetle	282,223	53,021	221,214	410,987	559,082	613,746
Mountain Pine Beetle	674	1,529	6,004	969	13,704	104,212
Spruce Beetle	4,543	2,512	28,202	133,244	4,005	40
Large Aspen Tortrix				68,936	32,360	4,395
Two-year Cycle Budworm		2,091		44,169		
Windthrow			156			809
Fire		2,753	904			2,165

Although the western balsam bark beetle has the greatest incidence in the TSA over the past six years, it is the mountain pine beetle that has captured the greatest attention, largely because of the commercial value of the trees being attacked, the widespread

[12] Source: Forest Health Strategy and Tactical Plan, Mackenzie TSA, March 2006

incidence of the infestation, and the exponential growth of the attack. As indicated by Figure 9

Maps

6.1.3 Current Management Practices

The assessment of current management practices is two-fold: 1) an articulation of the current management regime by describing the standard operating practices and regulations followed in the Mackenzie DFA; and 2) the determination of how these practices impact the sustainability of forestry related values in the management area. Once the Practices Matrix is completed, this section will summarize the current management practices and create linkages between the practices to the indicators. Linking current practices to the measures of each indicator provides information as to how practices are affecting sustainability targets through time and space. This assessment will also identify what level of risk there is to each indicator if current practices are continued over time.

Appendix I has seral stage and patch tables showing management outcomes of most recent forest management plan.

6.1.2 Indicator Mapping

Indicator mapping is a tool that assesses the current levels of resources to be sustained in the DFA and shows how the resources on the landbase are spatially contributing to meeting sustainability targets.

The SFM Framework assumes that the entire landbase (whether managed or unmanaged) contributes to meeting ecological, economic and social goals of sustainability. Where possible, indicators/measures will be spatially mapped demonstrating current levels of resources as represented by the indicators/measures. The landbase is delineated into THLB and NHLB (Appendix I) designations to assess the contribution of both managed and unmanaged areas to meeting sustainability targets. The intention is to assess how much of the targets are met by the NHLB and determine what level of contribution is required from the THLB.

Indicator mapping has not been initiated for the Mackenzie DFA. When it is determined that it is required, the results will be incorporated into the SFM Plan at that time. Once indicators have been mapped, their linkage to current practices will be reviewed and summarized. An analysis of how well current practices are helping in achieving targets for the THLB will be summarized and reported out on in the annual report.

6.1.3 Forecasting

Forecasting is an explicit statement of the expected future condition, through time, of an indicator/measure. It is a critical step in assessing SFM. Input layers (i.e. indicator maps, natural disturbance regimes, etc.), along with rule-sets (i.e. current management

practices), are used to forecast forest conditions over time using a simulation model. The projections are used to compare the indicators/measures to sustainability targets using current practices over time in order to assess the level of risk for each indicator. Local level indicators and measures currently in the process of being selected by the Mackenzie DFA Public Advisory Group and reviewed by technical experts for their suitability and credibility for measuring and forecasting. The next step in the process will be to develop a forecasting strategy for each of these (including spatial, temporal, analytical methods used etc.).

6.1.4 Multi-Criteria Analysis – Assessment of Sustainability

The Multi-Criteria Analysis (MCA) is an assessment of how well the current management strategy meets the targets identified for the indicators/measures of sustainability. The MCA process consists of two components: technical and public. It assists in determining if current conditions, assumptions, and practices as forecasted over time, are sustainable for the range and balance of values. If the assessment shows that current conditions are sustainable, then an operational plan is developed and/or modified for the DFA, highlighting any required changes as a result of the strategies developed in the SFM Plan.

Both signatories have submitted Forest Stewardship Plans and are currently awaiting approval. The strategies outlined in the FSP are consistent with those described within the SFM Plan. If the assessment shows that current management scenario is not fully sustainable then alternative scenarios may be developed in order to meet sustainability objectives (Section 6.2). An MCA provides input into the development of alternative scenarios.

For this iteration of the SFM Plan, the MCA that was undertaken focused on both soliciting input into the development of scenarios as well as assessing the suitability of the forecasted results. A questionnaire was used to determine the PAG's priorities by assessing values attributed to both the criterion and indicator levels. The questionnaire can be found in the PAG Records files at the respective signatories' offices.

Technical MCA

The technical MCA requires that the most up to date on each of the measures and on management practices be used. Technical specialists use this information as summarized in management scenarios to determine if:

- sustainability levels are clearly sustainable;
- sustainability levels are clearly unsustainable, or
- sustainability levels are marginal and whether that state is improving, relatively steady or declining over the forecast period.

For this SFM Plan, the technical analysis was completed by a contractor under the Forest Investment Account Land-Base Investment Program which was administered by Canfor as per terms of the Memorandum of Understanding.

Public MCA

The public MCA is meant to identify what stakeholders feel are the most important criteria within a DFA. Each member of the public advisory group were asked to rank value of the criteria (Value Assessment), the sustainability risk of each of the criteria (Sustainability Risk Assessment), and to distribute 100 points amongst the criteria.

The use of public weighting schemes to prioritize certain criteria/indicators is helpful where trade-offs may be required, and where decision-makers need a rational and objective basis for choosing between different stakeholder priorities. This process can lead to increased stakeholder inclusion and support in resource management decisions (Sheppard, Meitner).

Alternative management scenarios may be required if the initial baseline forecast shows that key indicators are not being met under current operational practices. If the alternative scenarios and innovative design still do not lead to sustainability across the indicators, trade-offs may have to be considered. Input from the public on their tolerance for trade-offs of indicators would be solicited in addition to the MCA. Ultimately, the decision-makers for a management unit take the input from the MCA and Trade-off Analysis, if applicable, as part of the decision-making process. Understanding the public's priorities, their tolerance for risk, and the input from technical specialists can assist managers in refining targets, practices, and/or the overall management scenario.

To solicit criteria priorities from PAG members, each member of the PAG was asked to independently go through the following steps:

Step 1. Rank each of the 9 criteria from 1 (the one which is the most important to your sector) to 9 (the one which is the least important to your sector). Each number can be used only once, that is, only one criterion can be ranked with a 1 (most important), only one criterion can be ranked with a 2 (second most important), etc.
Step 2. Distribute 100 points as the PAG member sees fit across the criteria that they believe are the most important. Points can be allocated to a single criterion, distributed evenly across all criteria, or weight the indicators by putting more points to some criteria. Once distributed the total points must equal 100.
Step 3. Rank each of the 9 criteria from 1 (the element that you fear is at most risk of not being achieved or accomplished) to 9 (the element that you are least worried about or, to put it another way, most confident will be achieved or accomplished).

The following figures (Figure 11 – Figure 15) summarize the results of the MCA process for the Mackenzie DFA PAG. For all figures the following applies: Criterion 1 – biological richness; Criterion 2 – productivity; Criterion 3 – carbon; Criterion 4 – economic forest industry; Criterion 5 – economic non-timber; Criterion 6 – diversified economy; Criterion 7 – public participation; Criterion 8 – First Nations; Criterion 9 – quality of life. The number of responses was 11 of 20 PAG representatives.

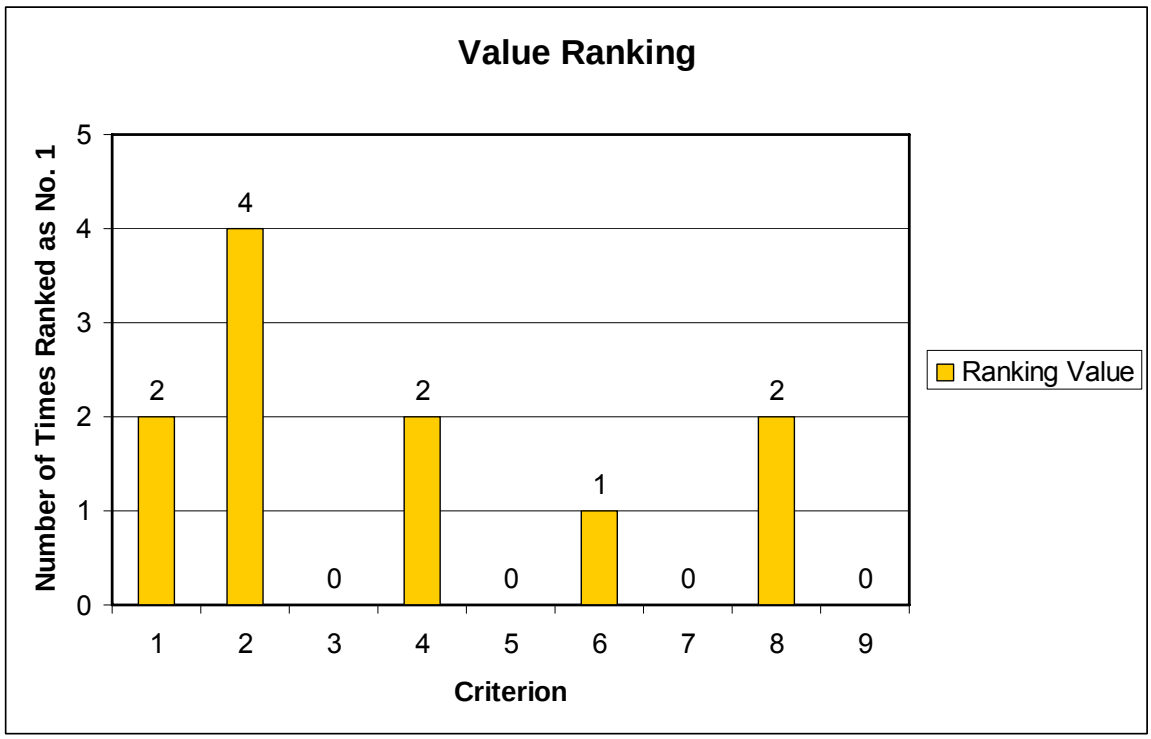


Figure 13. Criteria value ranking.

Figure 11 shows the number of times PAG members ranked a criterion as being most important to their sector (i.e. ranked as No. 1). This shows that PAG members ranked Criterion 2 – productivity – as being most important more often than any other criterion.

Figure 12 show the average ranking for each of the criteria. Since ranking is from 1 to 9, 1 being the highest ranking of value and 9 the lowest, a lower score indicates a higher priority ranking. This figure indicates that criteria 1, 2, and 4 (biodiversity, forest productivity, and economic forest industry respectively) have a high priority for the PAG, whereas criteria 3, 7 and 8 have the lowest priority.

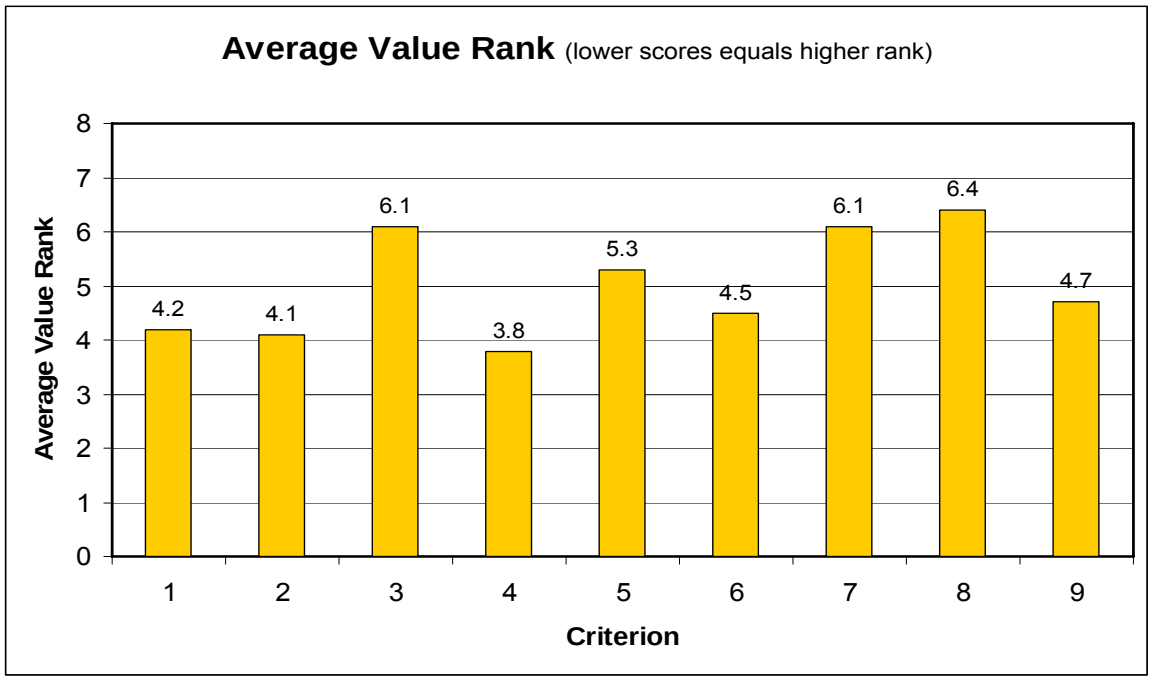


Figure 14. Average criterion ranking.

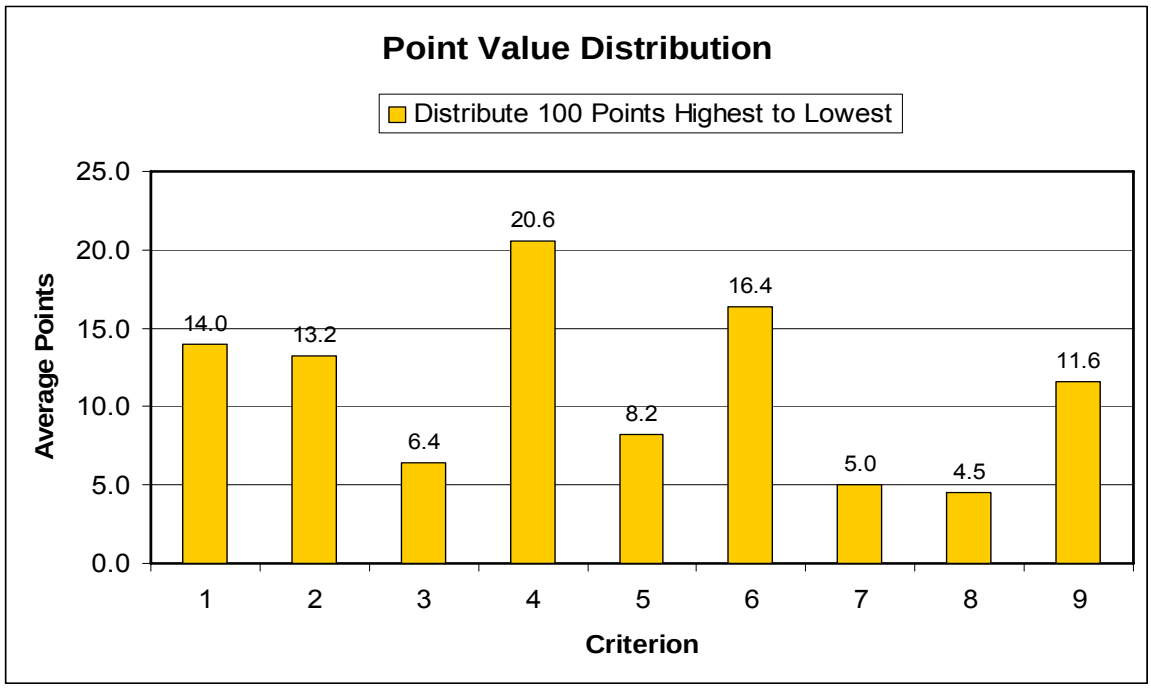


Figure 15. Average point distribution.

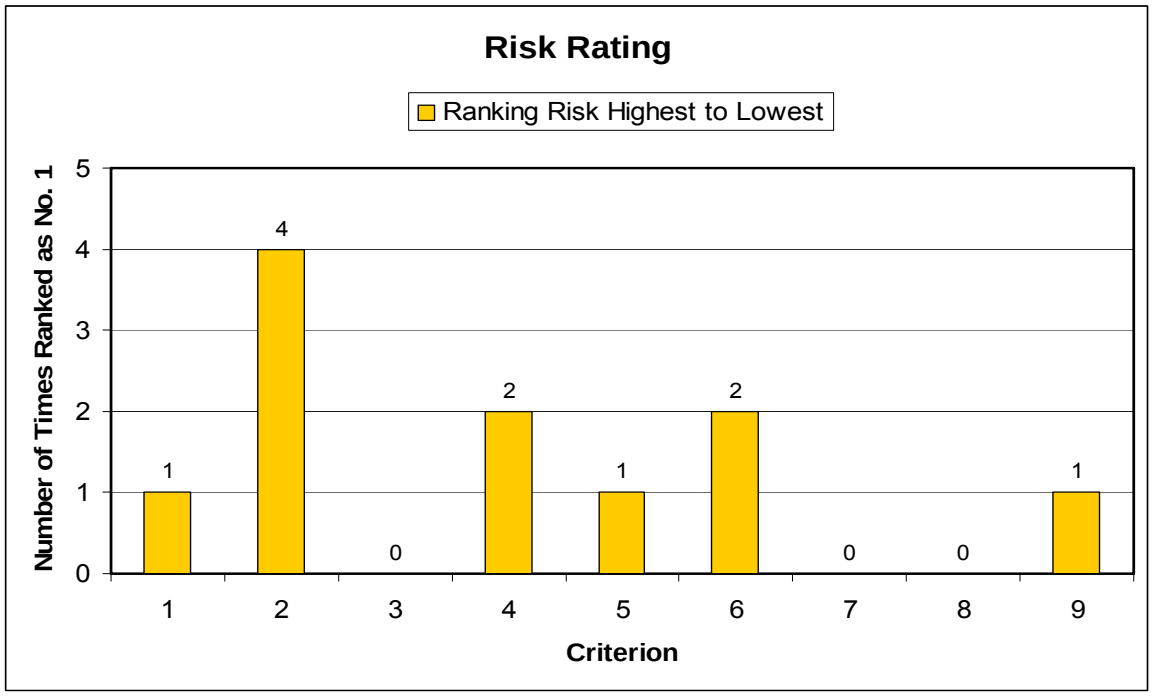


Figure 16. Criterion risk ranking.

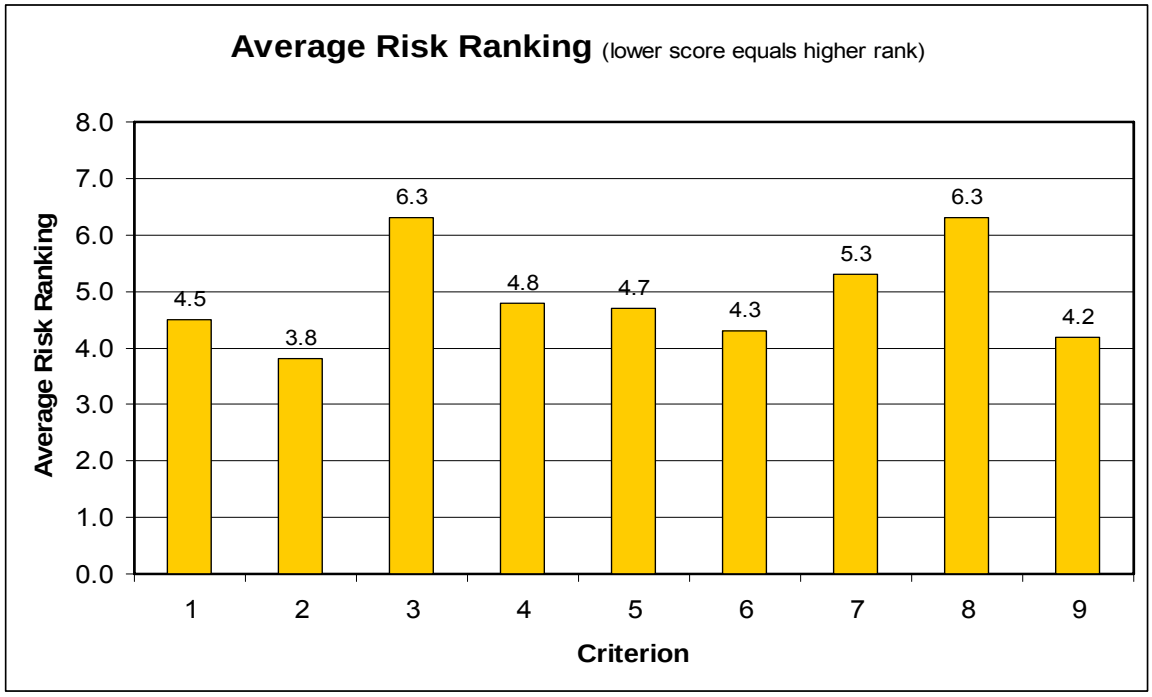


Figure 17. Average risk ranking.

How the PAG distributed the points is shown in Figure 13. Once again, it shows that Criterion 4 has a high importance, along with Criterion 6, whereas Criteria 3, 7, and 8 have a lower importance.

Figures 14 and 15 show the how the PAG ranked the relative risk to a particular criterion not being achieved or accomplished. These figures indicate that the PAG feels that Criterion 2 has the greatest risk of not being achieved whereas Criteria 3 and 8 are ranked as having a low risk.

Interpretation of the analysis indicates that Criterion 2 is seen by the PAG as being of a high importance and priority, and also seen as at the greatest risk of not being accomplished. Also ranked highly were Criteria 1 and 4. This indicates that the PAG believes that healthy, productive ecosystems, biodiversity, and an economically sustainable forest industry is of greatest importance. The ranking of Criterion 2 as of highest importance is a recognition of the important role that healthy, productive ecosystems have in sustaining both biodiversity and an economically sustainable forest industry.

Despite this, Figure 13 shows that points were distributed amongst all criteria, indicating a desire to sustain the full range of SFM values within the DFA and that all criteria are important to some degree.

Results of a public survey on forest management currently being completed by the University of British Columbia (UBC) may provide further guidance on the values of local residents. In future scenario design and forecasting, the results of the survey will be incorporated to provide a broader perspective on forest management within the Mackenzie DFA.

6.1.6 Default Approach to Assessing Current Practices

The Mackenzie DFA has not been able to complete the above processes of assessment of current management practices for a number of logistical reasons. As a result, the "default" to assess current management practices is to use the most current TSR data package, analysis report, rationale, and other recent DFA analysis. These are used to develop a "base case", described in Appendix H, against which other scenarios are compared to determine the potential impact of the scenarios.

6.2 Design of Sustainability Scenarios

Alternative scenarios were undertaken as part of the SFM planning process. They have been used to test the current management strategy for how sustainable it is, to test alternative approaches, and as a part of forecasting some of the measures. The information is also used to determine scenarios that are operationally feasible, publicly acceptable and technical appropriate for the DFA's criteria, indicators and measures. The process of evaluating a scenario involves examining forecasts for each indicator's response to the implementation of the strategy, and determining the degree to which targets are met. This process requires that DFA resource managers understand the

interactions and linkages between the indicators to know when changing a strategy to improve one particular indicator may then improve or negatively impact another. In some cases, changing a practice may lead to sustainability and in others changing a target or threshold for a particular indicator may be required. The analysis may lead to trade offs amongst indicators. As new data becomes available and as the public and managers gain more insight into resource management, more robust scenarios will be developed for future iterations of the SFM Plan.

6.2.1 Design of Alternative Scenarios

Forecasting, undertaken for each scenario, allows the forest manager and the PAG to analyse various scenarios (i.e. management decisions) based on the projected future forest condition. Input for the development of scenarios came from:

- Mackenzie DFA PAG,
- Current management practices and assumptions,
- MCA questionnaire,
- Canfor and BCTS,
- Technical specialists experienced in analysis and forecasting.

The scenarios listed below describe quantitative outputs using measures capable of being modeled. Scenarios were purposely designed to be plausible, that is the implementation of a given scenario would not necessary preclude the achievement of one or more criteria or indicators as would be the case if, for example, a “no harvest” scenario was forecast. A “no harvest” scenario would necessarily result in the inability to achieve economic indicators and is therefore not a reasonable alternative. The scenarios that were developed and presented to the PAG were:

Scenario 1: Base Case
Scenario 2: Habitat Richness Emphasis
Scenario 3: Species Composition
Scenario 4: Caribou Recovery Emphasis
Scenario 5: Non-Timber Economic Emphasis
Scenario 5A: Manual brushing
Scenario 6: Worst Case Forest Health on Mature Stands Emphasis
Scenario 6A: Unsalvaged Losses
Scenario 7: Worst Case Forest Health on Regenerating Stands Emphasis

Details of each of the scenarios, underlying assumptions, and the results of the comparative analysis are in Appendix H. The results of the forecasting process was presented and reviewed by the PAG. A comparison of the relative long-term implications is provided in Table 31. Results of the forecasting exercise indicate that the developed scenarios had a relatively small impact on long-term timber harvesting at current levels, with Scenario 2 (Biodiversity Emphasis) having the greatest impact and Scenario 5 (Non-timber Economic Emphasis) have virtually no impact (Appendix H – Figure 1).

A final report on the development, methods, assumptions, and results used in the forecasting exercise is pending. The final report will be available on or before March 31, 2007.

6.2.2 Preferred Scenario

PAG representatives and alternates in attendance were asked to select their first, second, and third choices from all of the forecast scenarios presented. A weighting of 3 points was assigned to each #1, 2 points for each #2, and 1 point for each number 3 was assigned. The results indicate that scenarios 2 and 6A were ranked highest with scenarios 4, 3, and 5A also receiving points. After discussion with the PAG, it was agreed that a combination of scenarios 2, 3, 4, and 6A could be implemented without any undue affect on other indicators. Individually, none of these scenarios has a significant impact on short-term harvest levels, although there is an impact on medium and long-term harvest levels. It is not known yet what the cumulative affect of implementing all three scenarios. Impacts, if any, will be monitored and strategies adjusted and presented to the PAG if unexpected impacts are encountered.

Table 17. Long-term impacts of scenarios on selected indicators.

Scenario:	1	2	3	4	5	5A	6	6A	7
Indicator	Base Case	Habitat Richness	Species Composition	Caribou Recovery	Non-Timber Economic	Manual Brushing	Worst Case MPB	Worst Case MPB plus beetles	Worst Case Health, young stands
Timber Harvest	o	--	--	- or o	o	-	-	--	-
Old Forest	o	+	o	o	o	o	o	- or o	o
Old Interior Forest	o	+	o	o	o	o	o	- or o	o
Ungulates	o	+ or o	o	+	o	o	o	o	o
Patches	o	o	o	o	o	o	o	o	o
Scenic Areas	o	+ or o	o	o	+	+	o	o	o
Wildlife Tree Retention	o	+	o	o	o	o	o	o	o
Species Diversity	o	+ or o	+	o	o	o	o	o	o
Jobs	o	--	--	- or o	o	- or o	-	--	-

o = neutral impact + = positive impact - = negative impact

The number of symbols indicates the relative degree of impact.

6.2.3 Trade-off Analysis

Analysis of the preferred scenario did not highlight any major conflicts between indicators, therefore a formal trade-off analysis was not required. As outstanding projects are completed, new data becomes available, and new alternatives are developed, a formal trade-off analysis may be required. The decision to undertake a trade-off analysis will be discussed with the PAG at that time.

7.0 OPERATIONAL LEVEL PLANNING

The operational planning level reflects the “on-the-ground” imprint of the implementation of the strategies identified through the tactical level activities. The operational level plan essentially translates these strategies into site-specific practices and forest management activities such as harvesting, silviculture and road building to be implemented and adjusted to meet sustainability targets.

Operational implementation allows licensees to harvest sustainably where and when markets and efficiencies dictate, within the confines of the tactical plan and in a manner broadly consistent with the strategic level plan.

Operational plans generally span a 20-year time period. From that, annual scheduling of operations is completed, usually covering a five-year planning horizon. The operational planning level adheres to all required legislation but acts more as a reporting function than as a mechanism to approve operations.

The collection of the data to satisfy the majority of specific monitoring plans is also completed at this level. The assessment of monitoring information is described in the Adaptive Management Section (8.0) of this SFMP.

7.1 Sustainability Practices

The challenge for operational plans is to provide unambiguous instructions for forest practices. Vague statements often lead to unintended or deliberate misinterpretation. However, highly prescriptive plans tend to constrain the flexibility and professional judgment that is often necessary to achieve desired outcomes, particularly when one considers the diversity of social, economic and ecological values across this province. Plans need to be an appropriate mix of unambiguous, yet flexible, prescriptions and guidelines, and still be easily assessable and enforceable. The Forest Stewardship Plan needs be reflective of this mix. Sustainability practices for forest management, applicable at the local level, will provide the guidance for the specific site conditions and assist in designing plans and procedures to contribute to meeting sustainability targets.

Sustainability practices are developed at the tactical level but implemented at the operational level. The development of sustainability practices at the tactical level provides a longer-term plan that clearly link strategic planning with operational options. The operational level is where the results of the practices are evaluated (via monitoring programs) against the strategic goals.

Resource professionals and managers need to develop sustainability practices that reflect the requirements set out at the strategic and tactical levels. These practices include:

- Harvesting
- Silviculture
- Roads & Road Building
- Rehabilitation/Restoration

Forecasting indicates that current practices are sustainable. Current practices of the signatories are detailed in their respective Standard Operating Procedures (SOPs) or similar such documents.

7.2 Operating Plans/Schedules

The Forest Development Plan (FDP) is used, among other things, to identify candidate areas for the annual scheduling of forest management activities (harvesting, silviculture, and road building) that are planned to occur in the DFA. Although it is termed an annual operating plan, it typically covers a 5-year planning horizon, and is updated regularly. The plan may be amended throughout the year due to unforeseen circumstances such as weather, forest health issues, or economic factors.

The Forest Stewardship Plan (FSP) will replace the current, approved FDPs of the signatories concurrently with the implementation of this SFM Plan. The FSP is designed to provide operational flexibility while adhering to legislative requirements and other Higher Level Plans. The FSP is considered an operational component of the SFM Plan.

Both the FDP and FSP have public components that allow for input by stakeholders into operational activities. Concerns or comments are recorded, tracked, and addressed prior to finalizing the plan. Current copies of approved and/or proposed FSPs may be viewed at the signatories' respective offices during business hours.

Canfor Operational Plan Summary

Canfor operations are based on an identified supply of timber, stemming from a 20-year forecast of available volume. The FDP refines the available volume and projects a 5-year plan based on merchantability criteria (age and height class, piece size, volume), access to the resource, and operational feasibility. Canfor's 2002-2006 Forest Development Plan was approved on June 3, 2002 and has been amended several times since then. The FDP is comprised of several sections addressing such issues as: timber, riparian management, recreation, biological diversity, wildlife, cultural heritage resources, visual resources and scenic areas, forest health, terrain stability, access, and public, aboriginal, and government referral.

It is the Harvest Summary and Integrated Resource Management Tables (Appendix I – 2002-2006 Forest Development Plan) that lists the blocks proposed for harvesting over the specified time period. These tables cross-reference blocks shown on the FDP maps and describes block location, landscape unit, approximate area, silviculture system, harvest method, natural disturbance type, biodiversity emphasis option, patch size, and the status of any visual impact assessments, terrain stability assessments, or other assessments that may be required.

The Main Access Road Construction and Modification Schedules and Road Deactivation Schedules (Appendices II and III – 2002-2006 Forest Development Plan, respectively) detail road construction and deactivation activities proposed.

In addition to the appendices noted above, there are several other appendices that address landscape unit analysis, block comments and commitments, recreation features, and consultation efforts and any subsequent changes or commitments associated with public, stakeholder, or First Nations input. Also listed as an appendix are the various maps associated with the FDP.

The FSP replaces the FDP as the operational plan under which licensees operate on December 31, 2006 in accordance with the Forest and Range Practices Act (FRPA). Canfor's FSP was submitted for approval to the Ministry of Forests and Range on October 11, 2006 and is anticipated to be approved prior to December 31, 2006. Under FRPA, it is no longer required to identify the location and approximate size and shape of proposed blocks. Instead, areas that are identified for operations are included in a Forest Development Unit (FDU), within which the licensee has the discretion to locate blocks. In exchange for this operational flexibility, licensees must detail in their FSP how it will achieve a variety of objectives. These include objectives in respect to:

- Old Growth Management Areas,
- Soils,

- Wildlife,
- Riparian Areas,
- Landscape-level and Stand-level Biodiversity,
- Visual Quality and Scenic Areas,
- Cultural Heritage Resources,
- Recreation,
- Wildlife Habitat Areas and Ungulate Winter Ranges,
- Lakeshore Management Zones, and,
- Community and Fisheries Sensitive Watersheds.

In addition, the spread of invasive plants, natural range barriers, and stocking standards are also included in the FSP.

In recent years, Canfor has consolidated their operations in their southern operating areas in response to the mountain pine beetle outbreak. As the outbreak spread into the TSA from the south and west, Canfor responded by moving their harvesting operations into these areas in order to concentrate on harvesting beetle-attacked stands as well as those stands susceptible to mountain pine beetle attack. By doing so it is hoped that the spread of the outbreak can be minimized while capturing the economic value of the dead and/or dying timber. Operations in their northern operating areas is confined to silvicultural and road maintenance activities.

BCTS Operational Plan Summary

BC Timber Sales is responsible for all planning and administration of Timber Sale Licences issued to registrants with the Timber Sales Program. BCTS was previously known as the Small Business Forest Enterprise Program (SBFEP) and administered under the authority of the District Manager. The Prince George Business Area of BC Timber Sales came into existence on April 1, 2003 and became responsible for the former operations of the SBFEP in the Mackenzie Forest District.

Originally, the SBFEP and later BCTS attempted to plan and propose new development in conjunction with Canfor's and Abitibi's development. As a result of this planning approach some BCTS blocks were located in proximity of major licensee blocks and a common infrastructure shared. In other cases BCTS took the initiative to develop other small drainages that were previously un-developed. BCTS had also purchased approved blocks in the past to meet its targets for putting volume up for sale. Although part of the Ministry of Forests, BCTS was subjected to all the same processes required by government of major forest tenures. Forest Development Plans and amendments were prepared and disseminated for public review and comment. First Nations were consulted on their interests on the areas proposed for harvesting and road building or deactivation. The BC Timber Sales 2000 – 2005 FDP was approved on July 4, 2000. Over the last few years new development increasingly has been proposed in response to the spread of mountain pine beetle into areas in the southern part of the district. The last amendment to this development plan, amendment #10 was approved June 1, 2006. For the foreseeable future new development will need to focus on salvaging beetle damaged timber while planning for and managing the other resources and interests and values on the land.

In the fall of 2006, BC Timber Sales signed agreements with Canfor and Abitibi on negotiated operating areas. The new operating areas allowed for BCTS to initiate

development planning in areas previously assigned to other licensees. Amendment number 10 was the first proposal to develop many of these new areas for BCTS.

BC Timber Sales' FSP was submitted to the Mackenzie Forest District Manager for approval on November 20, 2006 and is anticipated to be approved prior to March 31, 2007. Under FRPA the provincial government has established the core values that must be addressed with results or strategies consistent with these core values. Our FSP established FDUs over our new operating areas as well as areas where we have proposed development outside those areas. Under the FSP, parties with an interest on the land covered by the FDU have been given an opportunity to identify their interests. BCTS will develop blocks and roads in the FDU while making efforts to manage impacts to those interests. The approach will be to focus development in areas that target pine leading stands that have been attacked by mountain pine beetle. Consultation will be undertaken with First Nations on future development with our FDUs.

BCTS has established through this SFMP a broader set of values that will be managed. Our performance in maintaining these values expressed as indicators and measures will be tracked over time and re-evaluated for effectiveness and appropriateness.

8.0 ADAPTIVE MANAGEMENT

Adaptive Management (AM) recognizes change as a constant factor so it is necessary to understand the root causes of what has, and may be changing. To do so requires learning how the economic, social and ecological systems change and reconfiguration in response to human attempts to manage them.

The desired concept of sustainability is described through management goals and objectives, with the associated uncertainties and risks translated into learning objectives. A structured monitoring process is used to generate results, which are then evaluated in terms of their validity, relevance and significance. Through the evaluation process, monitoring information is combined with values, experience, training and intuitive thinking in order to achieve shared knowledge and derive meaning that is useful in developing recommendations for adaptations to management practices, the overall plan, etc.

To be successful, AM also requires decision-makers to acknowledge that uncertainty is a given.

Therefore, SFMP's need to recognize that reality and work within it, rather than planning to eliminate uncertainty. This has implications for not only how the problems are defined, but also the mandate given to those who are responsible for addressing the problems.

A comprehensive AM approach has been developed to address the needs of a corporate forest company in relation to SFM. The resultant AM framework consists of:

- Corporate level strategies for developing and maintaining the necessary corporate culture to support effective use of AM;

- Program level approaches for incorporating AM principles into strategic, tactical and operational planning processes to create the necessary context for successful use of AM at the project-level. For example, the mobilizing force for implementing SFM policies, and;
- Project level assessment of opportunities/benefits/costs for utilizing various AM approaches on a project-by-project basis.

Continuous improvement, as exemplified in an AM Framework, is built in to the SFM system. The initial steps include:

- Monitoring
- Evaluation and analysis
- Reporting
- Adjustment

The following sections will detail how the steps will work together to instigate the continuous improvement loop of the SFM Planning process.

8.1 Monitoring Plan

Once the C&I and their related measures have been established by the technical experts, forest practitioners and the PAG and technical experts, monitoring plans will be established for each measure.

8.2 Evaluation & Analysis

As monitoring information is warehoused in the information management system, it will be evaluated for completeness and accuracy and then analyzed against the targets and thresholds developed for the DFA.

8.3 Reporting

A summary of the analyses of the monitoring information will have to be reported to the PAG, the technical specialists used in the initial SFMP development and to various government agency managers.

8.4 Adjustment

As part of the AM/continual improvement loop, the analysis and reporting steps may lead to necessary adjustments. Adjustments may be made to practices, measures or targets, depending on the analysis. Adjustments may be undertaken through the PAG process or through current government processes.

8.5 Strategic Review

Management Review of plans, policies or strategies is not a new component of forest management. What may be new is the content of what will be reviewed: performance measures as defined by the SFM system. Or the fact that the review is annual and has

a formal process for the review, reporting and resulting decisions about a portion or all of the SFMP.

Management review of the SFM Plan will be conducted in accordance with the signatories' EMS. The management review will discuss, among other things, performance measures and targets pertaining to the SFM Plan and strategic priorities. Required improvements will be determined including an appropriate action plan, prioritized, documented, and implemented. These actions will also be tracked in accordance with the signatories' EMS.

The SFM Plan will also be reviewed at least annually by the PAG. The PAG review will include;

- Strategic direction of the plan (i.e. whether the plan continues to reflect the values of the public),
- Updates of the plan,
- Achieved levels of performance measures and targets,
- Proposed actions to address required improvements,
- Any other required improvements to the SFM Plan such as;
    - Updates to the plan or related processes (such as monitoring),
    - Addition, deletion, or modification of measures and targets,

9.0 INFORMATION MANAGEMENT

Over time, information management has become an increasingly essential component of resource management, and it becomes even more important with the science-based, integrated nature of the SFM Framework. A variety of information needs to be warehoused in easily accessible formats including scientific background data and reports, resource inventory data, forecasting results, key uncertainties, risks implementation reports and monitoring/evaluation outcomes. Corporate planning and operations staff and, in some cases, personnel from several levels of government and stakeholders need access to the system to input and extract information. A cooperative, multi-user information management system (IMS) supports the shared learning and resultant knowledge approach of adaptive management, and the hierarchical structure of the Framework.

The development of new data, and the amalgamation of existing data into the SFM hierarchical planning framework and operational implementation require time and effort. IMS standards are outlined to reflect the unique characteristics of the data, analysis and reporting needs of the SFMP, and the IMS partners in the DFA.

An effective IMS includes the following characteristics:

- Standardized data formats for existing and new data;
- Multi-agency and corporate management through a designated group; and
- A powerful data warehouse structure

9.1 Data Standards

Much of the data generated in conjunction with the SFM Plan is generic across the industry and definitions and/or measures follow industry standards. Examples of this may be the measurement of area to one-tenth of a hectare, the measurement of volume in cubic metres, or the definition of a lost-time accident. Data standards for more specialized or specific work, such as resource inventories, will follow provincial standards unless a variance to these standards is documented and agreed to by the Province. Links to these standards can be found at http://www.for.gov.bc.ca/hcp/fia/landbase/.

Standards for data developed through monitoring and quantifying measures or targets are specified in the monitoring plan for each measure. Reporting data will be in a standardized format as outlined in the Current Status Table.

9.2 Data Management

Data that is not required to be shared amongst the signatories will be managed in accordance with each signatories' respective business processes. However, as much of the data does need to be shared, particularly in the development stage of the SFM Plan, the signatories have developed a SharePoint site that enables the signatories to share documents in real time. Access to the SharePoint site is at the discretion of the Steering Committee. The SharePoint site notifies the Steering Committee whenever any changes, edits, or revisions are made to any of the documents hosted on the site, allowing the signatories to have access to the most recent documents at any time.

9.3 Data Storage

The signatories have approached information storage from three directions;
1. Scientific data and reports, and resource inventory data – such information will be shared amongst the signatories' in accordance with the Memorandum of Understanding. The information will be stored in accordance with the signatories' respective procedures. Data, reports, and inventories arising from publicly funded work (e.g. Forest Investment Account) will also be stored in the appropriate, publicly-accessible repository.
2. SFM support documents – documents that support the SFM Plan, but are not included in the plan will be stored on the signatories' SharePoint site. Such documents may include PAG documents. Hard copies of documents will be stored in accordance with the respective signatories' EMS.
3. SFM documents – documents that are an integral part of the SFM Plan (i.e. the plan and associated appendices) will also be stored on the SharePoint site. In addition, these documents will also be stored on an external, publicly-accessible website. Hard copies of documents will be stored in accordance with the respective signatories' EMS.

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