# Sustainable Forest Management Plan
# Radium Defined Forest Area
# Version 3.1

Z809-08
November 2012

**Canadian Forest Products Ltd.**
Planning Coordinator
Grant Neville
Radium Woodlands

*"Sustainable forest management is the balanced, concurrent sustainability of forestry-related ecological, social and economic values for a defined area over a defined time frame."*

# Acknowledgements

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

**Members of *FOREST* (2011) Public Advisory Group**

Lyle Wilson (Commercial Recreation, Woodlots)
Chris Paget (Interested Public)
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Peter Feldman (Rancher)
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Nola Alt (Spillimacheen residents)
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Dave Hillary (EKCP)
Peter Hale (Invermere Community Forest)
John Bergenske (Wildsight)

**Canfor Forest Management Group**

Grant Neville – Planning Coordinator
Ken Streloff – Planning Supervisor
Peter Baird – Planning Manager

**BCTS Representatives**

Sean Slimmon – Planning Forester
Roger Powell – Practices Forester

**Facilitator& Support**

Brenda Hopkin – Hopkin Forest Mgt Consulting Ltd

# Signature Page

## SIGNATURES

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

March 25, 2013.

Grant Neville, R.P.F., Date
First Nations and Planning Coordinator
Canadian Forest Products Ltd., Kootenay Region.

Mar. 25/13

Peter Baird, RPF. Planning Manager Date
Canadian Forest Products Ltd.
Forest Management Group

# Executive Summary

Between July 2003 and September 2005 forest tenure holders ("licensees") operating in the Radium Defined Forest Area (DFA), Canadian Forest Products Ltd. – Radium Woodlands and British Columbia Timber Sales –Kootenay Business Area, East Kootenay Field Unit (BCTS), worked with members of the public, local stakeholders, Ministry of Forests and Range, Integrated Land Management Bureau, Ministry of the Environment, and Aboriginal representatives to develop a Sustainable Forest Management Plan (SFM Plan) for the Radium Defined Forest Area (DFA). The SFM Plan was updated in December 2007 to address changes in forest condition, public, stakeholder, and Aboriginals input and local community values. A further update in 2011/2012 has taken place in order to change the plan from the old "SFM Framework" format to suit the wording and requirements of the Canadian Standards Association (CSA) Sustainable Forest Management Requirements and Guidance (CSA Z809-08) standard.

The CSA standard sets requirements for public participation, performance, management systems, review of actions, monitoring of effectiveness, and continual improvement. Through the public particiation, performance objectives are developed for a DFA to reflect local and regional interests. Consistent with most certifications, the CSA standards expect compliance with existing forest policies, laws and regulations. This edition of the SFM Plan includes updated references to the applicable laws and regulations, as well as an updated suite of Criteria, Elements, Values, Objectives, Core indicators and targets that address the current environmental, economic and social conditions within the Radium DFA. This SFM Plan is based on the Canadian Standards Association (CSA) Sustainable Forest Management Requirements and Guidance (CSA Z809-08), which is one of the most common forest certification systems in use in British Columbia. This SFM Plan localizes the implementation and monitoring of the criteria and elements.

The initial development and subsequent changes to the SFM Plan have been achieved through the ongoing input and support of the Radium SFM Public Advisory Group (PAG), also known as the Forest Operation Resource Environmental Stewardship Team (*FOREST*). Members of the PAG represented a broad cross-section of local interests including, but not limited to, recreation, tourism, education, trapping, farming, forestry, conservation, water, local communities, and Aboriginal communities. BCTS has remained on the PAG as an active participant but are no longer signatories to the plan.

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

# Canfor Environmental Policies

Canfor believes in conducting its business in a manner that protects the environment and ensures sustainable forest management. In July of 1999, Canfor formally announced its commitment to seek sustainable forest management certification of the company's forestry operations under the Canadian Standards Association (CSA) Sustainable Forest Management standard (CSA Z809-08). The Sustainable Forest Management Plan presented here and its implementation is intended to fulfil that commitment for Canfor's Radium operation.

The management of Canfor has set out a number of commitments that define the mission, vision, policies and guiding principles for the company. These include the Canfor Mission, Environment Policy and Sustainable Forest Management Commitments. These commitments have been used to enable and guide the development of this Sustainable Forest Management Plan. In addition, they also commit to continual improvement of performance through implementing the plan under the principles of adaptive management.

Canfor's *Environmental Policy* and *Sustainable Forest Management Commitments* detail the commitments to Environmental and Sustainable Forest Management for the Canfor Radium Defined Forest Area. These commitments are communicated internally and externally to all interested parties.

To access and read the detailed *Environmental Policy* and *SFM Commitments* please link to:

http://www.canfor.com/responsibility/environmental/policies

# ENVIRONMENT POLICY

We are committed to responsible stewardship of the environment throughout our operations.

**We will:**

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

**Don Kayne**
President and Chief Executive Officer

**Ronald L. Cliff**
Chairman

May 2011

CANFOR

# Sustainable Forest Management Commitments

## Canadian Forest Products

*Sustainable Forest Management Commitments - May 2012*

CANFOR

### Sustainable Forest Management

We will manage forests to maintain and enhance the long-term health of forest ecosystems, while providing ecological, economic, social and cultural opportunities for the benefit of current and future generations. In the management of forests we will honour relevant international agreements and conventions to which Canada is a signatory.

### Accountability

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

### Adaptive Management

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

### Science

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

### Multiple Value Management

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

### Health and Safety

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

### Aboriginal Peoples

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

**Opportunities for Participation**

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

**Scale**

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

**Timber Resource**

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

**Forest Land Base**

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

Don Kayne

President and Chief Executive Officer

May 2012

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# 1.0 Introduction

## 1.1 Background to Sustainable Forest Management

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

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

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

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

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

Canfor is committed to SFM in the Radium DFA and has provided and communicated these commitments publicly. The policies found in the Preamble of this document provide the SFM commitments for Canfor.

### 1.1.1 Migration to CSA Z809-08

In December of 2008, CSA released its new Z809-08 standard for Sustainable Forest Management. During independent and internal audits in 2009, it was identified as an opportunity for improvement to migrate the SFMP away from the SFM Framework to the new standard. The reason for this was that the old SFM framework used different descriptive wording for SFM performance from the new standard (Measures and Targets versus Elements Values, Objectives, Indicators, and Targets) which made it harder for auditors to assess the adequacy of the plan against the standard and also made comparisons difficult with other Canfor SFM Plans to look for reporting efficiencies.

With this in mind, this new 2011 updated plan will be fully adopting the new nomenclature of the CSA standard and migrating the old measures and targets over to core indicators and targets.

## 1.2 Purpose of an SFM Plan

The purpose of this Sustainable Forest Management Plan (SFMP or SFM Plan) for the Radium Defined Forest Area (DFA) is to provide an SFM-related planning document that localizes and operationalizes aspects of the SFM Framework with the CSA Z809-08 standard. The SFM Plan provides the "on-the-ground" implementation of CSA Elements, Core Indicators as well as locally developed Indicators, by addressing a range of social, ecological and economic values for the DFA. It is updated annually through the SFMP Annual Report and wholly revised approximately every 5 years, or as may be necessary to remain consistent and/or compliant with;

1) significant aspects of the CSA Z809-08 standard,

2) public, stakeholder and Aboriginal values, interests and/or treaty rights, and

3) provincial forestry laws, legislation and/or regulatory requirements.

The management unit (area) covered by this SFM Plan is termed the "Defined Forest Area" (DFA) and is described in Section 3.0 Background to the SFM Plan.

The Sustainable Forest Management Framework Document (2003) was the document that initially provided many of the concepts and rationales supporting the current SFM approach. The SFM Plan has now migrated to the Z809-08 standard as a vehicle to track how management policies and practices are doing relative to sustainability targets.

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

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

- Marketplace recognition,
- A foundation for a range of certification approaches,
- Providing credible information for requesting unit specific management objectives to improve economic efficiencies,
- Engaging the Aboriginals in ways that reflect their preferences and readiness,
- Rigorous, science based approaches and information allows government decision makers to accept innovative, cost-effective practices, and corporate managers to implement practices with a minimum of conflict,
- Engaging stakeholders efficiently, in ways that reflect their interests and capacity,
- Improved marketplace acceptance, government approval of innovative approaches, reduced conflict, increased certainty and effective information management will reduce costs,
- Certification and other marketing benefits,
- Providing for testing & implementation of the Kootenay Boundary Land Use Plan, and
- Providing for continual improvement of forest management activities/practices with input from stakeholders and employees.

The following describes the nine sections of the SFM Plan:

- Preamble provides the SFM commitments and policies for Canfor.
- Section 1.0 provides the background and purpose of this plan.
- Section 2.0 describes the SFM Planning process, including plan development, structure and responsibilities of those involved, as well as other resource management initiatives.
- Section 3.0 provides the background information about the DFA, including description of the DFA – geographically, biologically, and socio-economically.
- Section 4.0 covers the foundation for sustainable forest management in the DFA. The foundation of SFM Planning includes identifying or understanding the key issues, inventories, stakeholders, current practices, and decision support tools available.
- Section 5.0 describes the sustainability goals for the DFA through locally defined Criteria and Indicators (C&I) – ecologically, economically and socially.
- Section 6.0 provides the translation of the sustainability goals to the Tactical Level Planning. This section integrates the inventories, current conditions, management assumptions and forecasts future forest conditions to determine a scenario that is sustainable for a range of forestry related values.
- Section 7.0 provides the translation of the sustainability goals to operations through the integration with operational level plans, strategies, practices and training.
- Section 8.0 describes the continual improvement loop, inherent in Adaptive Management and describes the information management systems, monitoring, analysis, reporting and resulting management decisions.
- Appendices provide the background information and additional DFA specific content to support the SFM Plan.

# 2.0 SFM Planning Process

Section 2.0 provides the following breakdown of information:

- Section 2.1 describes how the SFM Plan was developed and is implemented, as well as outlines the continual improvement to the plan through plan maintenance.
- Section 2.2 outlines the structure and responsibilities of the groups involved in the development, implementation and maintenance of the plan.
- Section 2.3 provides a listing and brief description of the forest management initiatives and documents applicable to the DFA that are captured within the strategic SFM concept and/or the SFM Plan. It is important that these initiatives and documents are considered to be part of the SFM Plan.

## 2.1 Plan Development, Implementation & Maintenance

The first step in implementing the Sustainable Forest Managent Plan (SFMP) for the Radium DFA was to clearly state the commitment to SFM from senior management through the SFM Commitments[1]. The SFM Commitments provide the foundation and guidance to Canfor.

Following the tenets set out in the SFM Commitments, a number of key activities were undertaken to establish the foundation for a formal planning process. The activities included:

- Management unit was defined – geographically, ecologically, economically, and socially,
- Areas adjacent to the unit t (i.e. parks, regional service communities, etc.) were identified,
- Forest managers identified key issues that may affect (or be affected by) the achievement of indicators and that need to be addressed in the SFM Plan,
- Forest managers incorporated provincial forest management initiatives (i.e. legislation, policy, etc.),
- Aboriginals, stakeholder and public participation/involvement processes were initiated,
- Available information was collated, including:
    - resource inventories for the criteria and indicators identified;
    - reports, datasets and analysis tools from previous planning processes;
    - information about new forecasting and analysis tools that may be relevant; and
    - a stakeholder analysis for the unit.

[1] SFM Policies for Canfor are found within the Preamble to this SFM Plan

## SFM Plan Development

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

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

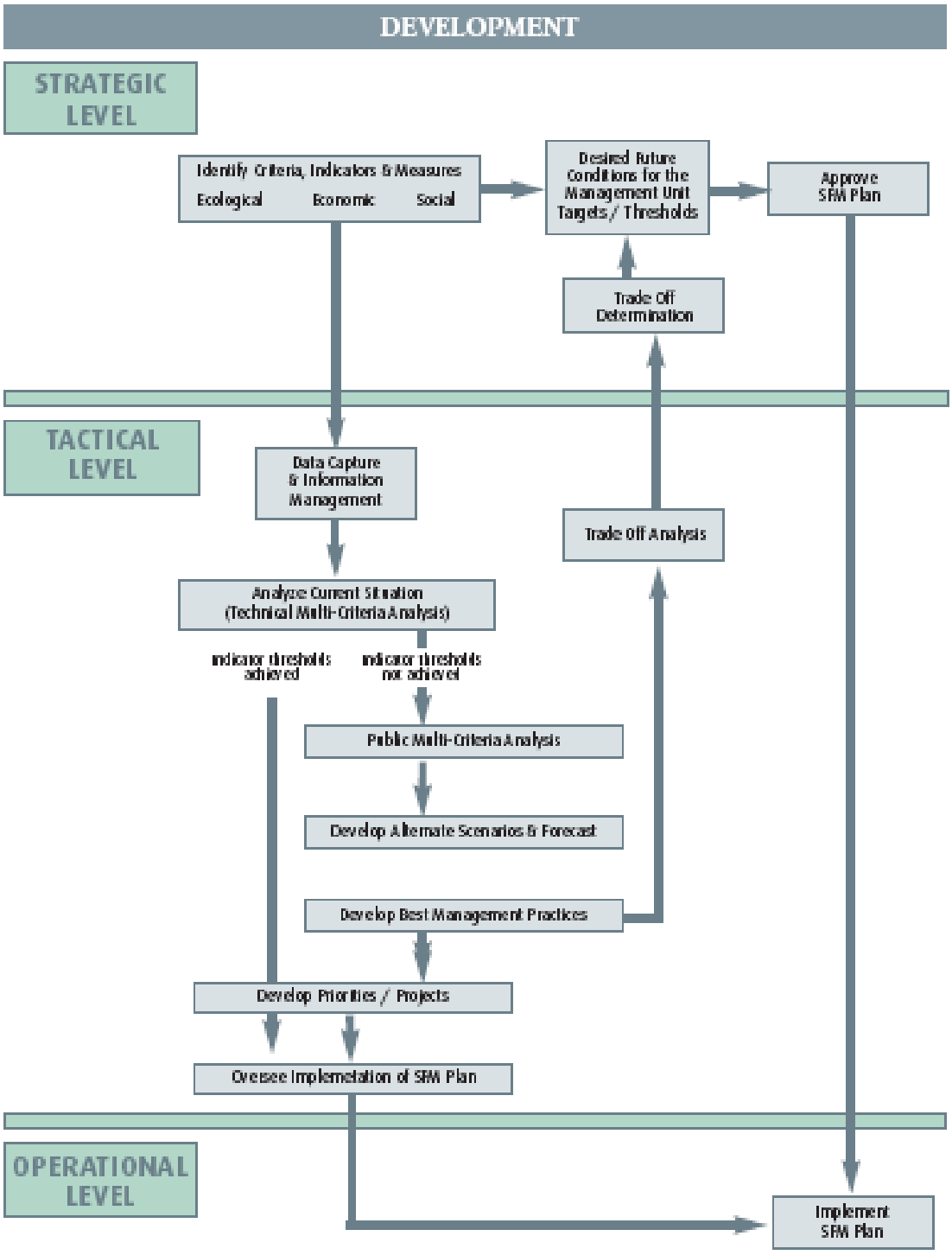
The outcome of the Strategic Level of planning is a Sustainable Forest Management Plan that meets the performance requirements of the CSA Z809-08 standard. The SFM Plan directs tactical and operational plans and practices within the Radium DFA. The critical step, at this planning level, was to localize the core set of Values, Objectives, Indicators, and Targets developed under the Framework and linked to the criteria, elements and core indicators from the CSAZ809-08 standard. This was accomplished through a combination of expert technical and stakeholder input. The desired future conditions for criteria and elements were determined through the articulation of measures and thresholds by the public advisory group (PAG). These Criteria have now become the CSA standard Criteria and the SFM framework Indicators have become Elements. The SFM Framework measures have become indicators under the revised SFMP. The strategic level is essentially captured within Section 5.1 Criteria, Elements, Indicators, Targets.

In the **Tactical Level** of planning, analysis focused on expected areas of operations over the next 20 years, which is a planning horizon that resource managers are familiar with through previous harvesting planning approaches. This level also analyzed data for longer time periods to ensure that practices are still within sustainable thresholds and moving towards the desired future forest condition. Section 6.0 Tactical Level Planning provides the details, but the main components completed at the tactical level included:

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

At the **Operational Level**, site- and treatment- specific planning such as site plans articulate the strategies and practices needed to achieve the preferred scenario while remaining consistent with legislative and corporate requirements, unless the strategic or tactical plans included adjustments to these practices. Section 7.0 Operational Level Planning provides the details on this planning level.

**Figure 1: SFM Plan Development Flowchart**



## SFM Plan Implementation & Maintenance

Once operational level plans are in place, the development phase of the SFM Plan is completed and resource managers begin implementing operational activities and collecting monitoring data according to the plan (Figure 2). As the operational level begins to gather data and assess the impacts of implementing the plan, the tactical level undertakes analysis of the information and the linkage between the levels continues to cycle.

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

A key task at the operational level is monitoring data collection, analysis and reporting as part of a scientifically sound, operationally feasible adaptive management plan. Monitoring responsibilities will be clearly defined in the adaptive management components of the strategic and tactical plans, and are likely to be shared with others including governments and interest groups. Monitoring information derived at the operational level will be available to the public, which is crucial for maintaining public support for SFM.

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

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

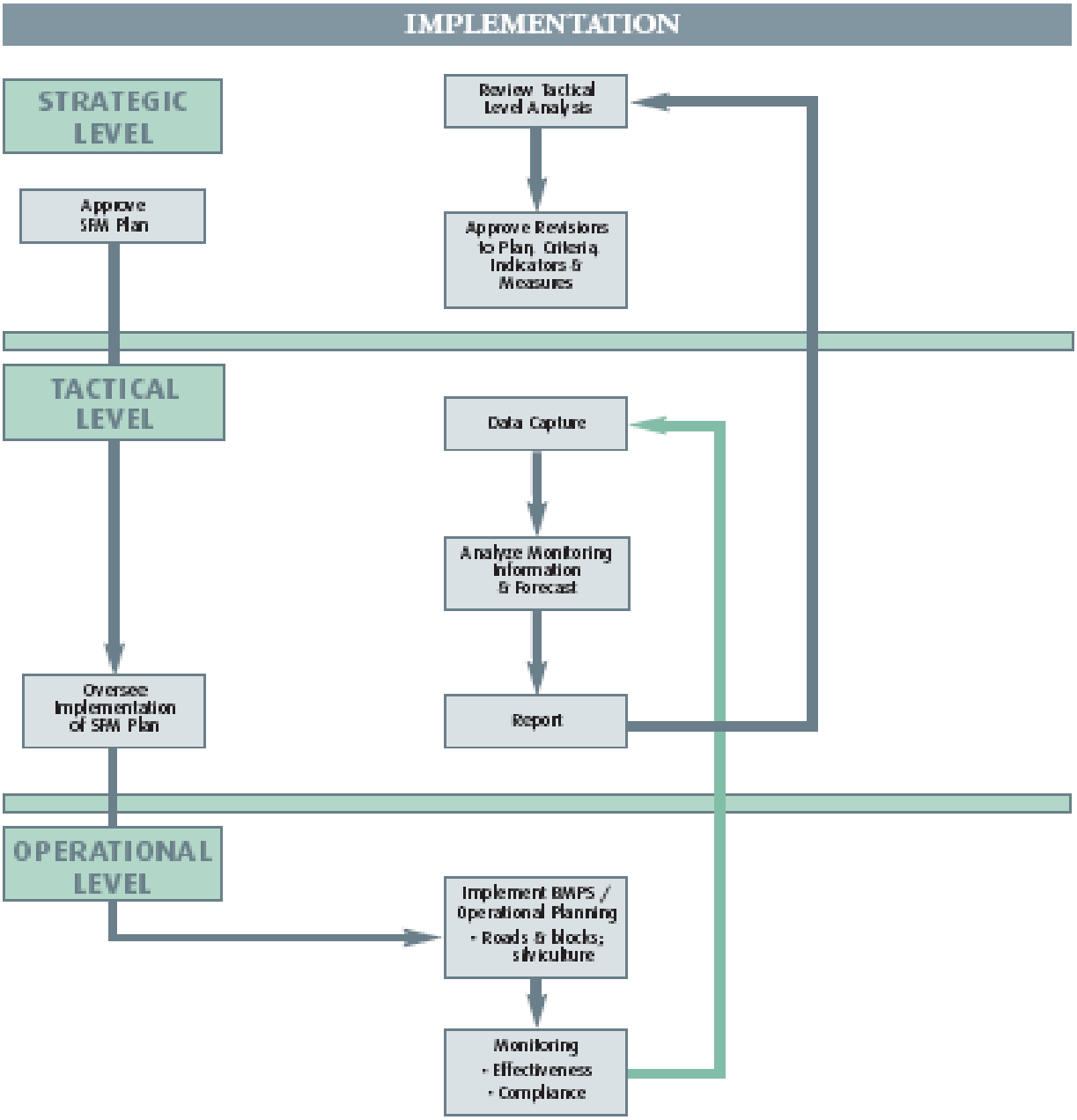
The **Strategic Level** completes the continual improvement loop by providing Canfor the opportunity to examine their performance against all of the SFM requirements, both individually and collectively and making appropriate changes if required or recommended. Annually, the following steps are completed:

- Review tactical-level analysis
- Consider a systems internal audit
- Consider appropriate changes to SFM Policy
- Consider appropriate revisions, replacement, or additions to indicators, or targets
- Consider appropriate changes to strategies or practices
- Consider appropriate staffing &/or resource levels for SFM implementation

Both the SFM Plan and the SFMP Annual Report are publicly available[2]. The general intent is that the SFM Plan is updated annually through the SFMP Annual Report and wholly revised every **five** years. However, on an "as needed basis", the SFM Plan may require updates that are necessary to facilitate adaptive management at a strategic, tactical or operational level. These are described in more detail in Section 8.4 Adaptation.

[2] SFM Plan and associated documents are available on the Canfor Website and at the Canfor Radium Office

**Figure 2: SFM Plan Implementation Flowchart**



## 2.2 Structure and Responsibility

The organizational structure for input into the development and maintenance of the SFM Plan consists of representatives from Canfor, BCTS, as well as interested and/or directly affected parties. The two main groups are a technical working group consisting of Canfor representatives and a public advisory group (PAG), which includes BCTS representatives.

The technical working group has been formed to assist in the development of the SFM Plan. This group consists of representatives from Canfor and BCTS. This group is responsible for the development, implementation and maintenance of the SFM Plan.

Aboriginal and public participation is keystone for sustainable forest management. A process for the involvement of those interested and/or affected by forest management is fundamental to exchanging information about the DFA resource management related priorities. This process allows for input, evaluation, and feedback into the SFMP. Valuable input is a result of informed, inclusive and fair consultative processes with local people who are directly affected, or who have an interest in, resource management in the DFA.

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

### 2.2.1 Signatories Involvement

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

- Canadian Forest Products Ltd. (Canfor) – Radium Woodlands

On publicly owned land, the responsibility and accountability of forest stewardship ultimately rests with the province of BC, however, the signatories to this plan are held responsible for forest management under legislative and contractual agreement through their respective tenure agreements. In light of the development of market driven third party voluntary certification schemes, there is an opportunity for an alternate form of stewardship under SFM. The results of this SFM Plan will help facilitate that process.

The defined forest area (DFA) includes the collective areas under which Canfor operates and has legal rights and responsibilities for those areas. For those parties within or adjacent to the area but are not signatory to this plan, Canfor acknowledges that they have considered and respected their legal rights and responsibilities.

Initiatives that are currently a part of Canfors operation will be important for implementation of the overall SFM Plan. While this SFM Plan is the primary document that will be used to guide implementation of SFM, other existing management systems, operating procedures and internal policies will also play a role. These components have been considered during the development of this plan.

In order to implement the SFM Plan, it is important that roles and responsibilities are identified. The following table outlines the general duties for each of the three main groups for Canfor: Senior Managers; SFM Representatives; and operational staff. These roles and responsibilities are in addition to those identified within the companies forest management system (FMS)

**Table 1: Canfor – Radium DFA Roles & Responsibilities**

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

Details on Canfor's structure, authority and roles and responsibilities, can be found within the Forest Management System (FMS) within the Radium office.

### 2.2.2 Public Involvement

The Radium DFA previously and currently adheres to the legislative review and comment process for public input. Based on the concepts and practices of the Strategic SFM Concept, the DFA is in the process of facilitating a more thorough and meaningful review process with the public and interest groups of the local area (i.e. Aboriginals, general public, and other stakeholders). This public involvement process will provide input, evaluation and feedback into the SFM Plan and therefore, into SFM for the DFA.

The process includes broad public discussion during the development of the values, objectives, indicators and targets of sustainability and allows for open dialogue and input to occur, based on information being available and understood by all parties. This process will allow stakeholders the opportunity for ongoing influence on decisions, continual input, learning and potential resolution of issues.

Canfor has engaged, and will continue to engage the participation of directly affected and interested parties in the planning process for the DFA based on the results of the details found in Section 4.3

Stakeholder Analysis. The Stakeholder Analysis is the basis for the public involvement process addressing the public's varied knowledge of SFM, its different level of interests, involvement, as well as differing social, cultural and economic ties with the forest.

Utilizing results from the Stakeholder Analysis, a balanced and representative mix of persons affected by, or interested in, forest management were invited to be members of a public advisory group (PAG). Details about the Stakeholder Analysis process can be found in Section 4.3 Stakeholder Analysis. Details on the establishment of the PAG can be seen below. For privacy reasons, people's contact information are not presented in this SFM Plan, however, Table 2 below provides the interests groups that were invited to participate on the PAG. Some of those (people/groups) invited chose not to be involved in the process at this time. The groups with active representation are indicated by an asterisk (*) in the table below. The groups indicated by (#) began the process but have not continued to attend meetings. These latter groups received information generated from the PAG until it was collectively decided at meeting #10 to stop sending information. They were informed however, that if they would like to join again or receive information, they could contact the group facilitator.

**Table 2: Interest Groups Invited on PAG**

| **Local Government** | **Aboriginal Communities** |
|---|---|
| East Kootenay Regional District<br>Radium Town Council<br>District of Invermere | Shuswap Band<br><br>Ktunaxa Nation Council (KNC)* including:<br>?Akisq'nuk Band<br>St. Mary's Band<br>Lower Kootenay Band<br>Tobacco Plains Band |
| **Tenure holders** | **Government** |
| Woodlots*<br>Christmas trees*<br>Commercial Recreation*<br>Trappers #<br>Guide Outfitter#<br>Ranchers*<br>Prospectors | **Provincial (Ministries)**<br>Aboriginal Relations and Reconciliation<br>Agriculture<br>Energy and Mines<br>Environment<br>Forests, Lands and Natural Resource Operations<br><br>**Federal**<br>Parks Canada* |
| **ENGO's** | **Interest Groups** |
| Wildsight*<br>Columbia Basin Trust<br>Nature Trust | Informally structured area groups* |
| **Workers** | **Miscellaneous** |
| IWA Canada #<br>Silviculture Consultants*<br>Logging Contractor #<br>Chamber of commerce* | Tourism*,<br>Non-commercial recreation*<br>Resorts* |

Note: Informally Structured Area Groups – i.e. Spillimacheen Residents

The public advisory group for the Radium DFA formed in April 2005 and has since been called the "Forest Operation Resource Environmental Stewardship Team" (*FOREST*). The structure of *FOREST* is outlined and updated as needed in the Terms of Reference (TOR) for the Radium DFA. The TOR provides the organizational structure used for the assignment of the duties of team members, advisors and reviewers. It outlines the basic operating rules for the public involvement process, including dispute resolution and the addition or removal of PAG members. The TOR also outlines the schedule for the development and maintenance of the SFM Plan, including the involvement schedule and communications. The documentation on the establishment, assembly and running of meetings, as well as the TOR can be reviewed at the Canfor Radium office.

This public involvement process contributed to the identification of local values, objectives, indicators and targets (5.1 Criteria, Elements, Indicators, Targets). It has been an effective process, involving a wide variety of people and interest groups. This process allows stakeholders the opportunity for continual input, and learning, as well as ongoing influence on decisions, and the potential resolution of issues.

To build on the public participation process, the existing stakeholder analysis will be reviewed, updated and used to solicit additional membership into *FOREST*. As well, the development of the communication/participation plan and working with *FOREST* and other specialists to review and identify additional local input processes will be initiated in order to reach a wider audience beyond *FOREST*. Prior to the completion of the communication/participation plan, a review/analysis of stakeholders was completed in early 2007. This brief analysis indicated that *FOREST* would benefit from the addition of some potential members: labour, guides, trappers and Aboriginals. During 2010 and 2011, extensive attempts have been made to solicit new PAG members. This has included a review of the Stakeholder Analysis to find identified groups that are not currently represented on the PAG. As well, the current PAG members have suggested a number of inidividuals or groups. All individuals and groups have been contacted and two new members have joined the PAG in 2011.

### 2.2.3 Aboriginal Involvement

Aboriginals 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. This includes Crown lands outside areas where treaties apply. Canfor recognizes all Aboriginals and treaty rights, and will facilitate the involvement of Aboriginals in the SFM Plan.

Aboriginal participation is a part of the overall public involvement process, as much as possible. If Aboriginal participation in the PAG is not possible for specific reasons, then Canfor will provide an opportunity to participate through a process specific to Aboriginals. The Ktunaxa Nation has traditional areas which overlap the Radium DFA. At this point in time, the Ktunaxa do not have the capacity to respond or provide meaningful input into the development of the SFM Plan despite the efforts made by Canfor. Limited input and comments were provided by the local Aboriginals in the initial stages of the SFM Plan development. Details specific to the involvement process with Aboriginals, including the Terms of Reference (TOR) can be reviewed at the Canfor Radium office.

The Aboriginal Communities and Councils that have an interest or that are present in the DFA include:

- Shuswap Band
- Tobacco Plains Band
- Ktunaxa Nation Council (KNC)* including:
    - ?Akisq'nuk Band
    - St. Mary's Band
    - Lower Kootenay Band

### 2.2.4 Other Tenure Holders

This SFM Plan discusses the intent and actions for Canfor within their respective and collective operating areas. It must be understood that other licensees (i.e.Galloway, BC Timber Sales, Salvage Non-Replaceable Forest Licences (SNRFL), Forest Licences (FL)) or tenure holders (i.e. range, commercial tourism, mining, etc.) may conduct harvesting and associated activities on the DFA under authority given by the British Columbia government.

Generally, other Licensees are responsible for the construction and maintenance of roads and stream crossings necessary to access the harvest areas approved by the British Columbia government. Other Licensees are responsible for hiring competent and skilled employees and are responsible for the direction, supervision, training and control of their employees. The performance of Other Licensees is subject to the review and inspection of British Columbia government compliance and enforcement officers and must fully comply with the applicable laws and regulations while operating on the DFA.

Currently there is one small FL within the DFA (less than 2% of the AAC on the DFA). The small FL within Canfor's operating area is being managed by another licencee and focused on mountain pine beetle salvage. The FL licence holder is responsible for all harvesting, road building and silviculture activities for their areas. The licence holder is not signatory to the SFMP, however, they are signatory to Canfor's Forest Stewardship Plan (FSP). They provide havest, road building and silviculture activities to Canfor.

The signatories to this plan do not have the right to direct or control other Licensees, tenure holders and/or their respective employees. As well, Canfor will not be responsible for other tenure holder activities in the DFA under this SFM plan. However, these other tenure holders have been invited to be involved in the SFM process via *FOREST*. In addition, Canfor will communicate their SFM commitments to all known tenure holders in relationship to this SFM Plan through traditional communication approaches (i.e. Invermere Forestry Association meetings, Legislative Review & Comment, etc.).

## 2.3 SFM Plan Links to Other Strategic Initiatives

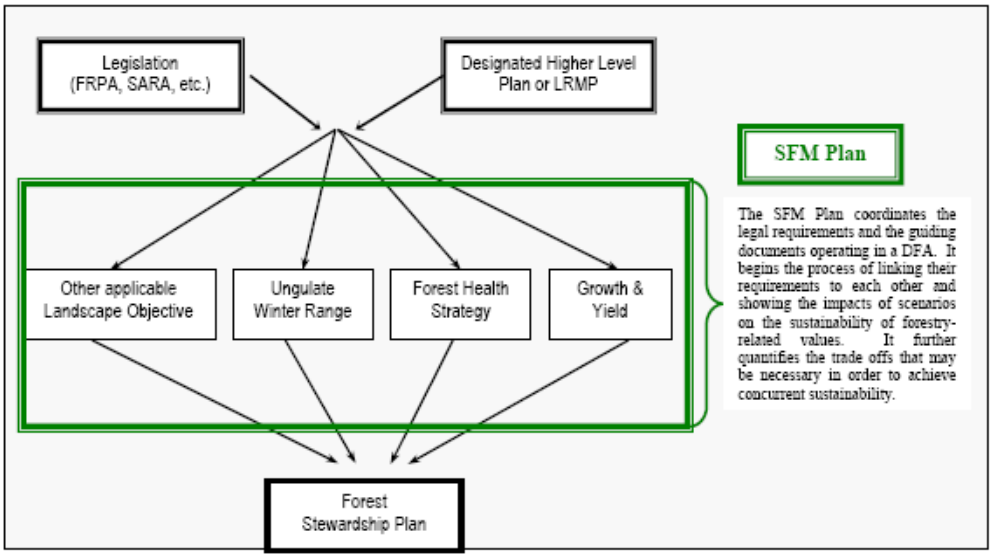
There are a number of policy, market and professional forest management drivers that are currently underway in BC. Few of these initiatives have been developed in context of each other or are linked within a larger planning environment, nor do they propose operational tools to address many of the strategic-level forest management approaches. The SFM Plan can assist with the implementation and integration of many of these initiatives and show how the requirements of each can be brought together, in order to gain efficiencies and improve overall management of forest resources.

This SFM Plan describes the SFM system for the DFA. The SFM Plan is a comprehensive planning document that integrates provincial legislative requirements, as well as many previously implemented forestry or land use initiatives. Applicable legislation and the most influential initiatives are described below, providing a listing and description of the linkages to the SFM Plan. Table 3 provides information on how the SFM Plan addresses the listed initiative.

### 2.3.1 Strategic Forest Management Initiatives

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

**Figure 3: SFM Plan Linkage to Strategic Initiatives**




Source: P. Jeakins, 2004

Table 3 contains a list of legislative requirements, strategic policies and/or initiatives applicable to the DFA. These documents are not appended to the SFM Plan, but will be consulted / considered during the PAG process, as well as the development/implementation/maintenance of this SFM Plan.

**Table 3: SFM Plan Links to Other Strategic Forest Management Initiatives**

| Forest Management or Sustainability Initiative | Linkage to SFM Plan |
|---|---|
| Forest and Range Practices Act (FRPA) | FRPA provides forest managers with a "results-based" structure upon which to develop and deliver forest management.<br><br>The SFM Plan is also "results-based". The SFM Plan, and supporting SFM Framework, provides the signatories the context to develop, implement and report on achievement of objectives either those set by government or proposed changes to set objectives. At a minimum, the SFM Plan must meet or exceed the requirements of FRPA. However, the documentation for the SFM Framework and local SFM Plan may provide the rationales for any proposed changes to any objectives. |
| Higher Level Plan | Community-based processes (such as the CORE process in the Kootenay-Boundary Region) for land use planning were completed throughout the province of BC. The resultant plans provide strategic direction and objectives for identified resource management areas. Some of these plans are legislative, while others fall under government policy.<br><br>The SFM Plan provides further refinement to the setting of strategic direction and implementation, as well as providing a process to encourage and accept change, following the concepts of SFM. |
| Timber Supply Review for Timber Supply Area (TSR for TSA) | The main objectives of the Timber Supply Review (TSR) are to:<br>1) Identify the economic, environmental and social information that reflects the current forest management practices— including their effects on the short- and long-term timber supply; |

| Forest Management or Sustainability Initiative | Linkage to SFM Plan |
|---|---|
| | 2) Identify where improved information is required for future timber supply forecasts; and<br>3) Provide the Chief Forester with information to make any necessary adjustments to the allowable annual cuts for the next five years.<br><br>Following the concept of the SFM Framework, the SFM Plan currently addresses the first and second objectives. It is anticipated that once the SFM Plan is fully implemented, the nature of TSR will change to become part of the development of the SFM Plan. |
| Canadian Standards Association (CSA) | The CSA Z809-08 Standard outlines the use of CCFM SFM criteria and CSA SFM elements. It requires public involvement in the process of setting locally appropriate values, objectives, indicators and targets.<br><br>This SFM Plan is the document that supports the SFM Requirements of CSA Z809-08 Standards. Many of the components of the plan or components of the SFM Framework satisfy the balance of the CSA requirements. Appendix 2.1: Translation Information between SFM C&I vs. CSA provides a matrix that cross references where CSA requirements are addressed within the SFM Plan. |
| ISO 14001 Forest Management System (FMS) | ISO 14001 provides organizations with the elements of an effective management system. This system was developed in a manner that is easily integrated with other management systems. The FMS provides the management system framework required for the CSA Z809-02 Standard. Compliance with all regulatory requirements is described within the FMS.<br><br>The FMS provides the foundation for the management system of the SFM Plan. The primary linkage between the FMS and SFM will be in the areas of roles & responsibilities, tracking, monitoring, corrective actions, internal/external audits and reporting of performance, as well as regulatory compliance. |
| Land Based Investment Strategy (LBIS) | LBIS provides funding to forest sector associations, researchers, tenure holders, manufacturers, and government agencies to: support sustainable forest management practices; improve the public forest asset base and promote greater returns from the utilization of public timber.<br><br>LBIS (previously Forsest Investment Account (FIA)) funding has been the financial support for many of the projects for testing SFM concepts including the resultant SFM Plan. |

### 2.3.2 Strategic Plans, Policies & Supporting Documents

In addition to the SFM Policies applicable to the Radium DFA, addressing strategic policies/plans developed through other initiatives and legislation is essential for a complete understanding of SFM applicable to the Radium DFA. These external, yet related documents are categorized into Strategic Plans/Policies (Table 4) or Supporting Documents (Table 5) and are listed below. Some of these requirements are in addition to being compliant with legislative and regulatory requirements established by federal, provincial or local levels of authority. The following contains a list of all DFA applicable strategic plans and/or policies.

**Table 4: SFM Plan Linkages to Strategic Plans/Policy**

| Strategic Plan / Policy | Linkages to SFM Plan |
|---|---|
| Kootenay Boundary Higher Level Plan (KBHLP) Order<br>(October 26, 2002) | The KBHLP Order gives legal status to Landscape Units, Biodiversity Emphasis Options with specific Old and Mature Retention Targets, Connectivity Corridors, Caribou Management Areas, Scenic Corridors, and Enhanced Resource Development Zones. These legally established land-use objectives were considered and complied with in the development of this SFM Plan. |
| Invermere TSA AAC Determination, November, 2005 & Supporting Reports | The AAC determines the timber that is available for harvest in the TSA. It provides the default description of the NHLB and THLB when indicator mapping has not been undertaken. |
| Invermere TSA TSR3 Analysis & Data Package, 2004 | TSR3 Data Package Submission and Analysis Report (2004) provide the inventory base and analysis rigor to assess SFM within the SFM Plan tactical planning section.<br>All TSR reports are important for SFM Planning given the mandate and scope of TSR. These reports provide DFA specific information for the analysis process. SFM Plans build on the TSR process. |
| Forest Stewardship Plan (FSP)<br>Canfor – March 2006 | FSPs link government objectives to practices on the ground through various results and strategies. Under the new FRPA legislation, the FSP will be one of the only operational plans that will be submitted to government for approval.<br>The FSP is a landscape level plan that will be the driver of site-specific operational plans, following the requirements of the SFM Plan. It will be the primary operational plan that will contain management strategies to achieve the SFM. The responsibility of the individual licensee to ensure that SFM principles are upheld through implementation of this and other operational plans.<br>Canfor's current FSP is approved until March, 2016. Under the approved FSP Canfor's site level plans will be developed and implemented to reflect SFM requirements. |
| Forest Health Strategy, Invermere TSA, 2011 | Invermere TSA Forest Health strategy identifies the known forest health factors in the TSA, provides links to specific strategies and tactics that apply to those forest health factors, and identifies and justifies any deviations from currently available pest management practices (Forest Practices Code Guidebooks, etc.).<br>The SFM Plan works under the concept that natural disturbance is an input rather than a driver of forest management. It is therefore important for the DFA to understand the historic and current natural disturbance agents in order to manage under SFM. Aspects of the Plan are linked to economic criteria (i.e. reducing the impact of mountain pine beetle to communities) and some are related to ecological criteria (i.e. natural disturbance). |
| Invermere TSA Silviculture Strategy (Type I), | The Type I Silviculture Strategy identifies the critical issues in timber supply, derives objectives with respect to those issues, specifies regimes to meet those issues, and identifies the regime activities that can be implemented in the next five years. The SFM Plan works to resolve these types of issues within the SFM Framework processes. |

| Strategic Plan / Policy | Linkages to SFM Plan |
|---|---|
| FIA – Land Based Investment Rationale (LBIR), | The LBIS identifies land-based resource management issues and projects based on biological needs and local forest management priorities through collaboration between government, licensees and key stakeholders. This initiative is to provide managers information required to support informed resource management investment decisions. FIA funding has been the financial support to many of the solutions and/or testing of SFM thinking, as well as the resultant SFM Plan. |
| Resource Management Plan for the Invermere TSA | Predecessor process and resulting documentation to the LBIR. Provides a listing of key issues on the land base, developed through a collaborative process. SFM Plan addresses the key issues within the context of the SFM Framework. |
| Kootenay Spatial Data Partnership | Data sharing agreement between the Government and Licensees will assist with the development, implementation and maintenance of the SFM Plan through the use of the most up-to-date spatial layers. (LRDW – Land & Resource Data Warehouse) http://www.kootenayspatial.ca/xsql/ksdpmenu01.xsql |

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

**Table 5: SFM Plan – Supporting Documents/Systems**

| Supporting Document(s), Date | Linkages to SFM PLAN |
|---|---|
| Canfor Radium Woodlands, Forest Stewardship Plan (FSP)*, March 9, 2006 | The FSP provides the legal "results" or "strategies" of forest practices – many of which are aligned with the SFM Criteria & Indicators. |
| Canfor Radium Woodlands, FMS – ISO 14001, July 29, 2001 | The FMS is an important component describing the company's overall standard operating procedures for environmental management and linkages to sustainable forest management. |
| PAG documents (i.e. TOR, minutes from meetings, etc.). Available at Canfor Radium Woodlands office. | Provides details on the public involvement process in the development and maintenance of the Sustainable Forest Management Plan. |

**The FSP is a "results-based" plan that is required under the Forest and Range Practices Act. This plan is the cornerstone of the results-based approach governing forest practices under the Act. The FSP must state explicitly how the licensee will address government objectives for key forest values, such as soils and wildlife. The FSP replaces the three operational plans formerly required under the Forest Practices Code. The FSP may be in place for up to five years. A forest tenure holder must meet all the requirements of forestry legislation and regulations, mainly, the Forest and Range Practices Act and the Forest Planning and Practices Regulation, which set out all the requirements for preparing a forest stewardship plan.*

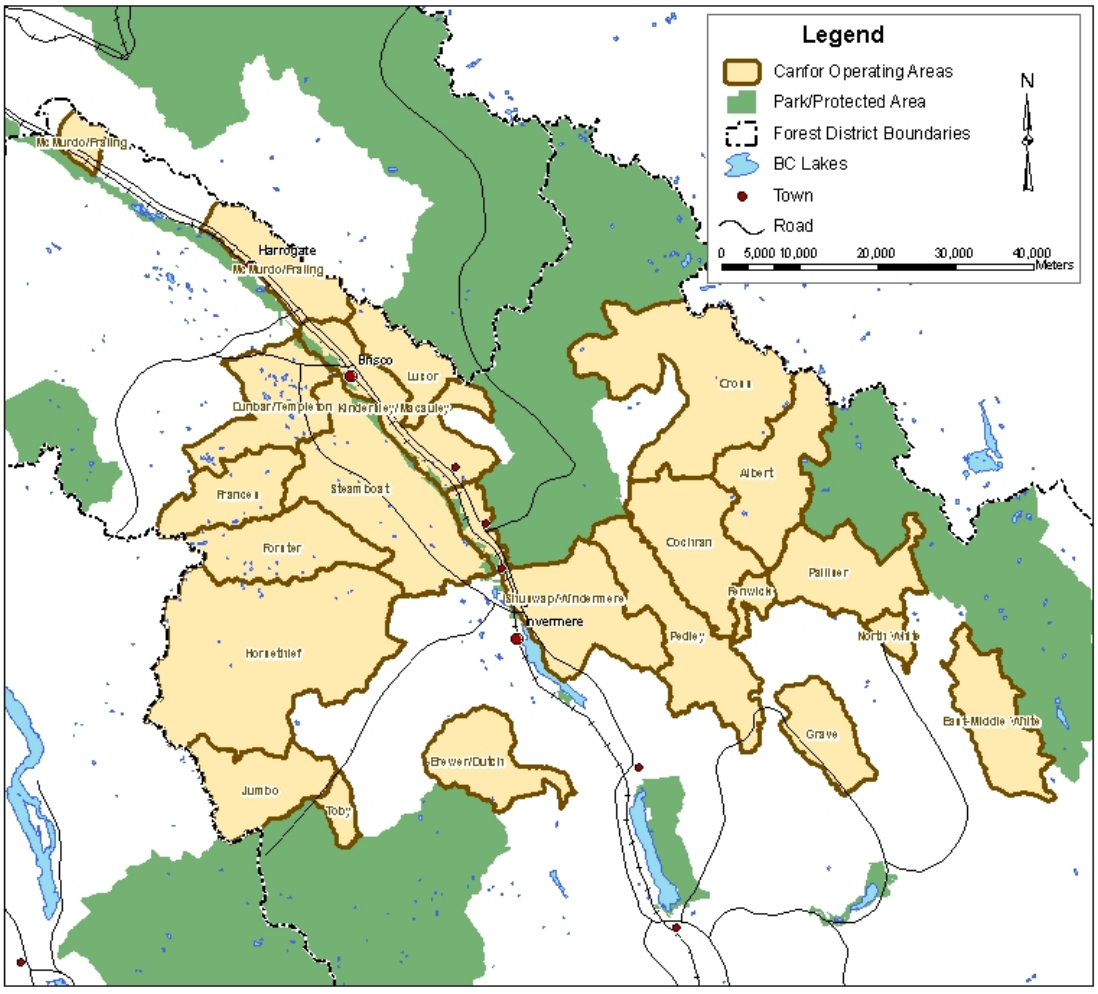
# 3.0 Background to the SFM Plan

Section 3.0 provides the background information and description about the Defined Forest Area (DFA) of this SFM Plan. This section describes the DFA geographically, ecologically, socially and economically. As well, the natural disturbance current condition is described.

## 3.1 Geographical Description

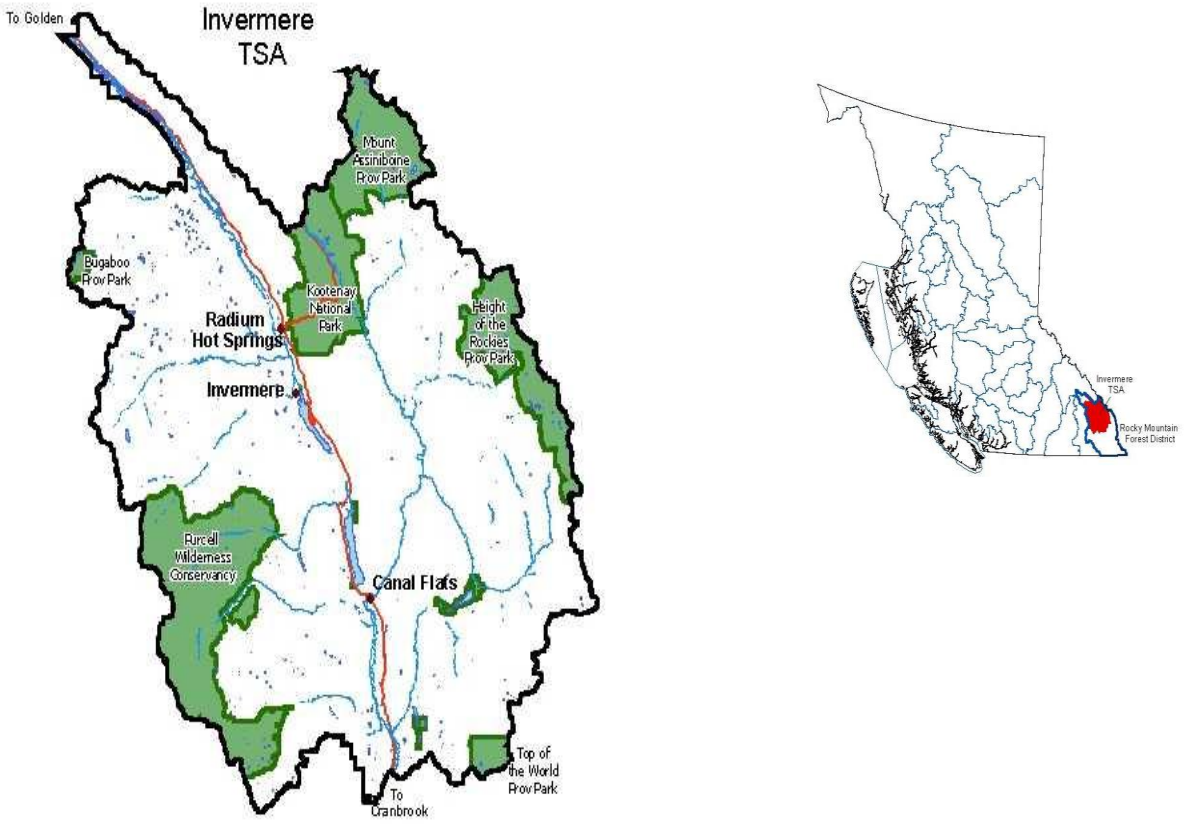
The DFA of this SFM Plan includes Canfor's Forest License A18979 (FL A18979) Chart area within the Invermere Timber Supply Area (TSA) as described for Timber Supply Review (TSR3)[3] The Invermere TSA is bounded by the Cranbrook TSA to the south, the Golden TSA and TFL 14 to the north, the Rocky Mountains / Alberta border to the east, and the Purcell Mountains to the west. Figure 4 and Figure 5 below, as well as, Appendix 1.1: Maps, illustrates the DFA included within this SFM Plan.

**Figure 4: Canfor – Radium DFA Operating Area Map**




[3] As defined by the Invermere Timber Supply Area Timber Supply Review #3 Analysis Report Version 3.0, May 12, 2004. Prepared for the Invermere DFAM by Forsite Consultants Ltd.

**Figure 5: Invermere Timber Supply Area Map**




Source: Invermere Timber Supply Area Timber Supply Review #3 Analysis Report Version 3.0, May 12, 2004

The Invermere TSA covers 1,153,073 hectares. Approximately 48% of the total area is considered Crown Forested Land Base (CFLB)[4]. The remaining 52% is considered non productive (i.e. rock, ice, alpine, etc), or is not managed by the Crown (i.e. private, Aboriginals, woodlots, etc)). Within the CFLB, only about 42% is considered economically and biologically available for timber harvesting (20% of the total TSA). Table 6 below provides a landbase summary for the TSA. A coarse map illustrating the locations of the CFLB and THLB is shown below (Figure 6). As well, the land base net down summary is provided in Table 7.

**Table 6: Invermere TSA Landbase Summary**

| Invermere Land Base | Area (ha) |
|---|---|
| Total TSA | 1,153,073 |
| Crown Ownership | 1,062,775 |
| Crown Forested Land Base (CFLB) – approx. 48% | 554,650 |
| Non-Productive / Private, Aboriginals, Woodlots – approx. 52% | 598,423 |
| Timber Harvesting Land Base (THLB)[5] | 233,873 |

Source: Invermere Timber Supply Area Timber Supply Review #3 Analysis Report Version 3.0, May 12, 2004

[4] The crown forested land base (CFLB) is the area of productive forest under crown ownership. This is the total area of land base that contributes to landscape level objectives for biodiversity and resource management. The crown forested land base excludes non-crown land, woodlots, non-forest and non-productive areas. With respect to percentages and total hectares noted, the CFLB for the Invermere TSA includes Kootenay National Park consistent with TSR3 process

[5] The timber harvesting land base (THLB) is the portion of the management unit where forest licensees under license to the province of BC are expected to harvest timber. The THLB excludes areas that are inoperable or uneconomic for timber harvesting, or are otherwise off-limits to timber harvesting. The THLB is a subset of the crown forested land base.

The Invermere TSA is within the BC Ministry Forests Lands and Natural Resource Operations. Kootenay/Boundary Region – Rocky Mountain Forest District. The Rocky Mountain Forest District is situated in the southeastern corner of British Columbia and was created in 2003 by amalgamating the former Invermere and Cranbrook Forest Districts. The district contains approximately 2.63 million hectares, of which 1.15 million hectares falls within the Invermere TSA. The Rocky Mountain Forest District, out of the district office in Cranbrook, administers FL A18979.

**Table 7: Land Base Area Netdown Summary[6]**

| Factor | Total area (ha) | Effective Area (ha)* | % of Forest District | % of Crown forest |
|---|---|---|---|---|
| **Total TSA (old Invermere Forest District less TFL14)** | 1,153,073 | 1,153,073 | 100% | |
| Less: | | | | |
| Private Land, First Nation reserves | 74,034 | 74,034 | 6.4% | |
| Woodlots, X-mas tree permits, Misc Leases | 16,264 | 16,264 | 1.4% | |
| **Total TSA under Crown Ownership** | 1,062,775 | 1,062,775 | | |
| Non-forest / Non-productive forest | 520,970 | 496,284 | 43.0% | |
| Non-Commercial Brush | 146 | 146 | 0.0% | |
| Backlog NSR (non-productive stands) | 971 | 936 | 0.1% | |
| Unclassified existing roads, trails and landings | 17,573 | 10,759 | 0.9% | |
| **Total Crown Forested Land Base** ** **(CFLB)** | | 554,650 | 48.1% | 100% |
| Less: | In CFLB: | | | |
| Fed Parks, Prov Parks and Reserves | 232,340 | 77,666 | 6.7% | 14.0% |
| Inoperable/Inaccessible | 254,162 | 183,861 | 15.9% | 33.1% |
| Operable/Inaccessible (Slope > 70%) | 4,320 | 4,296 | 0.4% | 0.8% |
| Unstable Terrain | 32,307 | 6,893 | 0.6% | 1.2% |
| Environmentally Sensitive Areas (includes Es where terrain mapping does not exist) | 82,151 | 6,723 | 0.6% | 1.2% |
| Non-Merchantable | 24,810 | 5,335 | 0.5% | 1.0% |
| Low Sites | 100,611 | 11,643 | 1.0% | 2.1% |
| Problem Forest Types | 9,828 | 6,024 | 0.5% | 1.1% |
| Riparian Management Areas | 31,415 | 17,669 | 1.5% | 3.2% |
| Existing Wildlife Tree Patches | 844 | 637 | 0.1% | 0.1% |
| **Timber Harvesting Land Base –THLB (ha)** | | 233,873 | 20.3% | 42.2% |
| Volume Reductions: | | | | |
| Identified Wildlife Management Strategy | 0% | 0 | | |
| Future Wildlife Tree Retn and other Retn (%) | 3.5% | 8,186 | | |
| Other Future Reductions: | | | | |
| FMER Open Range | | 1,585 | | |
| Future roads, trails and landings | | 11,016 | | |
| **Long-term Timber Harvesting Land Base (ha)** | | 213,087 | | |

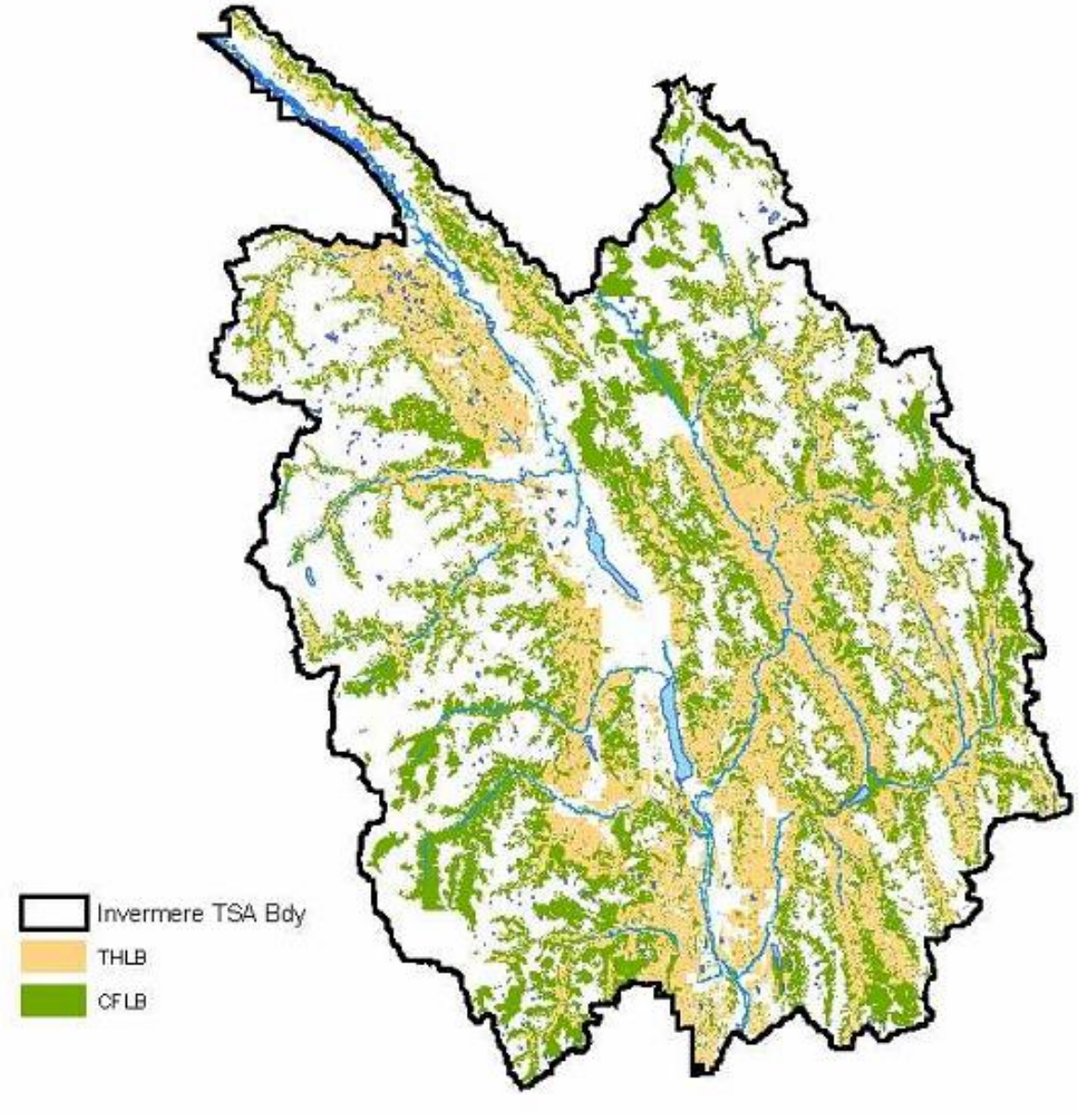
* Effective netdown area represents the area that was actually removed as a result of a given factor. Removals are applied in the order shown above, thus areas removed lower on the list do not contain areas that overlap with factors that occur higher on the list. For example, the unstable terrain netdown only removes area from the crown, operable forested land base.

** Crown forest in this context denotes the forest area that contributes to forest management objectives, such as landscape-level biodiversity, wildlife habitat and visual quality. It does not include alpine forest or non-productive areas with trees species.

Source: Invermere Timber Supply Area Timber Supply Review #3 Analysis Report Version 3.0, May 12, 2004

[6] Data Source: Invermere TSA Timber Supply Review 3 Analysis Report V3.0, May 12, 2004

**Figure 6: Invermere TSA – Land Base Classification Map**



## 3.2 Biophysical Description

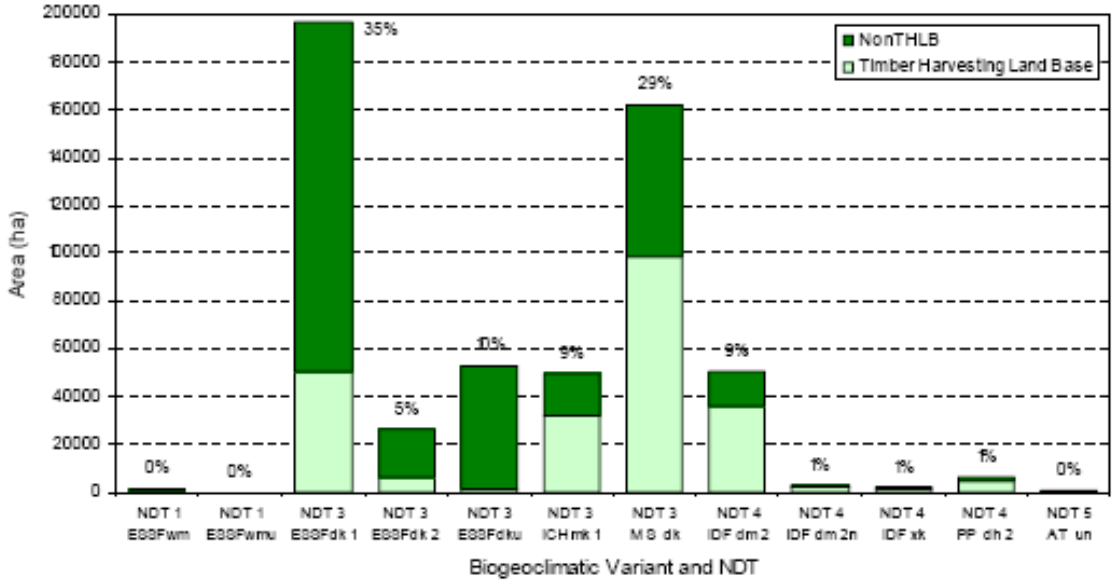
The Invermere TSA is approximately 165 km long and straddles two mountain ranges, the Purcell Mountains to the west and the Rocky Mountains to the east. Between these two mountain ranges lies the Rocky Mountain Trench, a broad, flat valley running north-south with numerous rivers and wetlands. The Columbia River flows north through the trench from Columbia Lake, creating a large, complex wetland ecosystem called the Columbia Wetlands. The Kootenay River enters the trench just south of Columbia Lake and flows south through the TSA.

### Biogeoclimatic Ecosystem Classification (BEC) & Forest Types

The Invermere TSA is located in the interior dry-belt of the province and contains six biogeoclimatic zones: Ponderosa Pine (PP); Interior Douglas Fir (IDF); Montane Spruce (MS); Interior Cedar Hemlock (ICH); Engelmann Spruce-Subalpine Fir (ESSF); and Alpine Tundra (AT). These zones reflect distinct differences in terrain, climate and the species of trees that are present.

Forests in the Invermere TSA have medium to low productivity relative to the rest of the province. Lodgepole pine forests are very common as a result of fire history. Old seral forests are more common in the mountainous areas of the TSA away from the Rocky Mountain Trench, and at higher elevations. Figure 7 below illustrates the biogeoclimatic zones area summary within the timber and non-timber harvesting landbase (THLB and NHLB) within the Invermere Radium DFA, whereas the table below summarizes the zones and locations, major tree species present, and other considerations such as climate and wildlife values.

**Figure 7: Biogeoclimatic Ecosystem Classification Area Summary**




Source: Invermere Timber Supply Area Timber Supply Review #3 Analysis Report Version 3.0, May 12, 2004

**Table 8: Biogeoclimatic Zones in the Invermere TSA**

| Biogeoclimatic Zones (Elevation) | Location/Description |
|---|---|

| | |
|---|---|
| Ponderosa Pine (PP) zone (700 to 900 m) | Occurs at low elevations in the southern portion of the Rocky Mountain Trench |
| Interior Douglas-fir (IDF) zone (between 800 and 1200 m) | Occurs in the valley bottoms and along the lower slopes of the Rocky Mountain Trench, generally between the Ponderosa Pine Zone and the Montane Spruce Zone |
| Montane Spruce (MS) zone is found at mid-elevations (between 1200 and 1600 m) | Often between the Interior Douglas-fir Zone and the Engelmann Spruce-Subalpine Fir Zone |
| Interior Cedar-Hemlock (ICH) zone (700 to 1500 m) | Occurs in small pockets at low to middle elevations in the wetter portions of the Purcell and Rocky Mountains |
| Engelmann Spruce-Subalpine Fir (ESSF) zone (from 1600 to 2000 m) | Uppermost forested zone, lying below the Alpine Tundra |
| Alpine Tundra (AT) Zone | Lies above the ESSF Zone, and is by definition treeless although stunted (or krummholz) trees are common at the lower elevations of this zone. Overall, this zone is dominated by rock, ice and grassy meadows |

Source: Invermere Timber Supply Area Timber Supply Review #3 Analysis Report Version 3.0, May 12, 2004

**Table 9: Trees species common in the Invermere TSA**

| Tree Species | Scientific Name | Percent |
|---|---|---|
| Lodgepole pine (Pl) | Pinus contorta | 40.7% |
| Douglas-fir (Fd) | Pseudotsuga menziesii | 28.7% |
| Engelmann spruce (Se) | Picea engelmannii | 13.% |
| Western Larch (Lw) | Larix occidentalis | 7.2% |
| Subalpine fir (Ba) | Abies lasiocarpa | 4.3% |
| Ponderosa pine, western hemlock, western red cedar, whitebark pine, cottonwood, birch and aspen – less common in TSA | | |

Source: Invermere Timber Supply Area Timber Supply Review #3 Analysis Report Version 3.0, May 12, 2004

Approximately 39% of the THLB is currently older than the minimum harvest ages defined in the TSR3 Analysis Report. Over 50% of the THLB is currently older than 80 years of age.

### Parks

There are 232,340 hectares of parks and reserves in the TSA. That area includes one national park (Kootenay) and eleven provincial parks; Mount Assiniboine, Height of the Rockies, Top of the World, Purcell Wilderness Conservancy, Bugaboo Glacier, Windermere Lake, Whiteswan Lake, Premier Lake, Canal Flats, James Chabot and Dry Gulch. Only parks and reserves under provincial Crown ownership contribute to forest management objectives such as landscape level biodiversity although they are not part of the area available for harvesting.

### Wildlife & Wildlife Habitat

The Invermere TSA is part of the East Kootenay region, which is unique in North America for its density and diversity of wild ungulate and large predator populations. Other large mammals, small mammals and birds are also abundant in the TSA. This wealth of wildlife is made possible by the great variety of habitat types available in the area. The valley floor of the Rocky Mountain Trench offers high quality ungulate habitat due to its limited snowfall and low elevation (800 m above sea level). Ungulate species include elk, mule deer, whitetail deer, moose, Rocky Mountain bighorn sheep, mountain goat, and caribou. Other large mammals include mountain lions, wolves, coyotes, black bear, and grizzly bear. Small furbearers include beaver, mink, muskrat, otter, fisher, marten, skunk, weasel, badger, wolverine, bobcat, lynx, squirrel, fox, and raccoon.

This region also supports 70% of the bird species known to occur in BC and 62% of all the bird species that breed in the province. The Columbia Wetlands is an important habitat for the nesting and migration of numerous species. The lakes and streams of the TSA also provide valuable bird habitat while supporting a wide range of fish species.

There are wildlife species in the TSA that are at risk due to declining populations across the province. There are 16 red-listed (Endangered or Threatened) and 19 blue-listed (Species of Concern) species found in the Invermere TSA.

### Table 10: Red Listed Species with Potential to Occur in Rocky Mountain Forest District

| Scientific Name | English Name | Name Category | Class (English) |
|---|---|---|---|
| *Ascaphus montanus* | Rocky Mountain Tailed Frog | Vertebrate Animal | amphibians |
| *Lithobates pipiens* | Northern Leopard Frog | Vertebrate Animal | amphibians |
| *Bartramia longicauda* | Upland Sandpiper | Vertebrate Animal | birds |
| *Falco mexicanus* | Prairie Falcon | Vertebrate Animal | birds |
| *Falco peregrinus anatum* | Peregrine Falcon, *anatum* subspecies | Vertebrate Animal | birds |
| *Megascops kennicottii macfarlanei* | Western Screech-Owl, *macfarlanei* subspecies | Vertebrate Animal | birds |
| *Melanerpes lewis* | Lewis's Woodpecker | Vertebrate Animal | birds |
| *Recurvirostra americana* | American Avocet | Vertebrate Animal | birds |
| *Sphyrapicus thyroideus nataliae* | Williamson's Sapsucker, *nataliae* subspecies | Vertebrate Animal | birds |
| *Spizella breweri breweri* | Brewer's Sparrow, *breweri* subspecies | Vertebrate Animal | birds |
| *Silene spaldingii* | Spalding's campion | Vascular Plant | dicots |
| *Adiantum capillus-veneris* | southern maiden-hair | Vascular Plant | ferns |
| *Euphydryas gillettii* | Gillette's Checkerspot | Invertebrate Animal | insects |
| *Rangifer tarandus* pop. 1 | Caribou (southern mountain population) | Vertebrate Animal | mammals |
| *Taxidea taxus* | American Badger | Vertebrate Animal | mammals |
| *Pterygoneurum kozlovii* | alkaline wing-nerved moss | Nonvascular Plant | |

Source: http://www.env.gov.bc.ca/atrisk/red-blue.htm

### Table 11: Blue Listed Species with Potential to Occur in Rocky Mountain Forest District

| Scientific Name | English Name | Name Category | Class (English) |
|---|---|---|---|
| *Anaxyrus boreas* | Western Toad | Vertebrate Animal | amphibians |
| *Ammodramus leconteii* | Le Conte's Sparrow | Vertebrate Animal | birds |
| *Ardea herodias herodias* | Great Blue Heron, *herodias* subspecies | Vertebrate Animal | birds |
| *Asio flammeus* | Short-eared Owl | Vertebrate Animal | birds |
| *Botaurus lentiginosus* | American Bittern | Vertebrate Animal | birds |
| *Contopus cooperi* | Olive-sided Flycatcher | Vertebrate Animal | birds |
| *Dolichonyx oryzivorus* | Bobolink | Vertebrate Animal | birds |
| *Euphagus carolinus* | Rusty Blackbird | Vertebrate Animal | birds |
| *Hirundo rustica* | Barn Swallow | Vertebrate Animal | birds |
| *Numenius americanus* | Long-billed Curlew | Vertebrate Animal | birds |
| *Otus flammeolus* | Flammulated Owl | Vertebrate Animal | birds |
| *Danaus plexippus* | Monarch | Invertebrate Animal | insects |

| Scientific Name | English Name | Name Category | Class (English) |
|---|---|---|---|
| *Gulo gulo luscus* | Wolverine, *luscus* subspecies | Vertebrate Animal | mammals |
| *Martes pennanti* | Fisher | Vertebrate Animal | mammals |
| *Ovis canadensis* | Bighorn Sheep | Vertebrate Animal | mammals |
| *Ursus arctos* | Grizzly Bear | Vertebrate Animal | mammals |
| *Oncorhynchus clarkii lewisi* | Cutthroat Trout, *lewisi* subspecies | Vertebrate Animal | ray-finned fishes |
| *Salvelinus confluentus* | Bull Trout | Vertebrate Animal | ray-finned fishes |
| *Chrysemys picta pop. 2* | Western Painted Turtle - Intermountain - Rocky Mountain Population | Vertebrate Animal | turtles |

Source: http://www.env.gov.bc.ca/atrisk/red-blue.htm

The lakes and streams of the TSA support a wide range of fish species including bull trout, cutthroat trout, rainbow trout, eastern brook trout, kokanee, mountain whitefish, burbot, walleye, smallmouth bass, and sturgeon.

### Water Resources

There are seven main river systems within Canfor's planning area: the Columbia, Kootenay, Palliser, Albert, Cross, Mitchell, White and Skookumchuk Rivers and their tributaries. The Columbia, Skookumchuk and White river/tributaries are considered some of the most important fisheries and stream systems in the East Kootenays mainly due to the presence of bull trout. The Palliser and Albert rivers are considered important fisheries watersheds for cutthroat trout. Numerous domestic watersheds are located on tributaries draining in the Columbia River. The Pinnacle /Luxor and Forster creek drainages are designated community watersheds.

The Invermere TSA contains abundant water resources, approximately 18% of which are within watersheds that are licensed for domestic use.

## 3.3 Socio-Economic Description

### Communities & Populations

Two Aboriginal communities reside in the TSA, the ?Akisq'nuk Band (previously named the Columbia Lake Band) at Windermere and the Shuswap Band at Invermere. These two communities have a population of approximately 400. Aboriginal people in the Invermere TSA are part of the Ktunaxa or the Shuswap.

The ?Akisq'nuk are part of the Ktunaxa people. They have traditional territory within the TSA, and archaeological evidence suggests the Ktunaxa have inhabited the East Kootenay region since the last glaciation over 10,000 years ago. The ?Akisq'nuk band is a member of the Ktunaxa Nation Council (KNC), formerly the Ktunaxa Kinbasket Tribal Council (KKTC).

The member bands of the KNC have asserted traditional territory in the Cranbrook and Invermere TSAs. The KNC, on behalf of the Ktunaxa Nation, have entered into the BC Treaty process and are currently at the fourth stage of that six stage process (Agreement in Principle stage). The traditional territory includes most of the southeast corner of the province, including the Invermere TSA. They have also submitted an Interim Measures Proposal that encompasses the guide and outfitting tenure areas and trap line areas registered to ?Akisq'nuk Band members.

The Shuswap Band has recently left the former Ktunaxa Kinbasket Tribal Council and is now an independent band claiming interests within the Invermere TSA. The Shuswap Nation Tribal Council (SNTC) is also proceeding through the BC Treaty Commission process of land claim negotiations and portions of the Invermere TSA are located within these land claim areas.

The Invermere TSA has a relatively small population of about 9,165[7], dispersed amongst several settlements, such as Edgewater, Windermere, Canal Flats, Wilmer, Fairmont Hot Springs, and Parson, and one small town, Invermere. The community of Invermere is the largest population centre with about 2,983 people. The other incorporated municipalities are Canal Flats and the small village of Radium Hot Springs. The full-time resident population is augmented by a significant (but unknown number) of part-time residents (mainly from Alberta) at Panorama Mountain Village, Fairmont Hot Springs, Radium Hot Springs and Lake Windermere.

The long-term population rise in the Invermere TSA (41.2% in last 20 years) is attributable to strong growth in its tourism sector, which includes Radium Hot Springs Resort, several championship calibre golf courses, Panorama Mountain Ski Resort and a number of other attractions that bring in numerous visitors from Alberta.

### Economic Profile

Overall, the economy of the Rocky Mountain Forest District Invermere TSA is relatively diversified. Results from the 2006 Census indicate that the public sector was the largest employers in the District by a wide margin 27% in 2006). The tourism sector is ranked as number 2 with 23% of basic sector employment and forestry accounts for 12%. Construction (14%), mining (16%) and agriculture (2%) are other sectors within the District that provide employment and economic activity within the District. Tourism's importance drops precipitously when measured by employment income, as the sectors relatively low wages mean that it has only 9% of basic sector employment income, ranking in size below the forest industry, public sector, mining, and those who rely on pension and investment income. More recent changes to the economy include the decrease in the forest sector and increase in mining.[8]

The relatively lower average incomes of the workers in the tourism sector are the reason for the drop in their economic importance when employment income is the focus. Additionally, tourism does less local purchasing than most other sectors. Jobs with higher incomes can support more spending in local service and retail outlets.

The District's logging industry creates double the indirect and induced employment of its' tourism sector and the local sawmilling creates almost three times the indirect and induced employment in the Invermere TSA as the tourism sector.

[7] Invermere Timber Supply Area Timber Supply Review #3 Analysis Report Version 3.0, May 12, 2004– based on BC Stats for 2001 reporting year.
[8] Economic Profile – http://www.bcstats.gov.bc.ca/pubs/econ_dep/2006/2006_fd.pdf - Table 1 & 2

## Local Business

Tourism, the public sector, forestry, mining and ranching operations form the main basis for employment and economic activity for communities within the TSA.

Recreation and tourist-orientated business enterprises continue to grow. Nearly 200 businesses in the TSA[9] service visitors' needs, including outdoor recreation facilities, tours and attractions, retail and service businesses, food and beverage facilities, and accommodations. Commercial heli-skiing, heli-hiking, and ski touring operations as well as guiding and trapping activities are ongoing within the license area. Fishing, hunting, hiking, snow-mobiling, camping, and touring are other activities.

In addition, there are ongoing mineral exploration activities throughout the TSA.

## Tenures Description

Canfor – Radium DFA

Canadian Forest Products Limited (Canfor) is a leading integrated forest products company marketing its products worldwide. The company has facilities located in BC, Alberta, Quebec, Washington State, and South Carolina, USA and is the largest producer of softwood lumber and one of the largest producers of northern softwood kraft pulp in Canada. Canfor also produces kraft paper, remanufactured lumber products, oriented strand board (OSB), hardboard paneling and a range of specialized wood products.. Canfor's operations have a history of over 67 years of forestry operations that include harvesting, planning, administration, log hauling, road building, silviculture, sawmilling, planing and pulpmaking operations.

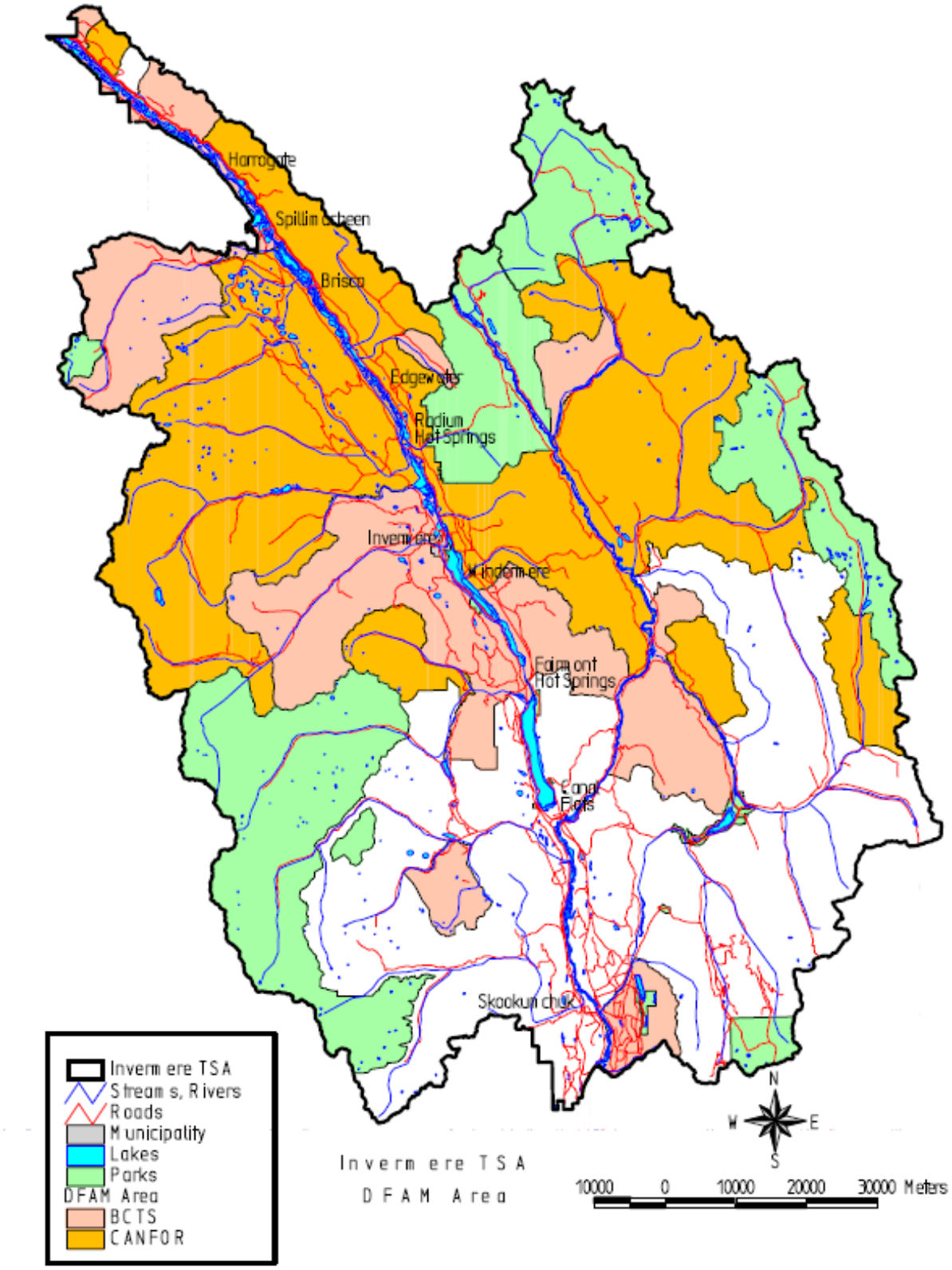
In the Kootenay area Canfor operates a dimension lumbermills in Radium Hot Springs[10], Canal Flats and Elko[11]. These mills produce dimension lumber, mainly for the domestic American market, but also make Japanese grade lumber which is approximately 25% of the output. The mill ships residual chips and hog fuel to the Skookumchuk pulp mill and ships other sawmill byproducts such as sawdust, planner shavings and hog fuel to other manufactures.

Forest License A18979 grants Canfor the right to harvest an allowable annual cut (AAC) of Crown timber each year, which is specified in cutting permits and road permits. The tenure allows Canfor to harvest, process, sell and distribute wood products derived from the forest area in the Invermere TSA. Canfor retains the reforestation responsibility until trees are free growing and has responsibility for road construction and maintenance.

In addition, Canfor purchases and trades significant volumes of timber throughout the Kootenay region to supplement its forest licence supply of timber.

[9] TSR2 – Socio-Economic Analysis Report – (new data not found)
[10] Canfor acquired the Radium operations from Slocan Forest Products in early 2004.
[11] Canfor is in the process of purchasing these sawmills and fibre supply from Tembec. The purchase is expected to be complete by the end of the first quarter 2012.

**Figure 8: Invermere TSA Map – Canfor – Radium DFA Operating Areas**




Source: Interior Reforestation Co Ltd. 2006.

## Current AAC

Effective November 1, 2005, the new AAC for the Invermere TSA was determined by the Chief Forester to be 598,570 cubic metres. This is made up of the current AAC of 581,570 plus 5000 cubic metres additional for ecosystem restoration and 12,000 cubic metres for small-scale salvage. The additional volume was not partitioned, but it is anticipated that it will be required for up to 20 years to finish ecosystem restoration in the fire-maintained ecosystems, and manage the mountain pine beetle infestation. This AAC will remain in effect until a new AAC is determined, which must take place within five years of the present determination unless a postponement is authorized. In September 2008, the chief forester postponed the date for the next AAC determination to a date prior to November 1, 2015.

**Table 12: AAC Apportionment (November 2005) and TSR3 Landbase Statistics**

| | | | Total THLB (ha) | |
|---|---|---|---|---|
| **Tenure** | **Current AAC Apportionment** | **% AAC** | **ha** | **% of Total** |
| Canfor | 231 005 | 38.59% | 85,664 | 36.6% |
| Tembec | 260 476 | 43.52% | 104,113 | 44.5% |
| BCTS | 90 089 | 15.05% | 44,097 | 18.9% |
| Small Scale Salvage | 12 000 | 2.00% | | |
| Ecosystem Restoration | 5 000 | 0.84% | | |
| **TOTALS** | **598 570** | **100.00%** | **233,873** | **100.0%** |

Source: Invermere TSA Rationale for AAC Determination. Effective November 1, 2005. BC Ministry of Forests.

Replaceable forest licenses account for 82% of the apportionment of the AAC. Canfor has rights to 231,005 $m^3$ attached to its replaceable forest license, accounting for 38.6% of the current AAC. A breakdown of the THLB area by licensee relative to AAC proportion as approved prior to TSR3 is provided in Table 12.

## Community Dependence – Employment & Services

Forestry employment exists in the form of silviculture activities, harvesting operations, planning and management, as well as mill-related employment, including a major portion of primary and value-added manufacturing. Considerable indirect forest industry employment is also generated through trucking, machinery repair and other support services. An estimated 85% of persons engaged in harvesting reside in the Invermere TSA.

### Canfor – Radium DFA

Canfor is the leading forest industry employer in the TSA. Canfor dimension lumber mill at Radium has rights to approximately two thirds of the TSA's AAC. Employment includes harvesting, planning, administration, log hauling, road building, silviculture, sawmilling and planing operations. Canfor generated an annual average of 204 person years (PYs) of direct local forest industry employment involved with harvesting and processing its Invermere TSA Forest License timber in 2008 (last period sawmill was in full production).

The volume harvested from FL A18979 provides a significant contribution to employment in the local area. The employment base for FL A18979, and the mills it supplies, includes people living in the communities of Radium, Invermere and numerous communities in the Columbia Valley.

The dimension lumber mill in Radium Hot Springs has an estimated annual fibre requirement at full capacity of 850,000 $m^3$. The company relies on other sources, including private lands, Alberta, BCTS sales and Golden TSA licensees to supply the volume needs to the sawmill.

### Non Forestry Tenures & Interests

In addition to Canfor, there are currently: 9 woodlot licenses; 17 Christmas Tree Permit; 9 guide outfitter tenures; 13 Range tenures; and 31 Trapper tenures. Within the Radium DFA there are 3 Community Watersheds and extensive domestic and irrigation watersheds. The domestic and irrigation watersheds are mainly off tributaries to the Columbia River.

Numerous backcountry recreation tenures such as heli-skiing (2), snowmobiling and ATV tenures, and fishing guide tenures exist in the Radium DFA.

There is an active gypsum mine located adjacent to the Whiteswan provincial park in the Lussier River drainage. There is an active rock quarry in the Findlay Creek area. Prospecting activity has generated an abundance of mineral claims throughout the planning area. BPR Industries Inc. operates a gypsum mine in Windermere Creek and Baymag operates a magnesite mine in the Mitchell River drainage.

There are many interests groups in the area that include such groups as the Nature Trust on the west side of Columbia Lake, Wildsight Environmental Society and Columbia Basin Trust.

The location of these licensed resource users and interests groups are known (some of which are mapped) and managed. The specific users are consulted during the planning process, as required.

# 4.0 Establishing the Foundation for SFM Planning

This section provides the foundation for sustainable forest management planning: primarily the collation and assessment of information required as the groundwork for the SFM Plan. This includes the identification and analysis of key issues, inventories, stakeholders and practices that directly influence the management of the DFA. The results of the analyses assist with the determination of locally appropriate decision support tools. A number of potential decision support tools are listed in this section. The results of the analyses also help identify data and knowledge gaps that will need to be addressed over time. The synopsis of these gaps is found in Canfor Radium's Action Plans resulting from management reviews and internal and external audits. The processes and protocols around updating the inventories and improving the quality of data are addressed in Section 8.0 Adaptive Management. All the information described within this section can be found on the Canfor website or from the Canfor Radium office.

## 4.1 Key Issues

A number of key forest management issues for the Radium DFA have been identified and collated from legislative requirements (i.e. FRPA), other land use initiatives, processes and/or stakeholder input. These key forest management issues will be addressed within the SFM Plan.

The initiatives and processes from which key issues have been collected are identified and listed in Section 2.3.2 Strategic Plans, Policies & Supporting Documents. Other key issues may be related to new or changing ecological and/or socio-economic conditions of the defined forest area, or provided by stakeholders input from within or outside of the local public process.

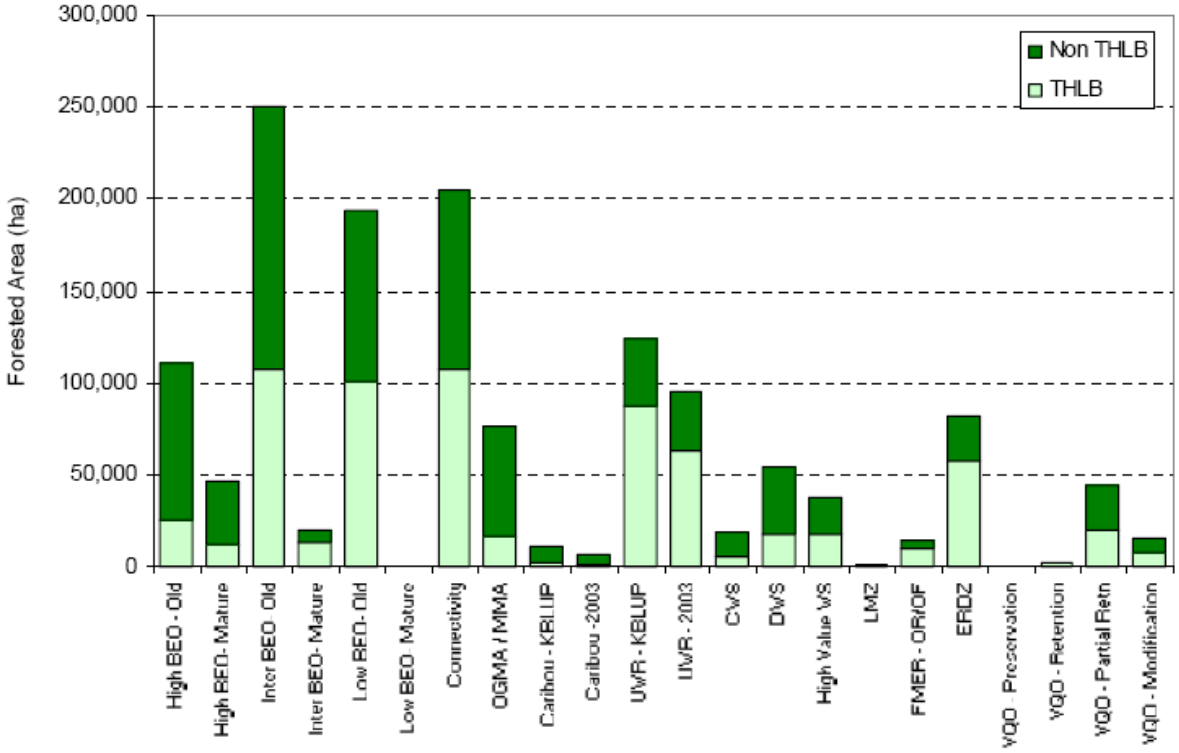
Identification and organization of these key issues is critical for developing and maintaining the SFM Plan. It provides the foundation for setting local criteria and indicators, as well as possibly providing solutions to these issues through strategies. A listing and scope of the key issues for the Radium DFA, as well as documentation on the significance of this issue to SFM Planning and SFM Strategy, is provided below. This is not a comprehensive list of issues but a summary of the key issues unique to the Radium DFA and is reflected in the Multi-criteria Analysis (See Section 6.2 Assessment of Sustainability).

**Table 13: Key Issues within the Radium DFA**

| Issue | Scope of issue | Significance to Planning | SFM Strategy |
|---|---|---|---|
| Mountain Pine Beetle Epidemic | TSA wide and beyond. Prioritizes harvestings. Affects biodiversity strategies | Potential to impact most, if not all, criteria and indicators | MPB<br>Natural Disturbance |
| HLP Order:<br>Biodiversity<br>Old Growth Management | Throughout the Rocky Mountain Forest District region as defined by the higher-level plan | Require biodiversity strategy arising from the KB-HLPO. | Habitat Representation<br>Wildlife Tree Retention<br>Coarse Woody Debris (CWD)<br>Hardwood Tree<br>Protected Areas |
| Riparian Habitat | TSA wide and beyond. Affects biodiversity strategies | Potential to impact most, if not all, criteria and indicators | Riparian Area<br>Stream Crossing |
| Domestic and | TSA wide and beyond. Affects | Potential to impact most, | Consumptive |

| Issue | Scope of issue | Significance to Planning | SFM Strategy |
|---|---|---|---|
| Community Watersheds | biodiversity strategies | if not all, criteria and indicators | Use Streams<br>Stream Crossing |
| Fire Maintained Ecosystems | TSA wide and beyond. Affects biodiversity strategies | Potential to impact most, if not all, criteria and indicators | Protected Areas |
| Identified Wildlife Species | TSA wide and beyond. Affects biodiversity strategies | Potential to impact most, if not all, criteria and indicators | Protected Areas |
| Loss of productive landbase | TSA wide and beyond. | | Land Base Productivity<br>Reforestation |
| Competing Integrated Resource Values | TSA wide and beyond. Prioritizes/constrains harvest – these requirements limit disturbance or maintain appropriate levels of specific forest types that are needed to satisfy objectives for wildlife habitat, visual quality, biological diversity, etc (see Figure 9 and Table 14) | Potential to impact most, if not all, criteria and indicators | In addition to previously listed strategies:<br>Aboriginal<br>Recreation<br>Visual Quality<br>Protected Areas |
| Economics | Keeping the business alive | Potential to impact most, if not all, criteria and indicators | N/A |
| Safety | Maintain a company wide Operational Health & Safety Program | Potential to impact the well being of the workers and the community | N/A |

**Figure 9: Integrated Resource Values: Area Summary by Land Base Type**




Source: Invermere Timber Supply Area Timber Supply Review #3 Analysis Report Version 3.0, May 12, 2004

**Table 14: Integrated Resource Values: Area Summary by Land Base Type**

| Name | CFLB (ha) | THLB | Non THLB | % of Total CFLB | % of Total THLB | Description |
|---|---|---|---|---|---|---|
| High BEO - Old | 110,280 | 25,277 | 85,003 | 19.9% | 10.8% | |
| High BEO- Mature | 46,012 | 12,251 | 33,761 | 8.3% | 5.2% | Biodiversity Emphasis Options define the amount of old and/or mature that must be retained in each LU/BEC variant combination. |
| Inter BEO- Old | 250,519 | 107,644 | 142,874 | 45.2% | 46.0% | |
| Inter BEO- Mature | 19,554 | 13,613 | 5,942 | 3.5% | 5.8% | |
| Low BEO- Old | 193,851 | 100,952 | 92,899 | 35.0% | 43.2% | |
| Low BEO- Mature | 0 | 0 | 0 | 0.0% | 0.0% | |
| Connectivity | 205,329 | 107,510 | 97,819 | 37.0% | 46.0% | |
| OGMA / MMA | 76,863 | 16,288 | 60,576 | 13.9% | 7.0% | Area of Spatial OGMA/MMA. |
| Caribou - KBLUP | 11,095 | 2,534 | 8,562 | 2.0% | 1.1% | Caribou habitat areas in base case. |
| Caribou -2003 | 6,664 | 1,225 | 5,440 | 1.2% | 0.5% | New caribou habitat area in Sensativity |
| UWR - KBLUP | 124,281 | 87,351 | 36,930 | 22.4% | 37.3% | Ungulate winter range in base case. |
| UWR - 2003 | 94,919 | 63,350 | 31,570 | 17.1% | 27.1% | New ungulate winter range (sensitivity) |
| Community Watershed | 19,263 | 5,218 | 14,045 | 3.5% | 2.2% | (CWS) |
| Domestic Watershed | 53,834 | 17,816 | 36,018 | 9.7% | 7.6% | (DWS) |
| High Value Watershed | 37,468 | 17,593 | 19,875 | 6.8% | 7.5% | Lussier Watershed |
| Lakeshore Mgmt Zones | 1,632 | 366 | 1,266 | 0.3% | 0.2% | 200m around L1 lakes |
| Fire Maintained Ecosystem Restoration | 14,759 | 10,105 | 4,654 | 2.7% | 4.3% | Open Range/Forest restoration areas. |
| VQO – Preservation | 380 | 5 | 375 | 0.1% | 0.0% | |
| VQO - Retention | 2,726 | 1,844 | 882 | 0.5% | 0.8% | Visual Quality Objectives |
| VQO - Partial Retention | 44,176 | 20,084 | 24,092 | 8.0% | 8.6% | |
| VQO - Modification | 15,459 | 8,042 | 7,417 | 2.8% | 3.4% | |
| Enhanced Resource Development Zone | 82,327 | 57,523 | 24,803 | 14.8% | 24.6% | Defined spatially by HLPO – based on older THLB definition. |

Source: Invermere Timber Supply Area Timber Supply Review #3 Analysis Report Version 3.0, May 12, 2004

## 4.2 Inventory Analysis

Over the years, the licensees and government agencies in the TSA have completed a number of inventories on the landbase. Inventories include, but are not limited to: forest health, forest cover inventory, rehabilitation, general management, growth and productivity, biodiversity, wildlife, watershed management, and archaeological inventory. These inventories provide a portion of the foundation needed to make management decisions in SFM.

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

Interior Reforestation Co Ltd. originally collated an inventory analysis for the Invermere TSA in March 2002. Forsite Consultants Ltd. completed updates to the inventory analysis in conjunction with TSR3 Data Pack submission in May 2004. The listing of the inventories and the details are found in Canfor Radium's office.

The inventory data will need to be continually assessed for quality and appropriateness of the data in relation to its end use.

## 4.3 Stakeholder Analysis

The Radium DFA Stakeholder Analysis is an objective and transparent identification of stakeholder interests for the DFA. It follows the standard format that is described in the SFM Framework. Interior Reforestation Co Ltd. completed this analysis in 2003.

Initial work required the identification of individuals and groups for inclusion in the Stakeholder Analysis database. Individuals and/or groups were identified based on their past participation in planning processes, their status as tenure holders (guiding, trapping, range, etc.), or their identification as potentially affected individuals (Aboriginals, property owners, government officials, etc.). The results of this analysis are stored in a database and updated continually through Canfors planning process. Once a group or individual was selected for inclusion in the database, a description was compiled of their involvement in potential forest planning/ development activities under the categories of Interest (e.g. Commercial tourism, Forestry, government, outdoor recreation, etc), Involvement, Affectedness, Influence and Contact Priority.

**Figure 10: Stakeholder Information**

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

Other initiatives such as organizing advertisements in the local newspaper, open houses and meeting with individuals in the area were carried out in an attempt to reach all public members who may be interested in participating in the development of the Radium DFA Sustainable Forest Management Plan. The invitation of spokespersons from identified interests based on the stakeholder analysis and other public consultation provided a balanced and representative mix of interests for the Public Advisory Group (details found in Sections 2.2.2 Public Involvement and 2.2.3 Aboriginal Involvement).

The database is to be seen as evolving as new stakeholders are identified, and existing entries become outdated. These changes will be updated in the database in order to maintain its value in future forest management planning. The detailed information contained with the database is proprietary and will not be made publicly available as part of the SFM Plan. The Summary of the Stakeholder Analysis describes the methods and results of the compilation of data and can be found in Appendix 1.2: Stakeholder Analysis.

## 4.4 Practices Analysis

A Practices Analysis was completed by Canfor and appended to Appendix 1.3: Practices Analysis. The analysis resulted in a matrix for each of Canfor operations that summarize common practices that take place within each of their respective operating areas. Practices include harvesting, road building/maintenance/rehabilitation, and silviculture practices. These practices become a set of inputs that a simulation model uses to quantify and forecast the long-term effect of current management strategies both spatially and temporally under Section 6.3 Design of Sustainability Scenarios for the Radium DFA.

## 4.5 Decision Support Tools

The appropriate decision support tools for each level of planning depends on the ecological, social and economic characteristics of the unit, the management issues, the types of information available, and the information required by corporate and government decision makers. The use of applicable tools are discussed in the relevant sections of this SFM Plan, however the specific details on each support tool can be further researched within the SFM Framework Supporting Documents. Details include the background, the rationale, and utilization of each of these tools.

The SFM Participants have identified specific simulation/forecasting and analysis tools that are required to support the spatial and temporal analyses for sustainable forest management for the Radium DFA. The following decision support tools were utilized within Section 6.1 Assessment of Current Conditions, 6.2 Assessment of Sustainability, and 6.3 Design of Sustainability Scenarios. Details on these decision support tools can be found within the supporting documents for the SFM Framework.

- Stakeholder analysis
- Priority indicator identification
- Indicator mapping
- Forecasting
- Scenario design
- Multi-criteria analysis
- Trade-off analysis
- Natural Disturbance Assumptions

# 5.0 Strategic Level Planning

The strategic level for SFM establishes broad management objectives or sustainability criteria over as large an area as possible over a long time frame (from 100 to 300 years). At this level, the overall strategy for the DFA is defined. It also makes a determination on the input provided from any trade-off analysis required. This component of the SFM Plan establishes the desired future conditions and defines the management emphasis to be followed in the various landscape units or planning zones for the next level of forest management planning.

In 2004, the Canadian Council of Forest Ministers (CCFM) Criteria and Indicators (C&I) guided the development of the SFM Framework's C&I which were used as a starting point for the Radium SFMP. One of the main purposes of this SFMP re-write (2011/12) was to align with the CSA Z809-08 standard and Canfor core indicators. As such, the SFM Plan's Criteria, Indicators, Measures and Targets have been replaced with the CCFM Criteria and CSA Z809-08 Criteria, Elements, Indicators and Targets.

It is worth noting that while there are fewer Criteria for the CSA Z809-08 standard, the same values are covered. They are simply covered under a broader spectrum for each criterion. Of more interest to those comparing the 2007 plan to the 2012 plan will be the conversion of the measures to core and local indicators. In the last update to the 2007 plan, there were 71 measures, while under the new plan; there are 44 core and local indicators. This is not to say that the scope of reporting was narrowed, merely that the data being measured are more focused to reflect the desired end results. The changes are summarized in Appendix 2.1: Translation Information between SFM C&I vs. CSA.

The establishment of Criteria, Elements, Indicators and Targets is undertaken at the strategic level. They can be used both to gauge the sustainability of strategic alternatives and assess broad trade-offs. Elicitation and consideration of stakeholder and public views on the indicators and targets, and the priorities amongst them, are an important component of this level. The information and strategies developed at the strategic level are used to guide the tactical and operational level activities.

The tactical level scenario design and forecasting process analyzes potential strategies for the DFA. This information was used to pick a preferred scenario that aims to meet all, or as many as possible, of the indicators and targets set at the strategic level.

## 5.1 Criteria, Elements, Indicators, Targets

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

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

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

**Values** identify the key aspects of the elements. For example, one of the values associated with "species diversity" might be "sustainable populations of native flora and fauna."

**Objectives** describe the desired future condition, given an identified value. For example, the objective to meet the value of sustainable populations of native flora and fauna might be "to maintain a variety of habitats for naturally occurring species."

**Indicators** are measures to assess progress toward an objective. Indicators are intended to provide a practical, cost-effective, scientifically sound basis for monitoring and assessing implementation of the SFMP. There must be at least one indicator for each element and associated value. Core indicators have

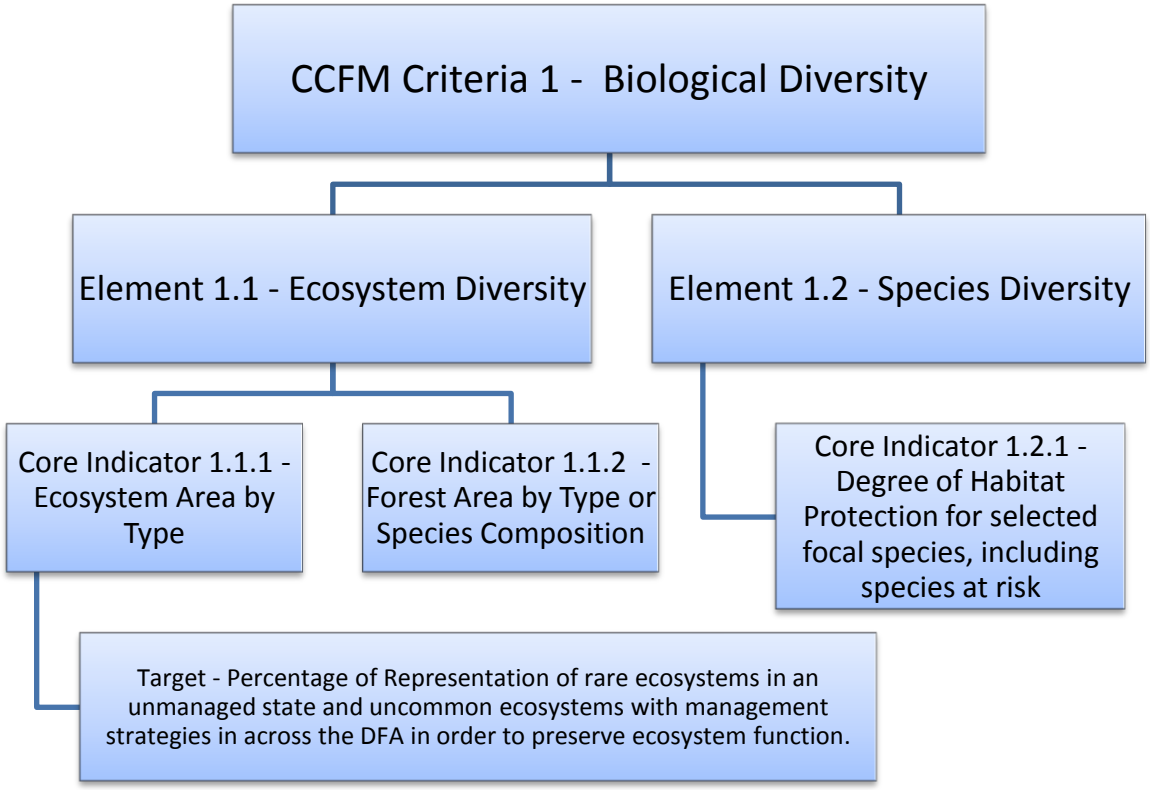
been included in the CSA standard for nearly all elements. Additionally, local indicators can be added to the SFMP.

**Targets** are specific short-term (one or two year) commitments to achieve identified indicators. Targets provide a clear specific statement of expected results, usually stated as some level of achievement of the associated indicator. For example, if the indicator is "minimize loss to the timber harvesting landbase," one target might be "to have less than 'x' percent of harvested areas in roads and landings."

The SFM Framework developed an initial set of Criteria and Indicators (C&I) that measure and demonstrate the sustainability of social, ecological and economic values at the forest management unit level. This initial set was used as "seed" information to assist with the development of a local level set of C&I. These local C&I have been adapted to reflect the ecological and socio-economic conditions of the Radium DFA as determined by the stakeholder input through *FOREST*. Summaries from each *FOREST* meeting capture the decision made following discussions between Canfor and *FOREST* in developing the Criteria, Element, Indicator, Target Matrix (Appendix 1.4: SFM Criteria & Indicators Matrix).

Figure 11 below provides a schematic sample of the hierarchy of criteria, element, indicators and targets.

**Figure 11: Criteria, Element, Indicators, Targets Hierarchy**




Appendix 1.4: SFM Criteria & Indicators Matrix contains the criteria, indicators, measures and targets, specific to the Radium DFA. Table 15 below provides a summary listing of the Criteria, Element, and Indicators.

## Table 15: Radium DFA Criteria & Indicators

**Criterion / Element / Indicator**

**Ecological Values**

**C1. Biological Diversity**
- **1.1 Ecosystem Diversity**
  - 1.1.1a – Ecosystem Representation of Groups
  - 1.1.1b – Interior Forest by Ecosystem Group
  - 1.1.1c – Patch Size Distribution by Natural Disturbance Type
  - 1.1.2 – Distribution of forest type >20 years old
  - 1.1.3 – Late Seral Distribution
  - 1.1.4.a – Dispersed Retention
  - 1.1.4b – Stand Structure Retention
  - 1.1.4c – Riparian Management Strategies
- **1.2 Species Diversity**
  - 1.2.1 & 1.2.2 –Species of Management Concern
- **1.3 Species & Genetic Diversity**
  - 1.2.3a/1.3.1a – Regeneration – Seed & Vegetative Material
  - 1.2.3b/1.3.1b – Natural Regeneration
- **1.4 Protected Areas & Sites**
  - 1.4.1 – Protected Areas & Sites of Biological Significance
  - 1.4.2a & b – Identification & Addressing Aboriginal And Other Cultural Forest Values, Knowledge And Uses

**C2. Ecosystem Condition & Productivity**
- **2.1 Forest Ecosystem Resilience**
  - 2.1.1 – Regeneration Delay
- **2.2 Forest Ecosystem Productivity**
  - 2.2.1a – Conversion To Non-Forest Land Use
  - 2.2.1b – Landslides resulting from forestry practices
  - 2.2.2 – Volume Harvested Vs. Allocated Harvest

**C3.Soil & Water**
- **3.1 Soil Quality & Quantity**
  - 3.1.1 – Soil Disturbance Objectives
  - 3.1.2 – Coarse Woody Debris Targets
- **3.2 Water Quality & Quantity**
  - 3.2.1a – High Hazard Drainage Structures – Mitigation Strategies Implemented
  - 3.2.1b – Peak Flow Targets – Sensitive Watersheds

**C4. Role of Global Ecological Cycles**
- **4.1 Carbon Uptake and Storage**
  - 4.1.1 –Retention of Existing Old Forest
  - 4.1.2 – Regeneration Delay
- **4.2 Additions and Deletions**
  - 4.2.1 – Conversion To Non-Forest Land Use

**Economic & Social Values**

**C5. Economic & Social Benefits**
- **5.1 Quantity and Quality of Timber & Non-Timber**
  - 5.1.1a – Volume Harvested Vs. Allocated Harvest
  - 5.1.1b –Non-Timber Benefits
- **5.2 Communities & Sustainability**
  - 5.2.1 – Investment In Local Communities
  - 5.2.2 – Environmental & Safety Procedures Training
  - 5.2.3 – Level Of Direct & Indirect Employment
  - 5.2.4 –Opportunities for Aboriginals to Participate in Forest Economy

**C6. Society's Responsibility**
- **6.1 Aboriginal & Treaty Rights**
  - 6.1.1 – Aboriginal Awareness Training
  - 6.1.2 – Aboriginal Communities Understanding of the Plans
  - 6.1.3 – Address Aboriginal Forest Values, Knowledge And Uses
- **6.2 Respect for Aboriginal Forest Values, Knowledge & Uses**
  - 6.2.1 – Identified Aboriginal Forest Values, Knowledge And Uses
- **6.3 Forest Community Well-Being & Resilience**
  - 6.3.1 – Primary And By-Products
  - 6.3.2 & 6.3.3 – Certified Safety Program
- **6.4 Fair & Effective Decision-Making**
  - 6.4.1 – PAG Satisfaction Survey Implemented
  - 6.4.2 –Educational Opportunities for Information/Training
  - 6.4.3 – Aboriginal Communities Understanding of the Plans
- **6.5 Information for Decision-Making**
  - 6.5.1 –Educational Opportunity
  - 6.5.2 – SFM Monitoring Report Public

# Values & Objectives

### Criterion 1: Biological Diversity

Conserve biological diversity by maintaining integrity, function, and diversity of living organisms and the complexes of which they are part.

### Element 1.1: Ecosystem Diversity

Conserve ecosystem diversity at the stand and landscape levels by maintaining the variety of communities and ecosystems that naturally occur in the DFA.

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Ecosystem Diversity | Maintain the diversity and pattern of communities and ecosystems within a natural range. | 1.1.1(a), (b), (c), 1.1.2, 1.1.3, 1.1.4(a), (b), & (c) |

### Element 1.2: Species Diversity

Conserve species diversity by ensuring that habitats for the native species found in the DFA are maintained through time, including habitats for known occurrences of species at risk.

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Species Richness | Maintain suitable habitat for indicator species. | 1.2.1, 1.2.2, 1.2.3(a) & (b) |

### Element 1.3: Genetic Diversity

Conserve genetic diversity by maintaining the variation of genes within species and ensuring that reforestation programs are free of genetically modified organisms.

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Genetic Diversity | Conserve the genetic diversity found naturally within trees. | 1.2.3(a) & (b), 1.3.1(a) & (b) |

### Element 1.4 Protected Areas and Sites of Special Biological and Cultural Significance

Respect protected areas identified through government processes. Co-operate in broader landscape management related to protected areas and sites of special biological and cultural significance. Identify sites of special geological, biological, or cultural significance within the DFA, and implement management strategies appropriate to their long-term maintenance.

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Protected Areas and Sites of Special Biological and Cultural Significance. | To maintain representative areas of naturally occurring and important ecosystems, rare physical environments and sites of cultural significance | 1.4.1, 1.4.2(a) & (b) |

### Criterion 2: Forest Ecosystem Condition and Productivity

Conserve forest ecosystem condition and productivity by maintaining the health, vitality, and rates of biological production.

### Element 2.1 Forest Ecosystem Resilience

Conserve ecosystem resilience by maintaining both ecosystem processes and ecosystem conditions.

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Ecosystem Resilience | Maintain a natural range of variability in ecosystem function, composition, and structure which will allow ecosystems to recover from disturbance and stress | 2.1.1 |

### Element 2.2 Forest Ecosystem Productivity

Conserve forest ecosystem productivity and productive capacity by maintaining ecosystem conditions that are capable of supporting naturally occurring species. Reforest promptly and use tree species ecologically suited to the site.

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Forest Ecosystem Productivity | Maintain ecosystem productive capacity by ensuring ecosystem conditions are maintained that are capable of supporting naturally occurring species. | 2.2.1(a) & (b), 2.2.2 |

## Criterion 3: Soil and Water

Conserve soil and water resources by maintaining their quantity and quality in forest ecosystems.

### Element 3.1 Soil Quality and Quantity

Conserve soil resources by maintaining soil quality and quantity.

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Soil Productivity | Protect soil resources to sustain productive forests | 3.1.1, 3.1.2 |

### Element 3.2 Water Quality and Quantity

Conserve water resources by maintaining water quality and quantity.

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Water Quantity and Quality | Maintain water quality and quantity | 3.2.1(a) & (b) |

### Criterion 4: Role in Global Ecological Cycles

Maintain forest conditions and management activities that contribute to the health of global ecological cycles.

### Element 4.1 Carbon Uptake and Storage

Maintain the processes that take carbon from the atmosphere and store it in forest ecosystems.

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Carbon Uptake and Storage | Maintain the carbon uptake and storage processes | 4.1.1, 4.1.2 |

### Element 4.2 Forest Land Conversion

Protect forestlands from deforestation or conversion to non-forests, where ecologically appropriate.

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Forest Land base | Sustain forests lands within our control within the DFA | 4.2.1 |

### Criterion 5: Economic and Social Benefits

Sustain flows of forest benefits for current and future generations by providing multiple goods and services.

### Element 5.1 Timber and Non-Timber Benefits

Manage the forest sustainably to produce an acceptable and feasible mix of both timber and non-timber benefits. Evaluate timber and non-timber forest products and forest-based services.

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Timber and Non-Timber Benefits | Provide opportunities for a feasible mix of timber, recreation, and non-timber commercial activities | 5.1.1(a) & (b) |

### Element 5.2 Communities and Sustainability

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

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Sustainable and Viable Communities | Ensure continued investment in local communities through local spending, training of workers, ensuring worker safety, and providing for local employment. | 5.2.1, 5.2.2, 5.2.3, 5.2.4 |

## Criterion 6: Society's responsibility

Society's responsibility for sustainable forest management requires that fair, equitable, and effective forest management decisions are made.

### Element 6.1 Aboriginal and Treaty Rights

Recognize and respect Aboriginal title and rights and treaty rights. Understand and comply with current legal requirements related to Aboriginal title and rights and treaty rights.

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Aboriginal and Treaty Rights | Ensure that aboriginal rights are understood and complied with. | 6.1.1, 6.1.2, 6.1.3 |

### Element 6.2 Respect for Aboriginal Forest Values, Knowledge, and Uses

Respect traditional Aboriginal forest values, knowledge and uses as identified through the Aboriginal input process.

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Aboriginal Forest Values and Uses | Respect known traditional aboriginal forest values and uses | 6.2.1 |

### Element 6.3 Forest Community well-being and resilience

Encourage, co-operate with, or help to provide opportunities for economic diversity within the community.

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Forest Community Well Being and Resilience | Help to provide opportunities for economic diversification with the community | 6.3.1, 6.3.2, 6.3.3 |

### Element 6.4 Fair and Effective Decision-Making

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

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Fair and Effective Decision Making | Ensure that the SFM public participation process is functioning. | 6.4.1, 6.4.2, 6.4.3 |

### Element 6.5 Information for Decision-Making

Provide relevant information and educational opportunities to interested parties to support their involvement in the public participation process, and increase knowledge of ecosystem processes and human interactions with forest ecosystems.

| Description of Values | Description of Objectives | Indicators |
|---|---|---|
| Information for Decision Making | Help educate interested parties and increase knowledge of ecosystem function and human interactions with forest ecosystems to support their involvement in the public participation process. | 6.5.1, 6.5.2 |

### Criterion 1: Biological Diversity

Conserve biological diversity by maintaining integrity, function, and diversity of living organisms and the complexes of which they are part.

Given the complexity associated with attempting to manage for biodiversity, species richness is used as a credible interim surrogate for a criterion intended to maintain biological diversity (Bunnell 1998[12]). Species richness meets the requirements for SFM criteria; it is measurable, cost effective and scientifically credible.

Dr. Fred Bunnell and the Weyerhaeuser Adaptive Management Working Group initially developed the biodiversity criterion and associated indicators.[13] They were adapted for use by many Canfor divisions, became the set of ecological C&I and were utilized as "seed" information for the Radium SFM Plan.

Criterion 1 uses a multi-filter approach to sustaining biological richness in forested landscapes. Ecological representation (1.1.1a) is a 'coarse-filter' approach to maintaining even poorly understood species and ecosystem functions by ensuring that all distinct habitat types are represented in the unmanaged land base. It is not a stand-alone strategy, but is meant to complement habitat elements and landscape structure indicators (1.1.1b, 1.1.1c, 1.1.2, 1.1.3, 1.1.4, 1.4.1, 1.4.2). Habitat elements and landscape structure is considered a 'medium-filter' approach, based on the principle of managing for forest structures that are both considered important as habitat and are impacted by forestry practices. While Ecological Representation (1.1.1a) provides for a diversity of habitat types, other indicators in this suite maintains a diversity of habitat structures to accommodate a wide range of species, including those that are poorly known. Species level indicators (1.2.1, 1.2.2, 1.2.3) provide a 'fine-filter' approach that monitors the response of species to changes in habitat structure and pattern. Monitoring the population trends of certain species is a means of assessing the effectiveness of the coarse and medium level indicators, whereby providing habitat and structure across the land base should result in persistent populations of species.

Criterion 1 and its associated indicators evaluate the biological components required to sustain species richness in managed and unmanaged landscapes. This criterion is strongly linked to Criterion 2 (Ecosystem Condition and Productivity) and Criterion 5 (Economic and Social Benefits). 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 tree biomass within the harvesting land base (Criterion 1 and Criterion 2).

Criterion 1 also is linked to social values. For example, late seral forests may be a management objective under Criterion 6 to address sites of spiritual importance. As well, 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 that are not necessarily identified under Species indicator (1.2), but are identified as important by stakeholders.

The overall intent of Criterion 1 is to maintain productive, well-distributed populations of species in a defined management area. This will maintain the variation among individuals and species, allowing species to persist in changing environments (Bunnell 1998).

[12] Bunnell, F.L. 1998. Overcoming paralysis by complexity when establishing operational goals for biodiversity. Journal of Sustainable Forestry 7: 145-164.

[13] Bunnell, F.L., B.G. Dunsworth, D.J. Huggard, and L.L. Kremsater. 2003. Learning to sustain biological diversity on Weyerhaeuser's coastal tenure. Weyerhaeuser, Nanaimo, BC. http://cacr.forestry.ubc.ca/forest_strategy/am/framework.htm

This Criterion consists of four Elements:

| | |
|---|---|
| **Element 1.1: Ecosystem Diversity** | Conserve ecosystem diversity at the stand and landscape levels by maintaining the variety of communities and ecosystems that naturally occur in the DFA. |
| **Element 1.2: Species Diversity** | Conserve species diversity by ensuring that habitats for the native species found in the DFA are maintained through time, including habitats for known occurrences of species at risk. |
| **Element 1.3: Genetic Diversity** | Conserve genetic diversity by maintaining the variation of genes within species and ensuring that reforestation programs are free of genetically modified organisms. |
| **Element 1.4: Protected Areas and Sites of Special Biological and Cultural Significance** | Respect protected areas identified through government processes. Co-operate in broader landscape management related to protected areas and sites of special biological and cultural significance.<br><br>Identify sites of special geological, biological, or cultural significance within the DFA, and implement management strategies appropriate to their long-term maintenance. |

| | |
|---|---|
| **Element 1.1: Ecosystem Diversity** | Conserve ecosystem diversity at the stand and landscape levels by maintaining the variety of communities and ecosystems that naturally occur in the DFA. |
| **Value:** | Ecosystem Diversity |
| **SFM Objective:** | Maintain the diversity and pattern of communities and ecosystems within a natural range. |

The following CSA Core Indicators have been identified for this Element:

1.1.1 — Ecosystem area by type

1.1.2 — Forest area by type or species composition

1.1.3 — Forest area by seral stage or age class

1.1.4 — Degree of within-stand structural retention

The following indicator statements have been identified for this Element:

1.1.1a Percent representation of ecosystem groups across the DFA

1.1.1b Recommended percent of interior forest by Ecosystem Group across the DFA

1.1.1c Percent patch size distribution by Natural Disturbance Type

1.1.2 Percent distribution of forest type > 20 years old across DFA

1.1.3 Percent late seral distribution by ecological unit across the DFA

1.1.4a Percent of blocks meeting dispersed retention levels as prescribed in the operational plan

1.1.4b Percent of stand structure retained across the DFA in harvested areas

1.1.4c Number of non-conformances to riparian management strategies

### Indicator 1.1.1a – Ecosystem Representation

This indicator is a 'coarse-filter' approach to maintaining the full range of biological diversity across the landscape (Huggard 2000).[14] It is intended to ensure that little known species and poorly understood ecological functions are sustained, particularly those species that may not be addressed by Indicators 1.1.1b, 1.1.1c and 1.1.3. Unmanaged areas can also provide both a precautionary buffer against any management errors made in the timber-harvesting portion of the land base, and an ecological baseline (i.e., benchmark) against which the effects of management can be compared (Bunnell et al. 2003).[15]

This indicator is achieved through a process of land base classification (timber harvesting land base (THLB), non-harvested land base (NHLB)), ecosystem classification (BEC variant, site series groups), representation analysis, and setting of management priorities to address poorly represented ecosystem types.

| Indicator Statement | Target (Variance) |
|---|---|
| Percent representation of ecosystem groups across the DFA | • Rare Ecosystems – 0 ha<br>• 25% of common ecosystem cluster will be reserved or managed to maintain or restore ecosystem functions<br>• Uncommon ecosystems – Table 16: Canfor (Radium DFA) Invermere TSA Ecosystem Representation Targets – March 31, 2007 |

**Table 16: Canfor (Radium DFA) Invermere TSA Ecosystem Representation Targets – March 31, 2007**

| Rare Ecosystem Groups (<2000ha EKCP) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Ecosystem Group** | **EKCP Area (ha)** | **EKCP Target** | **EKCP Target (ha)** | **EKCP NHLB** | **EKCP Net Target (ha)** | **Canfor Area (ha)** | **Canfor Responsibility (%)** | **Canfor Net Target (ha)** |
| **2** | 949 | 100% | 949 | 232 | 717 | 115 | 12.1% | 87 |
| **14** | 1,645 | 100% | 1,645 | 480 | 1,165 | 0 | 0.0% | 0 |
| **16** | 368 | 100% | 368 | 130 | 237 | 102 | 27.6% | 66 |
| **24** | 1,750 | 100% | 1,750 | 1,324 | 426 | 428 | 24.5% | 104 |
| **Uncommon Ecosystem Groups (>2000ha - <10,000ha EKCP)** | | | | | | | | |
| **Ecosystem Group** | **EKCP Area (ha)** | **EKCP Target** | **EKCP Target (ha)** | **EKCP NHLB** | **EKCP Net Target (ha)** | **Canfor Area (ha)** | **Canfor Responsibility (%)** | **Canfor Net Target (ha)** |
| **8** | 4,402 | 89.9% | 3,957 | 732 | 3,225 | 0 | 0.0% | 0 |
| **10** | 6,702 | 50.5% | 3,385 | 2,664 | 721 | 2,689 | 40.1% | 289 |
| **12** | 10,851 | 27.1% | 2,940 | 3,330 | 0 | 1,810 | 16.7% | 0 |
| **17** | 6,526 | 53.3% | 3,476 | 3,740 | 0 | 137 | 2.1% | 0 |
| **18** | 8,891 | 31.5% | 2,801 | 4,777 | 0 | 853 | 9.6% | 0 |

[14] Huggard, D. 2000. Ecological representation in the Arrow IFPA non-harvestable land base. Prepared for Arrow IFPA, Slocan, BC.

[15] Bunnell, F.L., B.G. Dunsworth, D.J. Huggard, and L.L. Kremsater. 2003. Learning to sustain biological diversity on Weyerhaeuser's coastal tenure. Weyerhaeuser, Nanaimo, BC. http://cacr.forestry.ubc.ca/forest_strategy/am/framework.htm

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **19** | 4,462 | 89.1% | 3,978 | 4,065 | 0 | 80 | 1.8% | 0 |
| **29** | 2,444 | 99.7% | 2,436 | 1,508 | 928 | 417 | 17.1% | 158 |
| **Common Ecosystem Groups (>10,000ha EKCP)** | | | | | | | | |
| **Ecosystem Group** | **EKCP Area (ha)** | **EKCP Target** | **EKCP Target (ha)** | **EKCP NHLB** | **EKCP Net Target (ha)** | **Canfor Area (ha)** | **Canfor Responsibility (%)** | **Canfor Net Target (ha)** |
| **1** | 73,765 | 25% | 18,441 | 10,885 | 7,557 | 4,439 | 6.0% | 455 |
| **3** | 237,685 | 25% | 59,421 | 55,357 | 4,065 | 13,826 | 5.8% | 236 |
| **6** | 92,710 | 25% | 23,178 | 29,989 | 0 | 18,511 | 20.0% | 0 |
| **7** | 315,806 | 25% | 78,952 | 103,435 | 0 | 51,018 | 16.2% | 0 |
| | | | | | | | **Total:** | **1,395** |

**What is this indicator and why is it important?**

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

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

- Seed zones
- Protected area planning
- Land management planning
- Forest pest risk
- Natural disturbance types
- Wildlife habitat management

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

- to help assess the status of an ecosystem throughout a planning area;
- to focus attention and tracking on ecosystems that merit conservation concern; and
- to help rank allocation of resources to conservation efforts, such as parks, Wildlife Habitat Areas, Old Growth Management Areas (OGMA's) or Wildlife Tree Patches (WTPs), (Bunnell et al 2004).

An ecosystem representation analysis consists of three primary steps: defining habitat or ecosystem types across the land base, defining the NHLB, and determining the proportion of each ecosystem type that is represented in an unmanaged state.[16] Ecosystem types should be defined at an ecologically relevant scale that is can be mapped and is useful to management. Within British Columbia, the Biogeoclimatic Ecosystem Classification (BEC) system provides a hierarchical framework within which ecosystem types may be defined at regional and local scales (Meidinger and Pojar 1991).[17]

[16] Unmanaged state – refers to the land that is not within the timber harvesting landbase i.e., NHLB.
[17] Meidinger, D. and J. Pojar (eds). 1991. Ecosystem of British Columbia. BC Ministry of Forests, Research Branch Special

One current approach to defining ecosystem types employs multivariate statistics to group together BEC site series based on similarities in vegetation communities, then uses Predictive Ecosystem Mapping (PEM) to map the resulting ecosystem groups across the management unit (Huggard 2000;[18] Bunnell et al. 2003;[19] Wells et al. 2004[20]) Once ecosystem types have been described and mapped, and the NHLB has been defined through a Timber Supply Review process, a Geographic Information System (GIS) environment can be used to determine the number and area of ecosystem types in both the THLB and NHLB.

Maintaining representation of the full range of distinct ecosystem types across the land base is a critical component of managing to sustain biological diversity. An ecosystem representation analysis is necessary firstly to establish the number and area of ecosystem types within a given area (and thus determine which types are common and which are rare), and secondly to identify which ecosystem types are poorly represented in the NHLB. Where adequate representation is achieved a more intensive use of the managed land base can occur; where representation is lacking then management strategies can be developed to transfer a portion of each under-represented type to the NHLB.

Rare plant communities[21] are included within the rare or uncommon ecosystems categories. The Ecosystem Representation analysis utilized information from a report generated in the East Kootenays, however, this report does not directly correlate between ecosystem groupings.

New measures may be developed based on the quantitative outcomes of the representation analysis in consultation with the *FOREST*.

**How are targets established?**

Proactive measure to identify and conserve rare and uncommon ecological communities.

It has been agreed by *FOREST* that the established targets for the percentage of each ecosystem type to be reserved in an unmanaged state will follow the recommendations from research (Wells et. al. 2004). As a coarse filter management approach, maintaining ecosystem representation in the non-harvestable land base (NHLB) is intended to cover the array of species for which there is little or no knowledge of, to provide insurance for species that are managed for within the harvested land base, and to provide "benchmarks" of unmanaged ecosystems. Knowledge of the state of representation of different ecosystem classes also allows managers to set ecosystem priorities within the timber harvesting land base.

Since one objective for ecosystem representation is to look after species and processes that we know little or nothing about, it is impossible to know precisely how much area is required. Targets for ecosystem representation are intended to be precautionary, providing some 'insurance' that species will be sustained in landscapes managed for a range of objectives. Although targets must be somewhat arbitrary, initial management targets selected for representation are an effective starting point, providing a baseline for further evaluation and for establishing species-based monitoring programs. Targets can then be adjusted if necessary, based on the results of evaluation or monitoring.

The recommendations for initial targets for Indicator 1 are based on the results of Wells et al. (2004).[22] The recommendations are dependent on the relative area of ecosystem groups, based on the principle that

[18] Huggard, D. 2000. Ecological representation in the Arrow IFPA non-harvestable land base. Prepared for Arrow IFPA, Slocan, BC.
[19] Bunnell, F.L., B.G. Dunsworth, D.J. Huggard, and L.L. Kremsater. 2003. Learning to sustain biological diversity on Weyerhaeuser's coastal tenure. Weyerhaeuser, Nanaimo, BC. http://cacr.forestry.ubc.ca/forest_strategy/am/framework.htm
[20] Wells, R.W., D. Haag, T. Braumandl, G. Bradfield and A. Moy. 2004. Ecological representation in the East Kootenay Conservation Program study area. Prepared for Tembec, Cranbrook, BC
[21] Ferguson, R.S. 2004. Species at risk assessment report for the Rocky Mountain and Kootenay Lake Forest Districts, British Columbia, Canada. Report to Tembec Industries Inc. and Canadian Forest Products Ltd., FIA Contract No. 04-RIP-FIA-304
[22] Wells, R.W., D. Haag, T. Braumandl, G. Bradfield and A. Moy. 2004. Ecological representation in the East Kootenay Conservation Program study area. Prepared for Tembec, Cranbrook, BC

if an ecosystem group is less common on the landscape, it potentially is more vulnerable and thus deserves a higher level of protection than a more common ecosystem group.

**Strategy**

Rare ecosystem groups[23] will be identified by mapping at the BEC variant level or PEM site series level and will be protected from harvesting.

Uncommon ecosystem groups[24] will be identified by mapping at the BEC variant level or PEM site series level. These sites will have assigned management strategies to retain characteristics of unmanaged forests either through their protection (such as being designated as a wildlife tree patch) or by special management (such as harvesting with dispersed retention).

**Forecasting and Probable Trends of the Indicator**

It is forecasted that a diversity of ecosystems, including maintaining "rare" attributes, will provide for diversity and abundance of naturally occurring plants, animals and their habitats. These ecosystems will meet the targets as specified in Table 16.

Modeling future amounts is planned at the renewal of the SFMP and will be updated regularly. The ecosystem representation analysis and targets will be updated with the next renewal of Canfor Radium DFA's Forest Stewardship Plan.

**Current Condition**

Ecosystem Representation mapping has been completed for the East Kootenays in 2004 (Wells et al, 2004) as summarized below:

Conservation strategies for sustaining biodiversity in managed forests. The East Kootenay Conservation Program (EKCP) study area provides a significant opportunity to evaluate and manage for ecological representation. The sub-regional scale is large enough to encompass a wide range and diversity of forested ecosystems. These variants include an ecological gradient ranging from low elevation, dry open forests through dry sub-alpine forests, as well as wetter low elevation and sub-alpine forests. The EKCP is 1.8 million hectares of productive forest, of which nearly 1.6 million ha is crown forest (88%) that is mostly managed for forestry. Nearly half (46%) of the forested land in the study area is currently constrained from harvest, and potentially able to contribute to ecological representation.

To evaluate ecological representation in the forested landscape of the EKCP, 35 distinct ecosystem groups were evaluated based on vegetation composition. It was found that the forested land base was dominated by relatively few broad-scale, circum-mesic groups of common vegetation composition with a larger number of uncommon xeric-subxeric and subhygric-hygric groups. The most underrepresented ecosystem groups were the lower elevation circum-mesic groups, with <30% of their area in the NHLB. In addition, many groups were relatively uncommon (<0.5% of forested area in the EKCP). These groups are vulnerable by virtue of their relative scarcity, regardless of their representation status. Results also show that vulnerable groups are poorly represented in parks and have a significant proportion of their area on private land.

Spatial evaluation showed that common groups were distributed as smaller patches in the NHLB relative to the EKCP. It also demonstrated that larger groups were not dominated by edge, though uncommon groups were potentially more vulnerable to managed edges by virtue of their small size. The assessment of the juxtaposition of ecosystem groups showed that many groups were spatially associated on the landscape, with uncommon xeric and hygric groups nested within common circum-mesic groups. It may

[23] Rare ecosystem groups – those having an area of less than 2000 hectares within and immediately adjacent to the DFA.
[24] Uncommon ecosystem groups – those having an area of between 2000 and 10,000 hectares within and immediately adjacent to the DFA.

be appropriate to consider these groups as ecologically associated vegetation communities, rather than as independent entities.

Canfor currently manages each landscape unit to a percent target for old seral forests and mature seral forests as required by the Kootenay Boundary Higher Level Plan. The old and mature forests are spatially identified on maps as derived from the Invermere old growth management field classification completed by the Ministry of Forests and Range and forest companies. These areas capture stand and landscape level ecosystem attributes unique to the landscape unit. The mapped old and mature forest areas are located within the NHLB and THLB and are treated as reserves unless a suitable alternative of equal or greater value is found.

Practices are guided by the Habitat Representation Strategy.

**Monitoring and Reporting**

Although ecosystems are theoretically static, the results of an ecosystem representation analysis can change over time with the availability of new Ecosystem Mapping (overlay of ecosystem clusters or site series to determine potential location of each ecosystem type and/or a new land base netdown (i.e. during TSR or changes in NHLB). As a form of monitoring, the ecological representation analysis will be redone whenever a new version of mapping and/or TSR and/or significant changes in the NHLB occurs.

Operationally, appropriate management practices following the Ecosystem Representation Strategy will be implemented and follow-up inspections will ensure conformance. Reporting will focus on identifying ecosystem types that are a management priority either because they are poorly represented, or are uncommon/rare. It is important to recognize the difference between underrepresented and rare ecosystem types, as their management strategies may differ. Annually, report any incidents of harvesting that occurred in ecosystem groups defined as rare. Also report the number of hectares where harvesting occurred within uncommon ecosystem groups and the number of these hectares where specific management strategies to retain the characteristics of unmanaged forests were implemented.

Reporting will provide maps identifying ecosystem groupings and report on the number of hectares in an unmanaged state. In addition, annual reporting will describe actions/activities taken in each of these ecosystem groupings.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 1.1.1b – Interior Forest by Ecosystem Group

Indicators 1.1.1b, 1.1.1c and 1.1.3 are a ‘coarse-filter’ approach to maintaining the full range of biological diversity. “Landscape” is used here to include any features created by two or more relatively homogeneous stands, or measurements made over an area larger than a typical stand – often referred to as landscape context. Landscape features are thus broad-scale summary variables. Most available landscape summary indices are unhelpful because they have little apparent ecological relevance or they require a simple “black-and-white” view of habitat that is not appropriate in regenerating, managed forests. Moreover, many current forest practices (such as retention of trees within cutblocks) explicitly attempt to make managed stands less different from natural stands. Additionally, different organisms respond to different habitat types in very different ways, obscuring tidy distinctions among habitat classes. Landscape-level monitoring therefore relies primarily on the representation analyses of Indicator 1.1.1 focused by the species accounting system outlined in Indicators 1.2.1 and 1.2.2. Four key landscape

features that are modified by forest practices have been identified in review of Bunnell et al. 2003[25]. These are:

- the amount of older forest, (Indicator 1.1.3)
- edge length and forest interior, (Indicator 1.1.1b)
- road densities and distribution (especially relative to streams), and, sometimes
- the distribution of patch age and size classes (Indicator 1.1.1c).

Note that monitoring these four broad measures in combination with organism monitoring (Indicators 1.2.1 & 1.2.2) serves three purposes. First, it documents trends in landscape features known to influence abundance of some species. Second, the measures can help to focus monitoring or action by revealing potentially troublesome areas (e.g., number of stream crossings in an area or stream). Third, in combination with species measurements they can reveal which species are responding to the measures and offer some guidance on potential thresholds for management action.

| **Indicator Statement** | **Target (Variance)** |
|---|---|
| Recommended percent of interior forest by Ecosystem Group across the DFA | 1 Report (0) |

**What is this indicator and why is it important?**

Edge effects are increasingly important as more of the DFA's forests are harvested using smaller cutblocks and retention patches. Forest interior is defined as areas away from the effects of edges. Forest planners are seeking to maintain interior habitat because although edges benefit some species, some are sensitive to edges and affects of nearby openings. Reviews of edge effects (Kremsater and Bunnell 1999) suggest that microclimate variables (radiation, wind, relative humidity) can be influenced up to 200 m into a forest by adjacent openings, but most effects taper off by 100 m into the forest. The depth of the microclimatic edge effects depends on the exposure of the edge. South-facing edges tend to have longer depth of edge than those with northern exposures. Biological edge effects such as predation and parasitism by cowbirds, tend, in general to be detected usually less than 50 m into a forest. On average, and slightly conservatively, we suggest modelling edge effects of 100 m.

**How are targets established?**

The amount of interior habitat that should be maintained depends in large part on the amount typical in natural forests. In coastal forests, the Clayoquot Scientific Panel recommended that almost half the reserved old growth be in interior conditions. A first step to setting targets is to examine the amount of interior forest at present in the DFA and the amounts in less developed watersheds. It may be possible to break interior forest by ecological groupings. These groupings need to be selected before targets for forest interior are developed. Just as for the other landscape measures, the amount of interior is most useful when responses of organisms are monitored or when management scenarios are compared. Scenarios with greater amounts of forest interior can be chosen over other scenarios.

The target is designed to determine the existing interior forest condition (baseline) prior to establishing meaningful targets that track the trend. The future target would need to reflect avoiding negative trends in Interior forest condition by ecosystem group across the DFA.

**Strategy**

[25] Bunnell, F.L., B.G. Dunsworth, D.J. Huggard, and L.L. Kremsater. 2003. Learning to sustain biological diversity on Weyerhaeuser's coastal tenure. Weyerhaeuser, Nanaimo, BC. http://cacr.forestry.ubc.ca/forest_strategy/am/framework.htm

Canfor Radium is to complete a report that provides recommended targets for interior forest percentages by ecosystem group. Once that is completed Canfor Radium will develop a strategy to ensure they meet those targets.

**Forecasting and Probable Trends of the Indicator**

Calculating the amount of edge and interior can be added on to the representation analyses relatively easily because they involve the same GIS database. Modeling future amounts under different scenarios is planned at the next 5-year renewal of the SFMP and will be updated regularly. Different edge depths can be modeled.

**Current Condition**

Interior forests are currently not identified by Canfor. However, several protected areas within the Invermere TSA will contribute to interior forests and the protected areas strategy in the SFMP will maintain the current state of interior forests.

Protected areas addressed by this strategy include national and provincial parks, reserves such as riparian reserve zones or High Conservation Value Forests, protected areas such as wildlife tree retention areas or wildlife habitat areas (WHA's) for species at risk, biologically significant areas such as den sites, animal licks or rare ecosystems, and finally specific wildlife management plans such as ungulate winter range. Objectives for these protected areas are often very diverse but the management strategies overlap.

Overall, primary forest activities are consistent with protected area objectives. Specific stand level strategies are addressed in an operational Forest Stewardship Plan and subsequent operational plans.

Canfor monitors the location of landscape level reserves over time.

High Conservation Value Forests are those forest areas of high ecological or cultural significance. These have been identified for the Canfor operating area in the Invermere TSA.

**Monitoring and Reporting**

Trends in forest interior will be reported every 5 years. Without context (such as organism responses or 'natural' amounts) or choices (as between management scenarios) these trends mean little. The utility of these variables is highest when choices are being made among alternative management scenarios (e.g., during TSA planning?) and when relationships are documented between the variables and responses of organisms. That is, they rarely can be interpreted without reference to other indicators.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 1.1.1c – Patch Size Distribution by NDT

| Indicator Statement | Target (Variance) |
|---|---|
| Percent patch size distribution by Natural Disturbance Type | Trend towards patch size distribution targets defined in the LU Planning Guide by Natural Disturbance Type over a 5 year period |

**What is this indicator and why is it important?**

Concern over patch size distribution originated with concern over effects of habitat loss and fragmentation. There is clear evidence of effects on species as habitat is reduced (that is as patches of habitat get smaller), there is also evidence that breaking up of habitat into smaller pieces, without actual habitat loss, has some effect on organisms. These effects are usually expressed through effects of edges and loss of forest interior and effects of isolation as distances between patches of habitat become large. Patches are generally thought of as forest of similar age. Generally concern over patch size is primarily a

concern over size of old forest remnants or size of young forest openings. The concern is around keeping enough habitat and making sure similar habitats are not isolated from each other (to allow movement and dispersal). There are no ideal distributions of patch size and shape. Keeping old forest and forest interior is more important, and ensuring that old forest will be generated in sizable pieces, with some connections is important. The conservative approach set by KBLUP in estimating natural patch sizes than sticking to those distributions is one way of making sure patch size distribution do not become too skewed from natural amounts, but targets should not be set in stone.

**How are targets established?**

In the patch size analysis completed by Forsite (2004) a patch is defined as a contiguous area with a common seral stage. Seral stages are based on stand age, NDT and BEC zone, as shown in Table 17.

**Table 17: Seral Definitions**

| NDT | BEC Zone | Very Early | Early | Mid | Mature | Old |
|---|---|---|---|---|---|---|
| 1 | ESSF | 0-20 | 21-40 | 41-120 | 121-250 | 250+ |
| | ICH | 0-20 | 21-40 | 41-100 | 101-250 | 250+ |
| 2 | ESSF | 0-20 | 21-40 | 41-120 | 121-250 | 250+ |
| | ICH | 0-20 | 21-40 | 41-120 | 121-250 | 250+ |
| 3A or 3B | ESSF | 0-20 | 21-40 | 41-120 | 121-140 | 140+ |
| | ICH | 0-20 | 21-40 | 41-100 | 101-140 | 140+ |
| | MS | 0-20 | 21-40 | 41-100 | 101-140 | 140+ |
| 4 | IDF | 0-20 | 21-40 | 41-100 | 101-250 | 250+ |

The above seral definitions are consistent with the LU Planning Guide and Biodiversity Guidebook, with one exception. Early seral has been divided into 0-20 yrs and 21-40 yrs to allow evaluation against the patch size targets provided in the LU Planning Guide. Colleen Jones, RPBio of Shamaya Consulting – Ecological Services has also provided supporting ecological rationale for this distinction within early seral (Forsite, 2004).

**Strategy**

Management practices will be implemented in the short term that trend the patch size target to the desired landscape design over the long term. The patch size distribution targets are long term and it is not the intention to achieve the targets within a short time frame. Conditions such as social, economic, biological and harvest priority factors may prevent the targets from being achieved in the short term.

**Forecasting and Probable Trends of the Indicator**

Calculating patch size distributions can be added on to the representation analyses relatively easily because they involve the same GIS database. Modeling future amounts is planned at the next 5-year renewal of the SFMP and will be updated regularly. The patch size analysis will be updated with the next renewal of Canfor's Forest Stewardship Plan.

**Current Condition**

To achieve the objective for wildlife and biodiversity at the landscape, the design of timber harvesting patterns considers, both spatially and temporally, the patterns of natural disturbance.

A patch size distribution pattern has been developed for each landscape unit as described by 'Patch Size Distribution Analysis for Specific LU's in the Invermere TSA, Forsite Consultants Ltd, November 2004'.

The forest patch size categories found in each landscape unit will trend towards or fall within the desired target ranges shown in the Patch Size Distribution Analysis completed by Forsite, 2004. Cutting permits will consist of larger cutblocks or cutblocks that are contiguous with previous clearcut openings where the patch size distribution indicates that openings greater than 40ha are appropriate. Cutting permits will not

consist of larger cutblocks or cutblocks that are contiguous with previous clearcut openings where the patch size distribution indicates that openings greater than 40ha are inappropriate.

New cutblocks that are proposed adjacent to existing cutblocks will be rationalized according to the patch size distribution targets as described above and in accordance with section 65 (4) of the FRPA.

**Monitoring and Reporting**

Trends in landscape variables will be reported every 5 years. Without context (such as organism responses) or choices (as between management scenarios) these trends mean little. Exceptions include amount of road, which has legal targets, and amount of old growth that also has a higher-level plan target. The utility of these variables is highest when choices are being made among alternative management scenarios (e.g., during TSA planning) and when relationships are documented between the variables and responses of organisms. That is, they rarely can be interpreted without reference to other indicators.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 1.1.2 – Distribution of forest type > 20 years old

| Indicator Statement | Target (Variance) |
|---|---|
| Percent distribution of forest type (deciduous, deciduous mixed wood, conifer mixed wood, conifer) across DFA | Maintain the baseline distribution (± 5%) over a 5-year reporting period. |

**What is this indicator and why is it important?**

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

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

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

Species relationships also occur between broad forest types. Current broad forest types are:

0-10 years old;
11 to 30 years old;
Deciduous 31 to 90 years old
Deciduous >90 years old
Mixed 31 to 90 years old
Mixed >90 years old
Conifer 31 to 90 years old
Conifer >90 years old
Non-forest
Non-vegetated
Water

These categories can be changed as relationships between organisms and forest types are refined and improved. Simply knowing amounts of these types across the DFA will allow planners to assess likely responses of the species outlined in Indicator 1.2.2.

**How are targets established?**

The need to maintain the biological diversity of forest ecosystems in future generation forests. Addresses diversity and abundance of naturally occurring tree species on the landscape. Management control restricted to areas of the Timber Harvesting Land Base (THLB).

**Strategy**

Forest plans will incorporate reforestation strategies that retain the natural balance of broad forest types within the DFA.

**Forecasting and Probable Trends of the Indicator**

It is forecasted that healthy ecosystems, with a diversity of native broadleaf and coniferous species, will be maintained at endemic and sustainable levels. These levels are a high-level overview and will be +/- 5% of the current distribution (Figure 12 and Table 18), over a 5-year period.

Species composition information is utilized in the Provincial Timber Supply Review.

**Current Condition**

The percent distribution of forest types across the DFA is outlined in the Table 18 below and is based on 2007 baseline data. Figure 12 provides a pie chart of the data.

**Figure 12: Broad Forest Group Distribution Across DFA**

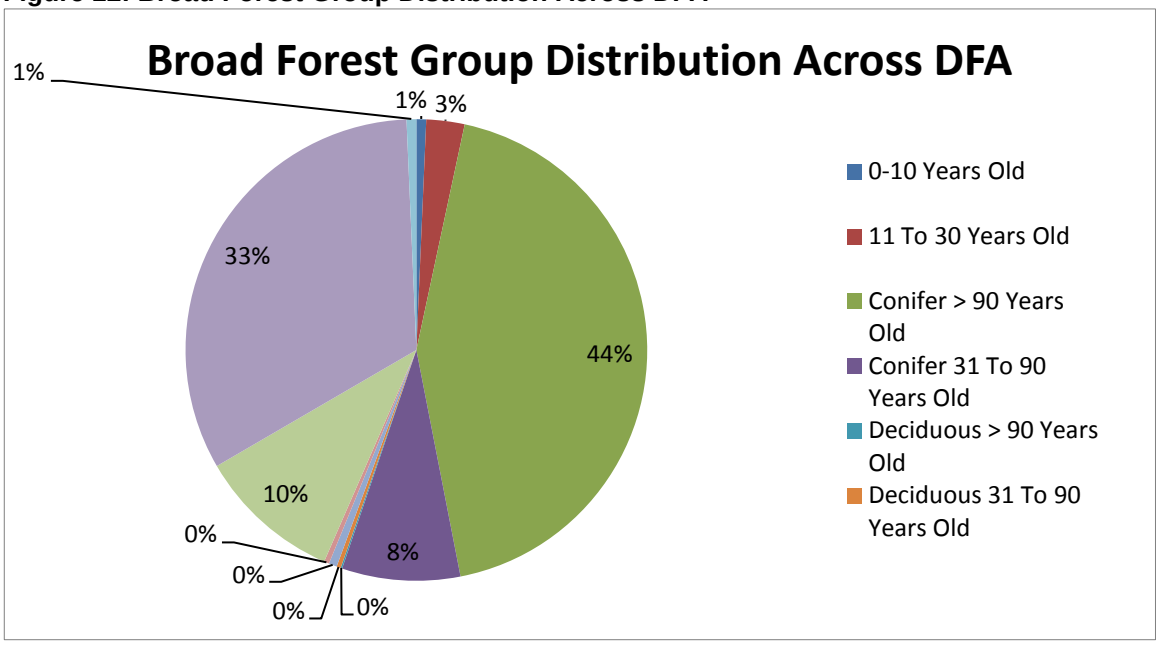



**Table 18: Canfor Radium DFA – Percent Distribution of Broad Forest Types**

| | BEC Zone (Ha) | | | | | | Percent Distribution |
|---|---|---|---|---|---|---|---|
| **Broad Forest Group** | **ESSF** | **ICH** | **IDF** | **IMA** | **MS** | **Grand Total** | |
| 0-10 Years Old | 1130 | 279 | 57 | | 1120 | 2586 | 0.69% |
| 11 To 30 Years Old | 1463 | 1013 | 1947 | | 5694 | 10117 | 2.70% |
| Conifer > 90 Years Old | 88119 | 16393 | 23516 | 7 | 36636 | 164670 | 43.88% |
| Conifer 31 To 90 Years Old | 12326 | 3315 | 5192 | | 10460 | 31294 | 8.34% |
| Deciduous > 90 Years Old | | 9 | 358 | | 43 | 409 | 0.11% |
| Deciduous 31 To 90 Years Old | 39 | 161 | 743 | | 158 | 1100 | 0.29% |
| Mixed > 90 Years Old | 9 | 182 | 1407 | | 554 | 2154 | 0.57% |
| Mixed 31 To 90 Years Old | 107 | 205 | 647 | | 392 | 1351 | 0.36% |
| Non-Forest | 10149 | 2984 | 12547 | 6 | 12388 | 38074 | 10.15% |
| Non-Vegetated | 66252 | 1038 | 3070 | 50936 | 2288 | 123583 | 32.93% |
| Water | 375 | 14 | 977 | 276 | 939 | 2581 | 0.69% |
| | **179360** | **26568** | **50314** | **46767** | **72264** | **375273** | **100.00%** |

## Monitoring and Reporting

This indicator will be reported on a 5-year basis. The different stand types will be run using GIS analysis and VRI data. The baseline data was revised in 2011 (see the table above). Subsequent analysis will be

done every 5 years in an effort to eliminate any bias from short-term trends on the land-base, and to allow for the periodic updating of data sources. The indicator will be considered to have been met if the area for the 5-year reporting window maintains its area spread within 5 percent of baseline areas.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 1.1.3 – Seral Stage or Age Class

| Indicator Statement | Target (Variance) |
|---|---|
| Percent late seral distribution by ecological unit across the DFA | 100% compliance with the mature and old seral targets defined in the Kootenay Boundary Higher Level Plan |

**What is this indicator and why is it important?**

Concern over old forest derives mostly from the amount of time it takes for such stages to develop. Old seral forests are home to many organisms, some respond to the microclimatic conditions (e.g., many lichens and bryophytes,) some respond to the stand structures of older forests. There are well-documented relationships between many species and the stand structures of older forest. Sometimes, particularly for vertebrates, if these structures are retained, then younger forests can serve as habitat. Often reasons why organisms prefer old growth are unclear (e.g., many invertebrates) and probably are a mix of microclimate, structures that take a long time to develop (large limbs, shedding bark,) time for biomass to accumulate, and time for dispersal and growth to occur (e.g., many lichens).

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

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

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

**How are targets established?**

Amounts of desired old growth are set in the Kootenay Boundary Higher Level Plan Order (KBHLPO). These amounts are levels suggested by experts to sustain species and ecosystem functions.

Landscape features also can be assessed through comparisons of management scenarios. Scenarios with the lesser amounts of roads, greater old seral, or less edge, more interior can be chosen over other scenarios.

Baseline information or legal targets are stated within KBLUP.

**Strategy**

The relative amount of late seral stage or old forests is mandated by KBHLPO .The target seeks to ensure compliance/conformance to that order.

Objectives 1 and 2 of the KBHLPO specify the amount of old and mature forest that must be maintained within each BEC variant inside each Landscape Unit (LU). LU's have been legally established along with

Biodiversity Emphasis Option (BEO) assignments that help guide the level of old/mature forest in each LU. KBHLP order defines old and mature forests.

**Forecasting and Probable Trends of the Indicator**

The trend of this measure is that the Old Growth Management Areas (OGMA's) and Mature Management Areas (MMA's) analysis will be updated regularly during TSR analysis and FSP updates.

**Current Condition**

The management strategy is consistent with the intent of the Kootenay Boundary Higher Level Plan Order (KBHLP) biodiversity emphasis options.

OGMA and MMA statistics are based on new Biodiversity Ecosystem Classification (BEC) variant line work to define BEO's within the LU's. This line work is the current District standard modeled in TSR3 base case.

Canfor currently manages each landscape unit to a percent target for old seral forests and mature seral forests as required by the Kootenay Boundary Higher Level Plan. The old and mature forests are spatially identified on maps as derived from the Invermere old growth management field classification completed by the Government and forest companies. These areas capture stand and landscape level ecosystem attributes unique to the landscape unit. The mapped old and mature forest areas are located within the NHLB and THLB and are treated as reserves unless a suitable alternative of equal or greater value is found.

The amount of late seral age class by ecological unit as compared to the target amount is documented in the 'Refined Script Driven OGMA's and MMA's for the Rocky Mountain Forest District-Document Package, V1.0 Forsite Consultants and Al Neal Environmental Consulting, March 31, 2004

**Monitoring and Reporting**

Utilize targeted percent late seral legal targets. Identification of actual percent late seral by ecological unit to occur with inventory updates in conjunction with Timber Supply Review (generally every 5 years).

Reporting will note whether legal targets are achieved. Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 1.1.4a – Dispersed Retention

Complexity of stand structure is a key component of an operational strategy to sustain biodiversity in forested ecosystems (Bunnell et al 1999). Structural complexity helps to mitigate the potential deleterious effects of large-scale stand and landscape simplification associated with intensive short-rotation forest management. It can be provided by the adoption of retention silvicultural systems, a practice broadly applied in interior BC (Lindenmayer and Franklin 2003, Bunnell et al. 1999).

| Indicator Statement | Target (Variance) |
|---|---|
| Percent of blocks meeting dispersed retention levels as prescribed in the operational plan. | 100% (0) |

**What is this indicator and why is it important?**

Operational level plans often include retention of dispersed trees such as snags, large live trees, deciduous trees, stub trees and understory trees. Dispersed retention provides stand level complexity and long-term recruitment of coarse woody debris. Harvest value and ecological value can be optimized by selecting the

variety of tree types (e.g., species, size, live and dead, etc.) that have high ecological value and low economic value, and through the number of trees retained.

This indicator is related to indicator 1.3.1.

**How are targets established?**

Recognition that tree retention and riparian areas are "focus areas" for successfully meeting biodiversity and ecosystem objectives. Stand level plan commitments are site specific, consider landscape conditions and may exceed legal requirements.

**Strategy**

Canfor Radium will achieve targets through allocation of retention patches and dispersed retention (individual trees and stubs) during cut block planning. Where applicable, plans will also contain riparian area commitments. Canfor Radium plans and practices support riparian management, group retention and protection of designated wildlife trees/stubs. Forest Stewardship Plans plans include commitments, where appropriate, to prescribe dispersed retention. Operational plans are properly prescribed and executed providing desired FSP results. Post harvest evaluations assess plan conformance.

**Forecasting and Probable Trends of the Indicator**

Healthy ecosystems with a diversity and abundance of native species and habitats are forecasted. This will include harvested areas with habitat attributes that will help to sustain biological and ecological processes in managed forests. Properly functioning riparian systems leading to the conservation of fish habitat and maintenance of water quality.

Dispersed retention levels are prescribed as appropriate for the pre-harvest stand. The forecast for this indicator is that Canfor will remain in compliance.

**Current Condition**

All blocks harvested between 2007-2011 have achieved the dispersed retention levels prescribed in the Forest Stewardship Plan.

**Monitoring and Reporting**

Areas harvested during the annual reporting period will report the percent of blocks meeting dispersed retention levels as prescribed in the operational plan to achieve FSP results.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 1.1.4b – Stand Structure Retention

| Indicator Statement | Target (Variance) |
|---|---|
| Percent of stand structure retained across the DFA in harvested areas | Landscape level target – 7% |

**What is this indicator and why is it important?**

Wildlife tree patches (WTPs) are a retention tool recommended for use in stand- and landscape-level planning to help sustain biodiversity and ecological processes. They are used to provide protection for known wildlife habitat features (including standing dead and dying trees), to provide attributes important to key ecological processes (including woody debris, tree species diversity, and understory vegetation diversity), to protect small, local sites of special biological or cultural significance (i.e. unclassified riparian or wetlands, rock outcrops or rare plants or ecosystems), or to provide stand level complexity (vertical and horizontal) to harvest areas under even-aged, short rotation management. At the landscape

level, WTPs can be used with other protected areas such as riparian reserves, old growth areas and provincial parks to provide landscape structure to help keep landscape complexity more consistent with natural disturbance regimes. All of the above values should be considered when considering where to locate (anchor) WTPs.

This indicator is related to indicator 1.3.1.

**How are targets established?**

Recognition that tree retention and riparian areas are "focus areas" for successfully meeting biodiversity and ecosystem objectives. Stand level plan commitments are site specific, consider landscape conditions and may exceed legal requirements.

Wildlife Tree Retention (WTR) targets are currently set, as outlined in the Forest Stewardship Plan, by landscape unit and ecosystem type.[26] The targets include a landscape minimum retention and a spatial distribution of WTR. WTR consist of wildlife tree patches, riparian reserves and individual tree retention in partial cut stands.

**Strategy**

Canfor Radium will achieve targets through allocation of retention patches and dispersed retention (individual trees and stubs) during cut block planning. Where applicable, plans will also contain riparian area commitments. Canfor Radium plans and practices support riparian management, group retention and protection of designated wildlife trees/stubs. Operational plans include commitments that, at the landscape level, will achieve a target level of 7% retention. Plans are properly executed providing desired results. Post harvest evaluations assess plan conformance.

**Forecasting and Probable Trends of the Indicator**

Healthy ecosystems with a diversity and abundance of native species and habitats are forecasted. This will include harvested areas with habitat attributes that will help to sustain biological and ecological processes in managed forests. Properly functioning riparian systems leading to the conservation of fish habitat and maintenance of water quality.

Stand level retention levels are static within each LU/BEC in the model. A net THLB impact of 3.5% is assumed for all stands. The forecast for this indicator is that Canfor will remain in compliance.

**Current Condition**

All blocks harvested between 2007-2011 have achieved the stand structure retention levels prescribed in the operational plan (Forest Stewardship Plan). The landscape retention targets and the spatial distribution of these targets throughout the Landscape units by ecosystem type have been achieved. WTR consist of wildlife tree patches, riparian reserves and individual tree retention in partial cut stands. These are mapped and identified in the field. Additional WTR rational of current condition is found in a separate report.[27] In brief, the report notes that the landscape minimum retention targets are achieved and the spatial distribution is achieved in some, but not all, Landscape Units.

**Monitoring and Reporting**

Areas harvested during the annual reporting period will be included in the Landscape Unit level calculation for retention, resulting in a report of the (weighted average) percent of area retained at the Landscape Unit level.

[26] Forest Stewardship Plan # 17 updated to March 21, 2011 section 6.1.1.8 Table 3 page 15 and 16.
[27] Forsite Consultants Ltd. 2005. Canadian Forest Products (Radium) Wildlife Tree Patch Analysis. Summary Report. Version 1. January 31, 2005. Prepared for Darren Tamelin, RPF. Canfor - Radium Division.

Stand level retention is currently tracked as part of the development of the operational plan. During the development phase, WTP are field located and spatially mapped (i.e. block level). This information is entered into the appropriate information management system at which point it can be analysed and reported at the Landscape Unit level. Final inspections verify that operational plans are followed.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 1.1.4c – Riparian Management Strategies

| Indicator Statement | Target (Variance) |
|---|---|
| Number of non-conformances to riparian management strategies | 0 (0) |

**What is this indicator and why is it important?**

Riparian management areas provide opportunities for connectivity of forested cover along waterways, which are generally areas with high value for wildlife habitat and movement. Vegetation in riparian areas also provide shade and large organic debris which is important for aquatic habitats. Operational plans influenced by riparian areas contain site-specific commitments that range from 100% protection to 100% removal of merchantable trees, generally with efforts to manage existing understory trees and shrubs.

This indicator is related to indicator 1.3.1.

**How are targets established?**

Recognition that tree retention and riparian areas are "focus areas" for successfully meeting biodiversity and ecosystem objectives. Stand level plan commitments are site specific, consider landscape conditions and may exceed legal requirements.

Riparian management objectives/targets are subsequently described within the operational plan for the proposed harvest area, in accordance with the riparian reserve and management zone requirements set for stream and wetlands by the FRPA Forest Planning and Practices Regulation. Canfor has committed to full compliance with the regulation requirements.

**Strategy**

Canfor Radium will achieve targets through allocation of retention patches and dispersed retention (individual trees and stubs) during forest development planning. Where applicable plans will also contain riparian area commitments. Canfor Radium plans and practices support riparian management, group retention and protection of designated wildlife trees/stubs. Plans are properly executed providing desired results. Post harvest evaluations assess plan conformance.

**Forecasting and Probable Trends of the Indicator**

Healthy ecosystems with a diversity and abundance of native species and habitats are forecasted. This will include harvested areas with habitat attributes that will help to sustain biological and ecological processes in managed forests. Properly functioning riparian systems leading to the conservation of fish habitat and maintenance of water quality.

Riparian areas (e.g. lakes, rivers and wetlands) are identified during forest inventory and are not expected to change over time. Riparian management areas have been estimated using assumptions on current management and reserve widths along water corridors. In scenario planning, a static reduction for water bodies, riparian reserves and riparian management areas are applied to all scenarios. The forecast for this indicator is that Canfor will remain in compliance.

**Current Condition**

Canfor Radium is 100% compliant with this measure in the last five years.

Currently, all streams, wetlands, and lakes adjacent to harvested areas are classified during operational plan preparation. Riparian Reserve Zones and Management Zones are established on both sides of all streams as per their classification and legal requirements identified in the Forest and Range Practices Act. Retention in the Riparian Management zone varies from clearcut to full reserve based on a blowdown risk assessment of the Riparian Reserve Zone. Only beetle infested pine trees are harvested from riparian reserve zones as legally allowed. Canfor has adopted new operating procedures around small wetlands not adequately protected within FRPA guidelines.[28]

**Monitoring and Reporting**

Areas harvested during the annual reporting period will report the number of riparian related non conformances to plans occurring during the reporting year as compared to the number of cutblocks that were harvested that had riparian management areas within or adjacent to them.

The location, classification and RRZ (Riparian Reserve Zone) requirements will be included in operational plans and/or on operational maps used for harvesting, road construction and silviculture activities. Field foresters will identify site-specific requirements for the protection of reserve zones, and management practices will be included in operational plans. Pre-works will be completed prior to harvesting, road construction or silviculture activities and will review the location and any prescribed site-specific protection measure(s) for the identified RRZ.

Inspections will be completed following harvesting, road construction and silviculture activities by Canfor, and any issues concerning the Riparian Reserve Zone (RRZ) will be noted and tracked. Non-compliance issues will be reported promptly to the appropriate government officials.

Any variances to the target will be reported and corrective action plans will be developed and implemented, if required.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

| | |
|---|---|
| **Element 1.2: Species Diversity** | Conserve species diversity by ensuring that habitats for the native species found in the DFA are maintained through time, including habitats for known occurrences of species at risk. |
| **Value:** | Species Richness |
| **SFM Objective:** | Maintain suitable habitat for indicator species. |

Element 1.2 is intended to complement the indicators in Element 1.1 (1.1.1, 1.1.2, 1.1.3, and 1.1.4) by assessing whether species naturally present in the management unit are likely to continue as well-distributed, productive populations. It serves as a test of the "coarse filter" approaches of the indicators of Element 1.1. Element 1.2 also addresses forest-dwelling species of social concern that are identified under higher-level plans or species at risk identified at regional levels.

28 Kremsater, L. & F.L. Bunnell. 2007. Standard Operating Procedures for species using localized habitats in Canadian Forest Products Radium Division. Designed and produced by F.L. Bunnell, I. Houde and L. Kremsater. Center for Applied Conservation Research, Forest Sciences, University of British Columbia, Vancouver, BC.

Element 1.2 differs from the indicators of Element 1.1 in that Element 1.2 addresses species or species groups, rather than ecosystems, landscape features or habitat components. Species have been grouped using a species accounting system that suggests ways of monitoring each group.[29] Given the incomplete information and limited local expertise for non-vertebrates, the SFM Plan and the species accounting system focuses attention on vertebrate species (which are also the public's primary concern). Canfor has completed a study that evaluated potential indicators for biological diversity focusing on lichens, bryophytes and fungi (Houde 2004).[30] This information will help guide how invertebrates will be incorporated into the SFM approach in the future.

Canfor commissioned a review of species occurring within or near the DFA and of social concern, global significance (based on NatureServe G ranks), or otherwise listed by COSEWIC, the BC Conservation Data Centre or within the IWMS process.[31] When they occurred within the DFA these species are included within the Species Accounting System. Thus, these groups of specific species do not require separate indicators; they are included in the overall approach to monitoring organisms. A few individual species are not monitored because their habitat is not forest-dwelling (e.g., alpine), or to date they have been reported near, but not within, the DFA. In the latter case, precautionary operating guidelines have been prepared should they be encountered within the DFA.[32]

The following Core Indicators have been identified for this Element:

1.2.1 — Degree of habitat protection for selected focal species, including species at risk

1.2.2 — Degree of suitable habitat in the long term for selected focal species, including species at risk

1.2.3 — Proportion of regeneration comprised of native species

The following indicator statements have been identified for this Element:

1.2.1 / 1.2.2 Percent of forest management activities consistent with management strategies for Species of Management Concern

1.2.3a Regeneration will be consistent with provincial regulations and standards for seed and vegetative material use

1.2.3b Percent of natural regeneration

### Indicator 1.2.1 & 1.2.2 – Species of Management Concern

| **Indicator Statement** | **Target (Variance)** |
|---|---|
| Percent of forest management activities consistent with management strategies for Species of Management Concern | 100% conformance with management strategies (0) |

**What is this indicator and why is it important?**

While ecosystem conservation is the coarse-filter approach to biodiversity management, species diversity is the fine-filter approach. For most species, forest managers can influence habitat only, not species populations. To account for the degree of habitat protection for selected focal species, including at risk

29 Bunnell, F.L. and P. Vernier. 2007. Vertebrate Species Accounting System for the Radium DFA. Report for FIA Forest Science Program Project Y073045 and Canadian Forest Products, Ltd.

30 Houde, I. 2004.

31 Bunnell, F.L., L.L. Kremsater, R.W. Campbell. 2007. Species of global, national and provincial concern occurring within and near the Radium DFA, and the actions undertaken to sustain and monitor them. Report for FIA Forest Science Program Project Y073045 and Canadian Forest Products, Ltd.

32 Kremsater, L. & F.L. Bunnell. 2007. Standard Operating Procedures for species using localized habitats in Canadian Forest Products Radium Division. Designed and produced by F.L. Bunnell, I. Houde and L. Kremsater. Center for Applied Conservation Research, Forest Sciences, University of British Columbia, Vancouver, BC.

species, this indicator looks at the proper execution of operational plans where those plans contain conservation measures for Species of Management Concern.

Canfor Radium includes commitments in site/logging plans or other operational plans to manage the habitat of the DFA's Species of Management Concern. These species will include at risk species and other focal species and are identified in Table 10, Table 11 and Table 19.

In his report to the Arrow IFPA on vertebrates and habitat elements (Vertebrates and stand structure in the Arrow IFPA 2000), Bunnell wrote that one of his objectives was to "relate forest-dwelling vertebrates to features of forest structure and composition changed by forest practices". Where such relations can be developed they facilitate four desirable outcomes:

- Practices to sustain forest vertebrates can be based on research findings.
- Consequences of a wide range of different practices (very different structures) can be evaluated in terms of their consequences to forest-dwelling organisms.
- Consequences can be estimated for both forest practices and natural disturbance regimes (by considering resultant structural attributes).

There is direct connection between forest practices to maintain vertebrate diversity and forest features that determine volume available for harvest.

It is impossible to directly monitor all species. Indicators of Element 1.1 are intended to provide surrogate indices for many species. The ultimate measure of success in sustaining biodiversity, however, are the species themselves. Forests change both naturally and under management. Distribution of habitat suitable for an individual species thus changes over time. Given the diverse habitat preferences of species within an area, no form of management could sustain all species everywhere. Indicators 1.2.1 and 1.2.2 are intended to keep all species somewhere, and ideally account for where each species is likely to occur under different management regimes. The species accounting system has two broad goals:

1) Accounts for the likely presence (where and when) of individual species over the entire DFA under different management regimes, and

2) Addresses likely presence and associated uncertainties it directs effectiveness monitoring where it will be most revealing of the consequences of forest management.

The species accounting system is intended to indicate how much favorable habitat is available at any time and how that habitat is distributed.[33] Relatively simple GIS layers can account for some species; others cannot be and must be accounted for or monitored differently. A further goal of the species accounting system is to monitor or account for species in the most cost-effective way possible. That permits tracking a larger portion of biological diversity than would be possible with more costly approaches. To confront the complexity and the high costs of monitoring the system is intended to be self-correcting, adding detail only as detail appears to be required. The system itself is intended to

1) estimate approximate amounts and location within the DFA of suitable habitat for all forest-dwelling vertebrates (expansion to other organism groups is underway);

2) permit 'scaling up' of monitoring findings over the entire DFA, providing estimates of the amount of suitable habitat, including where and when, over the entire area;

3) provide credence to Indicators 1-1, 1-2 and 1-3 by evaluating species associations with those indicators;

4) provide trend estimates for species (as data are accumulated);

[33] Bunnell, F.L. and P. Vernier. 2007. Vertebrate Species Accounting System for the Radium DFA. Report for FIA Forest Science Program Project Y073045 and Canadian Forest Products, Ltd.

5) focus more expensive effectiveness monitoring on areas of greatest uncertainty; and
6) be self-correcting and increase the credibility of the system as data are acquired.

The accounting system incorporates five groups of species determined by their response to forest practice and their accessibility to monitoring. The five groups are:

| Species Group | Accessibility to Monitoring |
|---|---|
| Group 1 | – 'generalists', species that can inhabit many habitat types or respond positively to forest practices |
| Group 2 | – species that can be assigned to broad forest types (e.g. older conifer stands) |
| Group 3 | – species with strong dependencies on specific habitat elements (e.g. snags or shrubs) |
| Group 4 | – species restricted to specialized and highly localized habitats |
| Group 5 | – species for which patch size and connectivity are important (patches > 2 ha) |
| Group 6 | – species that occur within the DFA but are not forest-dwelling (e.g., largely limited to alpine tundra) are categorized separately |

In addition to the identification of species (as described above), this indicator is the ultimate check on the effectiveness of forest practices in sustaining native species. All species cannot be monitored, but once there is confidence in the assignment of species to monitoring groups, focal species can be selected that are most informative for particular questions about the impacts of forest practices. As well as knowing the general approaches for monitoring a group, it is prudent to check on a few individual species (for example those that are most sensitive in the group or those for which group assignments may need revising).

These species must be:

- practical to monitor,
- sensitive to forest practices, and
- able to provide information that can guide management (Bunnell et al. 2003).[2]

This indicator is related to indicator 1.3.1.

**How are targets established?**

The targets are set as they meet legal obligations, use of best available information and application of Canfor's SFM Commitments. Habitat supply modeling done at the provincial/regional level for specific focal species.

Species have been assigned to groups (Bunnell et al 2007).[34] Confidence in those assignments depends largely on the data available to do the grouping. Assignments were checked on the basis of field data collected in 2006. Canfor Radium expects some assignments will change as more data are acquired. Once there is confidence in the assignment of species to groups, focal species can be selected that are most informative for particular questions about the impacts of forest practices. A broader description of each group, members of the group and associated approaches to monitoring is provided in Bunnell's report.[35].

[34] Kremsater and Bunnell 2007.
[35] Kremsater and Bunnell 2007.

The monitoring design must include the ability to continually inform assignment to groups (i.e., improve the efficiency of monitoring) while evaluating success. Targets are discussed further under 'monitoring and reporting' below.

Species are monitored using general trends in habitat types, elements and patterns. The targets are to identify focal species then track their trends and habitat associations. The first task is to select species.

**Strategy**

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

For some of these species, specific habitat conservation targets have been established that identify the amount, distribution and attributes of desirable habitat. For the remaining species, desirable habitat conditions have been identified for each species. Canfor Radium manages spatial information that identifies the broad habitat types and locations for each of the Species of Management Concern. Where applicable, this information is brought forward into operational plans to manage for the desired habitat conditions. Plans are properly executed providing desired results. Post harvest evaluations and other applicable post activity forms (i.e. road construction or site preparation) assess plan conformance.

**Forecasting and Probable Trends of the Indicator**

Short and long term supply of desirable habitat for all Species of Management Concern (see Appendix 4)[36] resulting in stable populations.

**Current Condition**

All vertebrate species have been assigned to monitoring groups within the Species Accounting System based on literature and one year of field data. For assignments for which field evaluation was possible, initial assignments were correct in 93% of cases. Nonetheless, assignments of many species remain tentative until additional field data are used to evaluate them. Assignments to monitoring groups will be reviewed periodically to ensure all key species are accurately incorporated.

Each survey provides increased credibility for habitat associations, many of which can be tracked by simple GIS measures once credible. Forecasting trends for specific focal species will rely on the results of fieldwork. Precision analyses can indicate the time required to obtain reliable trend information.

Table 19 provides an example of focal species chosen for one group of the species accounting system. For the birds, selection of focal species is based on one year (2006) of field data, for the other vertebrates it is based on literature review and expert knowledge. Similar tables can be built for each species group that requires monitoring (recall that groups 1 and 6 do not require monitoring).

[36] Bunnell, F.L. and P. Vernier. 2007. Vertebrate Species Accounting System for the Radium DFA. Report for FIA Forest Science Program Project Y073045 and Canadian Forest Products, Ltd.

**Table 19: Potential Focal Species Used in Assessing Responses to Habitat Elements**

| Species[37] | Significant attributes |
|---|---|
| **Riparian and wetlands** | |
| Bufflehead | Obligate cavity nester; feeds on invertebrates in open, shallow water |
| Common Merganser | Obligate cavity nester; feeds on fish & invertebrates; streams, rivers, lakes |
| Cinnamon Teal | Nests in emergent vegetation; omnivorous; freshwater & brackish wetlands |
| Green-winged Teal | Nests near marshes & ponds; omnivorous |
| Song Sparrow | Breeds in shrubby & treed riparian habitat |
| Yellow Warbler | Breeds in wet, deciduous thickets – riparian |
| Red-winged Blackbird | Breeds in marshy habitat; can be small as ditches |
| Yellow-headed Blackbird | Nests in emergent vegetation; typically deeper water |
| Beaver | Seeks hardwoods as forage in riparian areas |
| **Hardwoods** | |
| Black-headed Grosbeak | Strong preference for cottonwood and willow habitats |
| Cassin's Vireo | Primarily seeks hardwood leading, but uses mixedwood |
| Dusky Flycatcher | Seeks out aspen groves & willow thickets; will use open conifer |
| Warbling Vireo | Seeks mature hardwoods, often in riparian areas |
| **Shrubs** | |
| Cedar Waxwing | Avoids forest interior; seeks shrubs; feeds heavily on shrub-borne fruits |
| Swainson's Thrush | Seeks out multi-storied stands with older shrub layer for nesting |
| Gray Catbird | Published abundance increases linearly with shrub density |
| Willow Flycatcher | Largely restricted to willow thickets, often riparian |
| **Cavity Sites** | |
| Black-capped Chickadee | Prefers hardwoods or mixedwood; weak excavator = well rotted sites |
| Downy Woodpecker | Prefers hardwoods; weak excavator = well rotted sites |
| Hairy Woodpecker | Conifer to mixedwood; strong excavator |
| Red-naped Sapsucker | Prefers conifer; strong excavator |
| Red-breasted Nuthatch | Prefers conifer; weak excavator |
| Tree Swallow | Secondary cavity user; prefers open areas often near water |
| Violet-green Swallow | Secondary cavity user; prefers open forest |
| **Large live trees** | |
| Bald Eagle | Typically nests in mature or old-growth conifers close to water |
| Great Blue Heron | Typically nests in older hardwoods close to water |

Once such tables are built for all groups, the second step is to undertake the field sampling to track trend and habitat associations of select species. The most cost-effective and reliable approach is more likely to be more general monitoring of groups of species associated with habitat features than targeting a few specific species (the latter can be greatly influenced by inter-annual variation).

The following reports, specific to vertebrates, have been considered in strategic level planning for the DFA:

- Species at Risk Assessment Report for the Rocky Mountain and Kootenay Lake Forest Districts. (Ferguson, R. 2004).
- Steps to design a program to monitor biological diversity in managed forest landscapes. (Houde, I. 2003).

[37] All but the Black-headed Grosbeak and Gray Catbird are relatively common within the DFA and thus should provide trend estimates over time.

- Monitoring plan for biological diversity in the Radium DFA. (Bunnell, F.L, P. Vernier, and L.L Kremsater, April 2007).
- Vertebrate Species Accounting System for the Radium DFA. (Bunnell, F.L and P Vernier, April 2007).
- Species of global, national and provincial concern occurring within and near the Radium DFA, and the actions undertaken to sustain and monitor them. (Bunnell, F.L.,L L. Kremsater, and R. W.Campbell, 2007).

FSP management strategies have been developed for 3 species at risk located in Canfor's operating area: Flammulated Owl, American Badger and Lewis Woodpecker. Current practices will avoid harvesting and road building in known habitat areas. Precautionary approaches for species that may be encountered in the area have been developed, as have guidelines to manage species that require local habitats.38

High conservation value forests (HCVF) have been identified in the Invermere TSA. The HCVF evaluation process contained sub-components, completed by different parties, including assessment of species at risk (Ferguson 2004). Relative to other values, old-growth stands, intact watersheds, important habitat areas for identified species (mountain caribou, grizzly bear, important fish spawning areas and important habitat areas for species at risk) were effectively identified and incorporated into HCVFs.

Trend monitoring and broad habitat monitoring has been underway for birds in the DFA for 2 years and includes information on species from each of the monitoring groups. Data from only one year have been analyzed to date but reveal how habitat associations and trends.

It is possible that some of the focal species will require more targeted effort than the Breeding Bird Surveys. Data acquired to date also need to be analyzed to allocate sampling spatially; that is, it would be wasteful to sample the entire DFA uniformly. Selection of both species and area are yet to be guided by key management questions. Results from the identification of indicator species (March 2010) will help inform where forest activities are most extensive and thus help determine best locations for monitoring.

**Monitoring and Reporting**

General – For areas where forest activities occurred during the annual reporting period that contained operation plan commitments to mange for a Species of Management Concern, report the number of non conformances to plans occurring during the reporting year as compared to the total number areas having operational plan commitments.

Specific – A report was developed (Bunnell, 2007)[39] for the Radium DFA, which provides the lists of species in each group. The groups and monitoring approaches are:

[38] Kremsater, L. & F.L. Bunnell. 2007. Standard Operating Procedures for species using localized habitats in Canadian Forest Products Radium Division. Designed and produced by F.L. Bunnell, I. Houde and L. Kremsater. Center for Applied Conservation Research, Forest Sciences, University of British Columbia, Vancouver, BC.
[39] Bunnell, F.L. and P. Vernier. 2007. Vertebrate Species Accounting System for the Radium DFA.

**Table 20: Species Accounting Groups - Monitoring & Approaches**

| Group | Monitoring & Approaches |
|---|---|
| **Group 1** | Generalists, species that 1) show no strong affinity to particular broad forest types, 2) respond positively to forest harvest, and 3) sometimes have strong associations to particular habitat elements but find them in a variety of habitats. Analytically, they have no more than weak associations with any particular forest type or habitat element. Monitoring: The group requires no specific bookkeeping or accounting because they either respond positively to forest practice or will accommodate to a wider range of forest practice than will be implemented. |
| **Group 2** | Species that current data suggest can be assigned to broad forest types. Both forest types and assignment of species to specific types acquire increased credibility as data are cumulated. Monitoring: Accounting for Group 2 need only be a tabular summary of the area of preferred forest type classes (age x composition), modified by associations with BEC zone where appropriate and weighted by probability of occurrence. Current broad forest types are:<br>0-10 years old;<br>11 to 30 years old;<br>Deciduous 31 to 90 years old<br>Deciduous >90 years old<br>Mixed 31 to 90 years old<br>Mixed >90 years old<br>Conifer 31 to 90 years old<br>Conifer >90 years old<br>Non-forest<br>Non-vegetated<br>Water<br>These categories can be changed as relationships between organisms and forest types are refined and improved. Simply knowing amounts of these types across the DFA will allow planners to assess likely responses of the species listed under group 2. |
| **Group 3** | Species with strong dependencies on specific habitat elements (e.g. snags or shrubs). Some of these species are generalists with respect to stand age, provided that the specific habitat elements required are present. Projecting and reporting the habitat elements provides the baseline for anticipating responses of organisms. Monitoring: There are two broadly different ways of accounting for these species. To scale up and evaluate potential changes in management planning and practice, one choice could be to project the habitat elements either on their own or through structure classes, the other is to evaluate effects of standard operating practices (for example, are the species known to require riparian actually present under current operating practice around streams and wetlands? or Do vegetation management practices have a measurable impact on shrub-associated species and over what time period? Once such relations have been established, only implementation monitoring to ensure that standards are consistently followed is necessary. Analogous approaches to monitoring (effectiveness, then implementation) can be developed for snags or other habitat elements. |

| Group | Monitoring & Approaches |
|---|---|
| **Group 4** | Species restricted to specialized and highly localized habitats. The intent of the grouping is to recognize localized habitat types that are too rare to be accommodated in broader groupings or more general approaches to forest practice, but merit specific consideration during forest management. Monitoring: guidelines have been developed for these species. Monitoring should check whether the specifically designed standard operating procedures are being followed as intended and check whether the guidelines are in fact effective. |
| **Group 5** | Species for which distribution of habitat has a substantial additional effect beyond amount of habitat. These species frequently are defined by negative responses to edge that influences effective patch size. Within this group connectivity relative to dispersal can influence the amount of (connected) habitat available for use. Tracking forest interior, patch size of old forest, and edge will be done under Element 1.1 and those results will allow predictions about how species sensitive to landscape pattern will likely respond to current and projected conditions. The life histories of species within the group determine the most effective index. For example, movement capabilities of most birds make connectivity a less important index of suitable habitat that it may be for small mammals. Monitoring: Accounting for these species exploits one of two approaches, depending on the natural history of the species. For species that are highly mobile, but not wide-ranging within a large home range or territory, suitability can be assessed simply by the distribution of patch sizes or edge effects of favourable habitat types (e.g., older forest for Northern Goshawk). For species that are largely restricted to a few forest types or age classes and that to satisfy some need (usually foraging) also must range widely, then connectivity of favoured habitat classes is important. Of Group 5 species in the DFA, only the marten is likely to be influenced by connectivity. Although the marten uses a wide range of habitats (riparian areas, rocky sub-alpine, meadows, forest edges), their preference is for older, more closed canopies with down wood and well-developed understory layers that support their prey base. Connectivity analyses of such habitat types could be conducted. It is, however, difficult to derive inferences from such measures for marten because studies including forest edges have found marten to use edges preferentially because of greater prey abundance.<br><br>A broader description of each group, members of the group and associated approaches to monitoring is provided. This includes Group 6, which includes species occurring within the DFA, that are not forest-dwelling. |

Selecting focal species will rely on results of the data to date and guidance from the species accounting system and key management questions. Once these species are chosen they will be peer reviewed by local government agency staff, industry managers, FOREST and specialists prior to a final list being accepted. Peer review will include an analysis of the costs for monitoring and what partnerships are available to cover knowledge gaps.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

| | |
|---|---|
| **Element 1.2: Species Diversity**<br><br>**Element 1.3: Genetic Diversity** | Conserve species diversity by ensuring that habitats for the native species found in the DFA are maintained through time, including habitats for known occurrences of species at risk.<br><br>Conserve genetic diversity by maintaining the variation of genes within species and ensuring that reforestation programs are free of genetically modified organisms. |
| **Values:** | Species Richness and Genetic Diversity |
| **SFM Objectives:** | Maintain suitable habitat for indicator species.<br><br>Conserve the genetic diversity found naturally within trees |

The following CSA Core Indicators have been identified for Element 1.2:

1.2.1 — Degree of habitat protection for selected focal species, including species at risk

1.2.2— Degree of suitable habitat in the long term for selected focal species, including species at risk

1.2.3 — Proportion of regeneration comprised of native species

There are no CSA Core Indicators identified for Element 1.3

The following indicator statements have been identified for Element 1.2 and 1.3:

1.2.3a/1.3.1a Regeneration will be consistent with provincial regulations and standards for seed and vegetative material use

1.2.3b/1.3.1b Percent of natural regeneration

### Indicator 1.2.3a & 1.3.1a – Regeneration – Seed & Vegetative Material

| **Indicator Statement** | **Target (Variance)** |
|---|---|
| Regeneration will be consistent with provincial regulations and standards for seed and vegetative material use | Annually, 100% conformance with the standards |

**What is this indicator and why is it important?**

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

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

Tree seed used for growing seedlings to meet reforestation requirements on public lands in BC must be registered by the province. The province has strict procedures pertaining to the collection, transport, testing, storage and use of registered seed. Tree seed having uniformity of species, source, quality and year of collection are referred to as a seedlot. Administrative seed zones identify what seedlot is ecologically suited for a given area. By choosing a seedlot that was suitable to the site it was to be planted in, the resulting plantation would be adapted to its site, local climate, and endemic forest health problems.

Regeneration standards exist to ensure that appropriate species are reforested on harvested areas to within acceptable numbers. The government outlines 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 indicator is an important to ensure long-term productivity.

Another intent of these indicators is to conserve genetic diversity. Although genetic diversity is one of the fundamental reason for sustaining biological diversity, it presents intractable problems as an operational definition, including the fact that genes are not self-replicating units. Genetic diversity is more accurately referred to as genetic variability or variation – it can be considered that well distributed populations will capture the variability. Because individuals of a species are the smallest unit in which genes can be replicated, maintaining species diversity or productive and well-distributed populations of species is the most effective way to maintain genetic diversity in species covered under that indicator.

Direct forest management activities that could influence genetic variability include the use of genetically diverse (and appropriate) tree stock for planting and encouraging natural regeneration from local sources. Canfor plants ecologically suitable tree species, as well as manage for natural regeneration of coniferous trees.

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

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

This indicator is related to indicator 1.3.1.

**How are targets established?**

Legal obligations, use of best available information and application of Canfor's SFM Commitments.

The target was set as required by current government policy and by the Tree Seed and Cone Regulation and the Chief Forester's Standards for Seed Use.

**Strategy**

Strategic and operational level plans will contain site information and reforestation prescriptions that ensure regeneration will be consistent with provincial regulations and standards. Planted trees will be of acceptable species and originate from seedlots that are ecologically suited to the site. Planting reports will be used to confirm proper execution of plans.

**Forecasting and Probable Trends of the Indicator**

Healthy, productive and genetically diverse forests that are ecologically suited to the site. The forecast for this indicator is that Canfor will remain in compliance.

**Current Condition**

100% of Canfor blocks are regenerated to the stocking standards as identified in current Forest Stewardship Plans. Changes to preferred and acceptable species must be approved by government.

Practices for Canfor can be found in Appendix 1.3: Practices Analysis.

**Monitoring and Reporting**

For the reporting period, Canfor will report the number of hectares where trees were planted with species and seedlots appropriate to the site as compared to the total number of hectares where planting occurred.

The data required to monitor this indicator is the recorded number of non-conformance or non-compliance with the standards. All reforestation activities are tracked in Genus. Seedlots are tracked and recorded when they are ordered and again when they are planted. This information will be summarized and reported out within the SFMP Annual Report.

Once harvested, each cutblock is surveyed a specified number of years after harvest to ensure reforestation has occurred and that the stand is fully stocked with acceptable species. The results of all surveys are maintained in a Canfor database. 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 tracked in Canfor's database.

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

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 1.2.3b & 1.3.1b – Natural Regeneration

| Indicator Statement | Target (Variance) |
|---|---|
| Percent of natural regeneration | Greater than or equal to 50% of area harvested will be restocked by natural regeneration over a 5 year period (rolling average) |

**What is this indicator and why is it important?**

Natural regeneration of local tree species contributes to the genetic diversity for those species. As with indicator 1.2.3a, maintenance of genetic diversity is important in ensuring that tree species are adapted to local conditions and can withstand natural disturbance events and agents. Natural regeneration contributes to the overall regeneration of trees within the DFA (14% of the THLB).

This indicator is related to indicator 1.3.1.

**How are targets established?**

The target reflects current management practices.

**Strategy**

Natural regeneration is generally prescribed on lodgepole pine or Douglas-fir leading stands where harvest methods and cone crops are expected to result in sufficient natural regeneration. Season of harvest effects disturbance levels and mineral soil exposure for natural regeneration. Fill planting is often prescribed to augment natural regeneration to achieve desired stocking levels.

Canfor plants ecologically appropriate tree seedlings, as well as manage for natural regeneration of coniferous trees. Species are determined pre-harvest based on ecosystem type and potential regeneration risks (such as frost, excess water, snow creep, etc).

**Forecasting and Probable Trends of the Indicator**

Healthy, productive and genetically diverse forests that are ecologically suited to the site. The forecast for this indicator is that Canfor will remain in compliance with the target of greater than or equal to 50% of area harvested will be naturally regenerated (rolling 5-year average).

**Current Condition**

Canfor estimated that, 58% of all cutblocks are completely naturally regenerated within its operating area for 2010. Over a five-year average, natural regeneration is 61%.

**Monitoring and Reporting**

All reforestation activities are tracked in a Canfor database. Regeneration surveys are undertaken prior to the expiry of regen delay for a given cutblock and results recorded in Genus.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

| | |
|---|---|
| **Element 1.4: Protected Areas and Sites of Special Biological and Cultural Significance** | Respect protected areas identified through government processes. Co-operate in broader landscape management related to protected areas and sites of special biological and cultural significance.<br>Identify sites of special geological, biological, or cultural significance within the DFA, and implement management strategies appropriate to their long-term maintenance. |
| **Value:** | Protected Areas and Sites of Special Biological and Cultural Significance |
| **SFM Objective:** | To maintain representative areas of naturally occurring and important ecosystems, rare physical environments and sites of cultural significance. |

This suite of indicators recognizes the breadth of values that different stakeholders place upon forests including ecological, economic, cultural, spiritual and aesthetic values, and the need to accommodate the plurality of values that are associated with forest resources. The conservation of unique features is often carried out for social and not just ecological reasons. The intent of this suite of indicators is to also capture ecological, as well as social values that reflect social, cultural or spiritual needs and an important legacy of historical or traditional uses, heritage values and local knowledge.

This suite of indicators 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[40] in community

[40] Beckley, T., J. Parkins and R. Stedman. 2002. Indicators of forest-dependent community sustainability: The evolution of research. VOL 78, No 5, The Forestry Chronicle

resilience, property values, and tourism, although they are often hard to capture or express without ethnographic methods[41].

As well, this suite of indicators 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.

The following CSA Core Indicators have been identified for this Element:

1.4.1 — Proportion of identified sites with implemented management strategies

1.4.2 — Protection of identified sacred and culturally important sites

The following Local Indicators have been identified for this Element:

1.4.1 Percent of forest management activities consistent with management strategies for protected areas and sites of biological significance

1.4.2a Percent of identified Aboriginal and other cultural forest values, knowledge and uses considered in forestry planning processes

1.4.2b Percent of forest operations in conformance with operational/site plans developed to address Aboriginal and other cultural forest values, knowledge and uses

### Indicator 1.4.1 – Protected Areas and Sites of Biological Significance

| Indicator Statement | Target (Variance) |
|---|---|
| Percent of forest management activities consistent with management strategies for protected areas and sites of biological significance | 100% (0) |

**What is this indicator and why is it important?**

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

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

Canfor Radium includes commitments in operational level plans to ensure activities do not compromise these protected and unique areas.

[41] Lewis, J.L. 2000. Ancient Values, New Technology: Emerging Methods for Integrating Cultural Values in Forest Management. Unpublished Maters Thesis (M.Sc.), Faculty of Forestry, University of British Columbia, Vancouver.

This indicator also ensures compliance of forest management practices with the established objectives and indicators outlined for protected areas and special sites, such as Wildlife Habitat Areas and Ungulate Winter Range under the Identified Wildlife Management Strategy and the Forest and Range Practices Act. Compliance with designated objectives and standards is important both to mitigate the potentially negative impacts of particular forest practices and to contribute to the continued persistence of protected and special areas and within the Radium DFA.

**How are targets established?**

Legal obligations, use of best available information and application of Canfor's SFM Commitments.

In addition, due to the significance and rarity of these sites, Canfor Radium has committed to managing 100% of these sites as part of the Forest Stewardship Planning process.

**Strategy**

Canfor Radium manages spatial information that identifies the location of these larger scale and stand level protected areas. Where applicable, this information is brought forward into operational plans to ensure road and harvest activities do not compromise protected areas. Management strategies might include plans for road deactivation or rehabilitation, additional dispersed retention or a unique silviculture regime. Operational plans are then properly executed, providing desired results. Post harvest evaluations and other applicable post activity forms (i.e. road construction or site preparation) assess plan conformance.

**Forecasting and Probable Trends of the Indicator**

A system of landscape and stand level protected areas that conserve sites of special biological significance is implemented.

**Current Condition**

Parks, reserves, and protected areas, and old seral forests are identified in TSR3. In addition, rare and uncommon sites are included within this indicator (See Table 16: Canfor (Radium DFA) Invermere TSA Ecosystem Representation Targets – March 31, 2007).

| Factor | Total Area (ha) | % of Forest District | % of Crown Forest |
|---|---|---|---|
| Fed Parks, Prov. Parks, Reserves | 232,340 | 6.7% | 14.0% |
| WTP's | 844 | 0.1% | 0.1% |

Currently all forest management activities are consistent with the established objectives for parks, reserves, protected areas, biologically significant areas including areas with specific wildlife management plans. 100% of forest management activities were consistent with management strategies for protected areas and sites of biological significance as identified in operational plans (2010 baseline data).

Limited harvesting has occurred in Kootenay National Park in conjunction with restoring fire maintained ecosystems and fire protection objectives of the National Park and adjacent ecosystems. Overall, national park lands are managed to ensure that the biological elements and ecosystem processes are maintained and allowed to function naturally.

Within the TSA, mountain pine beetle harvest is permitted in riparian reserve zones where only the infested trees are removed. Harvesting practices are consistent with Ungulate Winter Range Management Guidelines established by government for the East Kootenays. Wildlife Habitat Areas for Flammulated Owl and Lewis Woodpecker, for example, are reserved from harvest.

The targets and guidelines established for UWR are followed in cutblock and permit design, harvest systems, and retention levels.

**Monitoring and Reporting**

For areas where forest activities occurred during the annual reporting period that contained operational plan commitments to manage areas identified as being of special biological significance or to manage for the continued integrity of existing protected areas, report the number of non conformances to plans occurring during the reporting year as compared to the total number areas having operational plan commitments.

Once a baseline dataset has been established, data will be collected and tracked in operational plans. The status and condition of the identified sites will be updated and stored in a database. Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. The strategy for managing these sites under the FSP process will be reported in the SFMP Annual Report.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 1.4.2a – Identified Aboriginal & Other Cultural Forest Values, Knowledge & Uses

| Indicator Statement | Target (Variance) |
|---|---|
| Percent of identified Aboriginal and other cultural forest values, knowledge and uses considered in forestry planning processes | 100% (0) |

**What is this indicator and why is it important?**

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

The number of unique sites, features and protected areas are a more rigorously defined measure of opportunity. Within the DFA, there are a number of established sites. Continued availability of these sites for Aboriginals allows them the opportunity to utilize the areas.

**How are targets established?**

Legal obligations, use of best available information and application of Canfor's SFM Commitments.

The target verifies the establishment, implementation and monitoring of forest management strategies that would maintain the values of existing and new unique or significant places and features and protected areas.

**Strategy**

Efforts have been made to understand which Aboriginal traditional territories fall within the Plan area and the Radium DFA. Information sharing agreements are made with willing Aboriginal communities to promote the use and protection of sensitive information.

Forest management plans are shared with Aboriginal communities. Open communication with Aboriginals that includes a sharing of information, enables Canfor Radium to understand and incorporate

traditional knowledge into operational plans. Canfor Radium is aware of culturally important, sacred and spiritual sites leading to their appropriate management and/or protection.

Once incorporated, operational plans are properly executed. Post harvest evaluations and other applicable post activity forms (i.e. road construction or site preparation) assess plan conformance.

**Forecasting and Probable Trends of the Indicator**

Open and meaningful relationships with local Aboriginals leading to a trust in sharing sensitive information. Forest plans contain information on how these sites will be managed or protected. Forest operations that properly execute the forest plans.

**Current Condition**

A database has been developed to identify and track these sites, features and protected areas within the DFA. Known unique sites, features and protected areas are identified in operational level plans. Management strategies/practices are outlined within these plans.

Operations have been 100% compliant with FSP strategies and operational plans. No non-compliance or non-conformance issues have been recorded in 2010.

No AIA's were completed in 2010 due to curtailed operations. All blocks harvested in 2010 are compliant with existing AIA prescriptions

**Monitoring and Reporting**

Retain a record of the Aboriginal communities whose traditional territory (any part) overlaps with the DFA for the purpose of communication with affected parties.

Retain a record demonstrating that forest management plans within the DFA were shared/discussed with Aboriginal communities.

Record the number of instances where discussions lead to the identification of Aboriginal forest values, knowledge and uses that required specific management or protection.

Where the above occurred, report the number of times where operational plans specified how these values were considered.

The data required to monitor this indicator a recorded number of non-compliances. The frequency of monitoring will be annually.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 1.4.2b – Aboriginal & Other Cultural Forest Values, Knowledge & Uses

| Indicator Statement | Target (Variance) |
|---|---|
| Percent of forest operations in conformance with operational plans developed to address Aboriginal and other cultural forest values, knowledge and uses | 100% compliance with operational plans (0) |

**What is this indicator and why is it important?**

This indicator contributes to respecting the social, cultural and spiritual needs of local Aboriginals who have traditionally, and who currently use the forest resource within the DFA for the maintenance of the traditional aspects of their lifestyle. Working with local Aboriginals to identify, define and develop

management strategies that encompass traditional values and uses is an important component of the forest industry's SFM initiative.

**How are targets established?**

The target has been established to ensure that once a culturally sensitive area or feature has identified and verified through discussions with Aboriginals, management plans and strategies will reflect the needs of the area/feature and provide direction for protection and that there will be zero non-compliance or non-conformance with those plans. A variance from this target is not considered appropriate.

**Strategy**

Efforts have been made to understand which Aboriginal traditional territories fall within the Plan area and the Radium DFA. Information sharing agreements are made with willing Aboriginal communities to promote the use and protection of sensitive information.

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

Once incorporated, operational plans are properly executed. Post harvest evaluations and other applicable post activity forms (i.e. road construction or site preparation) assess plan conformance.

**Forecasting and Probable Trends of the Indicator**

Open and meaningful relationships with local Aboriginals leading to a trust in sharing sensitive information is forecasted. Forest plans contain information on how these sites will be managed or protected. Forest operations that properly execute the forest plans.

**Current Condition**

A database has been developed to identify and track these sites, features and protected areas within the DFA. Known unique sites, features and protected areas are identified in management plans. Management strategies/practices are outlined within these plans.

Operations have been 100% compliant with FSP strategies and operational plans. No non-compliance or non-conformance issues have been recorded in 2010.

No AIA's were completed in 2010 due to curtailed operations. All blocks harvested in 2010 are compliant with existing AIA prescriptions

**Monitoring and Reporting**

Number of roads constructed or cutblocks harvested where operational plans had specific content requirements to manage or protect Aboriginal forest values, knowledge and uses.

Number of roads constructed or cutblocks harvested referenced above where plan requirements were followed.

The data required to monitor this indicator is the record of non-compliance or non-conformance with forest management plans that have identified culturally sensitive areas/features and have protection plans in place for those culturally sensitive areas/features.

The frequency of monitoring will be annual. Applicable records to satisfy this indicator, while protecting privacy and confidentiality of Aboriginals, will be stored.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual

Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Criterion 2: Forest Ecosystem Condition and Productivity

Conserve forest ecosystem condition and productivity by maintaining the health, vitality, and rates of biological production.

Productive capability of the forest ecosystem refers to current and future biomass creation. It assumes that the structure, functions and attributes characteristic of productive forest ecosystems, and hence with the production of biomass, are maintained (e.g. photosynthesis, nutrient cycling, regulation of hydrological cycles, etc.).

Both natural disturbance (i.e. fire) and forest harvesting affect the amount of current and future biomass. With regards to fires, large amounts of nutrients can be lost from an ecosystem in the smoke and hot gases 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. This process of renewal restores the plant communities' 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.

When trees are harvested large amounts of biomass are removed and the site is reverted to an early seral stage with relatively little biomass. Additionally, proportions of organic material (and associated nutrients) are removed from the site at this time. As with fire disturbance, the reduction of biomass is often temporary. If, however, the disturbance is excessive, it can be very damaging in terms of future forest productivity. 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 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 (THLB) to supply forest products in perpetuity, without compromising its capacity to also supply a range of additional values (such as critical habitat for wildlife and/or non-timber benefits). In this respect, Criterion 2 quantifies biomass production by measuring the growing stock (both commercial 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 the processes critical to ecosystem production are not compromised irreparably so 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, which reduces the supply of ecosystem services.

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

This Criterion consists of two Elements:

| | |
|---|---|
| **Element 2.1: Forest Ecosystem Resilience** | Conserve ecosystem resilience by maintaining both ecosystem processes and ecosystem conditions. |
| **Element 2.2: Forest Ecosystem Productivity** | Conserve forest ecosystem productivity and productive capacity by maintaining ecosystem conditions that are capable of supporting naturally occurring species. Reforest promptly and use tree species ecologically suited to the site. |

| | |
|---|---|
| **Element 2.1: Forest Ecosystem Resilience** | Conserve ecosystem resilience by maintaining both ecosystem processes and ecosystem conditions. |
| **Value:** | Ecosystem Resilience |
| **SFM Objective:** | Maintain a natural range of variability in ecosystem function, composition, and structure which will allow ecosystems to recover from disturbance and stress. |

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

The following CSA Core Indicators have been identified for this Element:

2.1.1 — Reforestation Success

The following indicator statement has been identified for this Element:

2.1.1 Regeneration delay for stands established annually

### Indicator 2.1.1 – Regeneration Delay

| **Indicator Statement** | **Target (Variance)** |
|---|---|
| Regeneration delay for stands established annually | As per FSP[42] (N/A) |

**What is this indicator and why is it important?**

This indicator recognizes that in the interests of enhancing the economic capacity of the THLB, there is a risk immature timber will be removed and stands converted to (largely) monocultures of marketable tree species. Conversely, previously forested sites could be converted to agricultural purposes (i.e. forage production). Communities with high species diversity are generally more resilient than communities dominated by one, or relatively few, species. Ecosystems with higher resilience are more likely to maintain their productive capacity following disturbance. An important result of stand-replacing disturbance is that it creates conditions favorable to early seral species. Re-setting ecosystem development could potentially result in a loss of older stands and the attributes unique to these forest types. This indicator is intended to maintain an appropriate representation of stand types of the THLB.

Regeneration delay is specified in a prescription and is defined as the time between the start of harvesting and the earliest date by which the prescription requires a minimum number of acceptable, well-spaced

[42] FSP #17 March 21, 2011 Section 8.0 pages 25 and 25 and Appendix B

trees per hectare to be growing on the cutblock. The regeneration delay period varies by species, location (as in BEC) and the regeneration method.

This indicator ensures that the appropriate time for regeneration to establish on DFA blocks harvested by the signatories is met. Growing stock is an important element in determining the productive capability of the area identified as forest available for timber production. As well, prompt reforestation is important to ensure that the harvested site maintains its contribution to carbon uptake.

This indicator is related to indicator 4.1.2.

**How are targets established?**

This target promotes prompt reforestation and exceeds legal requirements. Early establishment of a viable crop of trees reduces the need for subsequent interventions (re-planting, brushing) and positively contributes to carbon sequestration.

**Strategy**

Canfor will regenerate tree species through artificial or natural means that are ecologically suited to the site in a timely manner. This is intended to support higher yields and greater uptake and storage of carbon at rotation. Using ecologically suited species is also intended to reduce the forest risk because the tree species are better adapted to the site. Silviculture treatment regimes and forward plans schedule activities consistent with established key dates contained within plans.

**Forecasting and Probable Trends of the Indicator**

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

Healthy ecosystems with a diversity of native broadleaf and coniferous species are maintained at endemic and sustainable levels. Forests that uptake carbon and positively contribute to a reduction in carbon emissions.

**Current Condition**

Canfor is 100% compliant with this indicator. For planted sites, current practice in the Invermere TSA is to plant the year following harvest with one-year-old stock (i.e. no regeneration delay). There are some sites that are not restocked this quickly due to plantation failures, seedling delays, or general logistics. This small amount of area modifies the actual regeneration delay to somewhere between 0 and 1 year. Natural regeneration methods are currently used on 14% of the THLB in the DFA.

Practices for Canfor can be found in Appendix 1.3: Practices Analysis.

**Monitoring and Reporting**

The report will document the average time (weighted by area) for regeneration establishment on areas where regeneration delay was declared during the reporting period. Commencement of the regeneration delay period is based on harvest start date.

Once harvested, each cutblock is surveyed a specified number of years after harvest to ensure reforestation has occurred and the stand is fully stocked with ecologically suitable species. The results of all surveys are maintained in a Canfor database. 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 tracked in Canfor's database.

Once regeneration has been achieved, the Canfor must submit a report to the Government that will update the status of the cutblock on the government databases. Canfor and the Government track these reports

internally. This indicator can be tracked and monitored through government reports submitted annually at the end of May.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

| | |
|---|---|
| **Element 2.2: Forest Ecosystem Productivity** | Conserve forest ecosystem productivity and productive capacity by maintaining ecosystem conditions that are capable of supporting naturally occurring species. Reforest promptly and use tree species ecologically suited to the site. |
| **Value:** | Forest Ecosystem Productivity |
| **SFM Objective:** | Maintain ecosystem productive capacity by ensuring ecosystem conditions are maintained that are capable of supporting naturally occurring species. |

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. The following indicators track the status and trend of forestland base that remains productive.

The following CSA Core Indicators have been identified for this Element:

2.2.1/4.2.1 — Additions and deletions to the forest area

2.2.2— Proportion of the calculated long-term sustainable harvest level that is actually harvested

The following indicator statements have been identified for this Element:

2.2.1a Percent of gross forested landbase in the DFA converted to non-forest land use through forest management activities

2.2.1b Number of hectares of landslides resulting from forestry practices

2.2.2 Percent of volume harvested compared to allocated harvest level

### Indicator 2.2.1a – Conversion to Non-Forest Land Use

| **Indicator Statement** | **Target (Variance)** |
|---|---|
| Percent of gross forested landbase in the DFA converted to non-forest land use through forest management activities | Less than 3% of gross forested landbase (GFL)[43] |

**What is this indicator and why is it important?**

Given the Crown tenure situation in British Columbia forest companies generally have limited influence on any additions or deletions to the forest area, which generally are a result of government land use policies for other industries such as mining. Where forest companies can have an influence is through their practices, particularly as it pertains to permanent access structures such as roads, landings and borrow pits that are used in the process of harvesting timber. Unless rehabilitated, these access structures occupy otherwise productive land suitable for forests. This target is focused on those activities where forest companies have management responsibility (i.e. excludes other permanent losses resulting from other industries sharing the overall forest estate). Actual reporting against the 3% target is anticipated to

[43] GFL = THLB + NTHLB + NP Nat + adjacent protected areas

increase over time until the THLB is fully accessed. As such a periodic review of the associated targets will be necessary over time.

In order to assess the maintenance of the productive capability of the land base, this indicator 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 and mineral exploration.

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

Roads have three broad effects on forest ecosystem condition and productivity: 1) direct species mortality and disturbance 2) effects on species movement and 3) effects on species community composition. Several researchers have noted traffic caused mortality. Roads have been noted as important avenues for predators. Disturbance next to roads has been studied for ungulates, bears and other animals and is significant. It is well known that roads are avenues for poachers as well as hunters. Roads can hinder or facilitate movement of organisms. Invasive plants are often spread along road corridors. Roads of various widths can impede crossing by small mammals, and conversely can be chosen travel routes of larger animals. Swaths cut for roads can introduce edge associated species.

This indicator is linked to 4.2.1

**How are targets established?**

The focus of this indicator is on minimizing the removal of productive forestland base where forest managers have direct management responsibility. This target provides an overall DFA performance measure, evaluating landbase lost within harvest areas as well as that area lost to access those harvest areas. The target is inclusive of forests that are not part of the THLB.

The target for this indicator was calculated by determining the area of roads required to be constructed in a reporting period relative to the total area harvested during the same reporting period. The result is the percentage of road area needed to be constructed to harvest a given area of timber. Over time it is expected that the percentage of the gross forest landbase that is converted to permanent access structures will decrease over time as the DFA becomes fully roaded. As such periodic evaluation of the targets over time will be necessary to ensure that targets are still meaningful.

**Strategy**

Loss of the landbase to access structures resulting from forest management activities can be minimized with:

- careful access planning to minimize the amount of permanent access structures;
- concentrate harvesting where possible to reduce active road;
- construct roads no wider than safety considerations merit; and
- use of proper road construction, maintenance, deactivation and rehabilitation procedures.

The amount of road should be investigated when comparing management scenarios. Scenarios with the lesser amounts of roads can be chosen over other scenarios.

Conversions to the forest landbase are calculated and included in operational plans. Plans that are properly executed will provide the desired results. Post harvest evaluations and other inspections assess plan conformance.

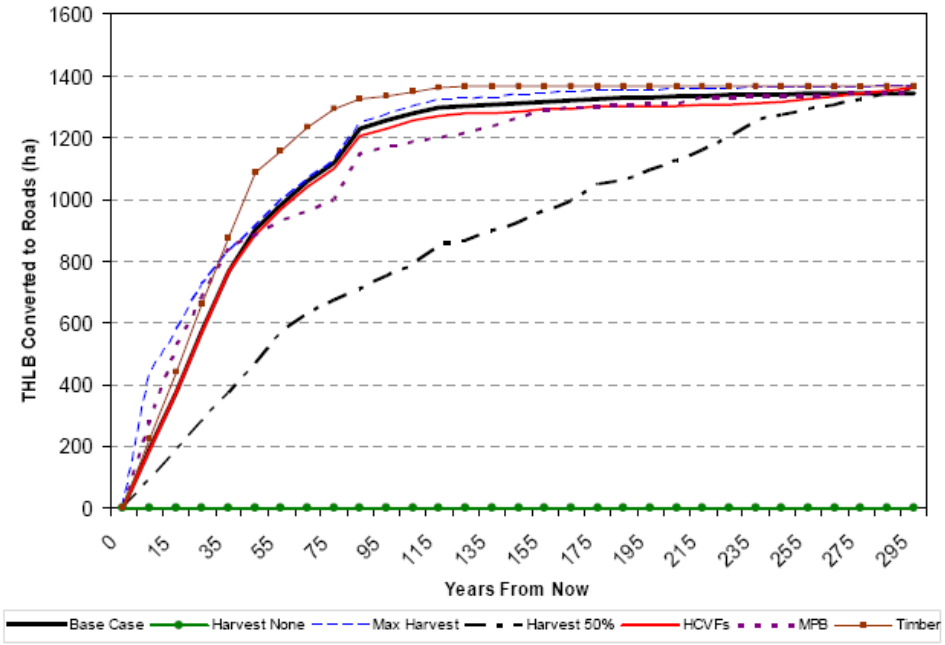
**Forecasting and Probable Trends of the Indicator**

Productive forest soil losses will be minimized from forest management activities. Permanent access structures (percent non-productive unnatural) are accounted for in the Provincial Timber Supply Review and can impact the harvest level

This indicator 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) is assumed in modelling. From the TSR3 process, an estimated 29,825 ha of roads, trails and landings are assumed to be removed from the THLB in the future. This assumption will be monitored.

Figure 13 provides a projection of the THLB area converted to non-forest over time for all scenarios. As existing roads, trails, and landings are already excluded from the THLB, the graph begins at zero and shows the area removed from the current THLB over the planning horizon (i.e. building of new access structures). As natural stands are logged for the first time they are assumed to lose 8.1% of their area to non-forest so the graph is simply a projection of how much and how quickly the natural stands on the land base are converted to managed stands. The Harvest Nothing scenario adds no new access structures over time while the Timber Focus run converts the most land base and does it the quickest. All scenarios trend toward a very similar long term state where all of the THLB has been converted to managed stands and approximately 1350 ha have been removed from the land base.

**Figure 13: Projection of THLB land converted to non-productive land in the DFA over time**




## Current Condition

The percentage of gross forested landbase in the DFA converted to non-forest land use through forest management activities will be reported on in the 2011 annual report.

Currently, no forestland is converted to non-productive except for landings, roads and gravel pits classed as permanent access. Based on the Roads, Trails and Landings Inventory Project (Timberline, 2008), the percent area of THLB converted to non-forest land use through forest management activities is 7.36% and in the future is expected to be 5.3%.

## Monitoring and Reporting

Permanent access structures percent (NPUNN) are utilized in Provincial Timber Supply Review forecasts (5-year intervals).

The data that is required for monitoring is the percent converted once every 5 years from operational information supplied into Genus that tracks area in permanent roads, landings, borrow pits, rock quarries and permanent camps. Deduct any included areas that have been rehabilitated during the reporting period.

This data collection and analysis is essentially a GIS exercise that can be completed at 5-year intervals in conjunction with TSR.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 2.2.1b – Landslides

| Indicator Statement | Target (Variance) |
|---|---|
| Number of hectares of landslides resulting from forestry practices | 0 ha in THLB (for slides >0.5 ha in size) |

**What is this indicator and why is it important?**

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 natural processes. In the THLB, activities such as timber harvesting and road building can create conditions that initiate slides particularly when these activities occur on unstable or potentially unstable terrain. Loss of soil productivity due to landslides related to forestry practices will be minimized as part of sustaining the overall productive capability in the THLB.

**How are targets established?**

The THLB of the DFA does not contain many areas that are prone to large scale landslides. Smaller areas of slides can occur as a result of forestry activities, particularly around steeper topography (e.g. near larger rivers). Landslides have not been officially tracked in the DFA until recently and so baseline data is anecdotal. The target for this indicator has been established based on consultation with the *FOREST*.

**Strategy**

The identification of unstable slopes should involve a review of slope conditions in areas planned for forest development. This review could include a review of terrain mapping, but should also include a field assessment of slope stability indicators.

During field review of slope stability indicators, field personnel should look for and record any slope conditions or characteristics that may indicate slope instability. These indicators will include:

- slopes over 60%
- pistol-butt trees
- timber growing at irregular angles in relation to ground slope
- existing slumps
- prevalence of slumping in the area

The existence of one or more of these indicators of instability may indicate the need for an assessment by a geotechnical professional prior to the commencement of forest development activities.

**Forecasting and Probable Trends of the Indicator**

Forecasting does not apply to this indicator. Landslides will not be spatially forecasted across the DFA. If landslides do occur that enables the establishment of baseline data, trends will be reviewed and potential future trends will be determined.

It is not likely that landslides greater than 0.5 ha will occur in the DFA as a result of forestry practices.

**Current Condition**

Canfor has had past occurrences of landslides resulting from forest practices. However, in the last number of years there have not been any landslides as a result of forestry practices within Canfor's operating area. All landslide incidents resulting from forest practices are documented and tracked in Canfor's Forest Management System (FMS). In addition, Canfor has standard operating procedures in place to prevent landslides from occurring during harvest and road building operations.

**Monitoring and Reporting**

In the event of a landslide occurrence, woodlands staff will record the incidence during inspections or surveys recording the size of the slide and where it occurred (i.e. within a cutblock, along a road). Once the slide is identified, an investigation of the cause will be completed to determine if forestry activities contributed to the incident. Action plans will then be developed to address significant damage and strategies for improved practice will be proposed. Annually, the incident tracking systems of each Licensee Team member will be reviewed for a summary of the number, size and cause of any landslides.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 2.2.2 – Volume Harvested Vs. Allocated

| Indicator Statement | Target (Variance) |
|---|---|
| Percent of volume harvested compared to allocated harvest level | 100% over the cut control period as defined by Timber supply forecast harvest flow (According to the Cut Control Regulation and Policy) (Variance +10%) |

**What is this indicator and why is it important?**

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

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

Timber supply is usually considered within the context of three relative timeframes — short-term, medium-term and long-term. The short-term is typically represented by the first two decades of the harvest forecast and reflects the period in which the scheduled harvest level is defined by immediate

concerns of achieving socio-economic objectives and maintaining non-timber values. The medium-term corresponds to the transition from harvesting mostly mature stands to harvesting managed stands. The long-term is the period that begins approximately when the harvest reaches the long-term harvest level.

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

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

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

This indicator is related to indicator 5.1.1a.

**How are targets established?**

Targets are established by the Forest Act and regulations and Forest license documents which is a legal agreement between the province of British Columbia and the license holder that specifies a number of conditions one of which is the allowable cut level for a forest license.

**Strategy**

Participating licensees contribute to the sustainable harvest level by managing to the determined harvest level for the management unit or in some cases by adhering to their apportioned harvest volume within the TSA. Cut control regulations dictate the short-term harvest flexibility. Essentially, licensees have flexibility on harvest levels from year to year but must balance every five years or less if desired by the licensee.

**Forecasting and Probable Trends of the Indicator**

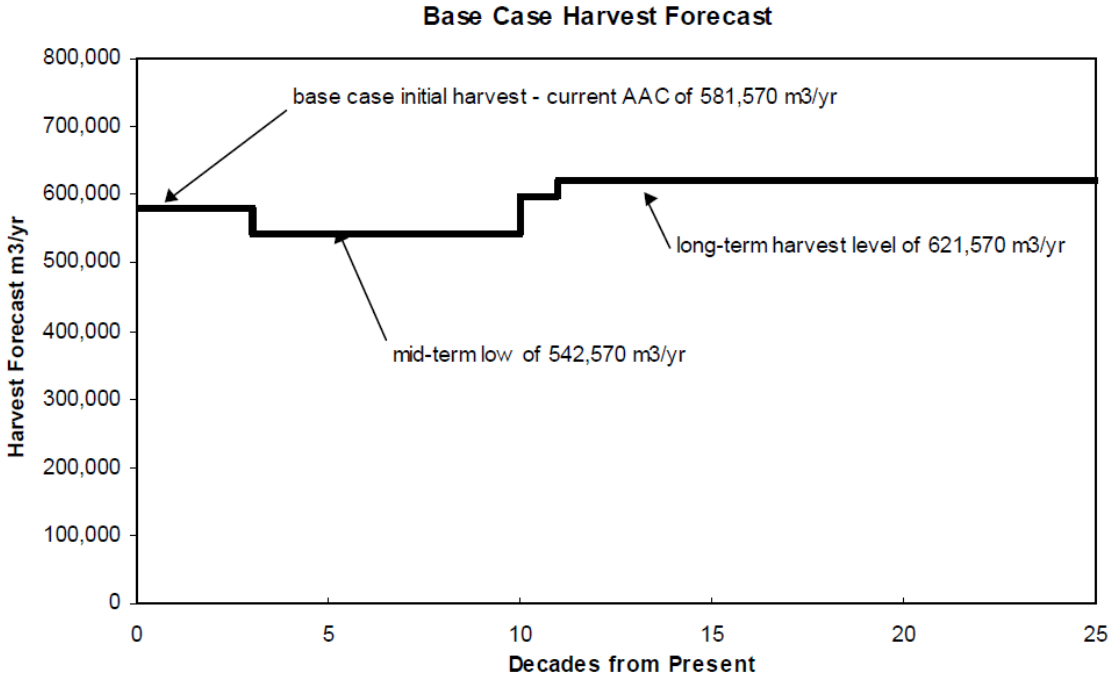
Short and long-term harvest flows reflect forest conditions, forest practices, and the socio-economic objectives of the Crown. Timber Supply Review has detailed timber supply forecasts which then rely on the Chief Forester to provide a determination of harvest levels utilizing forecast information, Crown objectives and input from the public.

A timber supply review for the management unit was last completed in 2004 with a resulting Chief Forester's determination effective November 1, 2005.

The timber supply analysis indicates an initial harvest level of 598,570 cubic metres per year in the Invermere TSA can be maintained for 3 decades (Figure 14). After that, harvest levels decline by 9% to the midterm harvest level (542,570 cubic meters). It then rises to the long-term harvest level of 621,570 cubic meters in the 11th decade. This long-term level is 7% above the current AAC[44].

[44] AAC determination. http://www.for.gov.bc.ca/hts/tsa/tsa09/tsr3/09ts2005ra.pdf and the analysis report. http://www.for.gov.bc.ca/hts/tsa/tsa09/tsr3/Invermere_TSR3_Analysis_Report_V3_submitted.pdf

**Figure 14: Base Case Harvest Forecast**




In September 2008, the chief forester postponed the date for the next AAC determination to a date prior to November 1, 2015.[45]

In BC, more information on the timber supply review can be found at:

http://www.for.gov.bc.ca/hts/tsa/tsa09/index.htm

**Current Condition**

Long-term harvest level (2005 baseline data):

- the AAC[46] for Canfor Radium of can be maintained for 21 years

As of December 31, 2009, all Canfor Radium was within the cut control variance set out by regulation. The total cut control volume harvested in 2010 was 5991 $m^3$ compared to an allocation of 221,005 $m^3$ or 2.7%.

Canfor's Annual Allowable Cut (AAC) is currently 231,005 $m^3$ with the 5 year cut control period (Table 21) beginning January 1, 2010 and ending December 31, 2014. Canfor will schedule the appropriate volume during the cut control period in order to achieve the 5-year (+10%) cut control volume.

[45] Reference http://www.for.gov.bc.ca/hts/tsa/tsa09/tsr3/09ts08pp.pdf
[46] BC data from most current AAC rationale (http://www.for.gov.bc.ca/hts/tsas.htm)

**Table 21: Five Year Cut Control Volume Control – Canfor FL A18979**

| Calendar Year | 2010 | 2011 | 2012 | 20013 | 2014 | Total |
|---|---|---|---|---|---|---|
| **AAC ($m^3$)** | 231,005 | 231,005 | 231,005 | 231,005 | 231,005 | 1,155,025 |
| Timber Cut Under Licence and RP | 4204 | | | | | |
| Timber Wasted or Damaged | 164 | | | | | |
| Udercut carry forward | 1623 | | | | | |
| **Total** | **5991** | **0** | **0** | | | **5991** |

**Monitoring and Reporting**

Periodic
The schedule for subsequent Timber Supply Reviews for the Canfor Radium can be found at:

http://www.for.gov.bc.ca/hts/schedule.htm

Annual
Report ($m^3$) the harvest level allocated for each license and harvest level cut (cut control volume) for the past reporting year. The existing scaling system in place (monitored by Government) tracks volume delivered.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

## Criterion 3: Soil & Water

Conserve soil and water resources by maintaining their quantity and quality in forest ecosystems.

This Criterion consists of two Elements:

| | |
|---|---|
| **Element 3.1: Soil Quality and Quantity** | Conserve soil resources by maintaining soil quality and quantity. |
| **Element 3.2: Water Quality and Quantity** | Conserve water resources by maintaining water quality and quantity. |

| | |
|---|---|
| **Element 3.1: Soil Quality & Quantity** | Conserve soil resources by maintaining soil quality and quantity. |
| **Value:** | Soil Productivity |
| **SFM Objective:** | Protect soil resources to sustain productive forests. |

The following CSA Core Indicators have been identified for this Element:

3.1.1 — Level of soil disturbance

3.1.2 — Level of downed woody debris

The following indicator statements have been identified for this Element:

3.1.1 Percent of harvested blocks meeting soil disturbance objectives identified in plans

3.1.2 Percent of cutblocks reviewed where post harvest CWD levels are within the targets contained in plans

### Indicator 3.1.1 – Soil Disturbance

| Indicator Statement | Target (Variance) |
|---|---|
| Percent of harvested blocks meeting soil disturbance objectives identified in plans | 100% of blocks meet soil disturbance objectives (0) |

**What is this indicator and why is it important?**

Soil is one of the most important physical resources in the DFA, as it is directly linked to the production of forest biomass with all of its associated attributes. The intent of disturbance limits is to ensure that the soil resource is adequately protected. Two specific objectives with respect to soil are: 1) minimize soil productivity losses; and 2) minimize off-site impacts due to soil disturbance.

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 corduroyed trails, compacted areas, and areas of dispersed disturbance." Some degree of soil disturbance is expected during timber harvesting or silviculture activities, however it needs to be minimized within the THLB.

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

This indicator tracks the percentage of detrimental soil disturbance at a site level (i.e. cutblock) where detrimental soil disturbance is defined for blocks with compaction or water table issues.

**How are targets established?**

Maintenance of site productivity is a core prerequisite for achieving sustainability. Managing the area of detrimental soil disturbance will help maintain the productive capacity of the landbase.

At the landscape level, it has been determined through a TSR study (1994/95) that the average in-block occupancy of trails and dispersed disturbance was determined to be 4.5%.

Within a cutblock, Canfor follows the legal limits as defined by legislation and prescribed in operational plans. Canfor has been 100% compliant with no incidence, follow-up actions or investigations occurring in the last two years.

**Strategy**

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

Depending on season of harvest (snowpack, dry vs. wet) and harvest method and equipment (cable vs. conventional and skidder, small cat vs. low ground pressure cut-to-length (CTL)), the level of disturbance on a cutblock can vary. Harvest areas are assessed for potential hazards for compaction, forest floor displacement, soil displacement, erosion, and mass wasting based on soil types. These hazards define the total amount of allowable soil disturbance on a cutblock.

Generally, the DFA consists of silt loam soils with a high compaction hazard. Clay soils and steep slopes result in very high hazards. Within Canfor's operations, the following disturbance has been summarized for summer conditions:

- CTL harvesting – generally 2-3% disturbance
- Rubber Tire Skidder/Small Cat – generally 8%
- Cable Harvesting – generally 2-4%

Random skidding is not allowed. Skidding is restricted to dry, frozen or snow covered ground, designated trails or low ground pressure CTL equipment to manage within the legal disturbance limits. Operations are often shut down during heavy period of rain to minimize disturbance.

Practices for Canfor can be found in Appendix 1.3: Practices Analysis.

**Forecasting and Probable Trends of the Indicator**

Productive forest soils with minimized losses from forest operations. The forecast for this indicator is that Canfor will remain in compliance and meet the targets as identified below.

**Current Condition**

Canfor Radium met soil disturbance objectives on of areas harvested (2010 baseline data).

| Target | Canfor Results |
|---|---|
| 1) Landscape: Average 4.5% (+/2%) all cutblocks over a 5 year period. | 4.0% |
| 2) Stand: For a cutblock, 10% disturbance on high hazard areas and 5% on very high hazard areas as defined in soil conservation guidebook. | High Hazard Areas = 2.6%<br>Very High Hazard Areas = 2.0% |

**Monitoring and Reporting**

Report the area (hectares) where soil disturbance commitments were achieved as compared to the total area of cutblocks that were harvested during the reporting year (reporting on net area requiring reforestation).

Reporting is based on harvest inspections and/or government inspections. The data required to monitor this indicator is derived from ocular estimates and site degradation surveys of soil disturbance on blocks post-harvest using Canfor's soil disturbance measurement procedure. Any non-conformance or non-compliance to plans will be identified and used as the basis for reporting.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 3.1.2 – Coarse Woody Debris

| Indicator Statement | Target (Variance) |
|---|---|
| Percent of cutblocks reviewed where post harvest CWD levels are within the targets contained in plans | 100% of blocks harvested annually (0) |

**What is this indicator and why is it important?**

This indicator and target addresses the need to maintain structural features of forest ecosystems at the stand level. Strategies include direction for basic levels of coarse woody debris (CWD), creation of stubs, and guidelines for enhanced levels of CWD in landscape units with high biodiversity emphasis options.

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

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

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

Beyond providing food and habitat for vertebrates and invertebrates as well as growing sites for plants, CWD is a source of nutrients for soil development. Past forestry practices have encouraged the removal of CWD from sites for a number of economic and/or safety reasons, potentially at the expense of soil nutrients.

This indicator quantifies the retention of appropriate amounts of CWD on site following harvesting operations as part of the strategy for maintaining soil productivity within the THLB. Within the THLB, CWD is to be retained within cutblocks, wildlife tree patches, riparian areas, and in un-salvaged timber. Within the NHLB it is assumed that natural processes will result in the maintenance of appropriate levels of CWD.

In addition CWD and other specific habitat elements such as shrubs and hardwoods play an important role in carbon sequestration for the DFA. This contribution is assessed under indicator summaries for Criterion 4: Role in Global Ecological Cycles in a following section of the SFMP.

**How are targets established?**

Retention of standing and downed woody debris provides habitat for many living organisms and soil organic matter as it decomposes.

CWD research is being completed in the East Kootenays in which Canfor is working with Tembec to develop ecologically appropriate CWD targets. These targets have been based on extensive research and field sampling. Data has been collected in many BEC's since 2001. The CWD targets that *FOREST* has accepted are presented in Appendix 1.6: Habitat Element Supporting Tables – Table 5.

The scientific literature provides little guidance on how much CWD to retain in forested stands. This is partly because studies assessing down wood have found very high variability among sites in similar ecosystems, and partly because vertebrates show inconsistent and variable responses to CWD volumes (Bunnell et al 1999[47], Feller 2003[48]). Tembec (since 2001), and Canfor (starting in 2004) undertook studies of CWD in unmanaged stands to provide some baseline data for the East Kootenay Region.

The study compared CWD volumes between logged stands and those burned by wildfire also found that logged stands had lower volumes of small pieces of CWD than stands burned by wildfire, although there were no differences for large pieces (Stuart-Smith 2002). Recent modelling projections for the East Kootenay (Wilson et al. 2004), though not accounting for all CWD retained on the land base, suggests

[47] Bunnell, F.L., Kremsater, L.L. and E. Wind. 1999. Managing to sustain vertebrate richness in forests of the Pacific Northwest: relationships within stands. Environmental Review 7: 97-146.
[48] Feller 2003

that CWD volumes will remain fairly consistent on the CFLB, increasing slightly on the NHLB and declining somewhat on the THLB. Thus, consistent with a precautionary approach, Canfor has developed a CWD strategy to retain more CWD on the THLB, while undertaking projects to more accurately model CWD volumes on the land base. Pre-harvest and post-harvest levels and quality of CWD are summarized by Biogeoclimatic Zone Variant level and dominant stand type.

Key patterns identified in the study were:

1. mean pre-harvest volumes of CWD increased with BEC elevation (from PP and IDF to ESSF)
2. on average, CWD volume decreased between pre and post-harvest, and
3. CWD volume post-harvest had a higher proportion of smaller pieces than CWD volume pre-harvest (Adams 2002).

**Strategy**

Canfor Radium will achieve objectives through a combination of stand-level actions including salvage guidelines, dispersed and group retention, modifying piling practices and adhering to minimum post-harvest limits of coarse woody debris. Training will for logging crews will also be utilized to ensure that the CWD remaining is of high quality.

CWD is managed on a rotation bases. Salvage of current wildlife trees, wildlife tree patches or future mortality within reserves is by exception. Live, dead and dying trees are left on site for CWD recruitment.

CWD targets are developed on a site specific basis and included in operational plans. Plans are properly executed providing desired results. Post harvest evaluations and/or waste surveys assess plan conformance.

The main ecological principles guiding a CWD management strategy are:

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

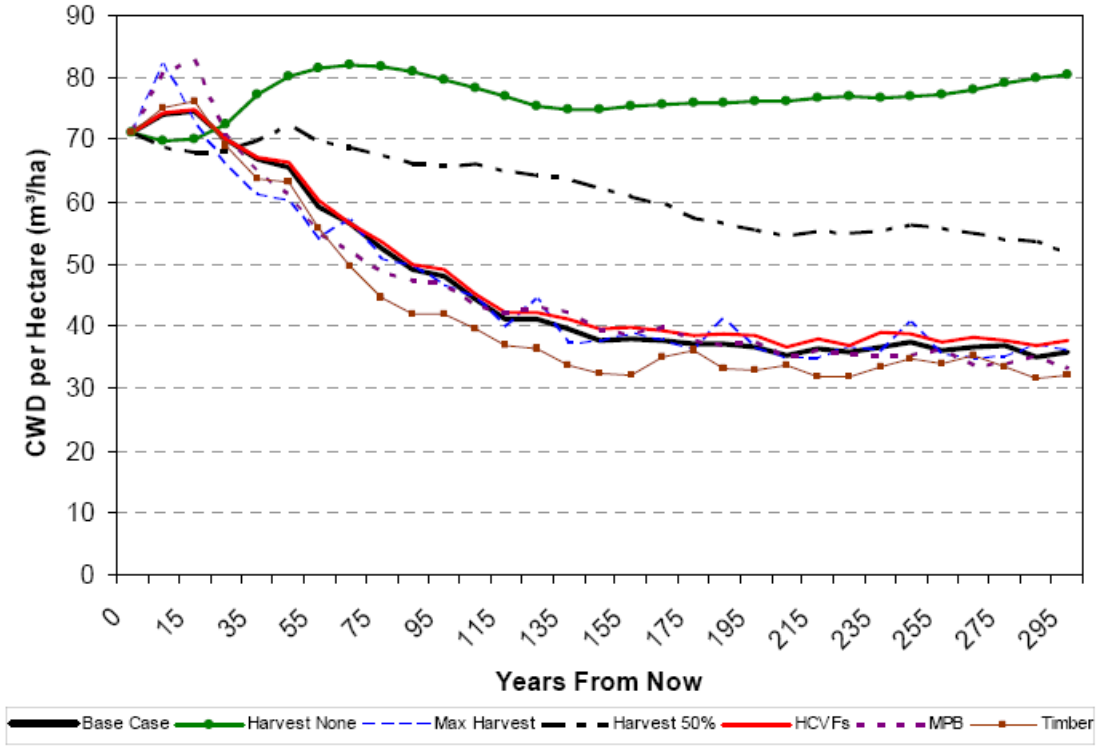
**Forecasting and Probable Trends of the Indicator**

It is expected that achieving the indicator targets will ensure healthy ecosystems with a diversity and abundance of native species and habitats.

Retention of large organic debris on harvested sites and utilization as habitat for wildlife.

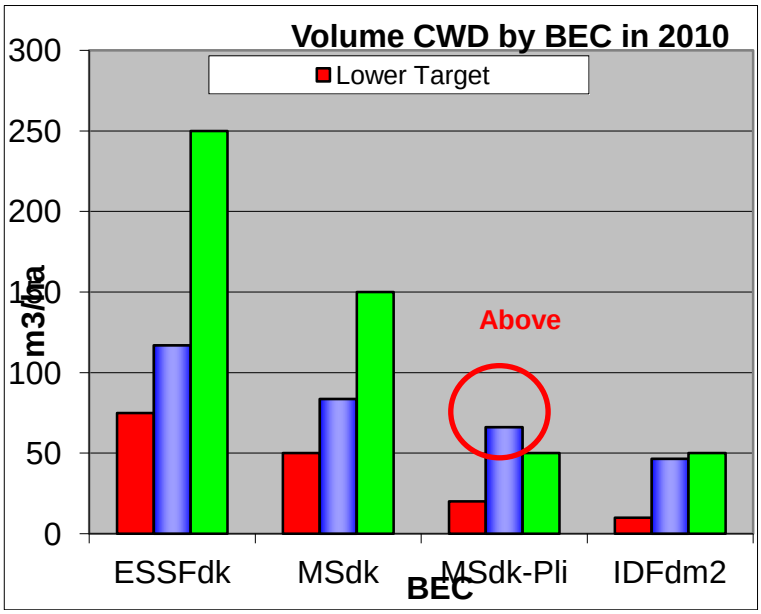
Figure 15 shows average CWD volumes on the THLB over time for each scenario. Volumes are initially high for all runs (70 $m^3$/ha) because a significant portion of the THLB is still in natural stand conditions and older age classes. As harvest is implemented in many of the runs, an initial flush of CWD is seen before a long-term decline to roughly 50% of current levels. The No Harvest scenario shows CWD volumes increasing slightly over time as stands age and existing managed stands revert to more natural conditions. The Timber Focus scenario shows the largest drop in CWD volumes because it converts the most THLB into managed stands. Each of the other scenarios assumes managed stands are grown on relatively short economic rotation ages and produce little new CWD naturally in that timeframe.

**Figure 15: Projection of CWD Levels on DFA THLB**




## Current Condition

CWD Targets by BEC consistent with Tembec and Canfor research (See Appendix 1.6: Habitat Element Supporting Tables – Table 5)



**Monitoring and Reporting**

Report operational plan conformance to the target (cutblocks harvested where planned targets met compared to total cutblocks harvested). Reporting may also utilize supplemental information collected as part of post harvest waste assessments including ocular estimates.

Post-harvest CWD levels will be measured and recorded through post harvest inspections or through silviculture surveys on a representative sample of the blocks harvested annually or in conjunction with waste and residue surveys. This measurement will provide a block average value that will be tracked by cutblock. The average amount of CWD present in blocks throughout the DFA will be monitored annually from reports generated by each participant. Analysis will be every 5 years (TSR or major changes to inventory or landbase definition).

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

| | |
|---|---|
| **Element 3.2: Water Quality & Quantity** | Conserve water resources by maintaining water quality and quantity. |
| **Value:** | Water Quantity & Quality |
| **SFM Objective:** | Maintain water quality and quantity. |

Element 3.2 is intended to ensure that forest management activities around watercourses do not degrade the quality and quantity of the water in or adjacent to the activities. Water quality and quantity is important both for aquatic species, domestic watering and human drinking water.

The primary concern for water quality in the Radium DFA is habitat for aquatic species, with the primary threat to water quality being increased sedimentation due to stream crossings. The primary threat to water quantity is altered stream flows as a result of changes to the forest canopy in a watershed from harvesting. Canfor takes water quality and quantity into account through environmental instructions mandated in their Environmental Management System (EMS).

The following Core Indicator has been identified for this Element:

3.2.1 — Proportion of watershed or water management areas with recent stand-replacing disturbance.

The following Local Indicators have been identified for this Element:

3.2.1a Sensitive watersheds that are above Peak Flow targets will have further assessment.

3.2.1b Percent of high hazard drainage structures in sensitive watersheds with identified water quality concerns that have mitigation strategies implemented.

### Indicator 3.2.1a – Peak Flow of Sensitive Watersheds

| **Indicator Statement** | **Target (Variance)** |
|---|---|
| Sensitive watersheds that are above Peak Flow targets will have further assessment. | 100% (-10%) |

**What is this indicator and why is it important?**

Water quality and quantity can be affected by stand-replacing disturbances (human and natural-caused). The effects are normally highest in the initial post-disturbance years and diminish over time as

regenerating forest cover is established. The critical threshold at which the disturbance begins to effect water values varies according to topography, soil properties, vegetation types, and climate. Certain watersheds can be classified as more sensitive to the impacts of disturbance either because their environmental and climatic attributes or because of their inherent value to aquatic life and communities that are dependent on the water. The peak flow of a watershed is directly influenced by the amount of area that is recently harvested or otherwise recently disturbed (Equivalent Clear-cut Area (ECA)). These disturbed areas accumulate more snow and subsequently can deliver more water as the snow melts more rapidly in the spring.

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

Water quality and quantity for human consumption are critical in Community and Domestic Watersheds. These watersheds are considered "sensitive". This indicator ensures that the operational plans that occur in consumptive use watershed follow all recommendations from those assessments.

Water quality is an important quality of life objective as well as being necessary for the survival of aquatic species. Riparian areas serve as habitat for non-aquatic species while also providing shading necessary for modulating stream temperatures. Fisheries sensitive watershed indentified within the DFA and established by government are critical. These watersheds are considered "sensitive". Developing plans to protect the riparian areas and then ensuring all the operations involved are aware of those requirements and follow them, are key to protecting this sensitive area and resource.

**How are targets established?**

This target places emphasis and resources on the most sensitive and high-risk areas. It ensures focused assessment of watershed conditions and drainage structures.

**Strategy**

An inventory of sensitive watersheds is completed for the DFA and peak flow targets assigned to each. Where peak flow targets are exceeded in a sensitive watershed (either currently or as a result of planned activity) further detailed assessments are conducted. Peak flow will be calculated as per Hydrologists recommendation.

If peak flow targets will be exceeded than more detailed assessments such as drainage structure (see indicator 3.2.1b) or channel stability assessment will be conducted.

**Forecasting and Probable Trends of the Indicator**

The forecast is for acceptable levels of water quality (clean water) and quantity (maintain stream-flow regimes within natural variation), as described by the specific hydrologic assessments. Riparian systems will maintain existing uses and support human and ecological communities and aquatic life. Introduction of sedimentation into watercourses' is minimized.

Peak flow analysis will have to be completed on any watersheds that are designated as "sensitive".

**Current Condition**

Healthy watersheds that function in a well-balanced natural state are forecasted. Zero percent of sensitive watersheds above Peak Flow targets, where harvesting occurred, that had further assessments conducted.

There are two community watersheds within the DFA, Forester Creek and Pinnacle /Luxor Creek. In addition, the Palliser River watershed is identified as a Fisheries Sensitive Watershed. Interior Watershed Assessments have been completed for these watersheds and operational plans follow the recommendations of the assessments. Road building and harvesting patterns and systems will be

developed in recognition of peak flow, erosion hazards, potential for change to the stream channel morphology, anticipated changes to the channel riparian habitats and the interaction of these processes resulting in overall watershed, or cumulative, effects. In addition, Emergency Preparedness and Response Plans will be implemented as required to mitigate impacts of unforeseen events such as landslides, product spills or fires.

Operational restoration plans have been implemented in Pinnacle/Luxor and Forester Creek watersheds based on the findings of Watershed Assessments. Activities such as stream rehabilitation, road/trail deactivation and stream crossing restoration have occurred.

Any future harvesting activities in these watersheds will require an update to the hydrological assessments to ensure operational plans are consistent with maintaining water quality and quantity.

The current percentage of area under 6 metres in height in the community watersheds of the DFA (Forester and Pinnacle) is 8.7%.[49]

**Monitoring and Reporting**

Report the number of sensitive watersheds where peak flow targets were exceeded and harvesting occurred. Identify the watershed(s) and for each, whether a further detailed assessment was conducted prior to harvest.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 3.2.1b – High Hazard Drainage Structures

| Indicator Statement | Target (Variance) |
|---|---|
| Percent of high hazard drainage structures in sensitive watersheds with identified water quality concerns that have mitigation strategies implemented as per the plan | 100% (0) |

**What is this indicator and why is it important?**

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

This indicator recognizes the importance of identifying high-risk drainage structures in those watersheds that were determined to be sensitive. In order to manage the risks to water quality, the target requires that a mitigation strategy be in place for each of the identified structures and that it is being followed. Strategies such as installing cross drains, grass seeding cut and fill slopes, building ditch blocks or sumps, placing silt fences, structure replacement or periodic monitoring may be prescribed

Water quality and quantity is important both for aquatic species and for human drinking water. Monitoring the compliance of stream crossings is important to guarantee that faults are quickly identified and corrected before degradation to aquatic habitat, water quality or quantity occurs. This indicator

[49] Time 0 forecasted value. Methodology provided in Table 3. Range exists because of variations between ecosystems. Forsite, Interior Reforestation, & Ecological Research. Sustainable Forest Management Plan Scenario Forecasting. Version 1.1 – February 24, 2006. Prepared for Canfor – Radium Woodlands & BCTS.

ensures that stream crossings within the DFA comply with the requirements outlined in legislation (i.e. FRPA, Fisheries Act, etc.). Monitoring the adherence of stream crossing construction to these standards ensure that crossings, particularly those posing a high risk to water quality, are built using the most current knowledge and technology.

**How are targets established?**

This target places emphasis and resources on most sensitive and high-risk areas. It ensures focused assessment of watershed conditions and drainage structures.

**Strategy**

Conduct a survey of drainage structures within sensitive watersheds and develop mitigation strategy for each of the structures that are rated a high hazard for sediment delivery. Action plans with respect to the identified high drainage structures will be developed and implemented.

**Forecasting and Probable Trends of the Indicator**

The forecast is for acceptable levels of water quality (clean water) and quantity (maintain stream-flow regimes within natural variation), as described by the specific hydrologic assessment. Riparian systems will maintain existing uses and support human and ecological communities and aquatic life. Introduction of sedimentation into watercourses' is minimized.

**Current Condition**

Mitigation strategies were developed and implemented for 100% of high-risk drainage structures in sensitive watersheds.

Stream crossings conform to the legislated requirements including the 'Timing Windows and Measures for the Conservation of Fish, Fish Habitat and Water Quality for the Invermere Forest District, MoELP, November 11, 2000, as required to avoid undue impact from the introduction of silt or other materials into the stream thereby, protecting and conserving water quality. Canfor environmental management system (EMS) tracks conformance and compliance to strategies or results specified in legislation or Canfor commitments.

**Monitoring and Reporting**

Report the number of high-risk drainage structures within the sensitive watersheds. Further report whether each had a mitigation strategy and whether that strategy was implemented as planned.

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

This indicator will be reported on an annual basis with actions tracked in a database. Where no road permits are issued to Canfor Radium, the report will indicate "No road permits held by Canfor Radium". Where no sensitive watersheds exist or no structures are present in a watershed the report would read "No sensitive watersheds" or "No structures within sensitive watershed".

The data required to monitor this indicator is the recorded number of non-conformance or non-compliance with FSP Riparian strategy requirements. Canfor will inspect all high hazard crossings upon installation or removal, as well as during spring runoff. Collection of this data, as well as monitoring and reporting will occur as per the documented requirements. A long-term inspection schedule for stream crossings will be developed and implemented. The results of which will be monitored along with high hazard road inspections and reported in the SFMP Annual Report.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Criterion 4: Role in Global Ecological Cycles

Maintain forest conditions and management activities that contribute to the health of global ecological cycles.

This Criterion consists of two Elements:

| | |
|---|---|
| **Element 4.1: Carbon uptake and storage** | Maintain the processes that take carbon from the atmosphere and store it in forest ecosystems. |
| **Element 4.2: Forest Land Conversion** | Protect forestlands from deforestation or conversion to non-forests, where ecologically appropriate. |

| | |
|---|---|
| **Element 4.1: Carbon uptake and storage** | Maintain the processes that take carbon from the atmosphere and store it in forest ecosystems. |
| **Value:** | Carbon Uptake and Storage |
| **SFM Objective:** | Maintain the carbon uptake and storage processes. |

Forest ecosystems are an integral part of the global carbon cycle as trees and soils absorb and release carbon dioxide ($CO_2$) through carbon uptake and decomposition. Trees can store carbon in their plant tissues through the process of photosynthesis and could potentially exist as a significant carbon pool, particularly in old forests. When trees are harvested, or when a natural disturbance such as fire occurs, the carbon that is not sequestered in forest products, is then 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 concern over human caused climate change and global warming. Initiatives such as the Montréal Process, carbon requirements for forest certification, and the Kyoto Protocol are examples of guidelines to address the issue. Forests and agricultural soils in Canada are projected to provide a carbon sink of 30 Mt of carbon by continuing with current management practices. This could be increased by additional activities (Government of Canada 2002) which local forest managers will have the opportunity to support it on the ground.

The criteria, element and associated indicators for Global Carbon Cycles considers the potential influence of forests on carbon uptake and storage and its implications to forest managers.

The following CSA Core Indicators have been identified for this Element:

4.1.1 — Net carbon uptake

4.1.2/2.1.1 — Reforestation success

The following Local Indicators have been identified for this Element:

4.1.1 Maintain the retention of existing (or replacement of) old forest

4.1.2/2.1.1 Regeneration delay for stands established annually

### Indicator 4.1.1 – Retention of Old Forests

| Indicator Statment | Target (Variance) |
|---|---|
| Maintain the retention of existing (or replacement of) old forest | See indicator 1.1.3 |

**What is this indicator and why is it important?**

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

Forest carbon has recently become a key SFM value, especially in light of Canada's international commitment to lower its net carbon outputs to the atmosphere. Models for calculating a forest carbon budget (e.g., the Canadian Forest Service's Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3)) are becoming available for use by practitioners particularly where they can be linked to forest inventory and timber supply models. Their use in forest planning can indicate whether a specific forest is expected to be a net carbon source or sink over the period normally used for wood-supply forecasts.

In their 2009 summary of carbon management in BC's forests50 Mike Greig and Gary Bull report a need for additional guidance for forest managers and practitioners. "The interest in managing British Columbia's forests for climate control and CO2 offsetting projects has built to the point where forest managers are seeking guidance. Equally important is the public's desire to understand the potential of provincial forests in mitigating climate change and to have this clearly communicated. Some work has taken place in assembling carbon yield curves, researching local carbon storage (Kranabetter and Macadam 2006), and undertaking carbon accounting projects. However, no published handbooks or policies exist to guide forest managers, practitioners, or the public.

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

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

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

Thus, Canfor's strategy within the SFM Plan will be to continue to report on the target within this indicator (retention of old forest) as well as related indicators and targets for forestland conversion and reforestation success. Collectively, these indicator statements and targets demonstrate commitment to positively influence carbon balance within the management unit. Retention of old forest (such as Old Growth Management Areas or OGMA's) throughout the DFA will assist in locking up the carbon already sequestered in these older forests.

**How are targets established?**

Targets are established by the Kootenay Boundary Land Use Plan (KBLUP) order by Landscape Unit – Objective 2.

**Strategy**

Contribute positively to carbon uptake and storage by managing the existing amount of designated old forest retention areas either through their protection from harvesting or by replacing area where incursions are necessary with old forests having similar attributes. Old forests designated as retention areas are guided by definitions found within the BC Provincial Old Growth Order (May 2004).

Detail of the replacement strategies is outlined in management plans.

**Forecasting and Probable Trends of the Indicator**

Actively growing, healthy forests will best contribute to carbon uptake and storage. Protected Area, Old Growth Management Area (OGMA), and Wildlife Tree Patch Strategies, together with inoperable or inaccessible areas, ensure retention of old growth to sustain biodiversity and ecosystem objectives. Carbon stored within these reserve areas are an important part of the entire carbon cycle.

**Current Condition**

Canfor is 100% compliant with the mature and old seral targets in the KBHLP

**Monitoring and Reporting**

Report the total area of old forest retained as it relates to the target.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 4.1.2 – Regeneration Delay

| Indicator Statement | Target (Variance) |
|---|---|
| Regeneration delay for stands established annually | As per FSP[51] (N/A) |

This indicator is related to indicator 2.1.1 and is covered off in the Criteria 2 section of the plan. Refer to 2.1.1 Reforestation Success: Regeneration delay for stands established annually.

Prompt reforestation of areas harvested is one of Canfor's strategies to maintain a positive carbon sequestration rate in the Radium DFA.

| | |
|---|---|
| **Element 4.2: Forest Land** | Protect forestlands from deforestation or conversion to non-forests, |

[51] FSP #17 March 21, 2011 Section 8.0 pages 25 and 25 and Appendix B

| | |
|---|---|
| **Conversion** | where ecologically appropriate. |
| **Value:** | Forest land base |
| **SFM Objective:** | Sustain forests lands within our control within the DFA. |

The following CSA Core Indicators have been identified for this Element:

4.2.1/2.2.1 — Additions and deletions to the forest area

The following Local Indicators have been identified for this Element:

4.2.1/2.2.1a Percent of gross forested landbase in the DFA converted to non-forest land use through forest management activities

### Indicator 4.2.1 – Conversion to Non-Forest Land Use

| Indicator Statement | Target (Variance) |
|---|---|
| Percent of gross forested landbase in the DFA converted to non-forest land use through forest management activities | Less than 3% of gross forested landbase (GFL)[52] |

This indicator is related to indicator 2.2.1a and is covered off in the Criteria 2 section of the plan. Refer to 2.2.1a – Additions and deletions to the forest area: Percent of gross forested landbase in the DFA converted to non-forest land use through forest management activities.

### Criterion 5: Economic and Social Benefits

Sustain flows of forest benefits for current and future generations by providing multiple goods and services.

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 even economic C&Is, and 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 attempt was made to keep social aspects of sustainability separate from those addressed in the Economics C&Is (e.g. non-timber economic benefits), in order to avoid double counting, by focusing on

[52] GFL = THLB + NTHLB + NP Nat + adjacent protected areas

socio-cultural conditions and activities affecting quality of life, public access to non-market benefits, resources, and community rights.

This Criterion consists of two Elements:

| | |
|---|---|
| **Element 5.1: Timber and Non-Timber Benefits** | Manage the forest sustainably to produce an acceptable and feasible mix of timber and non-timber benefits. Evaluate timber and non-timber forest products and forest-based services |
| **Element 5.2: Communities and Sustainability** | Contribute to the sustainability of communities by providing diverse opportunities to derive benefits from forests and by supporting local community economies. |

| | |
|---|---|
| **Element 5.1: Timber and Non-Timber Benefits** | Manage the forest sustainably to produce an acceptable and feasible mix of both timber and non-timber benefits. Evaluate timber and non-timber forest products and forest-based services. |
| **Value:** | Timber and Non-Timber Benefits |
| **SFM Objective:** | Provide opportunities for a feasible mix of timber, recreation, and non-timber commercial activities |

Forests represent not only a return on investment for an organization (measured, for example, in profit/loss, or product output) but also a source of income and non-financial benefits for DFA-related workers, local communities and governments. While there is limited information on the ecological services and non-timber benefits produced in the DFA, it is important to consider the costs and benefits of a variety of goods and services.

The following CSA Core Indicator has been identified for this Element:

5.1.1 — Quantity and quality of timber and non-timber benefits, products, and services produced in the DFA

The following indicator statements have been identified for this Element:

5.1.1a Percent of volume harvested compared to allocated harvest level

5.1.1b Conformance with strategies for non-timber benefits identified in plans

### Indicator 5.1.1a – Volume Harvested Vs. Allocated

| **Indicator Statement** | **Target (Variance)** |
|---|---|
| Percent of volume harvested compared to allocated harvest level | 100% over 5 years as defined by Timber supply forecast harvest flow (According to the Cut Control Regulation and Policy) (Variance +/- 10%) |

**What is this indicator and why is it important?**

Timber benefits can be measured by looking at sustainable harvest levels in relation to the allocated supply levels determined by the Chief Forester (BC). The harvest level is set only after considering social, economic and biological criteria. In BC, more information on this rigorous process to determine allowable annual cut (AAC) levels can be found at the website: http://www.for.gov.bc.ca/hts/pubs/tsr/tsrbkg.htm. Support for local communities through business relationships provides employment diversification and increased local revenue.

This indicator is related to indicator 2.2.2.

**How are targets established?**

The allocated harvest is developed with input from stakeholders, the broader public, Aboriginals, the forest industry, and government agencies. It is essential that holders of overlapping land use tenures communicate regularly with one another and with the public and Aboriginals. Canfor and other licensees[53] work together to undertake the initial analysis to recommend an AAC under the Timber Supply Review (TSR) process. The Government Chief Forester who then determines the AAC for the TSA analyzed their recommendations. The actual AAC is outside of the direct control of forest licensees, however it is important to track AAC levels over time as many indicators and targets are directly related to AAC and a lowering or increasing of AAC will be reflected in those indicators and targets.

The target reflects that portion of the Invermere TSA that is accounted for in the DFA. The AAC is recalculated every 10 years and is based on the Timber Supply Review (TSR) process.

Conforming to commitments in plans will help measure the company's performance of operating on public lands.

**Strategy**

Companies contribute to the sustainable harvest level by adhering to their apportioned harvest volume within the TSA. Cut control regulations dictate the short-term harvest flexibility.

**Forecasting and Probable Trends of the Indicator**

Short and long-term harvest flows that reflect forest conditions, forest practices, and the socio-economic objectives of the Crown. (See indicator 2.2.2 for more detail on forecast).

**Current Condition**

See details under Indicator 2.2.2

**Monitoring and Reporting**

Periodic
The schedule for subsequent Timber Supply Reviews can be found at:

http://www.for.gov.bc.ca/hts/schedule.htm.

Annual
Report the harvest level allocated for each license and harvest level cut (cut control volume) for the past reporting year. The existing scaling system in place (monitored by Government) tracks volume delivered.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

## Indicator 5.1.1b – Non-Timber Benefits

| Indicator Statement | Target (Variance) |
|---|---|
| Conformance with strategies for non-timber benefits identified in plans | No non-conformances for site level plans (0) |

[53] At the time of this TSR, the Invermere operated under a DFAM agreement. The DFAM does not exist anymore.

**What is this indicator and why is it important?**

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 indicator evaluates the benefits from identified non-timber products that are produced within the TSA. Forest management must recognize the existing, and potential, economic benefits that can be derived from TSA forests beyond the primary forestry industry, including marketed products such as tourism, mining, guiding, trapping and botanicals. Forest management activities and practices have the potential to substantially impact the economic value of non-timber products from an area.

The need to include indicators for non-timber forest products was developed in concert with the other economic indicators for timber products, and the local economy. The 1995 CCFM criteria and indicators were used as a starting point.

It was identified the need to follow a similar approach as for timber products, including measures for the 'units', value, distribution and resilience of the benefits from non-timber resources in the SFMP management area. Unfortunately, in general in British Columbia, there is an almost absolute lack of information about the non-timber resource benefits coming from BC's forests. Consequently, a substantial effort would be required to collect relevant information for this criterion if a full range of measures were included. As well, there is 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.

Many of the values or benefits associated with a particular land base are not marketed or commercial, such as recreation, subsistence uses, or domestic watersheds, and are thus included as social values in the SFMP. Although these values are not exchanged in a marketplace, they are often dearly held by both those who directly benefit from these values, and by those who benefit from knowing these values exist. Therefore there is a strong link between marketed and non-marketed values and benefits, especially in terms of how forest management can impact them.

Non-timber benefits can be assessed on a harvest unit specific basis by assessing operational plan commitments designed to reduce any potential impact of the operation on other forest users and stakeholders. These plan commitments could include specific actions to assist ranchers, trappers, guides, resort owners, mineral rights holders, etc. manage their licensed obligations on shared public forest land. Actions within plans could also involve public expectations related to forest access, visual quality or specific recreational or ecotourism opportunities, as well as the conservation of unique or significant places and features of social, cultural or spiritual importance.

Plan commitments could also include actions to manage or protect sites that are culturally important, sacred or spiritual to local Aboriginals. In the past, Aboriginals have traditionally used the forests to create non-timber forest products. This ability has been, and potentially continues to be, an important aspect of Aboriginals' culture. Where Aboriginals' rights and interests in known NTFPs have been identified, it is important that Canfor forest management plans consider and accommodate the NTFP so that they can be sustained.

This indicator is related to indicators 1.4.1 1.4.2 and 6.1.3.

**How are targets established?**

Developed with input from stakeholders, broader public and Aboriginals. It is essential that holders of overlapping land use tenures communicate regularly with one another and with the public and Aboriginals. Conforming to commitments in plans will help measure the company's performance the value and objective for non-timber benefits.

**Strategy**

Ongoing communication and discussions with existing license/rights holders, interested public and Aboriginals.

Operational plans incorporate commitments to manage concerns related to those discussions. Plans properly executed provide the desired results. Post harvest evaluations and other inspections assess plan conformance.

**Forecasting and Probable Trends of the Indicator**

Forest operations that respect and reflect the interests of non-timber resource users, local public and Aboriginals.

**Current Condition**

In 2010, there were no non-conformances to plan commitments pertaining to non-timber resource users (2007[54] baseline data).

**Monitoring and Reporting**

Report the number of cutblocks harvested having operational plan non-conformances related to non-timber resource users. Also report the total number of cutblocks harvested that contained commitments involving non-timber resource users.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

| | |
|---|---|
| **Element 5.2: Communities and Sustainability** | Contribute to the sustainability of communities by providing diverse opportunities to derive benefits from forests and by supporting local community economies. |
| **Value:** | Sustainable and Viable Communities |
| **SFM Objective:** | Ensure continued investment in local communities through local spending, training of workers, ensuring worker safety, and providing for local employment. |

The following Core Indicators have been identified for this Element:

5.2.1 — Level of investment in initiatives that contribute to community sustainability

5.2.2 — Level of investment in training and skills development

5.2.3 — Level of direct and indirect employment

5.2.4 — Level of Aboriginal participation in the forest economy

The following indicator statements have been identified for this Element:

5.2.1 Investment in local communities

5.2.2 Training in environmental and safety procedures in compliance with company training plans

5.2.3 Level of direct and indirect employment

5.2.4 Number of opportunities for Aboriginals to participate in the forest economy

[54] Non-timber forest products (NTFP) Review for the Invermere TSA-March 31, 2007.

### Indicator 5.2.1 – Investment in Local Communities

| Indicator Statement | Target (Variance) |
|---|---|
| Investment in local communities | >= 50% of dollars spent in local communities; 5-year rolling average (-10%) |

**What is this indicator and why is it important?**

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

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

This indicator is important to test the economic sustainability of the forest industry. This would measure the degree to which expenditures in forestry-related activities support the local economy. It would be an important indicator to community leaders and public advisory groups. The development of a strong local economy promotes strong labour markets, educational opportunities and amenities to attract highly qualified individuals to the forest sector. Therefore, it contributes directly to the long run sustainability of both the industry and the local economy.

This indicator looks at the amount of money spent by Canfor locally within the forestry sub-sector. This indicator can also be used to test the diversity and resilience of the DFA's economy. Local is defined as businesses that have mailing addresses or known established businesses located in the DFA.

This indicator is tied to 5.2.4 and 6.3.1.

**How are targets established?**

Target based on past performance and reflects a desire to enhance community well being. The variance is intended to account for the variability associated with the business cycle and the purchase of goods and services that may not be available locally.

**Strategy**

Canfor Radium tracks all spending pertaining to forest related activities (operations, management) within the DFA, separated by that occurring locally.

**Forecasting and Probable Trends of the Indicator**

Achievement of the target will support resilient and stable communities within and adjacent to the Radium DFA. Localized spending may also provide better management through local knowledge.

**Current Condition**

52% (5-yr rolling average) of spending pertaining to forest related activities occurred locally (2010 baseline data).

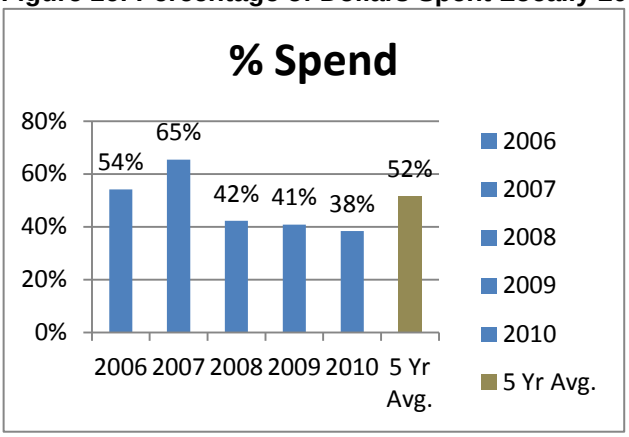
**Table 22: Percentage of Dollars Spent Locally 2006-2010**

| Year | Local $ | Total $ | % Spend |
|---|---|---|---|
| 2006 | $32,673,242.19 | $60,384,834.37 | 54% |
| 2007 | $39,955,643.00 | $61,073,281.13 | 65% |
| 2008 | $26,707,144.38 | $63,243,310.77 | 42% |

| | | | |
|---|---|---|---|
| 2010 | $14,073,949.65 | $34,497,215.04 | 41% |
| 2010 | $1,440,754.91 | $3,751,119.30 | 38% |
| **5 Yr Avg.** | **$22,970,146.83** | **$44,589,952.12** | **52%** |

(Note: 2010 and 2010 the operation was indefinitely closed)

**Figure 16: Percentage of Dollars Spent Locally 2006-2010**




**Monitoring and Reporting**

Internal accounting systems will be used to determine total amount of spending that occurs locally during the reporting period.

The total dollars spent and dollars spent locally for the forestry sub-sector will be monitored and reported annually from internal accounting systems for Canfor. Addresses of the contractors will be monitored as well as per the above definition for "local".

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 5.2.2 – Environmental & Safety Training

| Indicator Statement | Target (Variance) |
|---|---|
| Training in environmental and safety procedures in compliance with company training plans | 100% of company employees and contractors will have both environmental and safety training (-5%) |

**What is this indicator and why is it important?**

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

**How are targets established?**

A trained workforce is critical to safe and proper execution of plans. The variance allows for some discretion with respect to contractors or employees whose work is insulated from forest operations (for example administrative or clerical work).

**Strategy**

Canfor Radium invests in skills development by ensuring forest contractors have adequate safety and environmental training and by ensuring woodland employees (staff) training occurs in accordance with their plans.

**Forecasting and Probable Trends of the Indicator**

Forest planning and operations are conducted with a genuine focus on worker safety and environmental stewardship. Forest contractors and employees have the adequate knowledge and tools to conduct their jobs, performing well even under upset conditions.

**Current Condition**

Canfor Radium has an educated workforce that performs their duties safely and responsibly. 100% of company employees and contractors had both environmental and safety training (2008 baseline data).

**Monitoring and Reporting**

This indicator will be applied to all directly employed woodlands staff and forest contractors of Canfor who require specific environmental and safety training. In the case of contracted employees, it will apply to the company that is hired and to those contracted employees actually working for Canfor only and not every employee of the company. The current status will be reported out annually with the information being stored in the training records. The reporting will be based on these records. Canfor Radium will report the total number of company employees and forest contractors, as well as identify the number of those that had received both environmental and safety training in accordance with training plan expectations.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 5.2.3 – Direct & Indirect Employment

| Indicator Statement | Target (Variance) |
|---|---|
| Level of direct and indirect employment | AAC * employment multiplier - 5-year average (+/-10%) |

**What is this indicator and why is it important?**

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

While employment levels have been declining in many manufacturing industries including the forest industry, there remains a very direct relationship between direct and indirect employment and annual harvest levels. Direct forest sector and non forest sector employment levels are predicted using TSR3 multipliers (person years per 1000 $m^3$ harvested) as derived from Statistic Canada.

Direct employment = 0.545 PY's/'000m³
Indirect employment = 0.20 PY's/'000m³

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

The economic health and stability of a community is largely dependent on steady employment for area residents. Knowing the amount of employment in the forest industry sub-sector can help analyse the diversity of local employment opportunities for the forest industry in the DFA. As any industry continues to improve, efficiencies and as new technology comes on stream, the numbers and types of workers fluctuate. This indicator is meant to track local trends against regional/provincial trends to determine similarities.

Indirect/induced employment and income estimates relate to people who are not directly employed by the forest industry but who provide services or supplies to it. Measuring the amount of employment and income generated by related companies/individuals provides a clearer picture as to the economic impact of the forest industry in the DFA. It is one of the indicators that can be used to determine the resilience of the local economy.

**How are targets established?**

The employment coefficients for this indicator are set during TSR but the actual numbers are derived from Statistics Canada information and apportioned based on the Canfor's influence in the TSA. These critical statistics are monitored at the national level; the multiplier provides consistent average measure. The volumes used to determine the number of person years (PY) is based on Canfor's last five years performance from the cut control statement for FL A18979 (Table 23).

**Table 23: Employment 2007 – 2011**

| FL A18979 Volume harvested | | | | | |
|---|---|---|---|---|---|
| **Year** | **2007** | **2008** | **2009** | **2010** | **2011** |
| **AAC $m^3$** | 221,005 | 221,005 | 221,005 | 221,005 | 221,005 |
| **Cumulative AAC $m^3$** | 221,005 | 442,010 | 663,015 | 884,020 | 1,105,025 |
| **Annual harvest $m^3$** | 260,048 | 211,093 | 94,510 | 1,623 | 26,330 |
| **% of AAC** | 117.7% | 95.5% | 42.8% | 0.7% | 11.9% |
| **Cumulative** | 260,048 | 471,141 | 565,651 | 567,274 | 593,604 |
| **% of cumulative AAC** | 117.7% | 106.6% | 85.3% | 64.2% | 53.7% |
| **Average per year over five years** | | | | | 118,721 |
| **Direct + indirect employment per 1000 $m^3$** | | | | | 0.745 |
| **Person Year Target** | | | | | 90 |

It should be noted that due to Canfor Radium's shutdown, these numbers are not reflective of normal operations.

**Strategy**

Organizations contribute to direct and indirect employment within the region and to sustainable harvesting by adhering to their apportioned harvest volume within each respective TSA. Cut control regulations dictate the short-term harvest flexibility.

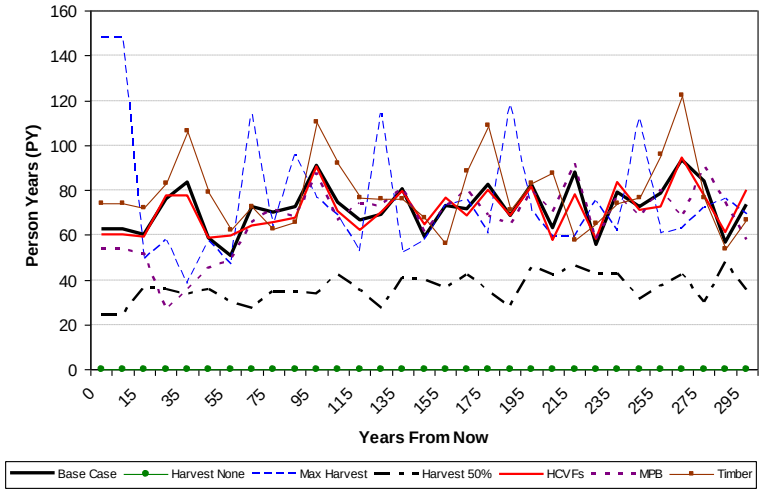
**Forecasting and Probable Trends of the Indicator**

Forest organizations that harvest in relation to their allocation of the allowable annual cut provide employment and taxation revenue to local communities.

Forecasting of this indicator will consist of utilizing harvest related employment multipliers. The multipliers have been set up as part of TSR and are subject to change. If harvest levels increase, it is expected that, initially, employment figures for most sub-sectors will also increase.

Based on the multipliers defined in section 3.2[55] and the harvest volumes associated with each scenario, the expected local direct and indirect employment levels are forecast in Figure 17.

**Figure 17: Projection of Local Employment Levels in the Forest Sector (direct PY's employment)**




The relationships seen when comparing timber supply in the DFA for each scenario are simply repeated here because employment is directly related to harvest volume. The more harvest that is occurring, the more jobs are present locally.

## Current Condition

Currently Canfor Radium has indefinitely suspended their operations in Radium DFA and as such are not conducting any harvesting. The main employment opportunities created in the Radium DFA currently are of an administrative and silviculture nature. During the current indefinite shutdown of the Canfor mills in Radium reliance upon the TSR employment multiplier, which is based on harvest volume produces an under estimate of the amount of employment created.

Table 23 supports the following levels of employment within the forest sector (direct) and outside the forest sector (indirect).

## Monitoring and Reporting

Periodic

Review the national statistics that support the job multiplier and revise the multiplier every 5 years.

Annual

Report the cut control volume harvested for each licence and for the DFA combined.

This is a process indicator and monitoring will consist of reporting out on the indicator and monitoring trends.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual

[55] Forsite, Interior Reforestation, & Ecological Research. Sustainable Forest Management Plan Scenario Forecasting. Version 1.1 – February 24, 2006. Prepared for Canfor – Radium Woodlands & BCTS.

Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 5.2.4 – Aboriginals Participate in Forest Economy

| Indicator Statement | Target (Variance) |
|---|---|
| Number of opportunities for Aboriginals to participate in the forest economy | Number of opportunities from baseline assessment; 3-year rolling average. (-10% of baseline) |

**What is this indicator and why is it important?**

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

This indicator and related target looks specifically at Aboriginal participation in the forest economy, evaluating Canfor Radium's efforts to build capacity within Aboriginals on matters related to the forest industry. The target recognizes that there are occasions when Aboriginals after being giving the opportunity, elect not to participate and is respectful of those decisions.

This indicator measures whether Aboriginals have opportunities to share in a portion of forestry related economic benefits. Aboriginals 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 Aboriginals have to receive a portion of the benefits once their capacity to do so has been developed.

This indicator is tied to 5.2.1 and 6.3.1.

**How are targets established?**

Canfor Radium engages in building mutually beneficial relationships with Aboriginal peoples. This indicator and target ties directly to Canfor's SFM Commitments.

The number of opportunities compared to the 3 year rolling average is the target.

**Strategy**

Canfor Radium engages in building mutually beneficial relationships with Aboriginal peoples.

**Forecasting and Probable Trends of the Indicator**

Operational activities and plans that recognize and manage for known aboriginal rights and duly established title. Canfor Radium supports Aboriginals in building organizational capacity.

**Current Condition**

There were 5 opportunities presented to Aboriginals to participate in the forest economy (2008 baseline data).

**Table 24: Summary of Contracts between Canfor and Aboriginals – Radium DFA**

| Year | Type of Contract | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | Employment | Road Building /Lowbed | Other Volume Purchased | Community/ Cultural Support & Donation | Logging | Silviculture / Forestry | Capacity Building | Other Contracts* | Training/ Education | Management Services |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 2008 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | **5** |

*Other contracts includes research/inventory and Archaeological Services

Employment opportunity included:

- In-house Ktunaxa Development Corporation position for woodlands
- Lowbed contract services are provided to woodlands operations on a regular basis
- Two Eagle Vision Archaeological Services contract for 2008-field season

Canfor Radium is in the process of negotiating a Protocol Agreement with the Ktunaxa Tribal Council. This agreement is expected to be completed once operations have resumed in Radium.

**Monitoring and Reporting**

Report on the number of working relationships with applicable Aboriginals (partnerships, joint ventures, co-operative agreements, memorandums of understanding, or business contracts over $5,000 or over 500 cubic meters in volume) during the reporting year. Include opportunities by also reporting on contracts for work/services offered directly to Aboriginals that, for whatever reason, were declined.

Performance is based on a three year rolling average. The 2014 performance target is achieved if the 12/13/14 average is ≥ to the 11/12/13 average.

Examples of a business contract include a specific work/service agreement or joint tenure arrangement with a Aboriginal Band or Aboriginal Contractor[56]. For consistency in reporting, count multiple work agreements with one band or contractor or purchase agreements with one band or contractor as a single business contract. Canfor Radium will report this figure as a rolling three-year average. For annual reporting, the information for the current year will be combined with the previous two years reporting, and then averaged for the three years. Examples of working relationships will be provided to indicate possible trends in the types of these relationships.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

## Criterion 6: Society's Responsibility

Society's responsibility for sustainable forest management requires that fair, equitable, and effective forest management decisions are made.

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 even economic C&Is, and 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.

[56] Aboriginal Contractor is a company where one or more of the principles are of Aboriginals decent.

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 attempt was made to keep social aspects of sustainability separate from those addressed in the Economics C&Is (e.g. non-timber economic benefits), in order to avoid double counting, by focusing on socio-cultural conditions and activities affecting quality of life, public access to non-market benefits, resources, and community rights.

This Criterion consists of five Elements:

| | |
|---|---|
| **Element 6.1: Aboriginal and Treaty Rights** | Recognize and respect Aboriginal title and rights and treaty rights. Understand and comply with current legal requirements related to Aboriginal title and rights and treaty rights. |
| **Element 6.2: Respect for Aboriginal Forest Values, Knowledge, and Uses** | Respect traditional Aboriginal forest values, knowledge and uses as identified through the Aboriginal input process. |
| **Element 6.3: Forest Community well-being and resilience** | Encourage, co-operate with, or help to provide opportunities for economic diversity within the community. |
| **Element 6.4: Fair and Effective Decision-Making** | Demonstrate that the SFM public participation process is designed and functioning to the satisfaction of the participants and that there is general public awareness of the process and its progress. |
| **Element 6.5: Information for Decision-Making** | Provide relevant information and educational opportunities to interested parties to support their involvement in the public participation process, and increase knowledge of ecosystem processes and human interactions with forest ecosystems. |

| | |
|---|---|
| **Element 6.1: Aboriginal and Treaty Rights** | Recognize and respect Aboriginal title and rights and treaty rights. Understand and comply with current legal requirements related to Aboriginal title and rights and treaty rights. |
| **Value:** | Aboriginal and Treaty Rights |
| **SFM Objective:** | Ensure that aboriginal rights are understood and complied with. |

Broadly defined goals such as secure access to resources, the equitable sharing of benefits, and participation in decision-making are found to be important in almost every forest context where there are aboriginal interests involved. The rationale behind Element 6.1 and 6.2 recognizes the importance of the physical and economic dependence of Aboriginal 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 Aboriginals unique cultural, spiritual and economic needs are addressed.

The development of the indicators for Elements 6.1 and 6.2 take into account the responsibility that resource managers have in ensuring that Aboriginals have access to and understanding of information on

forest resources for a variety of needs. Aboriginal communities may indicate a desire for this information, but managers also recognize that Aboriginals may chose not to participate or may not have the capacity to meaningfully participate.

The following CSA Core Indicators have been identified for this Element:

6.1.1 — Evidence of a good understanding of the nature of Aboriginal title and rights

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

6.1.3 — Level of management and/or protection of areas where culturally important practices and activities (hunting, fishing, gathering) occur

The following indicator statements have been identified for this Element:

6.1.1 Employees will receive Aboriginal awareness training

6.1.2 Evidence of best efforts to communicate interests and management plans based on Aboriginal communities having a clear understanding of the plans

6.1.3 Percent of forest operations in conformance with operational plans developed to address Aboriginal forest values, knowledge and uses

### Indicator 6.1.1 – Aboriginal Awareness Training

| Indicator Statement | Target (Variance) |
|---|---|
| Employees will receive Aboriginal awareness training | 100% (-10%) |

**What is this indicator and why is it important?**

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

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

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

**How are targets established?**

An understating of legal obligations, communication process with Aboriginals.

Sharing information and communication with Aboriginals on forest management activities supports the provincial government's legal obligation to consult with Aboriginals regarding Aboriginal rights and title.

Canfor Radium is committed to assisting the Crown in carrying out its duty to consult by sharing information and endeavoring to address concerns where it is appropriate to do so.

**Strategy**

Canfor Radium invests in cultural awareness and skill development by ensuring that Forest Management Group employees have received Aboriginal awareness training. Training is to occur as outlined in Canfor's Forest management Systems Manual (FMS) section 7.

**Forecasting and Probable Trends of the Indicator**

Forest operations that respect Aboriginal title and rights and reflect the timber and non-timber interests of local Aboriginals.

Employees who understand the rights, title, and interests of Aboriginals.

**Current Condition**

As this is a new target, the 2011 Monitoring Report results will be used to establish the baseline data. All forest resource management staff in Radium received Aboriginals training in 2008 and has been 100% compliant with the measure to date.

**Monitoring and Reporting**

This indicator will be reported out on an annual basis and will apply to all full time and temporary staff employed during the reporting year. It will utilize the employee-training database to plan and record awareness training for employees of the Forest Management Group. It will report the number of active employees working within the DFA that have received the training within the past five years compared to the total number of employees.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 6.1.2 – Aboriginal Understanding of Plans

| Indicator Statement | Target (Variance) |
|---|---|
| Evidence of best efforts to communicate interests and management plans based on Aboriginal communities having a clear understanding of the plans | 100% of management plans (0) |

**What is this indicator and why is it important?**

Open, respectful communication with local Aboriginals includes not only the organization understanding the Aboriginals rights and interests but for Aboriginals to understand the forest management plans of organizations. With this open dialogue, the two parties can then best work towards plans and operations that are mutually agreeable.

This indicator contributes to respecting the social, cultural and spiritual needs of local Aboriginals who have traditionally, and who currently use the forest resource within the DFA for the maintenance of the traditional aspects of their lifestyle. Working with local Aboriginals to identify, define and develop management strategies that encompass traditional values and uses is an important component of the forest industry's SFM initiative.

Canfor Radium develops plans, maps and/or visual simulations that outline logging details such as cutting areas, road construction, and other management strategies. In order for Aboriginals to effectively provide input into any potential interactions between their identified uses and forest management, all relevant material must be made accessible to them. In order to accommodate other measures under this Criterion, Aboriginals will need some level of access to these plans.

This indicator also considers that Aboriginals are completing a Land Use Plan of their Traditional Areas. In some cases, Aboriginals consider this information confidential. In order to accommodate other indicators under Element 6.1 and 6.2, Canfor will need some level of access to these plans. While Canfor cannot control whether access is made available, it is important to ensure that they access information when it is made available and that they respect Aboriginals' concern for privacy.

Finally, this indicator was designed to measure Canfor's effort in facilitating the comprehension level of the Aboriginals regarding plans and information that they receive. Simply making plans available and tailoring them to cultural needs does not ensure that the management plans and annual SFM reports and what they represent are necessarily understood. It is important that Aboriginals be asked if they have any questions of clarification regarding the information presented. Any questions arising must be clearly responded to and tracked through an appropriate method.

**How are targets established?**

The target has been established to ensure that once a culturally sensitive area or feature has identified and verified through discussions with Aboriginals, management plans and strategies will reflect the needs of the area/feature and provide direction for protection and that there will be zero non-compliance or non-conformance with those plans. A variance from this target is not considered appropriate.

At a minimum this target meets Legal obligations, as well as alignment with Canfor's SFM Commitments.

**Strategy**

Open, respectful communication of forest management plans with local Aboriginals.

**Forecasting and Probable Trends of the Indicator**

Forest operations that respect Aboriginal title and rights and reflect the timber and non-timber interests of local Aboriginals is forecasted.

**Current Condition**

All major management plans require an effort to be made to communicate interests and consideration of Aboriginals concerns. This indicator shows that extra effort is being made to give Aboriginals all the tools and information necessary to make an informed decision regarding acceptance of management plans.

Currently, Canfor Radium has had limited access to plans and maps that show baseline cultural uses of local forest resources. Generally, exchange of these values occurs during management plan reviews and comment periods. The KNC land and resource department is currently outlining traditional use maps. Canfor has a draft Protocol Agreement with KNC to work towards the target outlined in the SFMP. To date the communication exchange includes KNC providing Archaeological Overview Maps and outlining interest areas or values. Canfor provides management plan review and comment through face-to-face meetings, mailouts, and presentations, as well as annual review of road and cutblock development plans.

Canfor Radium has draft Protocol Agreement, which will aid to achieve this target.

See details for Indicator 6.1.3 below.

**Monitoring and Reporting**

Canfor Radium will retain a record of the Aboriginal communities whose traditional territory (any part) overlaps with the DFA for the purpose of communication with affected parties.

This indicator will report the number of forest management plans pertaining to Crown tenures held by the Canfor Radium within the DFA and the number of those where open communication to describe and obtain acceptance occurred during the reporting year. Reporting will rely upon meetings held, materials

provided for consideration, evidence of effort to provide time and resources, formal training opportunities and responses to requests for input.

Management plans considered are Forest Stewardship Plans (FSP), Pest management plans (PMP), and Sustainable Forest Management Plans (SFMP). Also considered would be information sharing on operational plans.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 6.1.3 – Address Aboriginal Forest Values, Knowledge and Uses

| Indicator Statement | Target (Variance) |
|---|---|
| Percent of forest operations in conformance with operational plans developed to address Aboriginal forest values, knowledge and uses | 100% compliance with operational plans (0) |

**What is this indicator and why is it important?**

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

This indictor includes Canfor Radium's commitment to demonstrate consideration and accommodation of Aboriginal's rights and interests in known Non-Timber Forest Products (NTFPs). See further details under Indicator 5.1.1b.

**How are targets established?**

At a minimum this target meets Legal obligations, as well as alignment with Canfor SFM Commitments.

**Strategy**

Efforts have been made to know which Aboriginal traditional territories fall within the SFMP area and the Radium DFA. Information sharing agreements are made with willing Aboriginal communities to promote the use and protection of sensitive information.

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

Once incorporated, operational plans are properly executed. Post harvest evaluations and other inspections assess plan conformance.

**Forecasting and Probable Trends of the Indicator**

Open and meaningful relationships with local Aboriginals leading to a trust in sharing sensitive information. Operational plans contain information on how these sites will be managed or protected. Forest operations that properly execute the site level plan.

**Current Condition**

Management practices for Canfor Radium have been 100% compliant with existing Forest Stewardship Plans and operational plans with regard to strategies to not impede access to identified resources for Aboriginals. Canfor Radium has also developed a result and strategy in its approved Forest Stewardship Plan to address the objective set by government to *"conserve, or, if necessary, protect cultural heritage resources that are:*

> *a) the focus of traditional use by an aboriginal people that is of continuing importance to that people, and*
>
> *b) not regulated under the Heritage Conservation Act"*

More detail on this strategy is available from Canfor.

In addition, cultural heritage resources that are regulated under the Heritage Conservation Act are sites and objects having historical, cultural, aesthetic, scientific or educational worth or usefulness to British Columbia, a community or an aboriginal people (Province of British Columbia 1994). Typically these are referred to as "archaeological resources" and have been the subject of much investigative and conservation effort, especially with regards to Provincial Forest lands after inclusion in forestry activities covered by the Forest Practices Code - an inclusion that persists under the FRPA.

The Invermere TSA, and the Radium DFA, has been subject to archaeological overview assessments involving aerial photo analysis, as well as the application of predictive models derived from the archaeological record to delineate GIS-based polygons where significant archaeological deposits or features might be present (archaeological potential mapping) (c.f. Choquette 2000). Where forestry developments are proposed within these polygons, archaeological assessments are completed to ascertain the presence, condition and character of any archaeological resources that may be present. These assessments take the form of Archaeological Impact Assessment (AIA), which involved intensive examination including test excavations by a team of archaeologists.

The results of AIA's are incorporated into operational plans. Reserves or winter harvesting practices, for example, are often prescribed to protect archaeological resources that occur on a particular site. Operations have been 100% compliant with these harvest strategies and plans.

Finally, Canfor and KNC have developed a draft Protocol Agreement". This agreement will set a baseline from which Canfor and the Aboriginals can build a working relationship based on the spirit of mutual professionalism, good faith, respect, openness, trust, understanding and integrity. This will also allow for maintaining access to Aboriginals resources, clear consultation, capacity building, accommodation, recognition and respect.

**Monitoring and Reporting**

This indicator will report out for all operational and operational plans released during the reporting year. The reporting will be based upon the percentage of conformance with plans where input from Aboriginal communities was given and the plan was changed to consider the input. The indicator will be considered met for a plan only if the strategies identified have been followed during the implementation phase.

Specifically, the participants will report the number of roads constructed or cutblocks harvested where operational plans had specific content requirements to manage or protect Aboriginal forest values, knowledge and uses and the number of roads constructed or cutblocks harvested referenced above where the plan requirements were followed.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

| | |
|---|---|
| **Element 6.2: Respect for Aboriginal Forest Values, Knowledge, and Uses** | Respect traditional Aboriginal forest values, knowledge and uses as identified through the Aboriginal input process. |
| **Value:** | Aboriginal Forest Values and Uses |
| **SFM Objective:** | Respect known traditional aboriginal forest values and uses |

The following CSA Core Indicators have been identified for this Element:

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

The following indicator statements have been identified for this Element:

6.2.1 Percent of identified Aboriginal forest values, knowledge and uses considered in forestry planning processes

### Indicator 6.2.1 – Identifed Aboriginal Forest Values, Knowledge & Uses

| **Indicator Statement** | **Target (Variance)** |
|---|---|
| Percent of identified Aboriginal forest values, knowledge and uses considered in forestry planning processes | 100% (0) |

**What is this indicator and why is it important?**

Meaningful relationships and open communication with local Aboriginal communities help ensure that areas of cultural importance are managed in a way that retains their traditions and values. This indicator recognizes the importance of managing and protecting culturally important resources and values during forestry operations. Aboriginals, with the benefit of local and traditional knowledge may provide valuable information concerning the specific location and use of these sites as well as the specific forest characteristics requiring protection or management. The intent of the indicator is to manage and/or protect those truly important sites, thus there is a degree of reasonableness in identifying the sites.

The objective will be achieved as Canfor Radium is aware of (and incorporates) culturally important, sacred and spiritual sites leading to appropriate management or and protection by specifying measures in operational plans. The proper execution of plans will provide desired results of accommodation of Aboriginals culturally important values and resources. Post harvest evaluations and other inspections will assess plan conformance.

**How are targets established?**

Legal obligations, alignment with Canfor SFM Commitments

**Strategy**

Efforts have been made to understand which Aboriginal traditional territories fall within the SFM Plan area and Radium DFA. Information sharing agreements are made with willing Aboriginal communities to promote the use and protection of sensitive information.

Forest management plans are shared with Aboriginal communities. Open communication with Aboriginals that includes a sharing of information and enables forest licensees to understand and incorporate traditional knowledge into forest management options.

**Forecasting and Probable Trends of the Indicator**

Open and meaningful relationships with local Aboriginals leading to a trust in sharing sensitive information. Forest plans contain information on how these sites will be managed or protected.

**Current Condition**

See Indicator 6.1.3.

**Monitoring and Reporting**

This indicator will be reported out annually and will be based upon all plans (FSP, SFMP, PMP) released in the reporting year. Reporting will be based upon all plans that received input from Aboriginal communities regarding forest values and resources and whether there were any actions taken or responses to that input. Specifically:

- Retain a record of the Aboriginal communities whose traditional territory (any part) overlaps with the DFA for the purpose of communication with affected parties.
- Retain a record demonstrating that forest management plans within the DFA were shared/discussed with Aboriginal communities.
- Number of instances where discussions lead to the identification of Aboriginal forest values, knowledge and uses that required specific management or protection.
- Where the above occurred, report the number of times where operational plans specified how these values were considered.

The indicator will be considered to have been met for a plan where Canfor Radium has addressed the input on an Aboriginal forest value, knowledge or use. This consideration may take the form of a response letter, partial or complete protection or any other modification of the plan from its original form made to accommodate the input given.

Canfor Radium will record all site-specific information provided by Aboriginals through the information sharing and consultation process regarding cultural resources and values. Canfor Radium will document any mitigating actions taken (revision of forest operational plans) to accommodate the cultural resources or values identified by Aboriginal as being important. Canfor will store the information specific to their operations in a database.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

| | |
|---|---|
| **Element 6.3: Forest Community well-being and resilience** | Encourage, co-operate with, or help to provide opportunities for economic diversity within the community. |
| **Value:** | Forest Community Well Being and Resilience |
| **SFM Objective:** | Help to provide opportunities for economic diversification with the community |

The following CSA Core Indicators have been identified for this Element:

6.3.1— Evidence that the organization has co-operated with other forest-dependent businesses, forest users, and the local community to strengthen and diversify the local economy

6.3.2 — Evidence of co-operation with DFA-related workers and their unions to improve and enhance safety standards, procedures, and outcomes in all DFA-related workplaces and affected communities

6.3.3 — Evidence that a worker safety program has been implemented and is periodically reviewed and improved

The following indicator statements have been identified for this Element:

6.3.1 Primary and by-products that are bought, sold, or traded with other forest dependent businesses in the local area

6.3.2/6.3.3 Implementation and maintenance of a certified safety program

### Indicator 6.3.1 – Primary and By-Products

| Indicator Statement | Target (Variance) |
|---|---|
| Primary and by-products that are bought, sold, or traded with other forest dependent businesses in the local area | Report out on # of purchase / sale / trade relationships (n/a) |

**What is this indicator and why is it important?**

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

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

This indicator is related to indicators 5.2.1 and 5.2.4.

**How are targets established?**

Business initiatives and relationships, built on sound principles are not only beneficial to the partners, but also to the economy and vitality of all communities within and adjacent to the DFA.

Canfor determines the amount of timber to be purchased locally on an annual basis, based on the availability of local wood, economics and the amount of timber to be harvested from tenures held by Canfor so it fluctuates on an annual basis.

**Strategy**

Canfor Radium seeks and maintains active, mutually beneficial business relationships (purchases, sales, trade arrangements) with other forest products businesses within or in the immediate vicinity of the DFA. Examples of primary products include logs and lumber. Examples of by-products include chips, sawdust, shavings, and hog fuel.

**Forecasting and Probable Trends of the Indicator**

Support for local communities through business relationships provides employment diversification and increased local revenue.

**Current Condition**

As this is a new target, the 2011 Monitoring Report results will be used to establish the baseline data. Historically, this indicator reported out on the volume of purchased wood versus the new requirements of "number of relationships". This information has been provided. Canfor's sawmill in Radium Hot Springs has traditionally utilized more than 60% of sawmill production volume from external sources such as woodlots, private land, other licensees and BC timber sales. When the sawmill is in production, it is expected to continue to require this volume from external sources and provide opportunities for citizens to sell timber within the Radium DFA.

**Table 25: Total Net Production Volume in 2010 for Canfor Radium Sawmill**

| Source | Volume ($m^3$) | Percent of Total Volume |
|---|---|---|
| Canfor Managed Quota (including off-grade) | 0 | N/A |
| Purchase Volume (Non-quota wood) | 0 | N/A |
| **Volume Used at Radium Sawmill** | 0 | **N/A** |
| **Total External Sales** | 5,991 | **2.7%** |

**Monitoring and Reporting**

Report on the number of purchase, sale or trade relationships with other forest dependant businesses within or in the vicinity of the DFA. Tracking is the number of relationships, not the number of transactions within each relationship.

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

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 6.3.2 & 6.3.3 – Certified Safety Program

| Indicator Statement | Target (Variance) |
|---|---|
| Implementation and maintenance of a certified safety program | 100% (0) |

**What is this indicator and why is it important?**

Canfor's first measure of success is the health and safety of its people. This philosophy is embraced and promoted from the mill floor to the executive offices. This commitment is reflected in the work practices and safety programs employed at all operations.

Worker and community safety can be impacted by forest management strategies. The provincial government sets acceptable safety limits for forest workers. Other guidelines identify other forms of risk potentially affecting communities and forest visitors, such as slope instability or fire. Monitoring safety within the SFM Framework will assist in refining forest management strategies that accomplish their intended function without putting workers and communities at risk.

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

**How are targets established?**

The target agreed to by the FOREST will be compliance with a safety program as evidenced through safety audits conducted to the BC Forest Safety Council SAFE Companies Program. Safety audits reveal, if existing safety programs are being implemented, if the safety programs are effective and if the safety program is being continuously improved. The results of Canfor's annual Safety Audit will be used to determine id Canfor maintains its' SAFE certification.

**Strategy**

Canfor implements their safety program by assigning responsibilities to managers, supervisors and to employees as follows:

Management must:

- Develop and maintain a comprehensive occupational health and safety program
- Conduct regular health and safety audits and implement appropriate action steps
- Facilitate active employee participation in health and safety initiatives and programs
- Provide the necessary education and training in safe work practices and procedures for supervisors, OH&S committee members, and all employees.
- Ensure there are emergency response plans in place that detail timely and appropriate actions to be taken in response to emergency situations.
- Develop and maintain effective disability management programs that provide all employees, affected by disabling occupational or non-occupational injuries or illness, with an early return to work evaluation process.

Supervisors must:

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

Employees must:

- Take responsibility for avoiding risk to themselves and others and following all known safe work rules, procedures and instructions
- Eliminate all accidents by working together to identify any potential hazards in the workplace and to take the appropriate corrective action
- If necessary, notify a member of their Joint Health and Safety Committee or a Management representative of any potential health and safety concerns or near misses.

In addition, contractors are expected to have emergency standards. Extensive safety audits are conducted in all woodlands activities from road construction, harvesting, silviculture, log hauling and layout.

Canfor requires that all forest operations contractors to be third party certified to a safety program that meets or exceeds provincial safety programs - SAFE Company in BC.

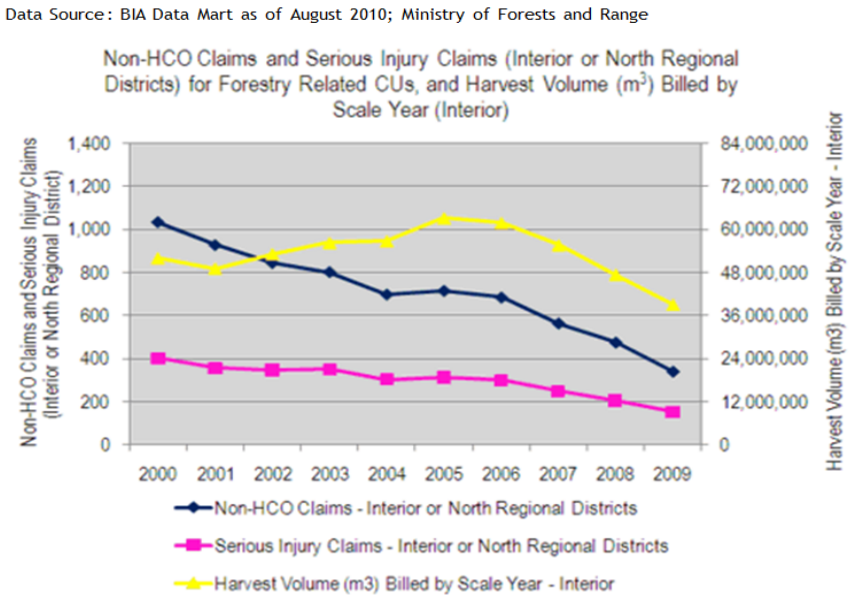
Forest operations retain their safety program certification.

**Forecasting and Probable Trends of the Indicator**

From 1998 to 2005, WorkSafe BC accepted an average of nearly 22 harvesting fatality claims each year — the worst in 2005 with 34 claims. But the industry averaged fewer than 14 fatalities from 2006 to

2008. Companies who conduct work that meet their certified safety program requirements demonstrate the efforts to make safety integral to each worker's life, and that unsafe is unacceptable.

**Figure 18: WorkSafe Numbers – August 2010**




Incident reports are rigorously implemented to determine route causes and action plans to correct these incidents from occurring in the future. Safety statistics are completed for woodlands and sawmill operations. Safety committees are established with Canfor staff, union crews and contractors to proactively identify and correct safety concerns and issues.

**Current Condition**

Canfor- Radium's safety program was initially third party certified in December 2007. This was rolled into a larger company wide safety program in 2010.

**Monitoring and Reporting**

The data required to monitor this measure is the written safety program, audit results and proof that it was administered to the workers, as well as proof that the workers understand the policy. Report a yes/no as to whether the operation has retained certification of its safety program.

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

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

| | |
|---|---|
| **Element 6.4: Fair and Effective Decision-Making** | Demonstrate that the SFM public participation process is designed and functioning to the satisfaction of the participants and that there is general public awareness of the process and its progress. |
| **Value:** | Fair and Effective Decision Making |

| SFM Objective: | Ensure that the SFM public participation process is functioning. |
|---|---|

There is a long history of stakeholder and public involvement in forestry related planning in British Columbia. However, involvement processes have not always been satisfactory, either for the participants or the planners. Key stakeholders are sometimes overlooked, and participation approaches are sometimes inappropriate for the time, resources, and interests of stakeholders. As well, decision makers are seldom provided with information outlining the number of stakeholders with particular interests when deciding on forest management plans.

Focused involvement of interested parties is fundamental to effective public participation. The public participation process will be as unique as the DFA and the representatives, containing a range of interested parties, their values and needs.

When public, stakeholders and Aboriginals interests are diverse, and a broadly supported plan is not achieved, decision makers need to weigh the input from a variety of perspectives before deciding on a plan, or components of a plan. For this reason, it is important to consider and deliberate concerns brought forward by the PAG, as well as other public input processes, prior to making major management decisions.

The development and maintenance of this SFM Plan has been one opportunity for the public, stakeholders and Aboriginals to participate in discussing forest management decisions. Other major forest management decisions are presented to these groups during the development of operational level plans, such as the Forest Stewardship Plans (FSP). In order to be equitable and inclusive, all plans will make allowances for different linguistic, cultural, geographic, or informational needs of all interested parties. The plans need to describe the scope and intent of "open public process".

The following CSA Core Indicators have been identified for this Element:

6.4.1 — Level of participant satisfaction with the public participation process

6.4.2 — Evidence of efforts to promote capacity development and meaningful participation in general

6.4.3 — Evidence of efforts to promote capacity development and meaningful participation for Aboriginal communities

The following indicator statements have been identified for this Element:

6.4.1 PAG established and maintained according to Terms of Reference (satisfaction survey implemented)

6.4.2 Number of educational opportunities for information/training that are delivered to the PAG

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

### Indicator 6.4.1 – PAG Satisfaction

| Indicator Statement | Target (Variance) |
|---|---|
| PAG established and maintained according to Terms of Reference (satisfaction survey implemented) | 80% satisfaction from surveys (-10%) |

**What is this indicator and why is it important?**

This indicator highlights the 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. An effective way to receive focused input from the public is to form a public advisory

group. Representative members of various interests groups, as identified through the Stakeholder Analysis, will be involved in order to receive wide-ranging knowledge and input. An effective public participation process needs to accommodate local circumstances, yet remain structured. Establishing and implementing an agreed upon Terms of Reference (TOR) provides for a fair, effective, open and accountable process to exist. The range of those involved in the process must establish this process.

This forum is designed to provide interested parties with an opportunity to work with the organization to provide input on important issues, as well as learn about many aspects of SFM and forestry operations. Canfor considers the public input seriously and demonstrates that it is responsive to and respectful of this input. The TOR explains how decisions are reached within the public advisory group.

The strength of this group is two-fold: 1) to assist with development and improvement of the decision-making processes that guide forest management; and 2) to promote awareness and capacity building for both the group and the forest managers. This indicator ensures that the public advisory group is satisfied with the processes and outcomes.

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

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

Transparent public processes which enable input from a wide range of stakeholders and interests, and which promote improved and shared understanding of sustainable forest management, can lead to greater public support and potentially more streamlined implementation of the SFM and other forest management plans. It also is a step to ensuring that local values and issues are identified and dealt with by Canfor.

Another important matter to document is the satisfaction of the interested party with the exchange and the result. This indicator ensures that a documented process is in place to track the exchange of values/opinions. The reason that documentation is important is so that the manager can have a record of the exchange and the result of the exchange. Over time, the manager can assess the trend of the comments and the results, following adaptive management processes, and learn from the trend. This documented process facilitates continual improvement for both the managers' receipt of information to guiding forest management decisions, and the interested parties' capacity building.

This indicator also ensures that the process set up, the responses and the participant's satisfaction will be documented.

**How are targets established?**

Ensure issues are identified, discussed, and where possible, resolved. The PAG process is being continuously improved.

**Strategy**

Canfor Radium has provided all PAG members, and interested public who have shown notable interest (written comments or SFM Plan meeting attendance) during the reporting period, a feedback form (survey) to assess their satisfaction with the process. The survey content and process will be that described in the PAG's Terms of Reference. All survey questions will have a 1-5 scoring assessment (1 being poor or ineffective, 3 being generally satisfied and 5 being excellent or highly effective).

**Forecasting and Probable Trends of the Indicator**

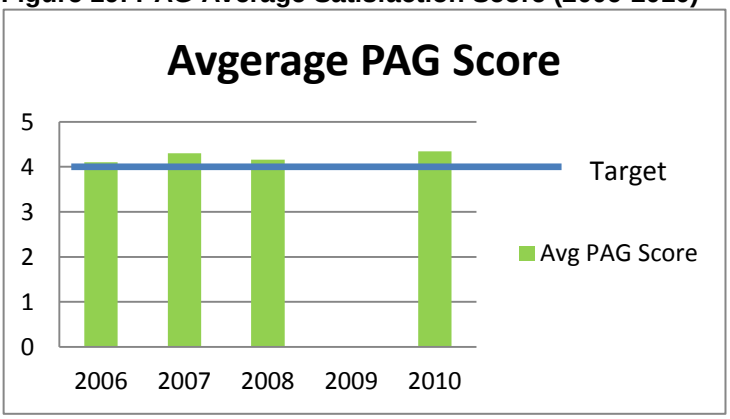
An active, engaged Public Advisory Group.

**Current Condition**

Canfor formed a public advisory group (PAG) in 2005 that contains a range of interests and organizations. In order to achieve the target, the PAG membership will need to be analyzed on an annual basis to ensure participation of all stakeholders is represented and the stakeholders' involvement in the PAG is effective.

The Facilitator conducted PAG Satisfaction Surveys in 2006, 2007, 2008 and 2010 with a combined average score of 4.1, 4.3, 4.16 and 4.34 respectively (Figure 19). Two specific questions were below target and have actions as noted in the PAG meeting minutes. These had to do with ensuring a good representation of Stakeholders and Aboriginals at the meetings.

**Figure 19: PAG Average Satisfaction Score (2006-2010)**




**Monitoring and Reporting**

The data required to monitor and report out on this indicator is the scoring of the satisfaction survey for the public advisory groups. The frequency of monitoring is at a minimum annually, but can be on an as needed basis or at a time determined in the TOR. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

Survey to be sent out only to those public members that submitted written comments or attended one of the meetings in the previous reporting period.

Results of feedback form is compiled and reported as part of annual monitoring program.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 6.4.2 – Educational Opportunities – Information/Training

| Indicator Statement | Target (Variance) |
|---|---|
| Number of educational opportunities for information/training that are delivered to the PAG | >= 1/meeting (0) |

**What is this indicator and why is it important?**

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

This indicator and target recognizes the importance of providing informational or training opportunities for members of the public advisory group that in turn contributes to a more knowledgeable and effective PAG. Members of the public provide local knowledge that contributes to socially and environmentally responsible forest management. At times, public members may feel limited in their ability to contribute to discussions because they lack the technical forestry knowledge. Broadening this knowledge enables better dialogue and helps contribute to balanced decisions and an SFM Plan acceptable to the majority of public. A few of the many examples of educational opportunities would include field trips and guest presentations on a particular topic.

This indicator is related to indicator 6.5.1.

**How are targets established?**

Additional knowledge provides for better dialogue and better ultimately better decisions. After reviewing previous PAG minutes it was determined that at least one opportunity could be provided at every PAG meeting.

**Strategy**

Canfor Radium is committed to work with members of the public advisory group on forest management issues and to improve the effectiveness of public processes. Canfor Radium will provide informational/educational opportunities for PAG participants on an annual basis as part of regularly held meetings.

**Forecasting and Probable Trends of the Indicator**

Public participation in forest planning and operations that is open, inclusive and responsive to public concerns and grounded in science. Over time, the PAGs knowledge and awareness of forest management will increase.

**Current Condition**

Canfor makes every effort to schedule at least one educational session for the PAG members over the course of a year's meetings. These usually take the form of a presentation during a PAG meeting by a contracted expert, a PAG advisor or a participant representative. The participants also provide the opportunity to educate the PAG and public by holding field trips to review and discuss various aspects of sustainable forest management. The subject of these presentations is either based upon reporting upon a project with bearing on the SFMP indicators or on subjects where the PAG has requested information.

As this is a new target, the 2011 Monitoring Report results will be used to establish the baseline data.

**Monitoring and Reporting**

This indicator will be reported out on an annual basis. Reporting will be based upon the number of educational opportunities that are delivered to the PAG and/or public either during the PAG meetings that take place in the reporting year, or during field tours or educational events put on by the Participants to which the PAG members are invited. PAG meeting minutes contain supporting documentation. The target will be considered to have been met if Canfor was able to provide one or more educational/training opportunities, as described above, to the PAG members in a reporting year.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 6.4.3 – Aboriginal Communities Understand Plans

| Indicator Statement | Target (Variance) |
|---|---|

| | |
|---|---|
| Evidence of best efforts to obtain acceptance of management plans based on Aboriginal communities having a clear understanding of the plans | 100% of management plans (0) |

**What is this indicator and why is it important?**

Open, respectful communication with local Aboriginals includes not only the organization understanding the Aboriginals rights and interests but for Aboriginals to understand the forest management plans of organizations. With this open dialogue, the two parties can then best work towards plans and operations that are mutually agreeable.

This indicator 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. Including Aboriginal people in planning and communication processes is an important aspect of SFM. As well it is fundamental to recognizing their unique interests in the forest resource present in the DFA.

The majority of the opportunities provided to Aboriginal people will be initiated and re-initiated during the SFM processes. In order for participation by Aboriginals to be meaningful, the opportunities for inclusive participation must consider culturally appropriate methods for presenting information and discussing issues with Aboriginals' members.

The definition of "culturally appropriate opportunities" will be determined through discussions with KNC and potential protocol agreements with Canfor.

In addition, this indicator was designed to determine the comprehension level of the Aboriginals regarding plans and information that they receive. Simply making plans available and tailoring them to cultural needs does not ensure that the management plans and annual SFM reports and what they represent are necessarily understood. It is important that Aboriginals be asked if they have any questions of clarification regarding the information presented. Any questions arising must be clearly responded to and comprehension must be tracked through an appropriate method.

Another important matter to document is the satisfaction of the Aboriginal community with the exchange and the result. This indicator ensures that a documented process is in place to track the exchange of values/opinions. The reason that documentation is important is so that the manager can have a record of the exchange and the result of the exchange. Over time, the manager can assess the trend of the comments and the results, following adaptive management processes, and learn from the trend. This documented process facilitates continual improvement for both the managers' receipt of information to guiding forest management decisions, and the interested parties' capacity building.

This indicator is related to indicator 6.1.2.

**How are targets established?**

Legal obligations, alignment with Canfor SFM Commitments.

100% of management plans are provided for review and comprehension is improved over time as documented in comments received or provided by the Aboriginals.

**Strategy**

Open, respectful communication of forest management plans with local Aboriginals.

**Forecasting and Probable Trends of the Indicator**

Forest operations that respect Aboriginal title and rights and reflect the timber and non-timber interests of local Aboriginals.

**Current Condition**

Both the Forest Stewardship Plan and SFMP pertain to Crown tenures held by Canfor Radium within the DFA. Open communication with Aboriginal communities to describe and obtain acceptance occurred for both of these plans (2010 baseline data).

Canfor provides a 60-day review and comment period for Forest Stewardship Plans (100% compliant). However, this process is not always appropriate to provide opportunities for inclusive participation. Canfor has delivered the following documents/events: FDP, FSP, SFMP, Working Protocol Agreement Meetings, and Non-Replaceable Forest License agreements.

**Monitoring and Reporting**

Retain a record of the Aboriginal communities whose traditional territory (any part) overlaps with the DFA for the purpose of communication with affected parties.

Report the number of forest management plans pertaining to Crown tenures held by the company within the DFA and the number of those where open communication to describe and obtain acceptance occurred.

Monitoring for this indicator will consist of asking appropriate Aboriginals representatives if they understand the key aspects of forest management plans that have been provided to them for review (e.g. FSPs) and documenting responses in the SFMP Annual Report.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

| | |
|---|---|
| **Element 6.5: Information for Decision-Making** | Provide relevant information and educational opportunities to interested parties to support their involvement in the public participation process, and increase knowledge of ecosystem processes and human interactions with forest ecosystems. |
| **Value:** | Information for Decision-Making |
| **SFM Objective:** | Help educate interested parties and increase knowledge of ecosystem function and human interactions with forest ecosystems to support their involvement in the public participation process. |

In order for interested parties to be able to review and provide comments on various SFM aspects, they need to be able to have access to all relevant information from forest managers. With different levels of interests, understanding and responsibility, members of the public may wish to have access to varying amounts and types of information and forest managers need to accommodate for this variety. However, the organization is not required to provide information to the public on purely internal proprietary and confidential matters. The intent is for it to be a reciprocal exchange whereby the term reciprocal implies that both sides will learn from each other and use that learning to improve communications.

In addition to providing access to information, forest managers need to document the occurrence of the exchange of information, as well as how the information from the party was utilized within the management decision.

The review of existing indicators and the development and addition of locally relevant indicators of sustainability is an important aspect of the public process. The public advisory group is one component of communicating with the public. Other venues that reach out to the larger community include public review and comment periods for Forest Stewardship Plans. Each of these communication opportunities will be tested to ensure they are effective for those participating. Through the Communication /

Participation Plan Canfor Radium will ensure that there are a number of different communications with the public and that there reciprocal exchange of that information.

Canfor Radium is aware that merely undertaking meetings and providing extension on what has been done does not ensure that the communication with Aboriginal and/or local stakeholders has been effective. This suite of indicators is meant to ensure that there is a process in place that allows for forestry management related information exchange between the Aboriginals, communities and stakeholders in the DFA and Canfor.

Indicator 6.5.1 measures whether or not the information provided to Aboriginals, the community and stakeholders has resulted in increased knowledge of SFM. Informed Aboriginals/public can better deal with potential trade-offs that may arise during the development of the SFM Plan or results of the SFMP Annual Report.

This suite of indicators ensures that Canfor resource managers continue to learn from the community, that the community continues to learn about forest management, and that new understandings are applied to future forest planning management through documenting information exchange, influence on decisions and participation satisfaction exists.

The ultimate target for this suite of indicators is that local Aboriginals and community knowledge of SFM will increase by over time via the effective exchange of information, and that an equitable and inclusive public deliberation has occurred prior to the making of major forest management decisions.

The following CSA Core Indicators have been identified for this Element:

6.5.1 — Number of people reached through educational outreach

6.5.2 — Availability of summary information on issues of concern to the public

The following indicator statements have been identified for this Element:

6.5.1 Number of people who took part in an educational opportunity

6.5.2 SFM monitoring report made available to the public

### Indicator 6.5.1 – Educational Opportunity

| **Indicator Statement** | **Target (Variance)** |
|---|---|
| Number of people who took part in an educational opportunity | 25 (-10) annually |

**What is this indicator and why is it important?**

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.

Canfor Radium is committed to working with directly affected stakeholders and members of the public on forest management issues and have a well-established history of participation in community meetings, including local planning processes. The sharing of knowledge and contributes to informed, balanced decisions and plans acceptable to the majority of public. When informed and engaged, members of the public can provide local knowledge and support that contributes to socially and environmentally responsible forest management.

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 related to indicator 6.4.2.

**How are targets established?**

Aligns with Canfor's SFM Commitments (Communities).

**Strategy**

Canfor Radium maintains their involvement in educational outreach initiatives (e.g., maintaining an open and active public advisory group, hosting field tours and open houses, notification and referrals to stakeholders, school classroom visits). Record attendance level at each meeting or tour (public and stakeholders).

**Forecasting and Probable Trends of the Indicator**

An educated and informed public with a broad understanding of forestry that can provide local input and support on matters pertaining to forest planning and operations.

**Current Condition**

Communication / participation with parties outside of a formal public advisory group is required to ensure SFM. Within the DFA, a comprehensive communication / participation plan and formalized procedure has been developed. It takes into account early input from a range of stakeholders. This plan was developed in 2008 for the DFA and guides Canfor. It provides a range of communication tools including newspaper articles, website, mail-out notifications, newsletters or surveys.

This indicator was developed to address the terms "effective and meaningful".

There were 29 people that participated in educational opportunities during 2010 (2006 baseline data).

**Monitoring and Reporting**

Track and report the number of people that participated in educational opportunities by opportunity type, on an annual basis.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

### Indicator 6.5.2 – SFM Monitoring Report

| Indicator Statement | Target (Variance) |
|---|---|
| SFM monitoring report made available to the public | SFM monitoring report available to public annually via web (N/A) |

**What is this indicator and why is it important?**

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

**How are targets established?**

Provides topical information to local public as well as a worldwide audience. Has contact mechanism for those looking for additional information.

**Strategy**

Canfor Radium to maintain a website that makes the SFM monitoring report publicly available.

**Forecasting and Probable Trends of the Indicator**

Public awareness and understanding of the SFM Plan and annual performance against the Plan's targets. A major component of a continuously improving SFM Plan is that it has openly informed, included, and responded to the public.

**Current Condition**

An external website containing the annual SFM monitoring report has been maintained since 2006.

Canfor Radium has provided Annual Reports for the following year: 2006 – 2010.

**Monitoring and Reporting**

This indicator will be reported out on an annual basis. Report a yes/no answer as to whether the annual monitoring report was made publically available on an external website. Reporting will be based upon the previous years' Annual Report being posted on the web prior to the end of the current reporting year. The measure will be considered met if the previous years' report is posted prior to March 31 of the current reporting year.

Records to satisfy this indicator will be stored within the Canfor office, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report. The position/person responsible for ensuring the information needed is gathered and captured in the information management system will be identified in Appendix 1.5: Responsibility Action Matrix.

# 6.0 Tactical Level Planning

This section describes the aspects of SFM Planning that occur at the tactical planning level for the DFA. The objective of the tactical level is to establish a detailed forest management strategy or scenario that is sustainable for a range of forestry related values. This level localizes planning to meet the broad goals developed in the strategic planning level.

At this level of planning, inventories are prepared, assumptions are made and future forest conditions are forecast. If current conditions do not meet the goals of sustainability, alternative strategies and/or scenarios are designed and forecast to assess their effectiveness in meeting sustainability targets and goals. The strategies that best meet the goals of sustainability are 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 may include: indicator mapping, scenario design, forecasting, natural disturbance strategies, and potentially could include 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. The scenario forecasting and preferred scenario are still valid with the updated (2012) indicators (See Appendix 1.4: SFM Criteria & Indicators Matrix).

Tactical level assessments and planning will identify strategies and potential management practices that are considered sustainable. The operational level is the place where those practices are described and implemented to meet sustainability targets. Operational level plans, such as Forest Stewardship Plans (FSP) and internal site plans, are currently used for this purpose in the DFA. The indicators and targets detailed in the Section (5.1 Criteria, Elements, Indicators, Targets) provide direction to 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 Canfor;
- 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 assessment of current conditions at the tactical level planning includes:

- identify external impact (i.e. other tenures);
- identifying and incorporating natural disturbance;
- identifying/describing current practices;
- linking the practices to indicators

The following provides an assessment of the current conditions for the Radium DFA. The information outlined within this section, influences the forecasting and obviously the final determination of sustainability at this point in time – the preferred scenario.

### 6.1.1 External Impacts

At this point in time, there are not considered to be any external impacts affecting the Radium DFA except for the potential influence of other Tenure Holders as described in Section 2.2.4 Other Tenure Holders or initiatives already identified in Section 2.3 SFM Plan Links to Other Strategic Initiatives. In

the future this section would describe the extent of external impacts and an assessment of how those influence the Radium DFA from meeting its sustainability goals.

### 6.1.2 Natural Disturbance Regime

Natural disturbance is defined in this SFM Plan as the historic processes of fire, insects, windstorms, and other natural events in an area that were not caused by humans. Natural disturbance plays an important role in all forest values at the stand and landscape level. Natural disturbance is considered an *input* to forest management, *not a driver*. In order to understand the effects of natural disturbance on the DFA, the first step is to identify natural disturbance agents that have historically, and currently affect the ecosystems being managed by Canfor.

Natural disturbances affect areas managed by the licensees, as well as areas outside their operating area. It is therefore critical to assess how natural disturbance affects the forest conditions over time. In scenario design, natural disturbance is considered during the forecasting because of its positive and negative role in achieving various indicators and its impact on forest management practices. It also allows for evaluation of the role of natural disturbance in non-timber harvesting areas where licensees have no control over how natural disturbance may affect various indicators.

Natural disturbance is modelled in three ways: 1) as a volume reduction based on non-recoverable losses in the TSA (at the time of Timber Supply Review), 2) as a reduction to each stand to account for small disturbances and 3) as a modelled assumption whereby stands within the non-harvestable land base would be "disturbed". For more details on the modelling assumptions of natural disturbance, please refer to the Forecasting Report.[57] The general result of applying natural disturbance into the scenarios is that there may be times where a target (i.e. % of area in old) is achieved prior to a disturbance but after a 'modelled' disturbance event, the target may no longer be met. In the forecast model, if harvesting limits a target from being met, it will not be harvested. Following the example above, harvesting may occur when the % old target has been met but if natural disturbance occurs which results in the target is no longer met, harvesting will also cease in this area so that the forest be allowed to age to achieve the target again.

Historic fire trends and data gaps as well as historic trends in insect and disease activity are described in a report completed for Canfor – Radium called Development of a Natural Disturbance Strategy for Sustainable Forest Management report[58]. This report has developed a Natural Disturbance Database (NDD) by collating forest disturbance data (i.e. insects, diseases and fire) relevant to operating areas included in this study. The intent of the NDD is to provide support for the pursuit of a natural disturbance strategy, and to provide a platform for additional data entry as new information becomes available. For example, the information can be queried by year, BEC zone, and type of natural disturbance. The current state of natural disturbance agents for the Invermere TSA has been provided in the annual forest health strategy developed by the Ministry of Forests.[59] The following summarizes the current situation for the Radium DFA with regards to agents such as fire, insects, and disease.

It should be noted that even though the above report on Natural Disturbance Strategy and NDD was developed in 2006, the natural disturbance regime has not changed for 2012. The last large fires were in 2003 and were captured in the forecasting. No new (significant) disturbance events (i.e. fire, insect/disease, or windthrow) have occurred since the analysis/forecasting. Therefore the analysis information and implementation of the strategies are still valid.

[57] Forsite, Interior Reforestation, Ecologic Research. 2006. Sustainable Forest Management Plan Scenario Forecasting. Version 1.1. February 24, 2006. Prepared for Canfor – Radium and BCTS.
[58] Forest Ecosystem Solutions Ltd, 2003. Development of a Natural Disturbance Strategy for Sustainable Forest Management.
[59] Invermere TSA Forest Health Strategy 2011. Ministry of Forests, Lands and Natural Resource Operations, Rocky Mountain District.

## Fire

The fires in 2003 impacted 19 631 hectares of Crown forested land in the Invermere TSA although mostly the NHLB area (Joffe, Hot, Bear). Within the THLB, a total of 1,985 ha were inside the mapped fire boundaries for Venebles, Middle Fork, and Magnesite fires.

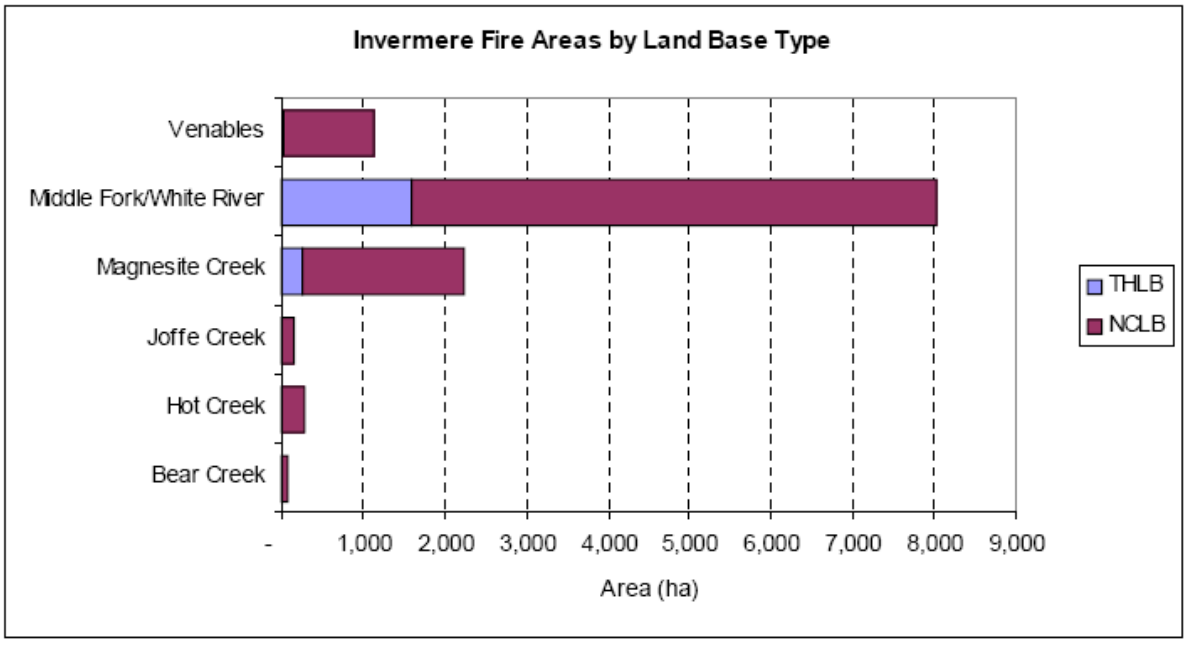
The fires of 2003 impacted considerable area of the CFLB in the Invermere TSA and has resulted in a significant salvage effort in 2003/04 and 2005. Table 26 and Figure 20 below provide details on the area and volume impacted. Within the THLB, a total of 1,895 ha were included in the mapped fire boundaries.

**Table 26: 2003 Fire Area and Volume Summary**

| | Forest District | | THLB | |
|---|---|---|---|---|
| FIRE | Area (ha) | Coniferous $^{m3}$ | Area (ha) | Coniferous $^{m3}$ |
| Bear Creek | 97 | 15,147 | 0 | 35 |
| Hot Creek | 485 | 69,329 | 0 | 41 |
| Joffe Creek | 209 | 39,564 | 0 | 0 |
| Magnesite Creek | 3543 | 572,206 | 266 | 82,362 |
| Middle Fork/White River | 10587 | 2,072,018 | 1,591 | 321,122 |
| Venables | 4711 | 244,432 | 37 | 6,801 |
| Fire Totals | 19,631 | 3,012,695 | 1,895 | 410,362 |

Source: Invermere Timber Supply Area Timber Supply Review #3 Analysis Report Version 3.0, May 12, 2004

**Figure 20: 2003 Fire Volume by Landbase Type**



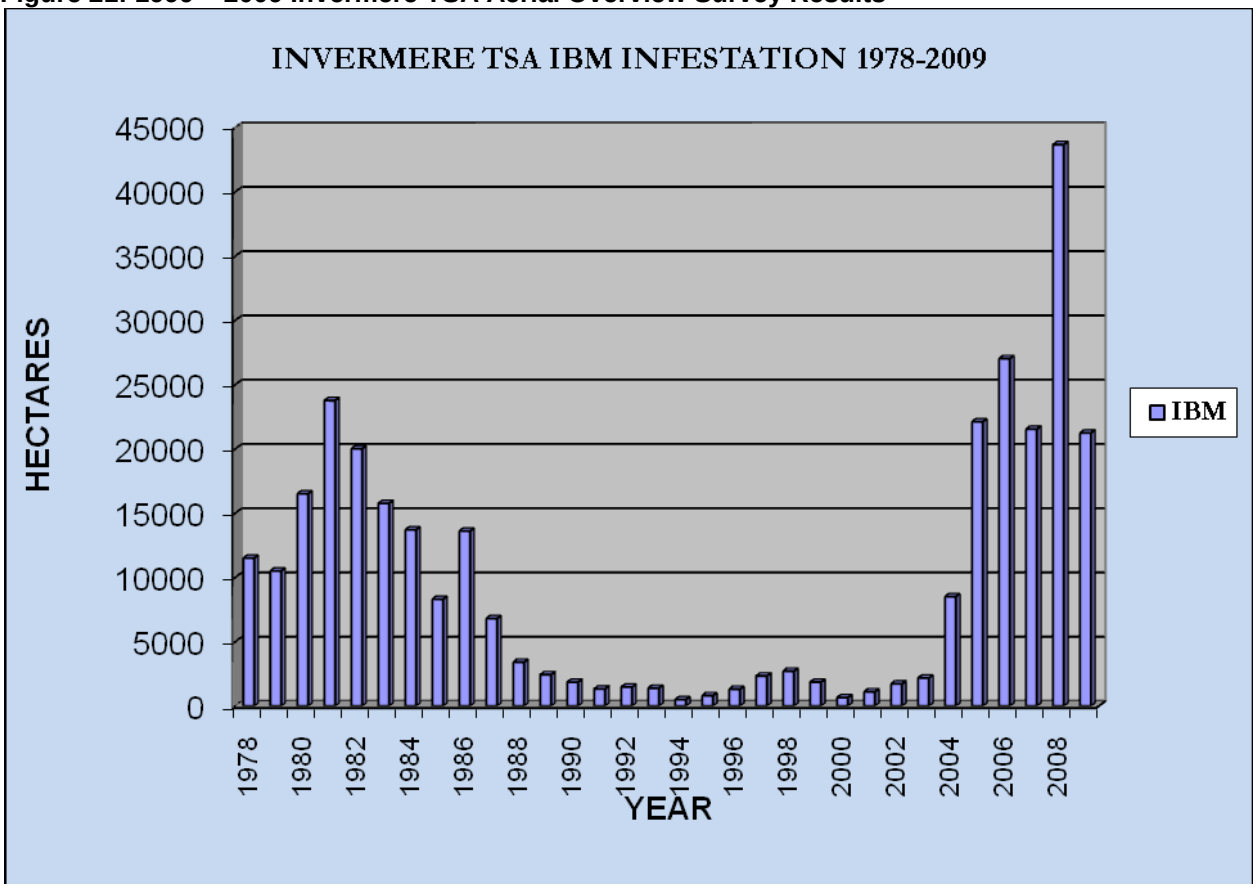

Source: Invermere Timber Supply Area Timber Supply Review #3 Analysis Report Version 3.0, May 12, 2004

## Insects

Aerial overview surveys conducted by the Government detected bark beetles, defoliators, needle casts, abiotic damage and impacts from feeding by mammals. Mountain pine beetle has been the most significant impact over the last decade (Figure 21) but appears to be on a downward trend since 2006. Other agents that have affected over 100 hectares in the last five years include Douglas-fir beetle, western

balsam bark beetle, pine needle cast, larch needle cast and western false hemlock looper. Agents affecting less than 100 hectares in the last five years (2004 – 2009) include impacts from geomorphic slides, western pine beetle, red turpentine beetle, white pine blister rust, and conifer sawflies. Often, other key forest health factors, such as Armillaria root disease, dwarf mistletoe and wildfire, have a significant impact on forest management and are not always detectable from the air, are ongoing, or have not occurred at time of aerial overview flight.

**Figure 21: 1999 – 2009 Invermere TSA Aerial Overview Survey Results**




Source: Invermere TSA Forest Health Strategy 2010. Ministry of Forests and Range Rocky Mountain District.

The interior of British Columbia has been severely impacted by the mountain pine beetle infestation and has encroached on the Invermere TSA. Tracking of the beetle infestation shows an exponential increase in infested area within the Invermere TSA that started in 2003. By 2004 this exponential increase in infestation had resulted in over 4500 hectares of timber harvesting land base infested with mountain pine beetle, with volume of current attack estimated at 60,231 cubic metres[60]. The population has decreased to present (2012) after hitting a peak in 2008.

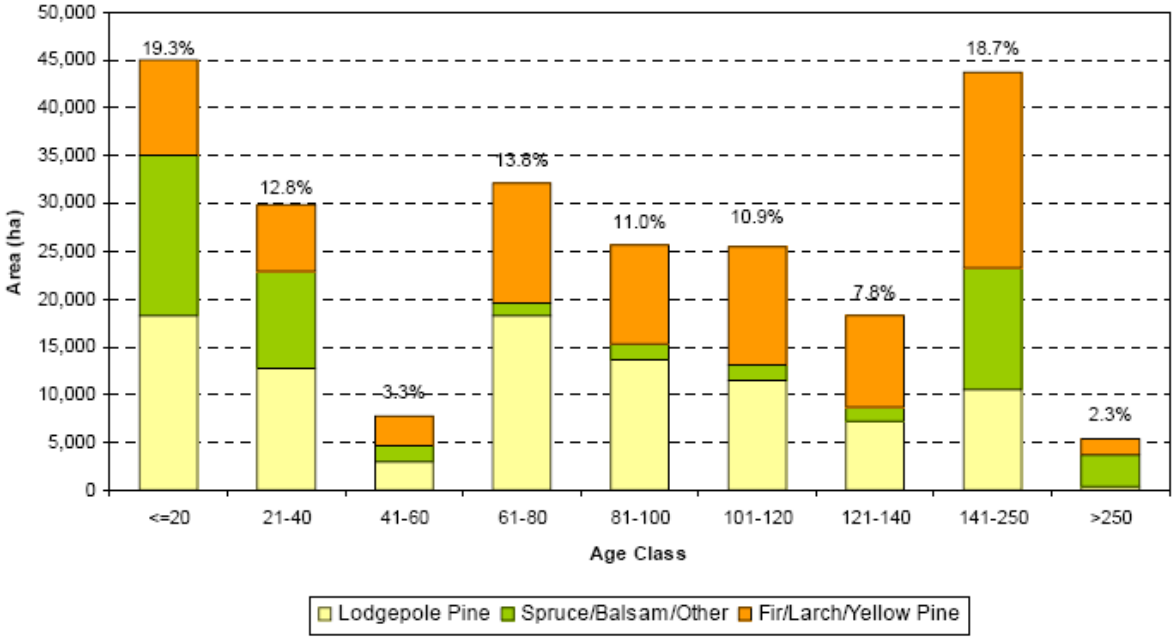
MOF District staff has stated[61] that currently 65 percent of the harvest in the Invermere TSA is composed of lodgepole pine – however with over 13 million cubic metres of mature pine leading stands on the timber harvesting land base, it will take about 23 years to harvest that volume. Pine-leading stands make

[60] Invermere Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination. Effective November 1, 2005.
[61] Invermere Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination. Effective November 1, 2005.

up over 40 percent of the TSA's timber harvesting land base. In addition, pine is often found as a minor species in the remaining 60 percent of the area.

As indicated by Figure 22, the TSA has a significant amount of mature lodgepole pine leading stands. There are approximately 60,000 ha of lodgepole pine over 60 years old on the THLB (26% of THLB) and the portion of this area outside the ESSF ecosystems is considered susceptible to attack by mountain pine beetle.

**Figure 22: THLB area by age class and leading species**




Source: Invermere Timber Supply Area Timber Supply Review #3 Analysis Report Version 3.0, May 12, 2004

Current practices are attempting to control beetle populations and salvage mortality where it occurs. The 20010/11 beetle survey data show that populations are decreasing and mortality is less than expected by previous modelling part in fact to wet spring weather pattern and aggressive management practices or other environmental factors.

A beetle monitoring plan has been developed and included as a component of the Invermere TSA forest health strategy. The comprehensive monitoring plan will assist in determining if current harvest levels are adequate to manage beetle populations.

As of 2012, there is a downward trend in Mountain Pine Beetle activity since the peak in 2008.

## Diseases

As stated in the 2010 Invermere Forest Health Strategy, Armillaria root rot is the most common disease in the Invermere TSA, particularly in the ICH and IDF, and is scattered in pockets in other biogeoclimatic zones. Most tree species and age classes are susceptible. The report further states that Armillaria is an important driver of structural diversity in interior forests - e.g., 62% of 111 active nests of primary cavity nesters were associated with Armillaria centres in studied ICHdw stands in the Nelson Forest Region (Steeger and Machmer 1995).

Armillaria spread has been found to intensify with some harvesting treatments such as partial cutting and thinning (Morrison et al. 2001). Armillaria is challenging to manage because it can be difficult to identify in the field and traditional treatments may not be acceptable. With extensive calcareous and fine textured soils, treatments such as stumping and push-over harvesting (that are effective controls in other areas in

the province that do not have these soil types) may not be desirable due to the resulting soil disturbance (Kishchuk et al. 1999, Curran et al. 2000)[62].

Armillaria root disease was not detected from the aerial overview flights and the amount/extent has not been reported in the 2010 Invermere Forest Health Strategy. Canfor, following locally accepted guidelines and practices, currently deals it with on a site-by-site basis.

As of 2012, the analysis information and implementation strategies are still valid for the Radium DFA.

### 6.1.3 Current Forest Management Practices/Strategy

The assessment of current management practices is two-fold:

- an articulation of the current management strategy by describing the standard operating practices and regulations followed in the Radium DFA; and
- the determination of how these practices impact the sustainability of forestry related values in the management area.

A summary of the current management practices undertaken by Canfor in the DFA is presented in Appendix 1.3: Practices Analysis. The current management practices are used to form a baseline management scenario. This scenario is compared against alternative scenarios to test strategies and to determine if the baseline is meeting the targets. Linking current practices to the indicators provides information as to how practices are affecting sustainability targets through time and space.

The development of scenarios, including a potential uplift (that was identified as being possible through the TSR3 process scenario) was used to review the current management strategy with *FOREST*. Modelling of certain indicators was used to hypothetically assess how differing management strategies may impact certain indicators over a specified time frame. The scenarios do not represent a true reality. The chosen scenarios are limited in their scope and are meant to show the key interactions between some of the modelable indicators. The scenarios look at the interactions between each of the chosen indicators under different management conditions to determine the likely interactions among key indicators. The inputs for modelling come from the indicators and targets (if established) for each indicator.

Forecasting is necessary as part of the evaluation and identification of sustainable forest management strategies and practices that will help achieve the desired future forest condition. It is a component of continual learning and improvement. "Forecasting allows the organization to specify the SFM strategy and forest practices that will achieve the desired result in the context of adaptive management."[63]

### 6.1.4 Indicator Mapping

Indicator mapping is a tool that assesses the current levels of resources to be sustained in the DFA and shows how those resources are spatially contributing to meeting sustainability targets.

The SFMP assumes that the entire land base (whether managed or unmanaged) contributes to meeting ecological, economic and social goals of sustainability. Where possible, indicators will be spatially mapped demonstrating current levels of resources as represented by the indicators. The land base is delineated into THLB and NHLB designations to assess the contribution of both managed and unmanaged areas in meeting sustainability targets. The intention of indicator mapping 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 yet been initiated for the Radium DFA. However, many indicators have identified the proportion of targets that are within the NHLB vs. THLB. As such, targets have been set on areas where Canfor has an impact, i.e. the THLB. An example of this includes the species groupings in

[62] Invermere TSA Forest Health Strategy 2010. Ministry of Forests, Rocky Mountain District.
[63] CSA Z809-02 Sustainable Forest Management: Requirements and Guidance, December 2002

the species accounting system.[64] An analysis of how well current practices are helping in achieving targets for the THLB will be summarized and reported out in the SFMP Annual Report.

## 6.2 Assessment of Sustainability

A Multi Criteria Analysis (MCA) was undertaken to solicit input from stakeholders, the public and technical specialists, for input into the development of scenarios. Section 6.3 Design of Sustainability Scenarios describes the development of scenarios and their use. An assessment of how appropriate the current management strategies are to meet the targets identified for the indicators of sustainability. Assessments assists in determining if current conditions, assumptions, and practices, as forecasted over time, are sustainable and acceptable for the range and balance of values. If the assessment shows that current conditions are sustainable, then a plan is developed and/or modified for the DFA, highlighting any required changes as a result of strategies described in the SFM Plan.

The strategies outlined in the current FSP are consistent with those described within this SFM Plan. If the assessment shows that the current management scenario is not fully sustainable then alternative scenarios may be developed in order to meet sustainability objectives. For the first iteration of the SFM Plan (2005), the assessment 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 *FOREST*'s priorities by assessing values attributed to both the criterion and indicator levels. The questionnaire can be found within the *FOREST* files found at Canfor's office. Canfor has compared the 2005 indicators to the ones revised for 2012 and have determined that the key indicators used for the MCA have not changed and therefore the results are still valid.

### 6.2.1 Technical MCA

The technical MCA requires that the most up-to-date data for each of the indicators and for the management practices be used. Canfor has compared the 2005 indicators to the ones revised for 2012 and have determined that the key indicators used for the MCA have not changed and therefore the results are still valid. Technical specialists use this information, as summarized in management scenarios, to determine one of the following for each measure:

- if sustainability levels are clearly sustainable,
- if sustainability levels are clearly unsustainable, or
- if sustainability levels are marginal and whether that state is improving, relatively steady or declining over the forecast period.

For the purposes of the SFM Plan, the technical analysis was administered by Canfor, as well as by contractors and subcontractors hired for specific FIA projects.

### 6.2.2 Public MCA

The public assessment for the 2005 SFM Plan asked stakeholders to identify what they felt were the most important values within a DFA. Members of the public advisory group were asked to identify their top priority amongst all of the criteria, to rank in order all of the criteria and to distribute 30 points amongst the criteria. Secondly, the group was asked to weigh the various indicators by distributing 33 points (same as number of indicators) across them.

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

[64] F.L. Bunnell and P. Vernier. April 2007. Vertebrate Species Accounting System for the Radium DFA. Centre for Applied Conservation Research, University of British Columbia

different stakeholder priorities. This process can lead to increased stakeholder inclusion and support in resource management decisions.[65]

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 also be solicited. Ultimately, the decision makers for a management unit take the input from the analysis, if applicable, as part of the decision making process. Understanding the public's priorities and their tolerance for risk and the use of input from technical specialists can assist managers in refining targets, practices and/or the overall management scenario.

The following process was used to solicit criteria priorities from *FOREST* members. They were asked to prioritize the criteria as follows:

**Step 1**. Rank the criteria in order of priority for you, 1 being the highest priority and 9 the lowest.
**Step 2**. You have a total of 30 points. Distribute them as you see fit to the criteria. You can allocate all of your points to a single criterion, distribute them evenly across the criteria or weight the criteria by putting more points to one than the other. Once distributed, the total points must equal 30.
**Step 3**. You have a total of 33 points. Distribute them as you see fit to the indicators. You can allocate all of your points to a single indicator or distribute them evenly across the indicators or weight the indicators by putting more points to one the others. Once distributed the total points must equal 33.

The following figures (Figure 23 – Figure 26) summarize the findings of the assessment process for *FOREST*. The sample size (i.e. the number of responses) was 9 of 12 *FOREST* members. Although this survey was completed in 2005, Canfor feels this information is still valid as the PAG members are the same and the survey is of the PAG's values as they relate to SFM.

For all the figures listed below, the following applies: Criterion 1 – biological richness; C2 – productivity; C3 – Carbon; C4 – economic forest industry; C5 – economic non timber; C6 – diversified economy; C7 – public participation; C8 – First Nations; C9 – quality of life. (See Appendix 2.1: Translation Information between SFM C&I vs. CSA for the cross reference of the 2007 Criteria to the 2012 Criteria).

[65] Paper submitted to the IUFRO conference in Austria (Peer Review Process) Using Multi-Criteria Analysis And Visualisation For Sustainable Forest Management Planning With Stakeholder Groups Stephen R.J. Sheppard and Michael Meitner

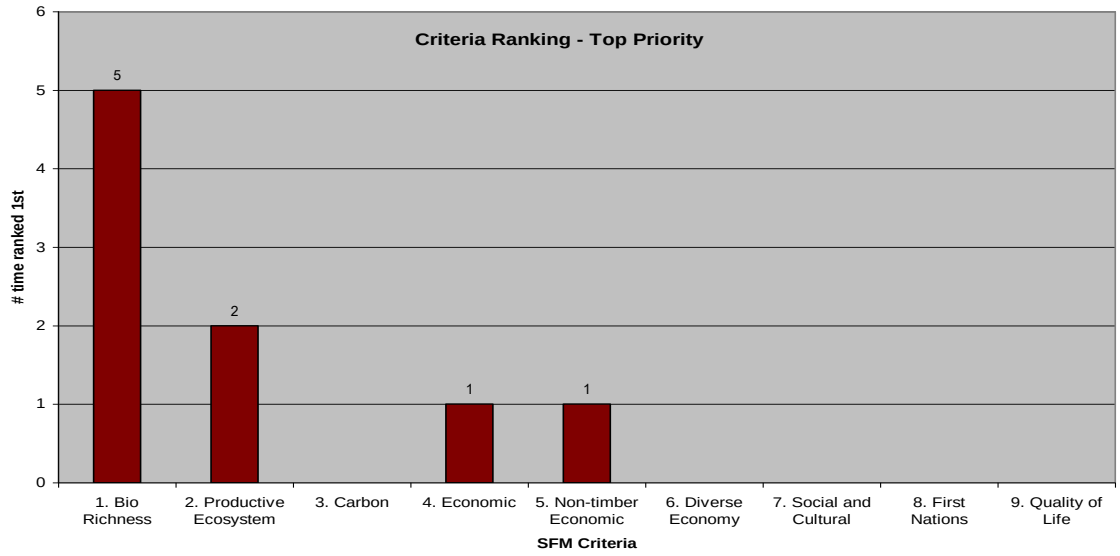



**Figure 23: Criteria Ranking Top Priority**

***Interpretation*** – The members of *FOREST* feel that ecological processes should be a top priority for the area. A productive ecosystem and economic criteria were also seen as top priorities. For 2012, the members of *FOREST* still feel that ecological processes are a top priority.

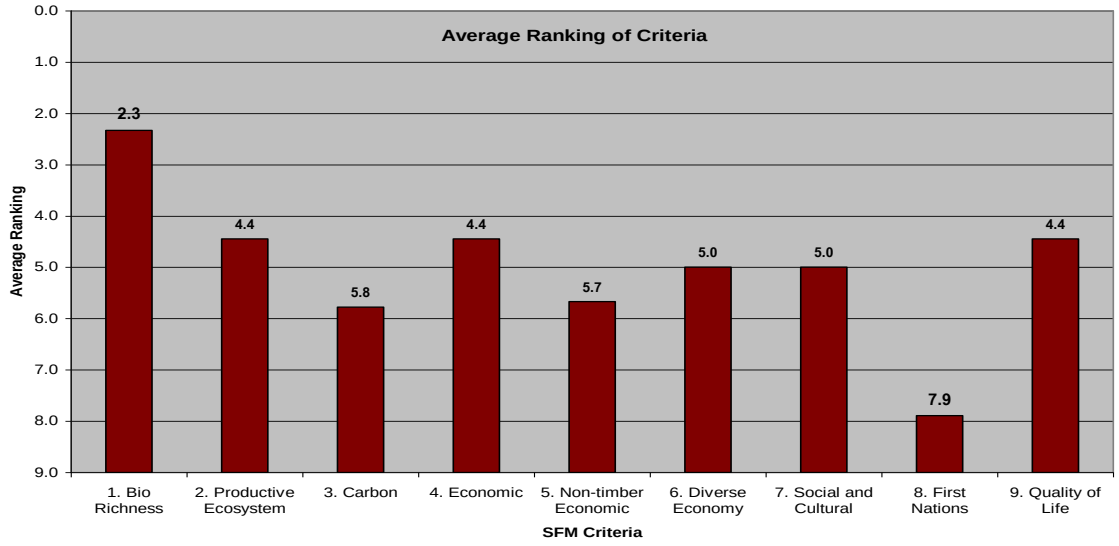



**Figure 24: Average Ranking of Criteria**

***Interpretation*** – Although certain criteria were seen as a top priority for management, the average priority assigned to each criterion shows a much more balanced level of recognized value.

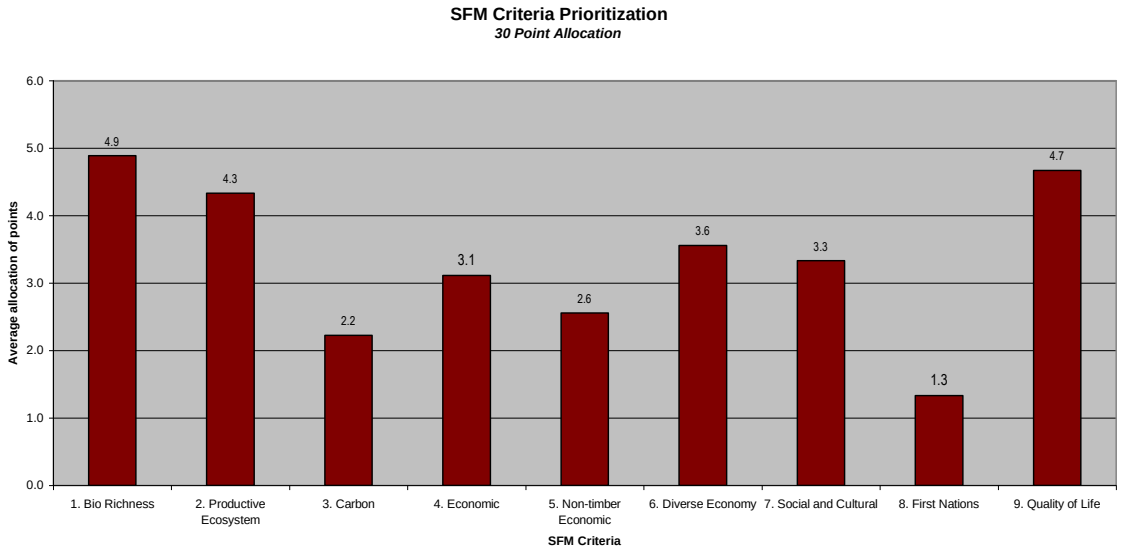



**Figure 25: SFM Criteria Prioritization**

***Interpretation*** – Of note here is that ALL SFM Criteria were allocated some points by the group indicating a preference to sustain the full range of SFM Values within the DFA. Of the allocation, the values of the top 3 criteria, in terms of their ranking relative to each other were; Biological Richness, Quality of Life, and Productive Ecosystems although the group is fairly well balanced. As most of the *FOREST* members remain the same in 2012, it is inferred that the allocation of values has also remained the same. No significant changes in practices or technology have occurred that would have influenced SFM values.

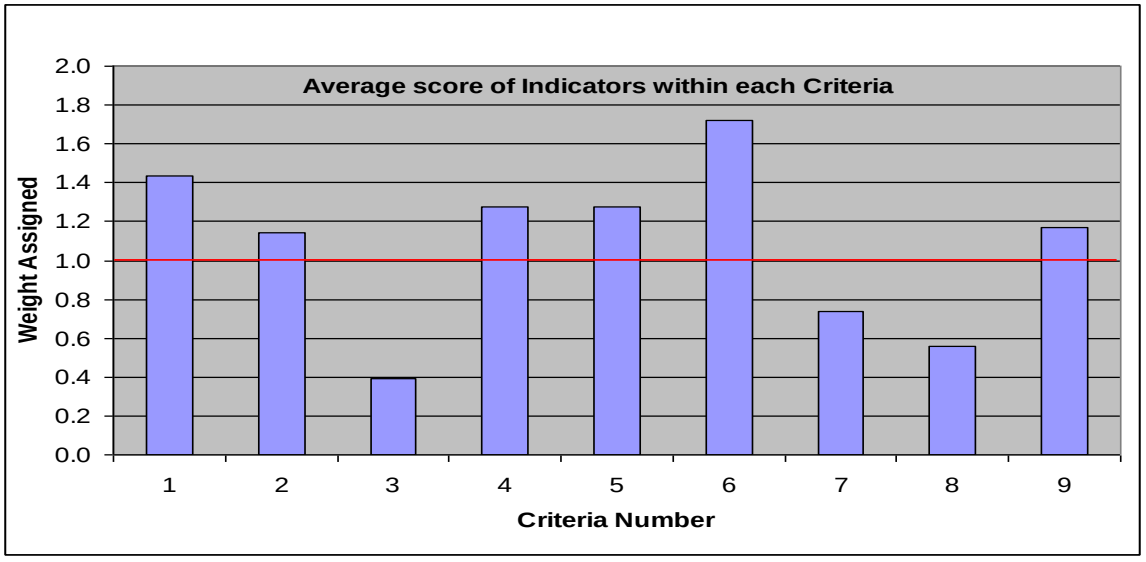



**Figure 26: Average score of the indicators within each Criterion.**

***Interpretation*** **–** The indicators were weighted by the group with a total of points equal to the number of indicators. That way an individual can put one point to each indicator showing that all of them are important, if so desired. The above graph displays the average weighting for each indicator within each criterion. The highest weighted indicator/criteria was Criteria 6 – Diversified Local Economy followed by Criteria 1 – Biological Richness. Once again the weighting is very balanced across all indicators/criteria. Because each indicator could have been assigned a score of 1, those above a score of 1 indicate a heavier

weighting was desired, while those below, indicate that the group was willing in some cases to assign a score of 0 to the indicator. As most of the *FOREST* members remain the same in 2012, it is inferred that the allocation of weightings has also remained the same. No significant changes in practices or technology have occurred that would have influenced these weightings.

**Assessment Summary**

The results above show that the Biological Richness stood out amongst all the other values as a priority. The Economic and Quality of Life[66] values also balanced out as priorities and in discussions while reviewing the results, *FOREST* members recognized that maintaining a productive ecosystem closely tied to both maintaining bio-richness and that it would contribute to a healthy economy.

The results show that all values are important to some degree.

### 6.2.3 Public Survey Results

The purpose of the Sustainable Forest Management Public Opinion Survey (Appendix 1.9: Public Opinion Survey) completed by the University of BC (UBC) in March 2006 was to inform Public Advisory Groups of stakeholder and constituency opinions and beliefs about sustainable forest management (i.e. more than specific indicators, but more about values that are important for SFM). This project reflects an attempt to realize continual improvement in the ways in which the Public Advisory Groups deliberate forest management issues, and to contribute to discussions about appropriate forest management practices in and near their communities.

The "executive summary" of the results, found below, may provide further guidance on the values of residents of the forest management area:

> Respondents were generally biocentric in their attitudes. On the whole, respondents were willing to lose some local forestry jobs to ensure that the economic well-being of future generations was maintained or enhanced, and to increase the amount of forests in parks and protected areas. Respondents indicated that they were uncertain about many of the provincial-scale forest management outcomes. The management of species at risk was important to respondents, both locally and outside of the area where they lived; however, there was not a clear sense among respondents about whether forestry was the commercial activity that most affected species at risk.
>
> Respondents indicated that they had sufficient knowledge of forestry and of forests to provide meaningful input for forest planning decisions, yet they felt strongly that opportunities for input were lacking. Respondents generally agreed that there was enough oversight to ensure responsible forest management and that that long-term security of forest lands (i.e. tenure) was a mechanism that would promote sustainable forest management. However, there was also a sense that too much attention was focused on timber resources and not enough on non-timber resources. There was also some concern among respondents that there may not enough wood in the province to meet future needs. The vast majority of forest management objectives that were presented to respondents were identified as important suggests that the indicators that constitute the Canfor SFM Framework resonate with the public and are in-line with public opinion of what forest management objectives are important.
>
> The vast majority of respondent reported that they were somewhat or very concerned about the effects of climate change, and two-thirds of respondents indicated that they had noticed any effects of climate change in their community. The majority of respondents indicated that they thought that forest managers should be doing something in response to climate change and three-quarters of respondents reported that it is more important to start acting now on climate change with what we know, in terms of how forest management should prioritize their response to climate change.

[66] Although "Quality of Life" is no longer a Criterion, specifically recreation and visual quality, they are still important to the PAG. The SFMP has addressed these values through other 'legislated' means.

Over half of respondents reported that the recreation activity that they had identified as being most important to them was mostly or very central to their lifestyles and respondents participated in an average of five recreation activities. Respondents are engaged in recreation activities in a variety of jurisdictional settings, although Crown land was the most popular.

Respondents represented a range of ages, education, occupations, and income levels. The three most common connections that respondents had to forested landscapes were non-motorized recreation, followed by environment and motorized recreation.

In future scenarios design and forecasting, the results of this survey will be incorporated to provide a broader perspective on forest management within the Radium DFA.

Although a Public Survey has not been completed since 2006, it was felt not to be necessary as the previous information is still considred to be valid since the key indicators and values have not changed.

## 6.3 Design of Sustainability Scenarios

Alternative scenarios were undertaken as part of this SFM Plan process. They have been used to test the current management strategy for how sustainable it is, to test alternative approaches and as part of forecasting some of the indicators. The process of evaluating a scenario involves examining forecasts for each modelable 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 to understand the interactions and linkages between the indicators in order to understand 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.

### 6.3.1 Forecasting

The first step in developing scenarios is forecasting indicators through time and space. Forecasting is an explicit statement of the expected future condition of an indicator. It is a critical step in assessing SFM to ensure the continuance of values. Input layers (i.e. indicator maps, growth & yield, etc.), along with rule-sets (i.e. landbase assumptions, management assumptions, current management practices, natural disturbance assumptions, etc.), are used to forecast forest conditions over time using a simulation model. The projections (i.e. forecasts) are used to compare the indicators to sustainability targets using current practices over time in order to assess the level of risk for each indicator.

Local level indicators have been reviewed by *FOREST* (in both 2005 and 2011), as well as by technical experts for their suitability and credibility for measuring and forecasting. As described in Section 5.1 Criteria, Elements, Indicators, Targets of this SFM Plan, a forecasting strategy specific for each indicator has been described ranging from no forecasting for some process indicators to full modelling for others. Results for indicators that were forecasted are found within the indicator write-ups.

The modelling for the Radium DFA was completed in 2006 using the spatially explicit forest estate model FPS/Atlas. The model represents each stand on the land base in terms of area, age, species mix, site productivity, ecosystem type, and eligibility for harvest. Modelling explored outcomes over a 300 year planning horizon and was based on assumptions in 4 key areas: land base, management, growth & yield, and natural disturbance. Details on the assumptions, analytical methods and results of the forecasting for this SFM Plan can be reviewed within the Radium DFA Forecasting report.[67] Forecasted indicators are listed below in Table 27.

[67] Forsite, Interior Reforestation, & Ecological Research. Sustainable Forest Management Plan Scenario Forecasting. Version 1.1 – February 24, 2006. Prepared for Canfor – Radium Woodlands & BCTS.

**Table 27: Summary of Modeled Indicators**

| Static Indicators | Dynamic Indicators |
|---|---|
| • Habitat types in the THLB and NHLB | • Harvest Levels<br>• Timber supply sustainability<br>• Direct/Indirect employment and income levels<br>• Fees paid to government |
| • Riparian area in the THLB | |
| • Protection of parks, reserves, and biologically significant areas. | |
| • Use of select seed | • Carbon stored in trees |
| • % of cutblocks converted to permanent access. | • Biodiversity<br>• Shrubs, snags, coarse woody debris, hardwoods) |
| • Regeneration delay period, species, timelines | • % natural regeneration occurring over time |
| • Free growing | |
| • Accommodation of known first nations cultural issues | • Conversion of productive land to unproductive land |
| • Soil disturbance | • Disturbance in community watersheds. |
| • Wildlife tree retention | |

Source: SFMP Scenario Forecasting. Forsite. Feb. 24, 2006.

### 6.3.2 Design of Alternative Scenarios

Forecasting, undertaken for each scenario, allows the forest manager and the public advisory group to analyse various scenarios (i.e. management decisions) based on the projected future forest conditions. Input for the development of the scenarios came from the following sources: modelling

- *FOREST* C&I matrix (individual indicators and the interaction of indicators) (2005 & 2012)
- Current management practices and assumptions (2005 & 2012)
- Public Assessment questionnaire (2005)
- Canfor (2005 & 2012)
- Consultant (specializing in analysis and forecasting) (2006)

Section 6.4 Preferred Scenario describes the resulting preferred scenario. The preferred scenario meets initial targets for sustainability, other scenarios were tested to confirm assumptions and to highlight areas that could be improved. The development of alternative scenarios has included the influence of natural disturbance, where appropriate for both the NHLB and the THLB.

The scenarios listed below describe quantitative outputs utilizing modelable indicators. The preferred scenario takes into account the projected forecast for these indicators, as well as indicators that are not modelled spatially and the indicators that will be developed as described in Section 5.1 Criteria, Elements, Indicators, Targets. The scenarios that were developed and presented to the *FOREST* in 2006, but which are still relevant for 2012, included:

1. Base Case
2. No Harvest
3. Maximum Harvest within Constraints
4. Timber Focus Only
5. Harvest 50% of Base Case
6. Harvest Limited in High Conservation Value Forests
7. Mountain Pine Beetle Uplift/Salvage

#### 1. Base Case

This scenario reflects current management in the DFA and is similar to the recent TSR3 base case harvest projection. It differs from the TSR3 base case in that the new ecosystem based UWR and Caribou

guidelines were used, an updated version of old growth and mature management areas (OGMA/MMAs) was used, additional visual constraints around Cartwright lake were added, and specific rare/uncommon ecosystems were removed from the harvesting land base.

### 2. No Harvest

This scenario illustrates the status of the land base and SFM indicators if only natural disturbances were to occur. No changes were made to the base case model except to add natural disturbances to the timber harvest land base (THLB) throughout the planning horizon. These natural disturbances were implemented in the same manner as the disturbances implemented on the NHLB.

### 3. Maximum Harvest within Constraints

This scenario illustrates the status of the land base and SFM indicators if all available timber is harvested in each period. No changes were made to the base case model – only the timing of harvest was modified. All constraints remained in place to protect non-timber values, thus the overall volume of timber harvest does not change dramatically but the timing of harvest varies.

### 4. Timber Focus Only

This scenario illustrates the status of the land base and SFM indicators if most non-timber resource constraints are turned off to create a run that is only focused on timber harvest. Parks, protected areas, wildlife tree retention, and riparian management remain in place but ungulate winter range (UWR), Caribou, OGMA/MMA, visuals, and watersheds management constraints are ignored.

### 5. Harvest 50% of Base Case

This scenario illustrates the status of the land base and SFM indicators if only half of the harvest implemented in the base case is taken in each period. No changes were made to the base case model – only the amount of harvest in each period was modified.

### 6. Harvest Limited in High Conservation Value Forests

This scenario illustrates the status of the land base and SFM indicators if specific High Conservation Value Forest (HCVF) areas were reserved from harvest. Identified HCVF polygons fell into 4 management types: No harvest allowed, no harvest of old stands allowed, no harvest of old lodge pole pine (Pl) allowed, and no harvest of cedar stands allowed. This translated into a gross TSA area of over 75,000 ha but resulted in only 1,962 ha removed from the THLB (0.8% reduction in THLB area) because of overlap with existing removals.

### 7. Mountain Pine Beetle Uplift/Salvage

This scenario illustrates the status of the land base and SFM indicators if a mountain pine beetle (MPB) infestation kills the vast majority of the lodgepole pine (Pl) volume in the TSA over the next 15 years and harvest levels are elevated in the short term to salvage as much volume as possible. The harvest uplift was established to allow harvesting of all THLB stands older then 60 yrs with >40% Pl within the next 15 yrs (5 yr shelf life assumed). The Pl volume in THLB stands with less than 40% Pl was assumed to be lost and was represented by an equivalent area regenerated with a 20 yr regeneration delay.

15 yr uplift implemented = 338,340 $m^3$/yr (58% increase over current AAC)
Pl volume salvaged = 9.3 million $m^3$
Pl volume left unsalvaged = 1.5 million $m^3$

The results were reviewed with *FOREST* in 2006, but remain applicable, as well as relevant, for 2012. The Radium DFA Forecasting report[68] contains the presentation made to *FOREST* and goes into more

[68] Forsite, Interior Reforestation, & Ecological Research. Sustainable Forest Management Plan Scenario Forecasting. Version 1.1 – February 24, 2006. Prepared for Canfor – Radium Woodlands & BCTS.

detail for each of the indicators modelled. As well, this report contains a comparison of each of the scenarios and the quantitative or qualitative impact on each indicator. The key to demonstrate the relevancy of this work for this SFMP is in the cross reference between the 2007 and 2012 indicators (See Appendix 2.1: Translation Information between SFM C&I vs. CSA).

A comparison of each scenarios long-term implication relative to the Base Case (current condition) is provided in Table 28.

**Table 28: Long Term Implications Summary**

| | Economics | Social | Ecological | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Scenario | ($m^3$/Income/jobs/Gov't fees) | (Visual Disturbance) | Snags | CWD | Shrubs | Hardwood | % Natural Regeneration | Carbon | Loss of Productive Landbase |
| Base Case | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Harvest None | ----- | +++ | +++++ | +++ | ---- | --- | ++ | ++++ | +++ |
| Max Harvest | +/- | - | - | - | + | 0 | 0 | - | 0 |
| Timber | ++ | -- | - | -- | + | + | 0 | - | - |
| Harvest 50% | --- | ++ | +++ | ++ | --- | --- | + | ++++ | + |
| HCVFs | - | 0 | + | + | 0 | 0 | 0 | 0 | 0 |
| MPB | - | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 |

Source: SFMP Scenario Forecasting. Forsite. Feb. 24, 2006.

0 = no change from Base Case
(+) = Positive implications
(-) = Negative implications
# of (+/-) indicates relative order of magnitude

The following general trends were seen in the reporting of the scenario forecasts:

- Economic indicators increased linearly with harvest levels. If harvest volumes in one scenario were twice what they were in another, it translated into twice the jobs, income, and fees paid to government.
- Increased harvest levels tended to put more pressure on visually sensitive areas. Reducing harvest levels eased the pressure on this area but only to the point where natural processes would be creating disturbances.
- The conversion of the THLB from older natural stands to generally younger managed stands significantly reduced coarse woody debris volumes and snags densities. The THLB represents only half of the forested land base and the Non THLB continued to provide snag densities at natural levels.
- The conversion of the THLB from older natural stands to generally younger managed stands increased the presence of shrubs and hardwoods on the land base.
- Disturbance in community watersheds increased slightly as harvest levels increased. Decreases in harvest reduced the disturbance levels in CWS up to the point where natural processes would be creating disturbances.
- Carbon stored in trees is directly correlated with growing stock on the land base and higher harvest levels tended to keep more the land base in younger age classes, thus slightly decreasing the growing stock/stored carbon in the long term.
- The various scenarios had little impact on the relative amounts of natural regeneration used.
- The amount of THLB area converted to roads/trails/landings in the long term was very similar in all scenarios but the rate of conversion differed based on harvest levels. Higher harvest levels resulted in faster conversion of natural stands to managed stands, thus putting more THLB area into non-forest conditions faster.

### 6.3.3 Trade-off Analysis

Analysis of the preferred scenario did not highlight any major conflicts between indicators and so a formal trade-off analysis was not undertaken for this SFM Plan. As outstanding projects are completed, as new data becomes available and as new alternatives are proposed and evaluated, a formal trade-off analysis may be required. The decision to undertake a trade-off will be discussed with *FOREST* at that time.

## 6.4 Preferred Scenario

Harvest Limited in High Conservation Value Forests – The preferred scenario for this iteration of the SFM Plan is to use the assumptions outlined in the CSA base case scenario (described above). This scenario illustrates the status of the land base and SFM indicators if specific High Conservation Value Forest (HCVF) areas were reserved from harvest. Identified HCVF polygons fell into 4 management types: No harvest allowed, no harvest of old stands allowed, no harvest of old lodge pole pine (Pl) allowed, and no harvest of cedar stands allowed. This translated into a gross TSA area of over 75,000 ha but resulted in only 1,962 ha removed from the THLB (0.8% reduction in THLB area) because of overlap with existing removals.

# 7.0 Operational Level Planning

The operational planning level reflects the "on-the-ground" imprint of the implementation of the strategies identified through the tactical level activities. The operational level plan essentially translates these strategies into site-specific practices and forest management activities such as harvesting, silviculture and road building to be implemented and adjusted in order to meet sustainability targets.

The challenge for operational level plans is to provide unambiguous instructions for forest practices. Vague statements can lead to unintended misinterpretation. However, highly prescriptive plans tend to constrain the flexibility and professional judgment that is often necessary to achieve desired outcomes, particularly when one considers the diversity of social, economic and ecological values across this province. Plans need to be an appropriate mix of unambiguous, yet flexible, prescriptions and guidelines that are still easily assessable and enforceable. The SFM Plan needs be reflective of this mix and endeavors to accomplish this through the development of the Sustainability Strategies (7.2 Implementation – Sustainability Strategies). Flowing from the strategies, sustainability practices that are applicable at the local forest level will provide the guidance for the specific site conditions. This will assist in designing plans and procedures to contribute to meeting sustainability targets.

The collection of the data to satisfy the majority of specific monitoring plans is also completed at this level through strategies, standard operating procedures, practices or special projects. The assessment of monitoring information is described in Section 8.0 Adaptive Management of this SFM Plan.

The preferred scenario includes current management and practices including harvest levels as set by the Chief Forester. For some of the indicators, this means using current or newly defined management strategies for operations (as defined in 7.2 Implementation – Sustainability Strategies).

## 7.1 Operational Level Plans/Schedules

Operational level plans can span from a one to 20-year time period. Annual scheduling of operations is completed, typically covering a five-year planning horizon. The operational planning level adheres to all required legislation and can act as both a reporting function as well as a mechanism to approve current operations.

The Forest Stewardship Plan (FSP) of the Forest & Range Practices Act (FRPA) outlines results or strategies for objectives of the Kootenay Boundary Higher Level Plan Order and FRPA objectives set by government, such as visual, soil or water objectives. The FSP is considered an operational component of the SFM Plan.

The FSP has a public component and can be vetted through the *FOREST* as well as the general public. The current operating schedule under the approved FSP can be viewed at the Canfor Radium office.

### Canfor FSP Summary

Canfor operations are based on an identified supply of timber, stemming from a 20-year forecast of available volume within the Invermere TSA.

Canfor's FSP was approved on March 9, 2006 and extended on March 4, 2011 with an expiry date of March 3, 2016 The FSP shows the location of Forest Development Units (FDU's) for the next 5 years. FDU's can be as small as cutblocks or as large as a licences operating area. FDU's within Canfor's FSP are parallel with the existing landscape units that extend from Radium Hot Springs east to the Alberta border, west to the height of the Purcell Mountains, south to Canal Flats and north to Parson.

FDU's identify the location where primary forestry activities occur that include harvesting, road building and silviculture activities over the 5-year term of the plan.

The plan specifies results or strategies for each FDU, as they relate to primary forest activities that are consistent with:

1) objectives set by government in the Kootenay Boundary Higher Level Plan, and
2) objectives prescribed by the Forest and Range Practices Act or otherwise established by government.

The FSP also specifies measures for preventing the introduction or spread of invasive plants and to mitigate the loss of natural range barriers. Finally, the FSP specifies the regeneration date, free growing height and stocking standards necessary to actively establish and reforest harvested areas.

The Forest Stewardship Plan guides the refinement of available volume based on merchantability criteria (age and height class, piece size, volume), access to the resource, and operational feasibility. This information is further refined to produce an annual harvest plan that drives yearly planning and harvesting activities.

When amendments to the FSP are required, amendments will follow legislated requirements and the District Manager Policy for Amendments to FSPs. Changes to the plan will be referred to those parties who may have the potential to be affected by these changes prior to submitting an amendment to the FSP to the District Manager.

In addition to the FSP, several background documents are prepared to support the results or strategies of the FSP. These include, but are not limited too, Forest Health Plans, Forest Seral Stage Distribution and Allocation Reports, Patch Size Distribution Reports, Wildlife Tree Patch Distribution Reports, Domestic Watershed Reports, and a report summarizing Review Comments obtained from the public and Aboriginals.

## 7.2 Implementation – Sustainability Strategies

Sustainability strategies are developed at the tactical level but implemented at the operational level. The development of sustainability strategies at the tactical level provides a longer-term plan that clearly links strategic planning with operational options. Forecasting allows the organization to define the SFM strategy and forest practices that will achieve the desired result in the context of adaptive management. Sustainability strategies are used to guide the development of new practices or the refinement of existing sustainability practices (e.g. Standard Operating Procedures).

The SFM Participants have developed some, but not all of the sustainability strategies to address the ecological and socio-economic values as identified in Section 5.0 for the Radium DFA.

Strategies have been developed based on the most current inventories and assessments and are applicable to all areas within the Radium DFA. The strategies include input/guidance from the tactical planning level –forecasting and scenario design. Update to the strategies will be on an as needed basis – that is when data, impacts or concerns arise that result in a need for a change in management direction.

Currently the following sustainability strategies have been developed and are described below:

- Habitat Representation
- Wildlife Tree Retention
- Coarse Woody Debris
- Riparian Area
- Hardwood Tree
- Protected Areas
- Land Base Productivity
- Reforestation
- Aboriginals
- Recreation
- Visual Quality
- Consumptive Use Streams

The following strategies are described in other documents:

- Stream Crossing – FSP Supporting documents
- Natural Disturbance – FSP Supporting documents
- Mountain Pine Beetle – Forest Health Strategy

Additional sustainability strategies will be developed from time to time as practices or conditions change that require a new strategy as part of continuous improvement. Action plans will be developed to implement these strategies within the DFA

### Habitat Representation Strategy

Ecological representation mapping for the East Kootenays will be applied to the Defined Forest Area. Management strategies will focus on four ecosystem groupings that have been identified from the representation mapping as being areas of high responsibility for management. Note that there are linkages between this strategy and the strategies developed for wildlife tree retention, coarse woody debris, hardwood trees, and riparian.

Management strategies for each ecosystem type and measure will then be applied as follows:

**A. Rare Ecosystem Groups** (Appendix 1.6: Habitat Element Supporting Tables – Table 1) are to be reserved from harvesting (except for required road or trail crossings where no other practicable option exists).

**B. Uncommon Ecosystem Groups with <50% representation in the NHLB and <2000 ha in the EKCP** (Appendix 1.6: Habitat Element Supporting Tables – Table 2) are to be reserved from harvesting, except for required road or trail crossings where no other practicable option exists.

**C. Uncommon Ecosystem Groups > 2000 ha and < 8500 ha** (Appendix 1.6: Habitat Element Supporting Tables – Table 3) are to be emphasized for placement of reserves including wildlife tree patches, riparian reserves, and old growth or mature management areas. Stand structure, CWD retention and wildlife tree retention will also be emphasized in these ecosystems through block design and silviculture systems, such as partial harvesting.

**D. Ecosystem Groups with Low and Moderate representation in the NHLB** (Appendix 1.6: Habitat Element Supporting Tables – Table 4) are to be emphasized for structural retention, including CWD, hardwood trees and snags, and reserve placement for reserves such as wildlife tree patches and old growth or mature management areas. Refer to the management strategies for wildlife tree retention, hardwood trees, and coarse woody debris for additional detail.

To complement the strategies for each ecosystem type described above, Biodiversity Emphasis will be assigned to landscape units within the DFA, consistent with the Kootenay Boundary Higher Level Plan (KBHLP). Old and mature seral forest retention targets will be calculated for each landscape unit consistent with the KBHLP requirements. Old growth management areas (OGMA) and mature management areas (MMA) will be spatially identified and reviewed or revised regularly due to:

- large unforeseen natural events, (including without limitation, fire, flood, outbreak of insects and disease or the impact of animals or other abiotic factors), that seriously impact the old or mature values in the areas identified, or
- unforeseen negative impacts on other resources such as approved mineral, coal, oil or gas exploration, development or production, or any other similar case, or
- an alternate old or mature area of higher biodiversity value is available

In addition to the above, rare, uncommon and groups with low and moderate representation were included in the analysis of High Conservation Value Forests (HCVF) as High Conservation Values. HCVF's will be designated for key areas that compliment these values. Refer to the management strategies for HCVF's (Appendix 1.7: HCVF Strategies) for additional detail.

### Wildlife Tree Retention Strategy

The wildlife tree retention strategy is expected to address both dead standing trees on harvested areas as well as stand level retention habitat features. Future dead standing trees will be recruited by leaving variable numbers of large, long-lived live trees and healthy understory trees in cutblocks, when these features exist in the pre-harvest stand. Hardwood trees, which create some of the most important snags, will be retained within harvested areas as detailed in the hardwood tree strategy.

Wildlife tree retention is not intended to occur on every cutblock but will be designated to satisfy landscape unit targets and maximum spacing requirements. This will allow for operational flexibility while providing for meaningful wildlife tree retention. The retention of lodgepole pine in a cutblock, for example, may not be suitable if the management regime is focused on mountain pine beetle suppression or control. Similarly, retention of stems in a cutblock may not be achievable if the operational logistics of cable harvesting is driven by topographical and safety constraints.

Wildlife trees will be retained in patches as well as individual trees within each landscape unit (LU) and biogeoclimatic (BEC) variant to the minimum targets established for each LU/BEC combination.

To ensure a meaningful distribution of wildlife tree retention within a LU/BEC combination, wildlife tree retention areas greater than 0.25 ha will be established where required such that any clear cut area is no more than 500 meters from a forest edge or wildlife tree retention area unless:

a) the pre-logging stand structure has few attributes that are valuable to wildlife as determined by a qualified person, or
b) the pre-logging stand will not provide for the best long term recruitment of wildlife trees as determined by a qualified person, or
c) the pre-logging stand has a high risk to windthrow, or
d) felling and removing of the trees is required to address a safety hazard, if there is no other practicable option for addressing the safety hazard, or
e) felling and removing or modifying the trees is required to address stands that have been damaged by fire, insects, disease or other similar cases, or
f) the portion of the wildlife tree retention area that is occupied by trees provides the most practicable access to another cutblock and the holder specifies one or more wildlife tree retention areas that provide an area, number of trees or habitat that are equivalent to the portion of the wildlife tree retention area from which the timber is being harvested.

Harvesting of a wildlife tree retention area will not occur unless the trees on the net area to be reforested of in the cutblock to which the wildlife retention area relates have developed attributes that are consistent with a mature seral condition.

WTP targets are defined within the Forest Stewardship Plan.[69]

[69] Forest Stewardship Plan # 17 updated to March 21, 2011

Field personnel will be guided to retain wildlife trees patches or individual wildlife trees where stand structure attributes include:

- Dead and dying trees
- Wolf trees – heavily branched, poor form trees
- Fallen logs, rotten logs
- Advanced regeneration and other understory trees
- Shrub complexes
- Mature broadleaf trees – e.g. aspen, cottonwood
- Trees with stick nests, broken tops or other structures suitable for nesting or perching – e.g. brooms
- Veteran trees
- Large diameter trees
- Trees where active or recent wildlife use is evident
- Wet areas
- Rocky knolls
- Armillaria root rot infection centres

Wildlife tree retention will be established with consideration for meeting other resources objectives, including riparian, coarse woody debris, hardwood tree and habitat representation strategies.

### Coarse Woody Debris (CWD) Strategy

Within the DFA, coarse woody debris (CWD) will be retained within cutblocks to achieve the specified targets (Appendix 1.6: Habitat Element Supporting Tables – Table 5) by biogeoclimatic variant and stand type. In providing for CWD, consideration must be given to recruitment in small accumulations and individually across the site, as well as variability of accumulated levels of CWD across the landscape. Targets will be met on an average annual basis and not on each individual cutblock. However, each individual cutblock will retain, at a minimum, the amount of logs specified in the Forest Planning and Practices Regulation, Sec 68 as such:

- a minimum of 4 logs per hectare, each being a minimum of 2m in length and 7.5 cm in diameter at one end.

*The CWD targets will not apply for areas within community fire-interface zones or areas where the over-riding objective is to reduce fire risk within these areas.*

Specific strategies to achieve the targets with a cutblock may include:

- Incorporating areas with a large number of high value pieces of CWD into WTP, riparian reserves, other reserves, or to be left out of blocks where possible,
- During harvesting, avoid skidding/yarding large pieces of CWD to the landing, and avoid crushing large logs with machinery,
- On especially dry sites, and where required for silviculture purposes, packing slash back to the block,
- Retaining wildlife trees that will be recruited for future CWD,
- Retaining incidental windthrow in sensitive ecosystems such as riparian areas and wildlife tree patches,
- Retaining debris piles on landings where post harvest fire hazard abatement is not required,
- Retaining small debris piles in cutblocks where processing occurs at the stump.

An accurate modelling projection on CWD volumes will be thoroughly investigated as part of the stand structure project (Davis et al. 2005[70]). This will enable trends in the CWD volume at the coarse scale to be examined in the near future.

[70] Davis, R., K. Stuart-Smith, J. Przeczek. 2005. Stand Structure and Structural Element projections for the Invermere TSA. Unpublished Progress Report for Tembec Inc.

## Riparian Area Strategy

At minimum, riparian classifications for streams, wetlands and lakes adjacent to cutblocks or roads will be classified according to the riparian classes identified in Forest Planning and Practices Regulation (FPPR). Similarly, riparian management zones and riparian reserve zones will be established as identified in the FPPR for streams, wetlands and lakes according to their riparian class.

*Riparian Reserve Zones (RRZ)*
RRZ will be extended beyond the minimum legislated requirements where associated with the following complimentary strategies:

- High Conservation Value Forest strategy,
- Habitat representation strategy specific to riparian ecosystems types with less than 2000ha represented in the East Kootenays (Appendix 1.6: Habitat Element Supporting Tables – Tables 1 – 4),
- Wildlife tree retention strategy,
- Consumptive use stream strategy, and
- Hardwood tree strategy.

Harvesting or road construction will generally not occur within RRZ except for those reasons specified in the FPPR section 50 or 51.

*Riparian Management Zones (RMZ)*
Retention levels within RMZ will be based on a windthrow hazard assessment of a RRZ to protect the integrity of the RRZ. In general, as the windthrow risk within the RRZ increases, the residual tree density of the RMZ will increase. Harvesting practices will be carried out surrounding streams as follows:

(a) S1, S2, and S3 streams, W1 and W5 wetlands and L1 lakes where both a RMZ and a RRZ exist, subject to paragraph b) and where :
   i. a high blowdown risk occurs,
   - no clear cutting of the RMZ, and
   - harvest the RMZ to a maximum of 30% removal of basal area, focusing on retention of windfirm trees, and
   - fall and yard away from RRZ unless a safety hazard dictates otherwise.
   ii. a moderate blowdown risk occurs,
   - clearcut 0% to 50% of the RMZ, and
   - harvest the RMZ to a maximum of 50% removal of basal area of the non clear cut portion of the RMZ, focusing on retention of windfirm trees, and
   - fall and yard away from RRZ unless a safety hazard dictates otherwise.
   iii. a low blowdown risk occurs,
   - clearcut 0% to 100% of the RMZ, and
   - if retaining trees in the RMZ, focus any retention on windfirm trees, and
   - fall and yard away from RRZ unless a safety hazard dictates otherwise.

(b) S5 and S6 streams, including those that are a direct tributary to an S1, S2 or S3 stream, W3 wetlands and L3 lakes where only a RMZ exists:
   - clearcut 0% to 100% of the RMZ, and
   - fall and yard away from S5 and S6 streams, W3 wetlands and L3 lakes, unless a safety hazard dictates otherwise or it is not practicable, and

- where falling and yarding away is not practicable, ensure that directional bridging is in place prior to cross stream yarding, and
- remove introduced harvest slash and debris concurrent with harvesting where there is significant potential for debris to be transported downstream, as determined by experienced staff or contractors for the Holder.

(c) S4 streams, including those that are a direct tributary to an S1, S2 or S3 stream, where a RMZ only exists:

- a minimum of 10% of the basal area is retained in the RMZ, focusing on utilizing topography breaks for boundary location and retention of windfirm trees and key wildlife attributes characteristic of natural riparian ecosystems, and
- unless a safety hazard dictates otherwise or it is not practicable, falling and yarding is directed away from S4 streams, and
- where falling away is not practicable, individual trees are bridged and yarded without disturbance to stream channel or banks, and
- introduced slash and debris is removed concurrent with harvesting where there is the potential for debris to be transported downstream.

(d) For all stream, wetland and lake classes that have riparian management areas of high or moderate blowdown risk, clearcutting of up to 100% of the RMZ can occur to:

- remove trees that are a safety hazard, if there is no other practicable option for addressing the safety hazard, or
- remove trees that have been windthrown or have been damaged by fire, insects, disease or other causes, if the removal will not have a material adverse impact on the riparian management area.

The following strategies apply for skid bridge stream crossings within the RMZ of S5 and S6 streams where the objective is to minimize sediment delivery to streams and maintain stream bank integrity:

- place clean logs and filter cloth in the stream channel to protect stream banks and prevent machines traveling through the stream.
- utilize culverts or bridges for large streams with high flows when logs are not sufficient to protect the stream.
- place branches and debris on the approaches of crossing to minimize sediment delivery from machinery.
- remove skid bridges prior to the spring freshet.
- re-vegetate approach and fills if required to reduce erosion and sediment delivery to stream

Strategies for crossing S1, S2, S3 and S4 streams will conform to the "Timing Windows and Measures for the Conservation of Fish, Fish Habitat and Water Quality for the Invermere Forest" District, MoELP, November 11, 2000, as required to avoid undue impact from the introduction of silt or other materials into the stream thereby, protecting and conserving aquatic resources.

A minimum five (5) meter no-machine zone will be placed adjacent to every stream, lake, or wetland, except as required for designated crossings. This is to reduce the chance of machinery depositing sediment into the riparian feature, or impacting trees, roots and other vegetation that provide stream-bank stability.

### Hardwood Tree Strategy

Harwood species such as aspen, cottonwood and birch are not commercially harvested within the DFA. Pure deciduous stands and deciduous leading stands will generally not be harvested.

Where hardwood species are a component of a pre-harvest stand, the following strategies apply:

1. Hardwood trees will be retained, primarily in clumps as incorporated into Wildlife Tree Patches, although some scattered individual stems will also be retained.
2. Incidental removal of hardwood trees will occur during regular harvest activities. Removing a component of the mature deciduous stems often results in increased suckering, and is encouraged, especially on blocks within Ungulate Winter Range.
3. A component of the hardwood regeneration will be retained in cutblocks, i.e. brushing or spacing operations will not result in complete removal of the deciduous component from a stand.
4. Aspen, cottonwood, and birch, as well as willow and alder within riparian management zones will be considered brush competition when determining free growing stocking status unless these species are determined, by a qualified professional and approved by the District Manager for specified sites, that they will not impede the growth and yield of preferred and acceptable species defined for the ecosystem of that site.

### Protected Areas Strategy

Protected areas addressed by this strategy include national and provincial parks, reserves such as riparian reserve zones or High Conservation Value Forests, protected areas such as wildlife tree retention areas or wildlife habitat areas (WHA's) for species at risk, biologically significant areas such as den sites, animal licks or rare ecosystems, and finally specific wildlife management plans such as ungulate winter range. Objectives for these protected areas are often very diverse but the management strategies overlap.

While Parks Canada is interested in cooperating and participating in initiatives within the regional ecosystem, any forest related activities occurring within Kootenay National Park will be planned and managed solely by Parks Canada.

Overall, primary forest activities will be consistent with protected area objectives. Specific stand level strategies will be addressed in the Forest Stewardship Plan and subsequent operation level plans.

The location of the various protected areas will be identified spatially and housed with the Kootenay Spatial Database centre. The management strategies associated with each of the protected areas can be accessed through resource agencies, ministries and/or licenses. Operational level plans have to be prepared with the knowledge of the locations of protected areas, and their implementation must be supervised to ensure their objectives are met. Canfor will monitor the location of landscape level reserves over time.

Training on protected areas will be provided through annual staff training of relevant staff when applicable. Individuals preparing operational level plans will ensure that the plans incorporate relevant strategies to address the objectives of the protected areas. Protected areas will be appropriately managed based on the recommendations and information provided in the FSP or operational level plan. A qualified professional will be consulted if deemed necessary by the signing and sealing forester.

Currently, systems are in place to evaluate the consistency of forest operations with operational plans. Inspections occur during forestry activities to ensure consistency with operational level plans, legislation, and EMS programs. Once operations are complete a final inspection is performed to evaluate consistency with operational level plans. Any management strategies identified in operational level plans for protected areas are monitored concurrently with other activities.

Existing inspection checklists, EMS procedures, and internal audits will continue to ensure operational level plans are implemented to achieve prescribed management strategies. If these methods are proving ineffective in achieving desired results, new procedures will be developed to meet objectives.

High Conservation Value Forests are those forest areas of high ecological or cultural significance. These have been identified for Canfor operating areas in the Invermere TSA. Management strategies have been developed and implemented for each HCVF. This strategy will also rely on the strategies specified for Riparian Areas and Habitat Representation, as well as strategies for High Conservation Value Forests (Appendix 1.7: HCVF Strategies).

### Land Base Productivity Strategy

Land base productivity strategy is comprised of three phases:

- Assessments,
- Prescription / Implementation, and
- Reclamation.

Terrain Stability Overview Assessments (Level D Mapping) and identified sensitive areas from field observations (e.g. steep slopes, jack-strawed or pistol butt trees) will used to guide detailed site assessments of proposed harvest areas and road construction. Site Assessments by qualified persons will be completed for all proposed roads/landings classified as Unstable or Potentially Unstable on overview mapping. Site Assessments will be completed for all proposed cutblocks classified as 'unstable'. Site Assessments will also be completed or proposed cutblocks classified as "Potentially Unstable" if skid trail construction is planned.

Operational level plans, such as site plans and Road Permits, are completed for all proposed roads and cutblocks. Recommendations from Terrain Stability Field Assessments will be incorporated into the specific site plan or road construction plans. In addition, these plans will identify maximum percentages of permanent access structures (roads/landings), maximum allowable soil disturbance and means to minimize landslides. These plans also address details such as harvest method (i.e. conventional vs. cable vs. aerial), identification of sensitive areas, seasonal restrictions, skidding restrictions, and other specific restrictions. Road and landing construction will be minimized to extent necessary to carry out safe and efficient operations. Landings will not be built in conventional cut to length operations.

Currently, systems are in place to evaluate the consistency of forest operations with operational plans. Inspections occur during forestry activities to ensure consistency with operational level plans, legislation, and EMS programs. Once operations are complete a final inspection is performed to evaluate consistency with operational plans. Existing inspection checklists, EMS procedures, and internal audits will continue to ensure operational level plans are implemented and monitored to achieve prescribed management strategies.

All temporary access structures and unplanned detrimental soil disturbance will be re-habilitated following harvest activities in order to be below the maximum allowable soil disturbance levels. In very sensitive areas, such as community watersheds, permanent access structures may also be re-habilitated in conjunction with recommendations from watershed assessments.

### Reforestation Strategy

Canfor are responsible for reforestation of areas harvested under their respective forest licence or timber sale licenses.

The standards for seed use, for areas to be reforested, will follow those described by the Chief Forester's Standards for Seed Use. By applying those standards, reforested areas will have seedlings grown from seed genetically appropriate for cut block locations. Seed will be collected either from natural stands (class B seed) or from seed orchards (class A) to create unique seedlots. A seedlot is a quantity of seed having uniformity of species, source, quality, and year of collection (BC MOF, 1995a). Canfor will use a particular seedlot to grow seedlings to be planted in an area that meet the conditions appropriate to that seedlot's genetic background. By choosing a seedlot that is suitable to the site it is to be planted in, the resulting plantation will be adapted to its site, local climate, and endemic forest health problems. Tracking and reporting the seedlots that are used for reforestation is standard practice. Canfor will monitor, track, and report the percent compliance with Chief Forester's Standards for Seed Use. Specifically, the Silviculture Forester must comply with the standards when planning sowing requests, planting prescriptions, cone collections, and registering seedlots.

Reforestation will be achieved either through artificial or natural regeneration as prescribed for each cutblock in an operational level plan. Species prescribed for regenerating a site will be based on the stocking standard measures specified for each ecological type as found in the Forest Stewardship Plan.

Reforestation will occur within the specified regeneration time periods identified in the Forest Stewardship Plan and subsequent operational level plans. Within this time period, site preparation may be required, such as windrowing or mounding, and seedlings have to be grown that are appropriate for that site. Silviculture surveys will be conducted on all cut blocks within three years of harvest on areas scheduled for natural regeneration or within two years of planting on areas scheduled for artificial regeneration unless otherwise stated. These surveys may include stocking, plantability, survival and free growing.

To achieve these dates, forestry operations have to be completed quickly and efficiently. Harvesting schedules, piling and burning of debris and road deactivation schedules all have to consider the target planting date. Silviculture foresters will have to ensure site preparation and seedling acquisition is timed to meet the regeneration target date. All silviculture activities, including declarations of meeting regen dates and planting, will be reported annually to the Government through their current database/reporting program.

Establishing free growing dates and standards for each harvested stand is a legal requirement. They will be recorded and maintained in a database. Each cutblock will be surveyed prior to the late free growing date identified in the Forest Stewardship Plan to ensure the free growing standards have been met and that the stand is at target heights, fully stocked, and healthy. The results of all surveys will be summarized and maintained in the database. If a survey indicates that the stand has not achieved free growing by the required date, corrective actions will be prescribed immediately to remedy the situation while still meeting the late free growing deadlines. If all free growing standards are met, an application is made to the Government for the cutblock to revert to the Crown's responsibility.

### Aboriginal Strategy

The strategy is intended to formalize processes already in place for management of archaeological resources and address broader cultural heritage resources related to Aboriginal traditional uses.

A list of all Aboriginal bands and their areas of interest in the DFA will be established and maintained. During Forest Stewardship Plan/major amendment preparation, all affected bands will be contacted as part of the communication strategy for referral. A record will be kept of each referral in the referral tracking system. Any additional communications will also be recorded and tracked in the referral tracking system. Communications will focus on areas proposed for harvest and road construction and:

(a) the relative value or importance of potential cultural heritage resources to a traditional use by an aboriginal people;
(b) the relative abundance or scarcity of potential cultural heritage resources;
(c) the historical extent of the traditional use of these cultural heritage resources; and,
(d) the impact on the FSP Holders' government granted timber harvesting rights in conserving or protecting these cultural heritage resources.

To support communications with Aboriginals, archaeological predictive maps will be used to guide information about traditional uses. The predictive maps will also be used to identify where detailed archaeological impact assessments will be conducted. Any recommendations resulting from such assessments will be incorporated into operational level plans. Archaeological impact assessments may not be conducted if:

(a) harvesting and yarding equipment is restricted to previously established roads and trails, or,
(b) harvesting occurs with low-impact harvest equipment (feller-processor-forwarder system) on
    i) dry soils and the harvest area is less than 1.0 hectare, or
    ii) frozen ground, or
    iii) snowpack conditions

    providing that the crew members are trained in the identification and avoidance of above ground cultural heritage resource features, notably cairns (artificial rock piles), rock rings, cultural depressions, and culturally modified trees, or
(c) harvesting occurs with equipment other than low-impact harvest systems on frozen ground or snowpack sufficient to bear the weight of harvesting or yarding equipment with no appreciable disturbance to the soil where archaeological deposits are buried below the surface providing that,
    i) the crew members are trained in the identification and avoidance of above ground cultural heritage resource features, notably cairns (artificial rock piles), rock rings, cultural depressions, and culturally modified trees, and
    ii) the harvesting equipment is restricted from the following areas within an area identified as having moderate or high archaeological potential from established archaeological overview assessment mapping,
        - within 30m of a terrace margin
        - ridge crests
        - knoll summits

In addition to the above strategies, the strategies specified for other indicators in the SFM Plan, such as the biodiversity or protected areas strategy, will contribute to meeting the cultural heritage resources that are of traditional use.

### Recreation Strategy

This strategy addresses recreation areas such as interpretive forest sites, recreation sites or recreation trails that have an established legal objective.

During the planning phases of forestry activities known recreational opportunities will be considered. This will be accomplished at a strategic level through the public involvement process and by referencing inventories of known recreational areas. Ensuring that recreation groups and the general public have the opportunity to comment on proposed harvesting activities provides additional information at the site specific Operational level to plan measures aimed to minimize impacts on known recreation features such as campsites, trails and roads.

When conducting a primary forest activity near a recreation area, Canfor will:

(a) Avoid damaging existing recreation features that have recreational significance or value with the recreation area (e.g. picnic tables, outhouses, access roads, etc.);
(b) For recreation areas that specify natural vegetation will be conserved or forested buffer strips will be retained in order to maintain the recreational experience, the retention of buffers of existing vegetation will occur utilizing topographic features, where applicable;
(c) Design roads and access trails to bisect established trails in a perpendicular fashion where practicable; and
(d) Establish access control barriers on roads or access trails for recreation areas that are designated for a non-motorized recreation experience.

If damage occurs, as a direct result of primary forest activities, any recreation feature associated with a recreation area will be replaced or repaired to its prior condition.

Currently, systems are in place to evaluate the consistency of forest operations with operational plans. Inspections occur during forestry activities to ensure consistency with operational level plans, legislation, and EMS programs. Once operations are complete a final inspection is performed to evaluate consistency with operational plans. Existing inspection checklists, EMS procedures, and internal audits will continue to ensure operational level plans are implemented and monitored to achieve prescribed management strategies.

### Visual Quality Strategy

Visual Quality Objectives (VQO's) have been established in the DFA as scenic areas from the significant public viewpoint of highway 93/95. In addition, Canfor has established VQO's associated with high use recreation lakes found in the Dunbar/Templeton and Steamboat Landscape units. Visual Impact Assessments (VIA's) will be completed by Registered Professional Foresters, or other qualified professionals, who will provide recommendations to achieve the VQO objectives. The assessments will be considered, along with other resource management objectives, when developing site plans and road permits. Potentially adverse visual impacts may be mitigated through management such as: partial cutting, irregular block edge design, group reserves, and harvest method selection.

### Consumptive Use Streams Strategy

Forest development will follow the specified provisions in Objective 6(1) of the KBHLP as stated below for streams licensed for human drinking water consumption:

(a) Stream side management provisions:
   i) the stream side management zone will extend from the edge of the stream channel bank or the outer edge of the active floodplain, to a minimum distance of 30 meters on each side of the stream, or to the top of the inner gorge, whichever is greater; and specific measures to safeguard water licensed for human consumption must be described in an operational level plan for any activities planned in the stream side management zone.

(b) The provisions apply to:
   i) the segment of stream between the water intake which is licensed for human consumption and the upstream point where the stream order is reduced and, if the intake is located on a first-order stream, the entire stream length above the intake;
   ii) a steam on which there is a water intake which is licensed for human consumption; and
   iii) a stream on which the location of a water intake and watershed boundary is shown on the FSP map.

(c) The provisions do not apply where:
   i) it has been established that a licensed intake is not being utilized for human consumption

In addition, specific practice requirements and measures will be undertaken to safeguard water licensed for human consumption, regardless if an intake is with a community watershed or not. The measures to be undertaken are:

- those legislated in the Forest Planning and Practices regulation Section 59 through 63; and,
- those recommendations resulting from Hydrological Assessments for specific watersheds.

From these various sources of recommendations and practice requirements, the prescribing forester will document operational practice requirements around streams licensed for human consumption in a site plan or road permit plan. Inspections will occur during forestry activities to ensure consistency with operational level plans, legislation, and EMS programs. Once operations are complete a final inspection will be performed to evaluate consistency with operational plans. Existing inspection checklists, EMS procedures, and internal audits will continue to ensure operational level plans are implemented and monitored to achieve prescribed management strategies.

## 7.3 Implementation – Sustainability Practices

Sustainability practices are developed following current proven practices or flowing from the Sustainability Strategies, as described in Section 7.2 Implementation – Sustainability Strategies.

Sustainability practices are implemented at the operational level. The refinement of sustainability practices at the operational level provides for a practical and site-specific approach. 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, specifically the Sustainability Strategies. Practices include:

- Harvesting
- Silviculture
- Roads & Road Building
- Rehabilitation/Restoration

The current management scenario has been assessed for sustainability, both through the TSR3 process and through the public advisory process. Once the analysis of monitoring data for each indicator has taken place, practices can be re-evaluated to determine what/if any changes are required. Current practices are identified in the approved FSP but have been summarized in Appendix 1.3: Practices Analysis. Further details on practices and operating procedures can be viewed at Canfor Radium office.

## 7.4 Training

Canfor Radium provides training to all employees and contract personnel to ensure they are aware of their responsibilities, and are trained and competent to carry out these responsibilities. Environmental and SFM awareness training for staff employees, operations employees, and contractors includes an explanation of (at a minimum):

- responsibilities for supporting the commitments in the Environment Policy, the SFM Commitments (Canfor only), and the SFM plans,
- responsibilities for following written procedures, and the potential consequences of not following operating procedures (impact on the environment, liability),
- the concept of sustainable forest management and how their work supports SFM,
- the benefits of SFM and improved environmental performance,
- responsibilities in environmental emergencies, and
- significant environmental aspects of the operation, and the employee's responsibilities for reducing environmental impacts.

Details on training can be found within Canfor FMS/EMS.

# 8.0 Adaptive Management

Given that the SFM Plan is a living document, it is understood that changes will occur over time. In a competent management system, this change is considered to be continual improvement. The SFM Plan is based on the principle of adaptive management, which enables and encourages the improvement of management actions and practices based on knowledge gained from experience. SFM requires the establishment of relationships between forest values (i.e. Criteria & Indicators) and management actions (i.e. operational level plans, strategies, practices) and the understanding of these relationships at the temporal and spatial levels at which forest systems are managed.

Adaptive Management (AM) recognizes change as a constant factor in forest management, and it is necessary to understand the root causes of what has, and may be, changing. To do so requires learning how the economic, social and ecological systems change and reconfigure in response to human attempts to manage them.

The desired concept of sustainability is described through management goals and objectives, with the associated uncertainties and risks translated into learning objectives. A structured monitoring process is used to generate results, which are then evaluated in terms of their validity, relevance and significance. Through the evaluation process, monitoring information is combined with values, experience, training, and intuitive thinking in order to achieve shared knowledge and derive meaning that is useful in developing recommendations for adaptations to management practices, the overall plan, etc.

To be successful, AM also requires decision-makers to acknowledge that uncertainty is a given. Therefore, forest managers 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 forest manager in relation to SFM. The resultant AM framework consists of:

- Program level approaches for incorporating AM principles into strategic, tactical and operational planning processes to create the necessary context for successful use of AM at the project-level. For example, training and the development of operational level plans that work with this SFM Plan.
- Project level assessment of opportunities/benefits/costs for implementing AM approaches on a project-by-project basis.

Continuous improvement, as exemplified in an AM Framework, is built into the SFM system. The initial steps include:

- Managing information
- Monitoring
- Evaluation and analysis (including the identification of knowledge gaps)
- Reporting
- Adjustment/Adaptation

The following sections will detail how the steps will work together to ensure the continuous improvement loop of the SFM Planning process.

## 8.1 Information Management System

Over time, information management has become an increasingly essential component of resource management. It has become even more important with the science-based, integrated nature of the SFM concept. A variety of information needs to be warehoused, in easily accessible formats including, scientific background data and reports, resource inventory data, forecasting results, key uncertainties, risks, implementation reports and monitoring/evaluation outcomes. Canfor 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 SFM concept.

The development of new data and the amalgamation of existing data into the SFM hierarchical planning framework and operational implementation requires considerable time and effort. To assist with strategic level data requirements Canfor Radium is involved with the Kootenay Spatial Data Partnership. The goal of this partnership is to increase the quality and reduce the cost of developing management plans (i.e. FSPs) by making available the most up-to-date spatial layers through the web/ftp site. A secondary goal is to increase cooperation between government and licensees for mutual benefit. The objectives of the partnership are to catalogue, rationalise, clean and apply metadata to spatial data layers necessary to the development of plans. Specific custodians and stewards have been assigned to important spatial layers and update procedures for key spatial layers are defined.

To address operational requirements, Canfor has a variety of information capture and management approaches. The current system includes the following components:

- Canfor's corporate website (www.canfor.ca) – which contains among other items, the SFM Plan annual reports,
- SFM related reports and the SFM Plan are housed within the Canfor Woodlands offices,
- Canfor Radium currently uses a resources database to capture and track roads, harvesting and silviculture activities and for harvest volume,
- Excel spreadsheets are used by staff to track other activities, and
- FSPs are developed using a geographic information system.

Canfor has standardized reports, developed a protocol for information management data exchange and developed a plan to involve other government agencies.

Current baseline data sources include the following for most indicators:

- TSR3 data package
- Terrain Stability
- Forest Cover/Vegetation Resources Inventory (VRI)
- In-house baseline data from Canfor
- SFM Framework C&I rationales
- SFM developed reports
- Statistics Canada
- Local policy/strategy/guide documents (see Section 2.3 SFM Plan Links to Other Strategic Initiatives)

Canfor Radium will update this section of the SFM Plan once their Genus systems are fully in place. Templates for reports will be designed and used for the SFMP Annual Report for Canfor.

## 8.2 Monitoring Plan

Monitoring is the collecting of information to track indicators and to check performance against an expected outcome for that indicator. Monitoring allows for observation of changes over time and space. A monitoring and evaluation process is necessary to ensure that management plans and activities contribute to meeting the objectives (i.e. values being sustained) and are capable of alerting the manager for any needed change in practices.

A monitoring plan or protocol is required for each indicator. There are essentially two types of indicators: process and performance. Process indicators describe a process, not an outcome. For process indicators neither trend nor effectiveness monitoring is relevant. These indicators are not so much monitored as reported out within the SFMP Annual Report.

For performance indicators (i.e. non-process indicators), status and trend monitoring plans have been, or are being, developed. Status monitoring provides managers and *FOREST* with a snapshot of how the indicator is currently doing. These measurements over time provide managers and *FOREST* with the trend of the indicator. Trend analysis can be used to assess how well forest practices are helping in meeting targets. Monitoring data for non-process indicators also improve the forecasting models that are to be used in the next round of sustainable forest management planning.

Effectiveness monitoring tests assumptions that are made about indicators (e.g. do the indicators under C2 really measure productivity?) It can assist in determining:

- What the relationship between the trend of an indicator and practices is, and
- When, or how to change a practice.

The following steps summarize the process to develop local monitoring plans:

a) Review of Scientific Reports
b) Consultation with Specialists/Experts
c) Review monitoring rationales for each indicator
d) Adapt monitoring rationales to local area by engaging with local PAG/Experts/Managers
e) Develop localized Monitoring Plan (unit/frequency/data source)

The monitoring plan for each indicator is included as part of the detailed discussion for the indicators in Section 5.0 and is summarized in Appendix 1.8: Monitoring Matrix. For the purposes of this SFM Plan, the current status for each indicator will be the starting point for trend monitoring and the basis from which analysis will take place in subsequent SFMP Annual Reports and updates to the SFM Plan.

## 8.3 Evaluation / Analysis and Reporting

As monitoring information is warehoused in the specified Information Management System, it will be evaluated for completeness and accuracy and then analyzed against the targets and thresholds developed for the DFA. Analysis takes place at the tactical levels, which is dependant on the indicator. Details of indicators analysis will be discussed as the monitoring plans are refined. Results of analysis of each indicator will be reported out as part of the SFMP Annual Report. *FOREST* will be involved in the review of the SFMP Annual Report. The SFMP Annual Report is a publicly available document.

## 8.4 Adaptation

As part of the AM/continual improvement loop, the analysis and reporting steps may lead to adaptations in management strategies, the target or the indicator itself. As well, new information (locally or from outside the area) or changes to policy and legislation may require changes to a component of the SFM Plan. Adjustments may be proposed through the *FOREST* process or through current government processes. The following process will be undertaken to propose changes to the SFM Plan's components:

- Analysis of monitoring data reviewed by Canfor
- Recommendations for changes put forward as a result of the review of the monitoring data
- Recommendations or non-conformances from internal and external audit results
- Review of recommendations by Canfor top management (i.e. management review)
- Review of recommendations with the *FOREST*
- Further evaluation, if required
- Alternatives explored
- Changes made to the SFM Plan and/or the SFM Policy
- SFMP Annual Report reflects the above

As part of the certification process, non-compliances or non-conformances may be found through internal and/or external audits. Canfor will address these through the Forest Managemet System process and protocols. For example:

- Identify and investigate non-conformance;
- Take action to mitigate any impacts caused; and
- Initiating, completing and documenting, root cause, corrective and preventive action and expected results.

Any corrective or preventive action taken to eliminate the causes of actual and potential non-conformances shall be appropriate to the magnitude of the problem and commensurate with the impact encountered.

### 8.4.1 Strategic Review

Management review of plans, policies or strategies is not a new component of forest management. The use of this SFM Plan, including the indicators and targets however, is a new approach within resource management. Annual reviews will be necessary at strategic, tactical and operational levels as this new approach is implemented. Annual strategic reviews will be undertaken by Canfor top management, the staff identified as responsible for various components of the SFM Plan and by *FOREST*.

The strategic review will consist of reviewing:

- data from monitoring,
- comparing the status and trend against the target,
- updating knowledge gaps filled in through monitoring data, as well as
- analysing the effectiveness of strategies used to achieve targets.

Findings will be summarized and reported out through the SFMP Annual Report. As well, recommendations for changes to the SFM Plan will be summarized in the SFMP Annual Report.

## 8.5 Integration with the Environmental Management Systems

An Environmental Management System (EMS) is a management tool that enables an organization to control the impacts of its activities, products or services on the environment. It is a structured approach for setting and achieving environmental objectives and targets, and for demonstrating that they have been achieved. The EMS requires an organization to have in place the mechanisms, policies and structure to comply with environmental legislation and regulations and to evaluate such mechanisms, policies and structure with the objective of continual improvement.

As a preparatory step to sustainable forest management certification, Canfor developed and maintains an Environmental Management System for their respective operations.

In July of 2001, Canfor's Radium operation certified its Forest Management System to the ISO 14001 standard developed by the International Organization for Standardization. The Company's Forest Management System[71] (FMS) provides a platform on which to build the sustainable forest management elements required to meet the CSA SFM standard.

Canfor's FMS provide a system for the continual improvement of performance that supports the adaptive management process within this SFM Plan in the following ways:

- The provision of mechanisms for the periodic reporting of performance, including environmental indicators within the FMS/EMS and relevant indicators within this SFM Plan;
- An annual internal audit program that assesses the implementation and maintenance of the FMS/EMS and this SFM Plan; and
- A management review process that ensures top management is aware of performance and is able to provide guidance and direction for the continual improvement of the FMS/EMS and this SFM Plan.

In addition, the FMS/EMS provides the assignment of roles and responsibilities, and the tracking of related training, to ensure the consistent implementation of these processes. The SFM Plan also makes use of the FMS/EMS document control and record keeping system to provide evidence of conformance to these procedures where relevant.

The SFM Plan will be revised to reflect any changes that result from the FMS/EMS process.

[71] The Environmental Management System (EMS) was rolled into the Canfor FMS – Forest Management System to capture the requirements of both the ISO 14001 standard and the CSA Z809 standard

# APPENDICES

## Appendix 1: SFM Plan Background & Support Documents

Appendix 1, with all the sub-appendices, provides support documents for SFM in the DFA.

### Appendix 1.1: Maps

This appendix contains maps for the DFA area, supporting SFM. Other relevant maps are available at the Canfor Radium office.

1. Radium Defined Forest Area

### Appendix 1.2: Stakeholder Analysis

This appendix contains the Inventory & Stakeholder Analysis completed for the DFA. Names and personal information of the stakeholder analysis have not been included in the appendix to ensure privacy. All information is maintained by Canfor and available for viewing at the Radium office.

1. Stakeholder Analysis Report

### Appendix 1.3: Practices Analysis

This appendix provides the resulting Practices Matrix for the DFA.

1. Practices Matrix Canfor

### Appendix 1.4: SFM Criteria & Indicators Matrix

This appendix is the set of matrices that list the localized Criteria & Indicators for the DFA. The matrices include a listing of the criteria, indicators, targets, and the current condition of the measure.

1. Updated C&I Matrix – December 2011

### Appendix 1.5: Responsibility Action Matrix

This appendix provides the responsibility matrix for achieving or moving towards targets for each indicator. The Responsibility Action Matrix describes required actions, frequency of the action, and whose responsibility it is to ensure the required action is completed. Staff assigned to responsibilities under the RAM require overview training for CSA and EMS as well as for specific components of the work they are undertaking.

### Appendix 1.6: Habitat Element Supporting Tables

This appendix contains tables that provide supporting data for the various habitat elements

1. Rare Ecosystem Groups
2. Uncommon Ecosystem Groups (<50% representation in the NHLB and <2000 ha in the EKCP)
3. Uncommon Ecosystem Groups (> 2000 ha and < 8500 ha)
4. Ecosystem Groups with Low and Moderate representation in the NHLB
5. Coarse Wood Debris Targets

### Appendix 1.7: HCVF Strategies

This appendix contains the strategies specifically written to support HCVF areas.

### Appendix 1.8: Monitoring Matrix

This appendix contains the monitoring matrix for each measure.

### Appendix 1.9: Public Opinion Survey

This appendix contains the results of the 2006 Public Opinion Survey for the DFA.

## Appendix 2: Certification Support Documents

Appendix 2, with all the sub-appendices, provides support documents for Certification (in this case ISO 14001-04 & CSA Z809-08) initiatives for the DFA.

### Appendix 2.1: Translation Information between SFM C&I vs. CSA

This appendix contains documents that provide the translation of SFM C&I to CSA requirement of the CSA Standards Z809-02.

1. SFMP 2007 vs 2012 Indicators Cross Reference Matrix
2. SFM Plan vs. CSA Requirements Cross Reference Matrix

## Appendix 3: Supporting Information

Appendix 3, with all the sub-appendices, provides additional information to support the SFM Plan for the DFA.

### Appendix 3.1: Glossary & Acronym List

This appendix contains a glossary for the SFM Plan. This glossary was generated from the *FOREST* process.

1. Glossary & Acronym List – Current

### Appendix 3.2: References & Citations

This appendix contains a listing of citations made throughout the SFM Plan.

### Appendix 3.3: Record of Revisions

This appendix contains the recording of changes to this SFM Plan.