

Sustainable Forest Management Plan Radium Defined Forest Area

Version 2.0

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*“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.”*

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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.



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SFM Policy – Canfor

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

The management of Canfor has set out a number of commitments which define the mission, vision, policies and guiding principles for the company. These include the Canfor Mission, Environment Policy and Forestry Principles. 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 *Forestry Principles* 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.

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.

A handwritten signature in black ink, appearing to read 'J. Shepherd', located above the name and title of Jim Shepherd.

Jim Shepherd
President and Chief Executive Officer

February 2005

A handwritten signature in black ink, appearing to read 'Peter Bentley', located above the name and title of P.J.G. Bentley.

P.J.G. Bentley
Chairman



Radium DFA Sustainable Forest Management Plan

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

The following is a summary of Canfor's *Forestry Principles*:

Ecosystem Management

We will use the best available science to develop an understanding of ecological responses to natural and human-caused disturbances. We will incorporate this knowledge into higher level and operational plans by applying ecosystem management principles to achieve desired future forest condition.

Scale

We will define objectives over a variety of time intervals (temporal scales), and at spatial scales of stand, landscape and forest.

Adaptive Management

We will use adaptive management to continually improve forest ecosystem management. This will require the development and application of collaborative research and monitoring programs.

Old Growth

We will include old growth and old growth attributes as part of our management strategies and philosophy in the forests where we operate.

Timber Resource

Canfor will ensure a continuous supply of affordable timber in order to carry out its business of harvesting, manufacturing and marketing forest products. Canfor will strive to maximize the net value of the fibre extracted for sustained economic benefits for employees, communities and shareholders.

Forest Land Base

We advocate the maintenance of the forestland base as an asset for the future.

Health and Safety

We will operate in a manner that protects human health and safety.

First Nations

We will pursue business partnerships and cooperative working arrangements with First Nations to provide mutual social, cultural, and economic benefits and to address mutual interests.

Communities

We will engage members of the public, communities and other stakeholders in the delivery of the Forest Principles. The process will be open, transparent and accountable.

Accountability

We will be accountable to the public for managing forest to achieve present and future values. We will use credible, internationally recognized, third party verification of our forestry operations as one way of demonstrating our performance.

To access and read the detailed *Environmental Policy* and *Forestry Principles* and please link to: www.canfor.com/sustainability/corporate/policy.asp and www.canfor.com/sustainability/principles.asp.

SFM Policy – BCTS

BC Timber Sales Corporate Overview

BC Timber Sales (BCTS) is a stand-alone organization within the Ministry of Forests and Range. We share the ministry's vision of "*diverse and sustainable forest and range values for B.C.*" and its mission to "*protect, manage and conserve forest and range values through a high-performing organization.*"

BC Timber Sales was created to develop Crown timber for public auction to establish market price and cost benchmarks, and capture the value of the timber asset for the public. By 2007, BC Timber Sales will be responsible for managing some 20 percent of the provincial Crown allowable annual cut or approximately 16.5 million cubic metres of timber.

The vision of BC Timber Sales is to be "*an effective timber marketer generating wealth through sustainable resource management.*"

In achieving our mandate, we:

- have skilled, motivated, committed and loyal employees;
- pursue efficient, effective and innovative business practices;
- strive to be respected managers of public forests;
- contribute to the British Columbia economy; and
- provide opportunities to our customers through the sustainable management of public forests.

BC Timber Sales, Kootenay Business Area – Sustainable Forest Management

In the fall of 2004, BC Timber Sales; Kootenay Business Area, accepted an invitation to join with Canfor Radium Division to develop a Sustainable Forest Management Plan for their operations within the Invermere TSA. The SFMP presented here confirms the Kootenay Business Area's intention to achieve and maintain that commitment.

In all of our operating areas, we have implemented an Environmental Management System (EMS) and achieved International Organization for Standardization certification (ISO 14001). We have a strategy for third party certification of our operations in the Invermere TSA under Sustainable Forest Management (SFM) standards that we expect to implement in 2007.

For further information on BC Timber Sales commitments to Sustainable Forest Management please visit our Web Site at: <http://www.for.gov.bc.ca/bcts>



BC Timber Sales is committed to managing and administering forest management activities on our Invermere Timber Supply Area operations through effective measures that ensure *sustainable resource management*.

It is the policy of BC Timber Sales to:

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



Shane Bowden
Timber Sales Manager

December 1, 2006

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1.0 Introduction

1.1 Background to Sustainable Forest Management

Recently, a multi-faceted partnership has been designing and testing 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.

The SFM Framework¹ is made up of three major parts:

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

The overall objective of the SFM Framework 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 process to achieve successful SFM will occur through the development, implementation and maintenance of this SFM Plan. Use of the SFM Framework, this plan and related operational plans and practices will lead to efficiencies for government and industry, serving to increase the public's confidence in forest management.

Third party certification has become 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. In order to assure buyers that wood products meet certain standards considered critical for SFM, many companies in BC and Canada are seeking certification of their practices.

Many of the larger wood products customers require that a forest company have either Sustainable Forestry Initiative (SFI), Canadian Standards Association (CSA), or Forest Stewardship Council (FSC) third party certification for their woodlands operations. The SFM Framework accommodates the requirements of these certification schemes for SFM (e.g. CSA) but was not developed exclusively for that purpose. Certification is an output of the Framework, not an input.

Canfor and BCTS are committed to SFM in the Radium area and have provided and communicated these commitments publicly. Canfor Radium Woodlands SFM Policy – Canfor and SFM Policy – BCTS found in the Preamble of this document provide the SFM commitments for Canfor and BCTS, respectively.

¹ A Framework for Sustainable Forest Management: Designing a scientifically credible and operationally feasible approach to multi-value forest management in British Columbia May 2004.

Radium DFA Sustainable Forest Management Plan

Canfor is currently undergoing a redesign on the SFM Framework, in combination with the Forestry Principles. This new “Strategic SFM Framework” document will be available in 2008. The concepts are reflected within this SFM Plan.

1.2 Purpose of an SFM Plan

The Strategic SFM Framework document provides the concepts and rationales supporting the SFM approach. This SFM Plan translates the strategic goals of the SFM Framework to operational reality on the ground through strategies and practices. 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 SFM Plan uses locally developed C&Is as a vehicle to track how management policies and practices are doing relative to sustainability targets. It also serves to recommend changes to practices, forest management policy, contribute to national initiatives around the sustainable management of forest resources, focus limited funds and staff time, and assist with the development of certification plans. The SFM Plan is not a stand-alone document – it must be used in conjunction with the Strategic SFM Framework.

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. It 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 Strategic SFM Framework document and SFM Plan will provide direction and links to government policy and licensee business plans. Some expected outcomes of the Strategic SFM Framework and 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 First Nations 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,
- Reduced costs through improved marketplace acceptance, government approval of innovative approaches, reduced conflict, increased certainty and effective information management,
- Certification and other marketing benefits,
- Providing for testing & implementation of the Kootenay Boundary Land Use Plan,
- Improved transition and implementation of the Forest Range and Practices Act, and
- Providing for continual improvement of forest management activities/practices with input from stakeholders and employees.

Radium DFA Sustainable Forest Management Plan

The following describes the nine sections of the SFM Plan:

- Preamble provides the SFM commitments and policies for Canfor and BCTS.
- 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 key issues, the inventory, stakeholders, current practices, decision support tools available and knowledge gaps.
- 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 operating plans, strategies, practices and training.
- Section 8.0 describes the continual improvement loop, inherent in Adaptive Management and describes the monitoring, analysis, reporting and resulting management decisions.
- Section 9.0 describes the information management systems applicable to the DFA.
- 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 Framework and/or the SFM Plan. It is important that these initiatives and documents are considered to be part of the Strategic SFM Framework, as well as the SFM Plan.

2.1 Plan Development, Implementation & Maintenance

The first step in implementing the Strategic SFM Framework for the Radium DFA was to clearly state the commitment to SFM from senior management through the SFM Policy². The SFM Policy provides the foundation and guidance to Canfor and BCTS.

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

- Management unit was defined – geographically, ecologically, economically, and socially,
- Areas adjacent to the unit (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),
- First Nations, stakeholder and public participation/involvement processes were initiated,
- Available information was collated, including:
 - ◆ resource inventories for the criteria and indicators identified in the SFM Framework;
 - ◆ 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.
- Knowledge gaps were identified.

² SFM Policies for Canfor & BCTS are found within the Preamble to this SFM Plan

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SFM Plan Development

As described in the SFM Framework, 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, tactic, 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 an approved Sustainable Forest Management Plan. The SFM Plan directs tactical and operational plans and practices within the Radium DFA, either within or outside of a forest products certification context. The critical step, at this planning level was to localize the core set of C&I developed under the Framework. This was accomplished through a combination of expert and technical input and stakeholder input. The desired future conditions for criteria and indicators were determined through the articulation of measures and thresholds by the public advisory group. The strategic level is essentially captured within Section 5.1 Values, Criteria, Indicators, Measures, Targets.

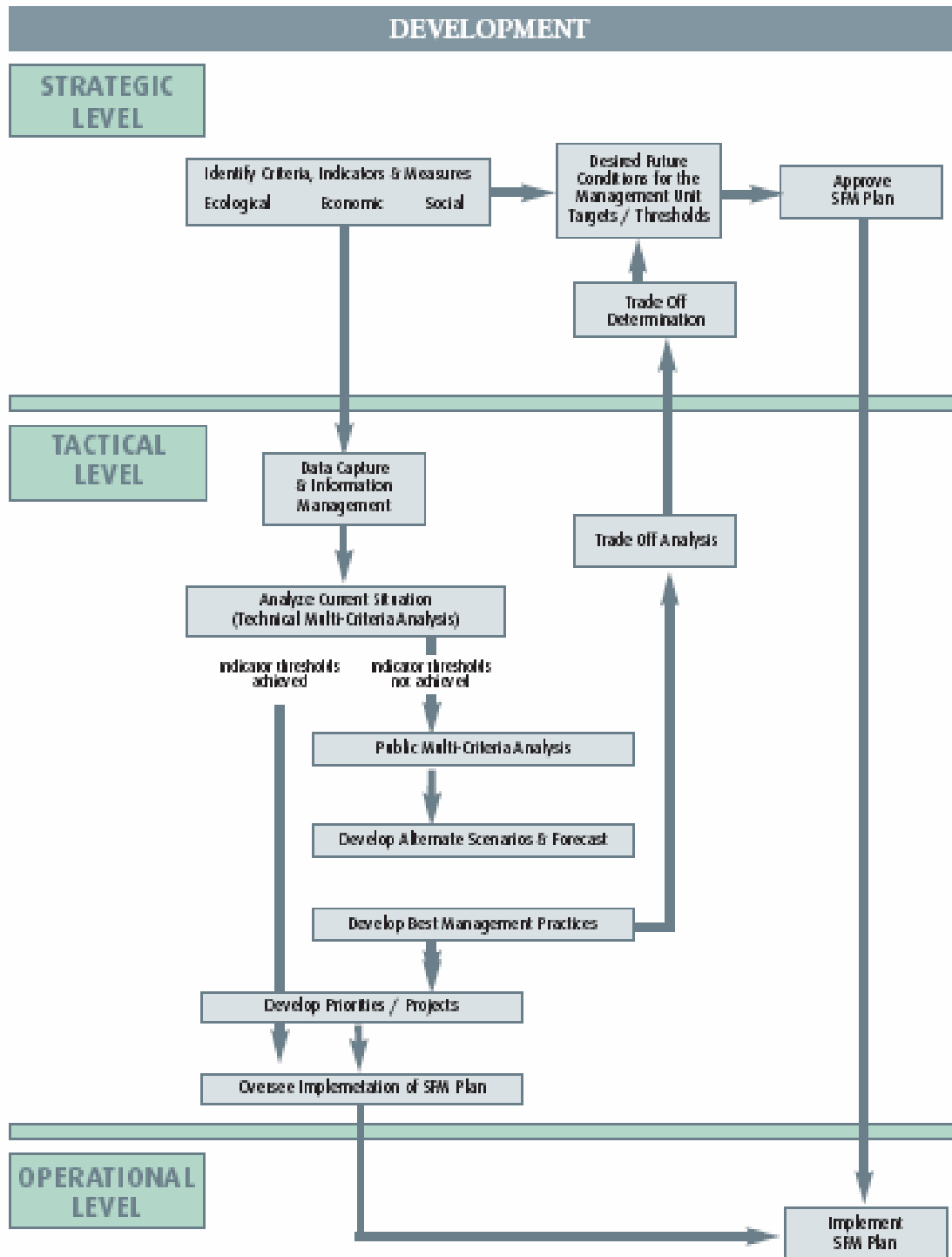
In the **Tactical Level** of planning, analysis focused on expected areas of operations over the next 20 years, which is a planning horizon that resource managers are familiar with through previous harvesting planning approaches. This level also analyzed data for longer time periods to ensure that practices 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
- First Nations, 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.

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Figure 1: SFM Plan Development Flowchart



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SFM Plan Implementation & Maintenance

This following text briefly outlines the flow of activities illustrated in Figure 2. Once government has approved strategic and tactical plans, and operating 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. 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 indicator 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.

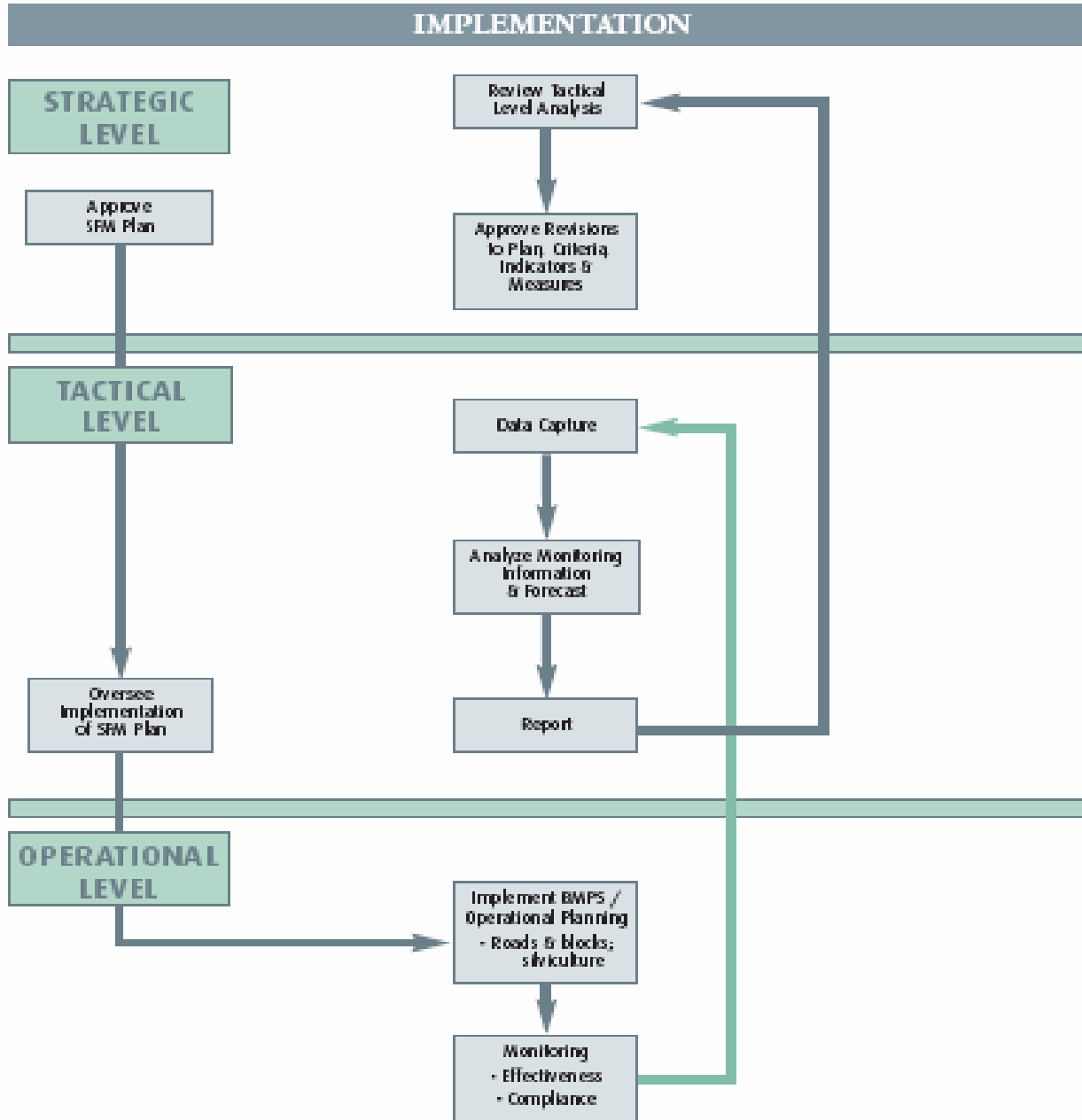
The **Strategic Level** completes the continual improvement loop by providing Canfor/BCTS the opportunity to examine their performance against all of the SFM requirements, both individually and collectively and making appropriate changes if required or recommended. Annually, the following steps are completed:

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

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Both the SFM Plan and the SFMP Annual Report are publicly available³. 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.

Figure 2: SFM Plan Implementation Flowchart



³ SFM Plan and associated documents are available on the Canfor Website and at the Canfor Radium Office

2.2 Structure and Responsibility

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

The technical working group has been formed to assist in the development of the SFM Plan – for ease of naming; they have been called the SFM Participants. This group consists of representatives from the signatories of this plan (Canfor and BCTS). The SFM Participants are responsible for the development, implementation and maintenance of the SFM Plan.

First Nations 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 various processes of SFM from the determination of indicators through to the continual involvement in providing feedback in the evolving process. 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.

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
- BC Timber Sales (BCTS) – Kootenay Business Area – East Kootenay Field Unit

On publicly owned land, the responsibility and accountability of forest stewardship ultimately rests with the BC Ministry of Forests and Range, 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 new Forest & Range Practices Act (FRPA), 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 and BCTS operate and have legal rights and responsibilities for those areas. For those parties within or adjacent to the area but are not signatory to this plan, Canfor and BCTS acknowledge that they have considered and respected their legal rights and responsibilities.

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

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

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Table 1: Roles & Responsibilities – Signatories

Senior Management – Canfor & BCTS
<ul style="list-style-type: none"> • Develop, implement and maintain commitments to SFM (including the SFM Policy) • Assign appropriate level of resources to implement SFM Plan • Define, document and communicate the roles, responsibilities and authority to implement and maintain the SFM Plan • Conduct management review of SFM – including the SFM Plan, monitoring results, annual report, internal/external audits • Implement appropriate changes to SFM due to the results of the management review
SFM Representative – Canfor & BCTS
<ul style="list-style-type: none"> • Coordinate the development, implementation and maintenance of an effective public advisory group (PAG) • Participate within the PAG following the agreed Terms of Reference for the group • Respect the roles, responsibilities, rights and ownership of all parties, both those involved and those not actively involved • Provide/receive information to affected or interested parties concerning all aspect of SFM • Track internal and external communication concerning SFM • Develop, implement and maintain the SFM Plan – including participation in the development of local Criteria, Indicators, Measures & Targets • Develop/deliver appropriate training for staff to implement and maintain SFM • Develop/deliver appropriate training for contractors to implement and maintain SFM • Develop, implement and maintain appropriate procedures (operational controls, monitoring, checking and corrective actions) to ensure effective delivery of the SFM Plan • Develop, implement and maintain an effective adaptive management process to ensure continual improvement of the SFM Plan
Operational Staff – Canfor & BCTS
<ul style="list-style-type: none"> • Develop operational plans that reflect SFM Plan • Implement operational plans • Implement inspections, monitoring and corrective actions as per the specific requirements outlined in the respective plans & operational controls • Attend applicable training session to ensure effective implementation of SFM Plan • Knowledge, understanding and access to SFM Plan and applicable supporting documents • Follow applicable operational controls and procedures to ensure effective delivery of SFM Plan

Details on the signatories, including their structure, authority and roles and responsibilities, can be found in Appendix 2.2: Signatory Roles & Responsibilities.

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 Framework, 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. First Nations, 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 indicators and measures of sustainability and allows for open dialogue and decision 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.

The SFM Participants have 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 and under Measure 7-1.1 Stakeholder Analysis. Details on the establishment of the PAG can be found in Measure 7-1.3 Effective Public Advisory Group. For privacy reasons, people's names or contact information are not presented in this SFM Plan, however, the table below provides the interests groups that were invited to participate on the PAG. Some of those (people/groups) invited chose not to be involved in the process at this time. The groups with active representation are indicated by an asterisk (*) in the table below. 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.

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Table 2: Interested Groups

Local Government	First Nation
East Kootenay Regional District Radium Town Council	Shuswap Band Ktunaxa Nation Council (KNC)* including: ?Akisq'nuk Band St. Mary's Band Lower Kootenay Band Tobacco Plains Band
Tenure holders	Government
Woodlots* Christmas trees* Commercial Recreation* Trappers # Guide Outfitter# Ranchers* Prospectors	Provincial Ministry of Agriculture and Food Ministry of Energy and Mines Ministry of Forests* Ministry of Water, Land and Air Protection Ministry of Sustainable Resource Management Land and Water BC Inc. Federal Parks Canada*
ENGO's	Interest Groups
Wildsight* Columbia Basin Trust Nature Trust	Informally structured area groups*
Workers	Miscellaneous
IWA Canada # Silviculture Consultants* Logging Contractor # Chamber of commerce*	Tourism*, Non-commercial recreation* 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 found in Appendix 2.3: *FOREST* and First Nations Involvement Process.

This public involvement process contributed to the identification of local values, indicators and measures (Section 5.0). 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.

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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 (measure 7-1.2) 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 First Nations.

2.2.3 First Nations Involvement

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

First Nations participation is a part of the overall public involvement process, as much as possible. If First Nation participation in the PAG is not possible for specific reasons, then Canfor and BCTS will provide an opportunity to participate through a process specific to First Nations. 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, BCTS and the Facilitator. Limited input and comments were provided by the First Nations in the initial stages of the SFM Plan development. Details specific to the involvement process with First Nations, including the Terms of Reference (TOR) can be found in Appendix 2.3: *FOREST* and First Nations Involvement Process.

The First Nation Bands and Councils that have an interest or that are present in the DFA include:

- Ktunaxa Nation Council
- ?Akisq'nuk Band
- St. Mary's Band
- Lower Kootenay Band
- Tobacco Plains Band
- Shuswap Band
- Shuswap Nation Tribal Council

2.2.4 Other Tenure Holders

This SFM Plan discusses the intent and actions for Canfor and BCTS within their respective and collective operating areas. It must be understood that other licensees (i.e. Tembec, 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 SNRFL and one small FL within the DFA (less than 2% of the AAC on the DFA). Harvesting, road building and silviculture activities for the small FL within Canfor's operating area are being managed by Canfor. The SNRFL (10,000 m³/per for five years) is focusing on mountain pine beetle salvage within BCTS' operating area. The SNRFL licence holder is responsible for all harvesting, road building and silviculture activities for their areas. While these two licence holders are not signatory

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to the SFMP, they do have a small amount of tenure within and some of the SFMP measures may be applicable to their operations.

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/BCTS 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 and BCTS 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

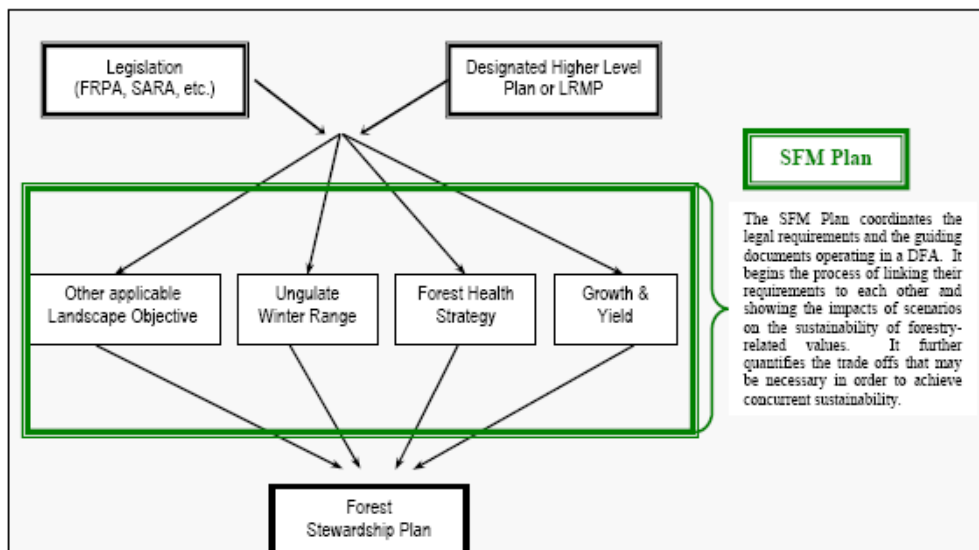
There are a number of policy, market and professional forest management drivers that are currently underway in BC. Few of these initiatives have been developed in context of each other or are linked within a larger planning environment, nor do they propose operational tools to address many of the strategic-level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

This SFM Plan, supported by the Framework, 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. The relationships between the SFM Plan and the broad legislative and market driven initiatives (e.g. the Forest Range and Practices Act, Higher Level Plans, Defined Forest Area Management, Certification) are described in the SFM Framework Document, providing clarity and context to the role of the SFM Plan as a guiding or strategic document in the DFA.

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 BC, i.e. legislation, policy and guidelines.

Figure 3: SFM Plan Linkage to Strategic Initiatives



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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)	<p>FRPA provides forest managers with a “results-based” structure upon which to develop and deliver forest management.</p> <p>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.</p>
Higher Level Plan	<p>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.</p> <p>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.</p>
Defined Forest Area Management (DFAM)	<p>DFAM is a policy framework developed by the Ministry of Forests proposed to provide multi-licensee management for TSAs. Currently, the Licensee and BCTS are responsible for collaborative tasks on the TSA, including collection of appropriate inventories, Timber Supply Analysis and Forest Health actions.</p> <p>The SFM Plan furthers this initiative through the collaborative process for the hierarchical planning and sustainability analysis that addresses the ecological as well as the socio-economic values.</p>
Timber Supply Review for Timber Supply Area (TSR for TSA)	<p>The main objectives of the Timber Supply Review (TSR) are to:</p> <ol style="list-style-type: none"> 1) Identify the economic, environmental and social information that reflects the current forest management practices— including their effects on the short- and long-term timber supply; 2) Identify where improved information is required for future timber supply forecasts; and 3) Provide the Chief Forester with information to make any necessary adjustments to the allowable annual cuts for the next five years. <p>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.</p>

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Forest Management or Sustainability Initiative	Linkage to SFM Plan
Canadian Standards Association (CSA)	<p>The CSA Z809-02 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.</p> <p>This SFM Plan is the document that supports the SFM Requirements of CSA Z809-02 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 (item #5) provides a matrix that cross references where CSA requirements are addressed within the SFM Plan.</p>
ISO 14001 Environmental Management System (EMS) ⁴	<p>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 EMS provides the management system framework required for the CSA Z809-02 Standard. Compliance with all regulatory requirements is described within the EMS.</p> <p>The EMS provides the foundation for the management system of the SFM Plan. The primary linkage between the EMS 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.</p>
Forest Investment Account (FIA)	<p>FIA 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.</p> <p>FIA funding has been the financial support for many of the projects for testing SFM concepts including the resultant SFM Plan.</p>

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.

⁴ ISO 14001 EMS for Canfor is called the Forest Management System (FMS)

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Table 4: SFM Plan Linkages to Strategic Plans/Policy

Strategic Plan / Policy	Linkages to SFM Plan
Kootenay Boundary Higher Level Plan (KBHLP) Order (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. 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) Canfor – March 2006 BCTS – June 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. 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. The FSP will replace the Forest Development Plan. Canfor's and BCTS' current FDP are approved until December, 2006. Under the approved FSP Canfor's site level plans will be developed and implemented to reflect SFM requirements.
DFAM Forest Health Strategy, Invermere TSA, 2003 & 2006	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.). 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), March, 2000	The Type I Silviculture Strategy identifies the critical issues in timber supply, derives objectives with respect to those issues, specifies regimes to meet those issues, and identifies the regime activities that can be implemented in the next five years. The SFM Plan works to resolve these types of issues within the SFM Framework processes.

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Strategic Plan / Policy	Linkages to SFM Plan
FIA – Land Based Investment Rationale (LBIR), April, 2004	<p>The LBIR establishes the land-based resource issues 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.</p> <p>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.</p>
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	<p>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)</p> <p>http://www.kootenayspatial.ca/xsql/ksdpmenu01.xsql</p>
Protected Areas Strategy (PAS)	<p>The PAS was developed by government to put aside 12% of British Columbia as Parks and Protected Areas by the year 2000 in order to protect representative ecosystems around the province. Protected Areas within the DFA were developed through the KBLUP process in order to preclude timber harvest in these areas and to protect high value, critical habitat or unique landscape areas.</p> <p>The Radium SFM Plan will respect the Protected Areas that have been identified within the DFA. These areas will not be included in management strategies in order to preserve the landscape features within each area.</p>

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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, Forest Development Plan, September 7, 2001	The FDP details harvesting, road building and silviculture strategies for the next 5 years. It also describes management strategies for a number of Criterion and 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.
BCTS, Forest Stewardship Plan (FSP), September 15, 2006	The FSP provides the legal “results” or “strategies” of forest practices – many of which are aligned with the SFM Criteria & Indicators.
BCTS, Forest Development Plan, July 12, 2001	The FDP details harvesting, road building and silviculture strategies for the next 5 years. It also describes management strategies for a number of Criterion and Indicators.
BCTS, EMS – ISO 14001, certification early May	BCTS management system used to develop and implement its environmental policy and manage its environmental aspects.
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.*

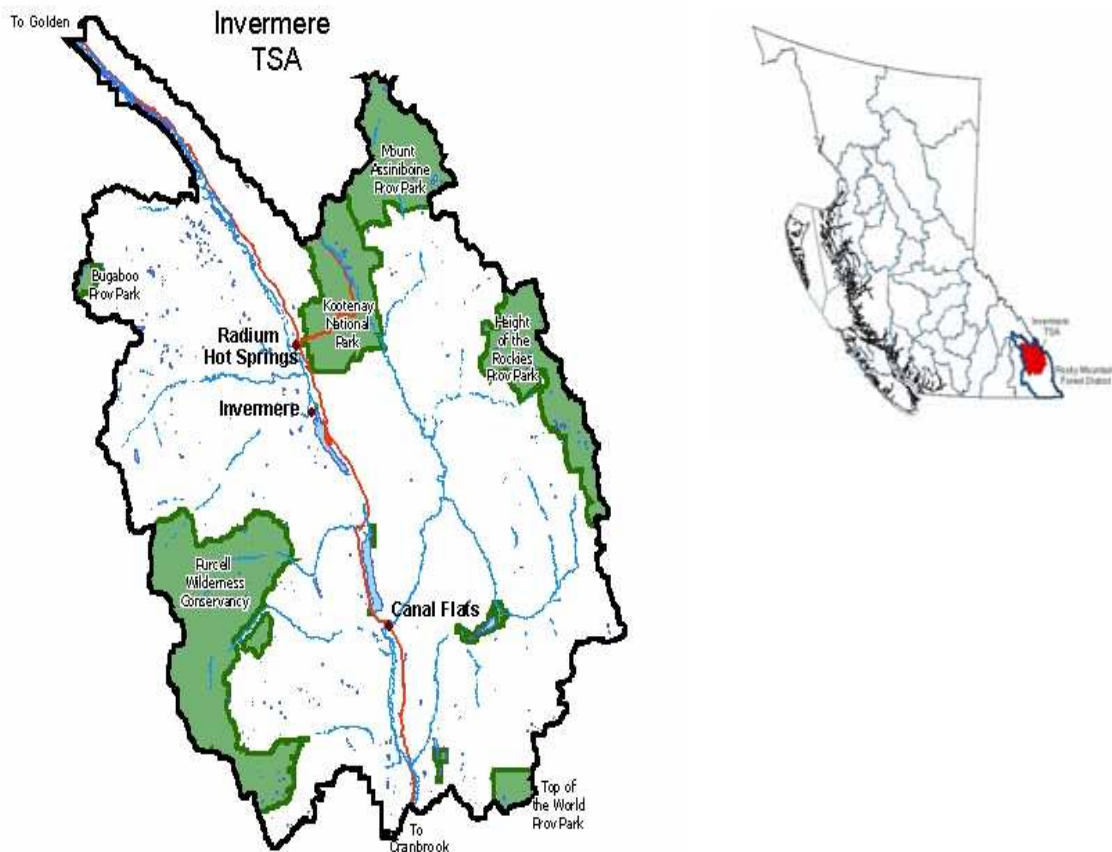
3.0 Background to the SFM Plan

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) and BCTS Chart area within the Invermere Timber Supply Area (TSA) as described for Timber Supply Review (TSR3)⁵ 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 below and Appendix 1.1: Maps, illustrates the DFA included within this SFM Plan.

Figure 4: Invermere Timber Supply Area Map



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

⁵ 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.

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The Invermere TSA covers 1,153,073 hectares. Approximately 48% of the total area is considered Crown Forested Land Base (CFLB)⁶. The remaining 52% is considered non productive (i.e. rock, ice, alpine, etc), or is not managed by the B.C. Forest Service (i.e. private, First Nations, 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 5). 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, First Nations, Woodlots – approx. 52%	598,423
Timber Harvesting Land Base (THLB) ⁷	233,873

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

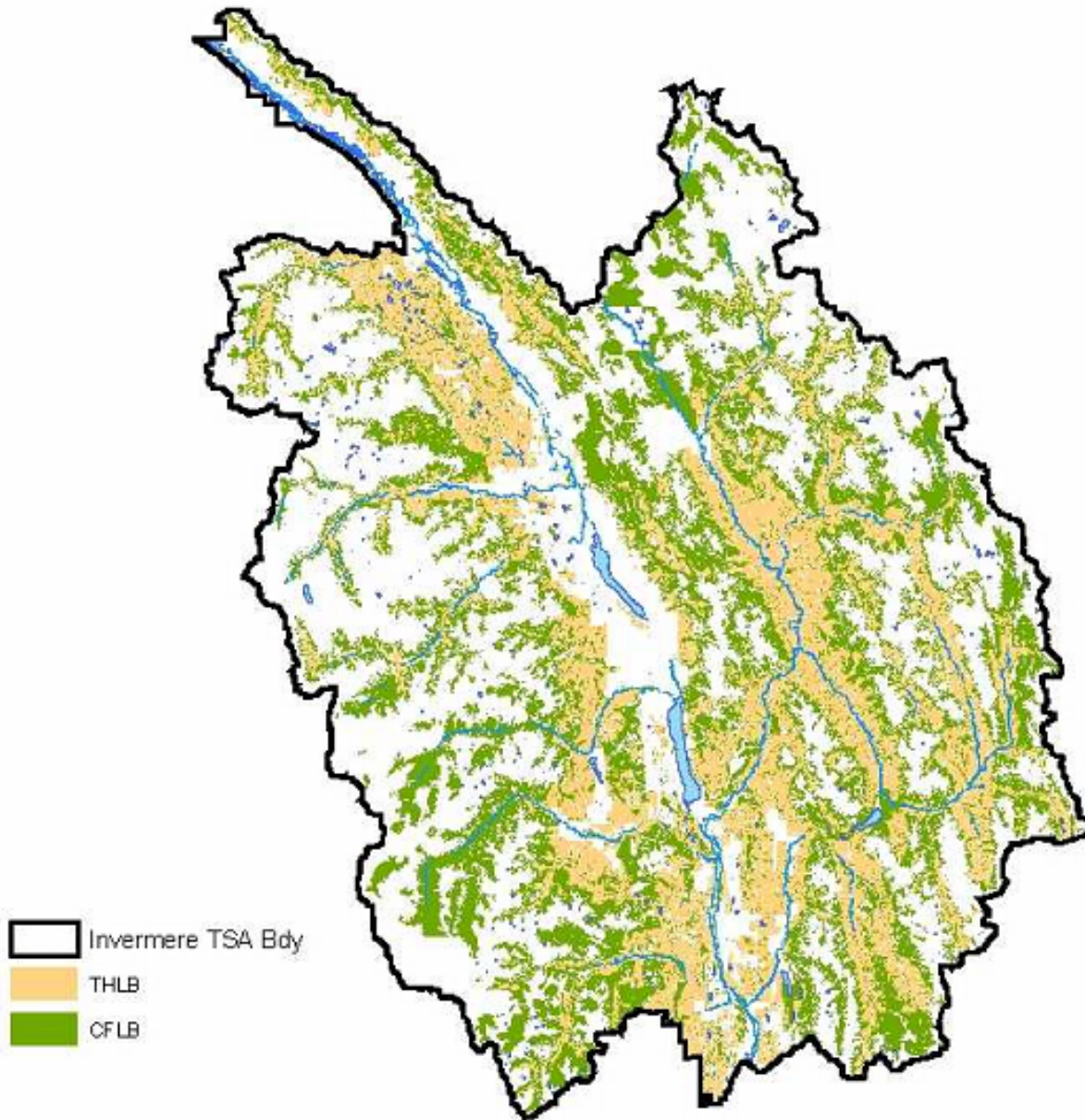
The Invermere TSA is within the BC Ministry of Forests' Southern Interior Forest Region – Rocky Mountain Forest District. The Rocky Mountain Forest District is situated in the southeastern corner of British Columbia and was created in 2003 by amalgamating the former Invermere and Cranbrook Forest Districts. 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. BCTS operations within the Invermere TSA are administered by the East Kootenay Unit of the Kootenay Business Area.

⁶ 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

⁷ 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.

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Figure 5: Invermere TSA – Land Base Classification Map



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Table 7: Land Base Area Netdown Summary⁸

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

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

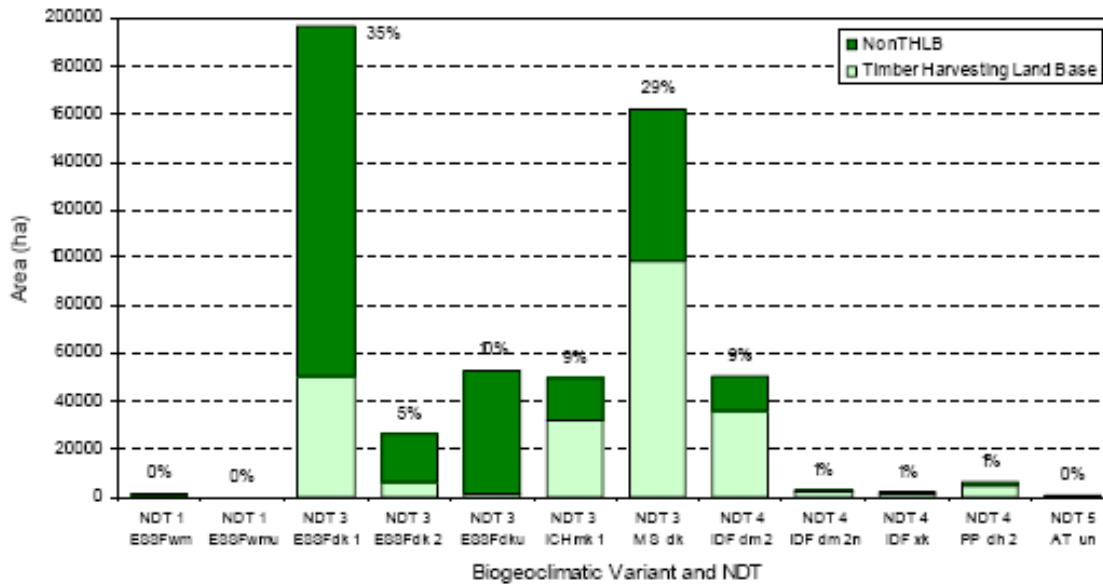
⁸ Data Source: Invermere TSA Timber Supply Review 3 Analysis Report V3.0, May 12, 2004

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(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 6 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 6: 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

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Table 9: Trees species common in the Invermere TSA

Tree Species	Scientific Name	Percent
Lodgepole pine (Pl)	<i>Pinus contorta</i>	40.7%
Douglas-fir (Fd)	<i>Pseudotsuga menziesii</i>	28.7%
Engelmann spruce (Se)	<i>Picea engelmannii</i>	13.9%
Western Larch (Lw)	<i>Larix occidentalis</i>	7.2%
Subalpine fir (Ba)	<i>Abies lasiocarpa</i>	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 which are at risk due to declining populations across the province. There are 8 red-listed (Endangered or Threatened) and 18 blue-listed (Species of Concern) species found in the Invermere TSA (Table 3). Since TSR2, the Vivid Dancer (damselfly), and the fisher have been red-listed, while the Mead's Sulphur (butterfly) and cutthroat trout have been blue-listed. The rubber boa, blue-listed at the time of TSR2, is now yellow-listed and the Rocky Mountain bighorn sheep has been removed from the blue-list.

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Table 10: Red & Blue Listed Species with Potential to Occur in Invermere TSA

Red-listed (Endangered or Threatened)		Blue-listed (Species of Concern)	
Scientific Name	English Name	Scientific Name	English Name
<i>Argia vivida</i>	Vivid Dancer		
<i>Buteo swainsoni</i>	Swainson's Hawk	<i>Aeronautes saxatalis</i>	White-throated Swift
<i>Falco mexicanus</i>	Prairie Falcon (<i>anation spp</i>)	<i>Ardea herodias herodias</i>	Great Blue heron, <i>herodias</i> subspecies
<i>Martes pennanti</i>	Fisher	<i>Asio flammeus</i>	Short-eared Owl
<i>Rana pipiens</i>	Northern Leopard Frog	<i>Botaurus lentiginosus</i>	American Bittern
<i>Rangifer tarandus pop. 1</i>	Caribou (southern population)	<i>Chrysemys picta</i>	Painted Turtle
<i>Tamias minimus selkirki</i>	Least Chipmunk, <i>selkirki</i> subspecies	<i>Colias meadii</i>	Mead's Sulphur
<i>Taxidea taxus</i>	Badger	<i>Dolichonyx oryzivorus</i>	Bobolink
<i>Ascaphus montanus</i>	Rocky Mountain Tailed Frog	<i>Grus canadensis</i>	Sandhill Crane
<i>Pelecanus erythrophynchus</i>	American White Pelican	<i>Gulo gulo luscus</i>	Wolverine, <i>luscus</i> subspecies
<i>Icteria virens auricollis</i>	Yellow-breasted Chat (<i>auricollis spp</i>)	<i>Melanerpes lewis</i>	Lewis's Woodpecker
<i>Otus kennicottii macfarlanei</i>	Western Screech-Owl (<i>Macfarlanei spp</i>)	<i>Myotis septentrionalis</i>	Northern Long-eared Myotis
<i>Athene cunicularia</i>	Burrowing Owl	<i>Numenius americanus</i>	Long-billed Curlew
<i>Aechmophorus occidetalis</i>	Western Grebe	<i>Oncorhynchus clarki lewisi</i>	Cutthroat Trout, <i>lewisi</i> subspecies
<i>Recurvirostra americana</i>	American Avocet	<i>Otus flammeolus</i>	Flammulated Owl
<i>Sterna forsteri</i>	Foster's Tern		
<i>Sphyrapicus thyroideus nataliae</i>	Williamson's Sapsucker (<i>nataliae spp</i>)	<i>Tympanuchus phasianellus columbianus</i>	Sharp-tailed Grouse, <i>columbianus</i> subspecies
<i>Thomomys talpoides segregatus</i>	Northern Pocket Gopher (<i>segregatus spp</i>)	<i>Ursus arctos</i>	Grizzly Bear
<i>Tamias ruficaudus ruficaudus</i>	Red-Tailed Chipmunk (<i>ruficaudus spp</i>)	<i>Plethodon idahoensis</i>	Coeur d'Alene Salamander
		<i>Tytoalba</i>	Barn Owl
		<i>Buteo platypterus</i>	Broad-winged Hawk
		<i>Tamias minimus oreocetes</i>	Least Chipmunk (<i>oreocetes spp</i>)
		<i>Clethrionomys gapperi galei</i>	Southern Red-backed Vole (<i>Galei spp</i>)
		<i>Ovis canadensis</i>	Bighorn Sheep
		<i>Larus californicus</i>	California Gull
		<i>Corynorhinus townsendii</i>	Townend's Big-eared Bat

Source: Conservation Data Centre database query, March 2004 in addition to local input / knowledge (Matrix Resource Services).

Riparian Areas

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.

There are seven main river systems within Canfor's and BCTS' 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

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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 First Nations 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. First Nation 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 9,165⁹, 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.

⁹ Invermere Timber Supply Area Timber Supply Review #3 Analysis Report Version 3.0, May 12, 2004– based on BC Stats for 2001 reporting year.

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Economic Profile

Overall, the economy of the Invermere TSA is relatively diversified. Results from the 2001 Census indicate that the tourism sector was the largest employers in the TSA by a wide margin (33.9% in 2000). The public sector is ranked as *number 2* with 21.3% of basic sector employment and forestry accounts for 19.1%. Construction (18.1%), mining (2.9%) and agriculture (2.7%) are other sectors within the TSA that provide employment and economic activity within the TSA. Tourism's importance drops precipitously when measured by employment income, as the sectors relatively low wages mean that it has only 15.7% of basic sector employment income, ranking in size below the forest industry, public sector, and those who rely on pension and investment income. More recent changes to the economy include the decrease in the public sector and increase in construction.

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 TSA'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.

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 TSA¹⁰ 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

Canadian Forest Products Limited (Canfor) is a leading integrated forest products company marketing its products worldwide. The company has 34 facilities located in BC, Alberta, Quebec 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, plywood, remanufactured lumber products, oriented strand board (OSB), hardboard paneling and a range of specialized wood products, including baled fibre and fibre mat. Canfor's operations have a history of over 67 years of forestry operations which include harvesting, planning, administration, log hauling, road building, silviculture, sawmilling, planing and pulpmaking operations.

Canfor's operations are located throughout British Columbia. In the Kootenay area Canfor operates a dimension lumbermill¹¹ in Radium Hot Springs. This mill produces dimension lumber, mainly for the domestic American market, but also makes Japanese grade lumber which is approximately 25% of the output. A new kiln and breakdown line was installed at this mill in 2002. The Radium Hot Springs mill

¹⁰ TSR2 – Socio-Economic Analysis Report – (new data not found)

¹¹ Canfor acquired the Radium operations from Slocan Forest Products in early 2004.

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ships residual chips and hog fuel to the Skookumchuk pulp mill, trim blocks to the company's fingerjointing Uneeda Division in Chilliwack, and shavings to Nova Fibre in Grand Forks.

Forest License A18979 grants Canfor the right to harvest an allowable annual cut (AAC) of Crown timber each year, which are 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 to the sawmill facility in Radium

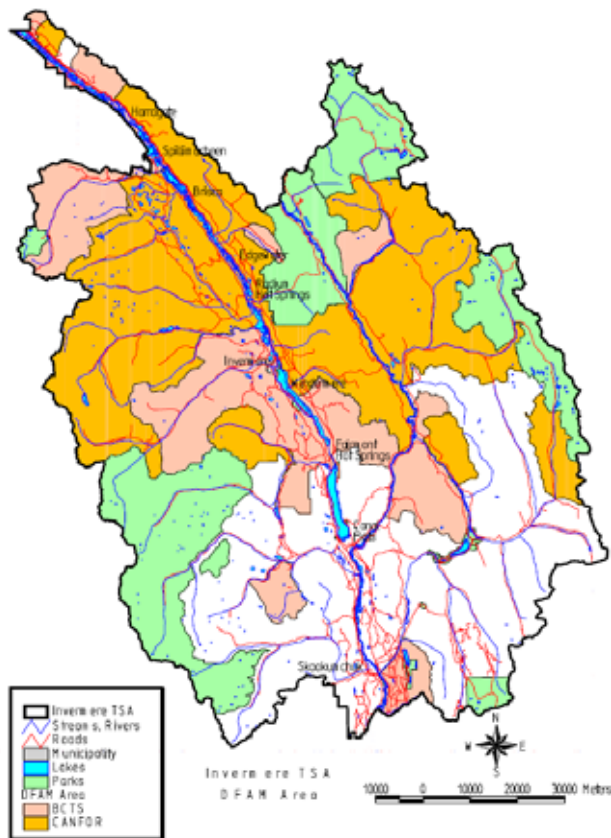
BCTS

British Columbia Timber Sales (BCTS) is a division of the Ministry of Forests and Range (MoF), independent from Operations Division (i.e. regional and district offices). The Kootenay Business Area is one of 12 business areas which administers the BCTS program in the province. The East Kootenay Field Unit located in Cranbrook administers the field operations in the Invermere and Cranbrook TSA's.

BCTS sells timber competitively through auction and Timber Sale Licences are awarded to the highest bidder. BCTS does not operate any milling or log sort facilities but is responsible for the construction and maintenance of roads as well as and stewardship obligations.

BCTS has approximately 15.05% of the current AAC after the "takeback" process under the BC Government's Forestry Revitalization Plan.

Figure 7: Invermere TSA Map – Canfor & BCTS Operating Areas



Source: Interior Reforestation Co Ltd. 2006.

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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.

Table 11: AAC Apportionment (November 2005) and TSR3 Landbase Statistics

Tenure	Current AAC Apportionment	% AAC	Total THLB (ha)	
			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 m³ 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 11.

BCTS provides access to approximately 20-25% of the provincial allowable annual cut (AAC) in British Columbia. Within the Invermere TSA, BCTS harvests approximately 15.5% of the AAC (approximately 90,089 cubic metres annually). Much of the timber from BCTS is primarily sold to Canfor through BCTS' competitive bid process or from other successful licensees.

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

Canfor is the second leading forest industry employer in the TSA, after Tembec Industries Inc. (Tembec). Canfor dimension lumber mill at Radium and has rights to approximately one third 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 183 person years (PYs) of forest industry employment involved with harvesting and processing its Invermere TSA Forest License timber over the 2001-2003 period.

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 715 000 m³. The volume attached to the company's replaceable forest license is 231 005 m³,

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leading the company to rely on other sources, including private lands, Alberta, BCTS sales and Golden TSA licensees.

Table 12 presents recent harvesting and employment results for Canfor in the Invermere TSA.

Table 12: Canfor annual average harvests and employment, 2001-2003

Canfor Harvest / Employment	Result
Harvest	Timber volume (m3)
Allowable Annual Cut (AAC)	231 005
Annual average harvest, 2001-2003	270 000
2003 harvest	326 000
Employment	Person-Years (PYs)
Harvesting, planning & administration	49
Log transport	10
Road construction & maintenance	5
Silviculture	7
Timber processing	112
Total	183

Source: Ministry of Forests, survey of licensees and TSR3 Analysis Report

Non Forestry Tenures & Interests

As mentioned previously, there is one other major licensee in the TSA – Tembec Forest Industries Inc. In addition, 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.

Domtar has 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

Following the concepts and direction from the Strategic SFM Framework, 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 which will need to be addressed over time. The synopsis of these gaps is found in the final portion of this section, with the listing of the gaps in the appendix (Appendix 1.4: Data / Knowledge Gaps Matrix). 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 Woodlands 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 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 Strategy¹², 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.

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 Natural Disturbance ¹³
HLP Order: Biodiversity 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. Current beetle epidemic is resulting in major updates to this strategy to manage for	Habitat Representation Wildlife Tree Retention Coarse Woody

¹² Although a strategy is identified, it may not be developed at the time of the approval of this SFM Plan. However, this need to develop a strategy will be captured within the Knowledge Gap Matrix found in the appendix.

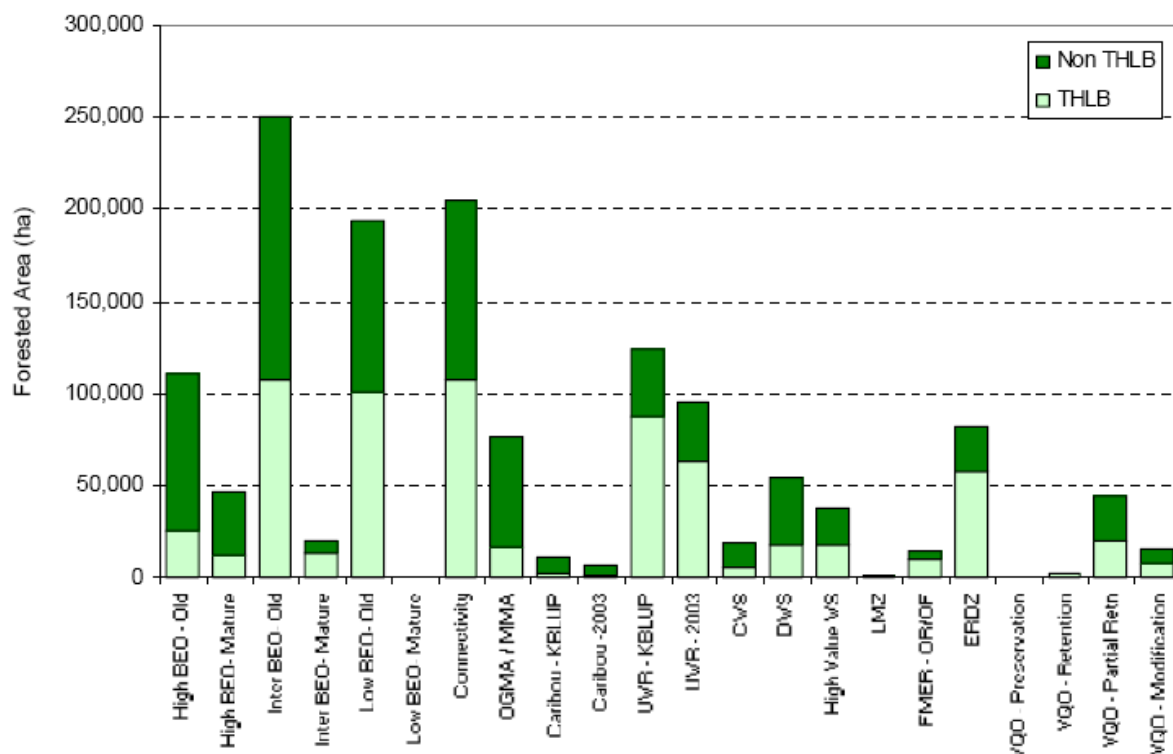
¹³ MPB & Natural Disturbance Strategies have not been developed and incorporated into the SFMP at this time but will be completed for the next SFMP.

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<u>Issue</u>	<u>Scope of issue</u>	<u>Significance to Planning</u>	<u>SFM Strategy</u>
		infested and killed the old growth pine stands. This will affect some Criteria and Indicators.	Debris (CWD) Hardwood Tree Protected Areas
Riparian Habitat	TSA wide and beyond. Affects biodiversity strategies	Potential to impact most, if not all, criteria and indicators	Riparian Area Stream Crossing
Domestic and Community Watersheds	TSA wide and beyond. Affects biodiversity strategies	Potential to impact most, if not all, criteria and indicators	Consumptive Use Streams 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 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 8 and Table 14)	Potential to impact most, if not all, criteria and indicators	In addition to previously listed strategies: First Nation Recreation Visual Quality Protected Areas
Economics	Keeping the business alive	Potential to impact most, if not all, criteria and indicators	N/A
Safety	Developing a company wide Operational Health & Safety Program	Potential to impact the well being of the workers and the community	N/A

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Figure 8: 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%	Biodiversity Emphasis Options define the amount of old and/or mature that must be retained in each LU/BEC variant combination.
High BEO- Mature	46,012	12,251	33,761	8.3%	5.2%	
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%	Area of Spatial OGMA/MMA.
OGMA / MMA	76,863	16,288	60,576	13.9%	7.0%	
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%	Visual Quality Objectives
VQO - Retention	2,726	1,844	882	0.5%	0.8%	
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.

An inventory analysis for the Invermere TSA was originally collated by Interior Reforestation Co Ltd. in March, 2002. Updates to the inventory analysis were completed in conjunction with TSR3 Data Pack submission by Forsite Consultants Ltd. in May, 2004. The listing of the inventories and the details are found in Appendix 1.2: Inventory & Stakeholder Analysis.

The inventory data will need to be assessed for quality and appropriateness of the data in relation to its end use. Prior to completing this task, the SFM Participants required a final set of Criteria & Indicators and an SFM Plan to assess against. The task of data assessment cannot occur until the C&I's have been set and the SFM Plan is into the "implementation" phase.

Knowledge and information management gaps that exist as a result of the inventory analysis are summarized in the Knowledge Gap section of the SFM Plan (Appendix 1.4: Data / Knowledge Gaps Matrix), including a strategy provided to resolve the variance.

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. This analysis was completed in 2003 by Interior Reforestation Co Ltd..

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 (First Nations, property owners, government officials, etc.). The results of this analysis are archived in a Microsoft Access database (SFM-Stakeholder Analysis Database Prototype). Once a group or individual was selected for inclusion in the database, a description was compiled of their involvement in potential forest planning/ development activities under the categories of Interest (e.g. Commercial tourism, Forestry, government, outdoor recreation, etc), Involvement, Affectedness, Influence and Contact Priority.

Table 15: Stakeholder Information

STAKEHOLDER INFORMATION				
Group Information	Name			
	Group, License Number or Individual			
	Number of Members			
	Source of Contact			
	Primary Interest			
	Secondary Interest			
	Geographic Area of Interest			
	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 First Nations 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: Inventory & Stakeholder Analysis.

4.4 Practices Analysis

A Practices Analysis was completed by each of the SFM Participants and appended to Appendix 1.3: Practices Analysis. The analysis resulted in a matrix for each of Canfor and BCTS operations that summarize common practices that take place 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

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Multi-Criteria Analysis – 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

4.6 Knowledge Gaps

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. Identification of gaps in data or knowledge is the first step to enable change. It is important to develop a strategy with timelines to fill those gaps in order to ensure the continual improvement.

A number of sources of information have been used to assist with the initial identification of data / information gaps for the Radium DFA. It is acknowledged that some gaps identified by the following sources may not be listed at this time. However, the adaptive management process built into the SFM Plan will ensure that these gaps are addressed in future processes. Appendix 1.4: Data / Knowledge Gaps Matrix provides a current summary of gaps, along with strategies to rectify the variances or gaps in a timely and effective manner.

- A review of the strategic initiatives, policies/plans, or documents applicable to the DFA (listed in Section 2.3.2 Strategic Plans, Policies & Supporting Documents) has identified issues, gaps or concerns that need to be addressed for reasons as outlined in those respective documents.
- The inventory analysis (Appendix 1.2: Inventory & Stakeholder Analysis) has helped identify gaps in knowledge or data specific for the DFA, particularly relating to inventories.
- The establishment of local level indicators, measures and thresholds/targets for the Radium DFA (Section 5.0) resulted in the identification of additional data required to complete the SFM C&I Matrix (Appendix 1.5: SFM Criteria & Indicators Matrix).
- Individual projects developed for the SFM Framework such as the Natural Disturbance Summary highlight the data and knowledge gaps as they relate to the particular subject area of the report.
- The development of the SFM Plan has identified gaps to implementation of this plan.
- The Land Based Investment Rationale (LBIR) developed for the TSA can help identify gaps and prioritise information needs.

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.

The Canadian Council of Forest Ministers 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 DFA's C&I. The establishment of criteria, indicators and thresholds/targets is undertaken at the strategic level in the SFM Framework. 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 criteria and indicators, and 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 measures and targets set at the strategic level.

5.1 Values, Criteria, Indicators, Measures, 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.”

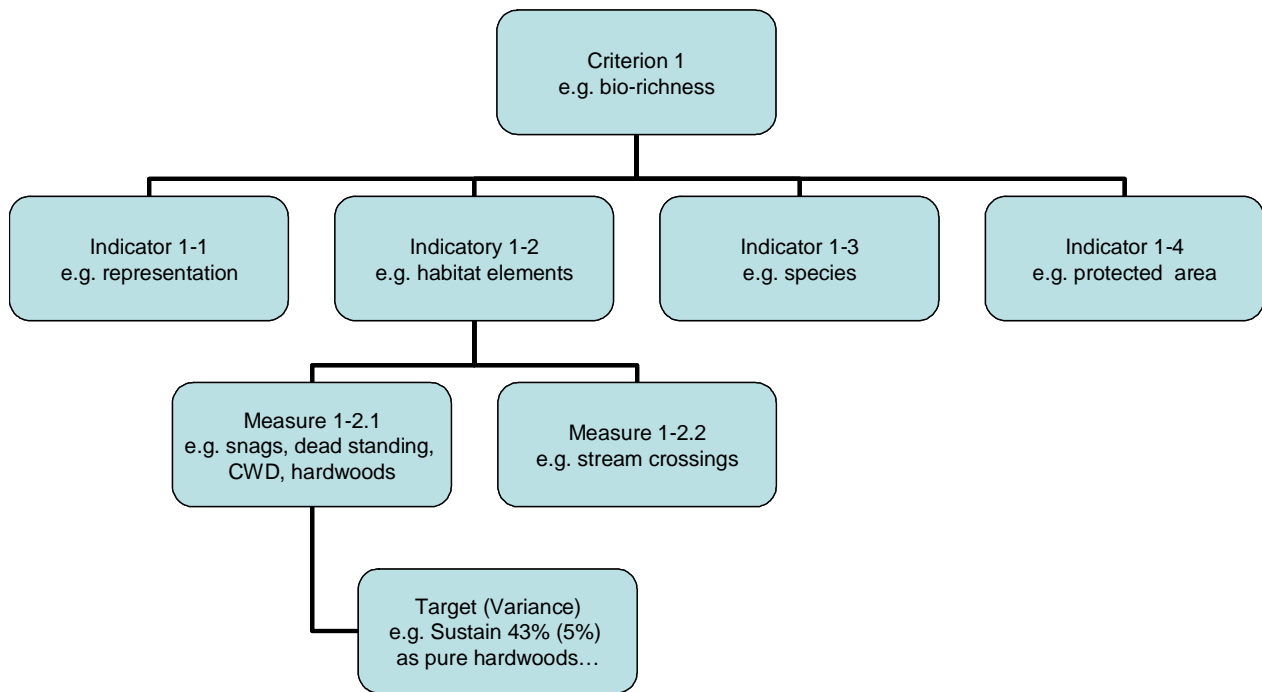
Criteria are meant to be broad management statements describing a desired state or condition. Criteria are validated through the repeated, long-term measurement of associated indicators. They include vital ecological functions and attributes, as well as socio-economic benefits.

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

The SFM Framework developed an initial set of Criteria and Indicators (C&I) that measure and demonstrate the sustainability of social, ecological and economic values at the forest management unit level. This initial set was used as “seed” information to assist with the development of a local level set of C&I. These local C&I have been adapted to reflect the ecological and socio-economic conditions of the Radium DFA as determined by the stakeholder input through *FOREST*. Summaries from each *FOREST* meeting capture the decision made following discussions between Canfor, BCTS and *FOREST* (Appendix 2.3: *FOREST* and First Nations Involvement Process) in developing the C&I Matrix.

Figure 9 below provides a schematic sample of the hierarchy of criteria, indicators, measures and targets.

Figure 9: C&I Hierarchy



Appendix 1.5: SFM Criteria & Indicators Matrix contains the criteria, indicators, measures and targets, specific to the Radium DFA. Table 16 below provides a summary listing of the Criteria and Indicators.

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Table 16: Radium DFA Criteria & Indicators

Criterion	Indicator
Ecological Values	
C1. Biological richness and its associated values are sustained in the defined forest area (DFA)	
	1-1. Ecologically distinct habitat types are represented in an unmanaged state in the DFA to sustain lesser known species and ecological function
	1-2. Negative trends in landscape features that affect forest-dwelling organisms are avoided
	1-3. The amount, distribution, and heterogeneity of terrestrial and aquatic habitat type elements and structure important to sustain biological richness are sustained
	1-4. Native forest-dwelling species or species guilds are well distributed throughout their range in the DFA
	1-5. Government designated protected areas and sites of special biological significance are sustained at the site and sub regional level
	1-6. Forest Management activities will conserve the genetic diversity of tree stock
C 2. The productive capability of forest ecosystems within the Timber Harvesting Land Base (THLB) are sustained	
	2-1. Biological components of forest soils are sustained
	2-2. Productive land-base loss as a result of forestry activities is minimized
	2-3. Total growing stock of merchantable and non-merchantable tree species on forest land available for timber production
	2-4. No net detrimental loss in productivity as a result of forest related slope instability
	2-5. Natural disturbance levels and risk levels are managed for such that resistance to catastrophic change and the ability to recover on the landscape level is sustained
C 3. Forest ecosystem contributions to global ecological cycles are sustained within the DFA	
	3-1. The total forest ecosystem biomass and carbon pool is sustained
	3-2. The forest products carbon pool is maintained or increased
	3-3. The processes that take carbon from the atmosphere and store it in forest ecosystems will be sustained
Economic Values	
C 4. The flow of economic benefits derived from management unit forests through the forest industry is sustained	
	4-1. Timber harvesting continues to contribute to economic well-being
	4-2. Citizens continue to receive a portion of the benefits
	4-3. Governments continue to receive a portion of the benefits
	4-4. Opportunities to share a portion of the benefits exist for local First Nations
	4-5. Forest management contributes to a diversified local economy
	4-6. Levels of forest damaging events or agents are managed such that their economic impact is minimized
C 5. The flow of marketed non-timber economic benefits from forests is sustained	
	5-1. Amount and quality of marketed non-timber forest resources is sustained or enhanced over the long-term as a result of forest management activities
C 6. Forest management contributes to a diversified local economy	
	6-1. Employment and income sources and their contribution to the local economy continue to be diversified
Social Values	
C 7. Decisions guiding forest management on the management unit are informed by and respond to a wide range of social and cultural values	
	7-1. Forest management planning adequately reflects the interests and issues raised by the public (tenure holders, residents and interested parties) in the DFA through an effective and meaningful (to all participants) public participation process
	7-2. Community understanding and capacity to participate in forest management planning is improved through information exchange between DFA forest resource managers and the public through a varied and collaborative planning approach in order to facilitate capacity building in the community
C 8. Forest management sustains or enhances the cultural (material and economic), health (physical and spiritual) and capacity benefits that First Nations derive from forest resources	
	8-1. Aboriginal and treaty rights are respected
	8-2. Local management is effective in controlling maintenance of, and access to, resources for First Nations
	8-3. The relationship between forest management and First Nations culture is acknowledged as important
	8-4. First Nations are provided with detailed, reciprocal knowledge pertaining to forest use as well as forest management plans prior to government approval and implementation
C 9. Forest management sustains ongoing opportunities for a range of quality-of-life benefits	
	9-1. Resources and opportunities for recreation (including quality of experience) are maintained or enhanced
	9-2. Visual quality of harvested/managed landscape is acceptable to a broad range of residents, stakeholders and visitors
	9-3. Forest management conserves unique or significant places and features of social, cultural, spiritual importance (including protected areas) at the landscape and site levels
	9-4. Worker and community safety is maintained within acceptable levels
	9-5. Water resources will be sustained by maintaining water quality and quantity for domestic and community watersheds that are licensed for human consumption

5.1.1 Ecological Values

Criterion 1	Native species richness is sustained in the defined forest area (DFA)
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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 1998¹⁴). Species richness meets the requirements for SFM criteria; it is measurable, cost effective and scientifically credible.

The biodiversity criterion and three associated indicators were initially developed by Dr. Fred Bunnell and the Weyerhaeuser Adaptive Management Working Group (Bunnell et al. 2003¹⁵). They were adapted for use by the Arrow IFPA, a part of the SFM Framework set of C&I and utilized as “seed” information for the Radium SFM Plan.

Criterion 1 uses a multi-filter approach to sustaining biological richness in forested landscapes. Indicator 1-1 (ecological representation) 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 Indicators 1-2 and 1-3. Indicator 1-2 (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 Indicator 1-1 provides for a diversity of habitat types, Indicator 1-2 maintains a diversity of habitat structures to accommodate a wide range of species, including those that are poorly known. Indicator 1-3 (species) is 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 Indicators 1-1 and 1-2, 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 Productivity) and Indicator 4-1 (contribution to economic well-being). 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 9 to address sites of spiritual importance (e.g., what some people term old-growth forests). 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 Indicator 1-3, 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).

¹⁴ Bunnell, F.L. 1998. Overcoming paralysis by complexity when establishing operational goals for biodiversity. *Journal of Sustainable Forestry* 7: 145-164.

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

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LINK TO OTHER CRITERION

- Criterion 2 – conservation of biomass in terms of habitat and soils
- Criterion 3 – habitat elements in terms of carbon sequestration
- Criterion 4 – contribution to economic well-being
- Criterion 9 – quality of life

Indicator	1-1. Ecologically distinct habitat types are represented in an unmanaged state in the DFA to sustain lesser known species and ecological function.
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Indicator 1-1 is a ‘coarse-filter’ approach to maintaining the full range of biological diversity across the landscape (Huggard 2000).¹⁶ 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 1-2 and 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).¹⁷

Indicator 1-1 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.

The process uses locally developed measures:

1-1.1 Ecosystem representation

Measure 1-1.1 Ecosystem Representation

Measure:

1-1.1 Number, size and type of distinct habitat types in both the THLB and NHLB and recommends proportion of area that should be represented in an unmanaged state.

Target (Variance):

1. 25% of common ecosystem clusters (>10,000 ha) will be reserved or managed to maintain or restore ecosystem function.
2. 0 hectares of rare ecosystem clusters (<2000 ha) will be harvested.
3. For uncommon ecosystem clusters (>2000 ha and < 10,000 ha), the amount reserved (or managed to maintain or restore ecosystem function) depends on the area of the ecosystem group (Figure 10: NHLB targets (%) for the DFA).

What is this measure and why is it important?

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.¹⁸ Ecosystem types should be defined at an ecologically relevant scale

¹⁶ Huggard, D. 2000. Ecological representation in the Arrow IFPA non-harvestable land base. Prepared for Arrow IFPA, Slocan, BC.

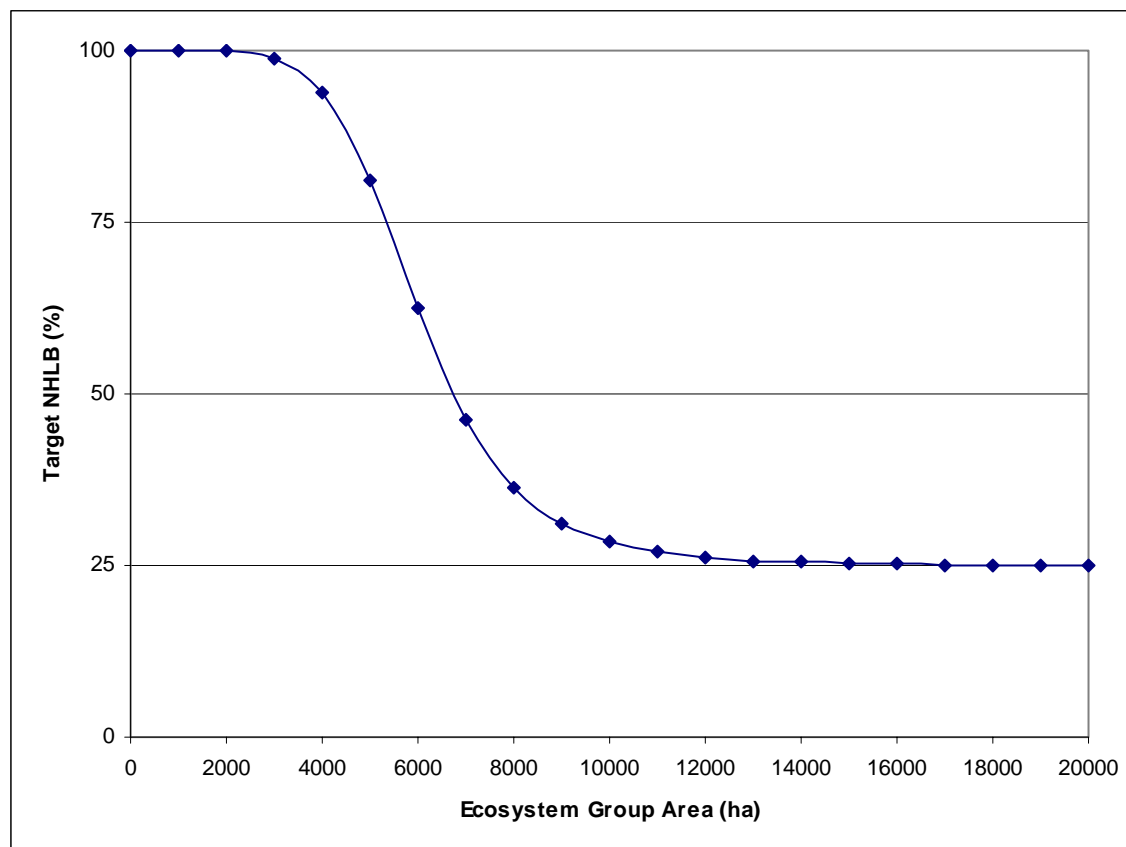
¹⁷ Bunnell, F.L., B.G. Dunsworth, D.J. Huggard, and L.L. Kremsater. 2003. Learning to sustain biological diversity on Weyerhaeuser’s coastal tenure. Weyerhaeuser, Nanaimo, BC. http://cacr.forestry.ubc.ca/forest_strategy/am/framework.htm

¹⁸ Unmanaged state – refers to the land that is not within the timber harvesting landbase i.e., NHLB.

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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).¹⁹

Figure 10: NHLB targets (%) for the DFA



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;²⁰ Bunnell et al. 2003;²¹ Wells et al. 2004²²) 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

¹⁹ Meidinger, D. and J. Pojar (eds). 1991. Ecosystem of British Columbia. BC Ministry of Forests, Research Branch Special

²⁰ Huggard, D. 2000. Ecological representation in the Arrow IFPA non-harvestable land base. Prepared for Arrow IFPA, Slocan, BC.

²¹ 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

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

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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 communities²³ 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?

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).²⁴ The recommendations are dependent on the relative area of ecosystem groups, based on the principle that 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.

Current Condition and Practices:

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

Maintaining representation of a full range of ecosystem types outside of the managed land base can be a key component of 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.

²³ 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

²⁴ 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

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

Canfor and BCTS both currently manage 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 found in Annual harvest levels are based on an apportionment of the Annual Allowable for the Invermere TSA. BCTS staff, contractors, and agreement holders operate within BCTS operating areas through out the Defined Forest Area. At this time annual timber harvesting is directed primarily by the Invermere Forest Health Strategy to manage and salvage mountain pine beetle impacted timber and periodically fire killed timber. Operational Plans outline harvest opportunities, forest health assessments, inventory information (age and height class, piece size, volume), resource values, access to the resource, and operational feasibility. Site Plans are developed for blocks and roads to ensure compliance with current legislation, our Forest Stewardship Plan (FSP), Safety program and Sustainable Forest Management Plan (SFMP).

The BCTS FSP for the Rocky Mountain Forest District was approved September 15 , 2006 for a five year term. The FSP is comprised of several sections addressing management of Kootenay Boundary Higher Level Plan objectives, FRPA resource values such as; Timber, Water, Fisheries, Riparian Management, Wildlife, Recreation, Range, Biological Diversity, Cultural Heritage Resources, Visual Resource Management, and Soil Productivity.

Harvest block summary tables are included in the Operational Plan. These tables cross-reference blocks shown on the Operational Plan maps and describes Block/Road location, area, timber harvest volume, landscape values, stage of development, and other information. To support plans for road construction and harvesting there may be assessments of resource values such as Seral Stage Distribution, Biodiversity, Habitat Distribution, or Hydrology.

Operational Plans are referred to stakeholders and First Nations to ensure all possible information is collected and issues or concerns including those which fall outside the legislative requirements are addressed.

Following the Operational Plan review and comment process roads are constructed either under contract or in conjunction with the sale of timber under a Timber Sale License. Timber Sales Licenses are

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competitively awarded to BCTS registrants who are responsible for all activities; road construction, maintenance and harvesting operations. BCTS with the help of contractors undertake the post harvest obligations for silviculture and ensure the block achieves the objective of a free growing stand as quickly as possible.

A FSP amendment may be considered at any time, to address any deficiencies or changes that may be required to address new legislation, changes in Land Use Plans, and where current plans are not meeting the resource objectives.. When amendments to the FSP are required, amendments will follow legislated requirements for content, and review and comment. Major amendments to the plan will be referred to interested parties for review and comment prior to submitting an amendment of the FSP to the District Manager.

The BCTS Environmental Management System (EMS) will be used to track compliance with our FSP and the requirements of this SFMP. It is anticipated that some subtle changes to the EMS may be required to track commitments under a SFMP. When instances of non-conformance are discovered in a Operational Plan or the SFMP, they are dealt with on a site-specific basis, with the initialization of a corrective action plan to remedy the issue.

7.2 Implementation – Sustainability Strategies.

Legal Requirements:

Old and Mature Forest Target – Kootenay Boundary Higher Level Plan

Forecasting and Probable Trends of Measures:

This is a process measure and modelling is not applicable, however the probable trend of this measure is that the Ecosystem Representation Analysis will be updated regularly.

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.

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

Indicator	1-2. Negative trends in landscape features that affect forest-dwelling organisms are avoided.
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Indicator 1-2 is 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.

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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 which 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 focused by the species accounting system outlined in Indicator 1.4. Four key landscape features that are modified by forest practices have been identified in review of Bunnell et al. 2003²⁵. These are:

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

Note that monitoring these four broad measures in combination with organism monitoring (Indicator 1-4) 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.

Measure 1-2.1 Mature and old Seral Forest Distribution

Measure:

Target (Variance):

1-2.1 Percent mature and old seral forest 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 measure 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 forest 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).

How are targets established?

Amounts of desired old growth are set in the Kootenay Boundary Higher Level Plan. 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.

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

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Current Condition and Practices:

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

Old Growth Management Areas (OGMA's) and Mature Management Areas (MMA's) 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 and BCTS both currently manage 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.

Legal Requirements:

Objectives 1 and 2 of the KBHLP 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.

Forecasting and Probable Trends of Measures:

This is a process measure and modelling is not applicable, however the probable trend of this measure is that the OGMA and MMA analysis will be updated regularly.

Monitoring and Reporting:

Trends in landscape variables will be reported in the annual report. Reporting will note whether legal targets are met. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The status of the Report will be updated in SFMP Annual Report.

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

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Measure 1-2.2 Interior Forest Distribution

Measure:

1-2.2 Recommended percent of interior forest by Ecosystem Group across the DFA

Target (Variance):

1 (0) Report recommending percent of interior forest by Ecosystem Group across the DFA – March 2009

What is this measure 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.

Current Condition and Practices:

Interior forests are currently not identified by Canfor or BCTS. 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 site plans.

Canfor/BCTS monitor the location of landscape level reserves over time.

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

Legal Requirements:

There are no legal requirements to protect forest interior habitat.

Forecasting and Probable Trends of Measures:

Calculating the amount of edge and interior can be added on to the representation analyses relatively easily because they involve the same GIS data base. Modelling 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 modelled.

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 measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The status of the Report will be updated in SFMP Annual Report.

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

Measure 1-2.3 Road Density

Measures:

1-2.3 Road densities not to exceed the legal requirements for amounts of roads (permanent access structures 7% provincially)

Targets (Variance):

5% (+/- 2%) of the THLB

What is this measure and why is it important?

Roads have three broad effects on biological diversity: 1) direct mortality and disturbance 2) effects on movement and 3) effects on community composition. Traffic caused mortality has been noted by several researchers. 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.

How are targets established?

The legal requirements for roads should be the minimal targets for the DFA. Where possible the actual amount of road should fall below the legal 7%. Although the literature is sparse, some general recommendations around roads can be made – reduce density where possible; concentrate harvesting where possible to reduce active road, and construct roads no wider than safety considerations merit. The

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

Current Condition and Practices:

Currently, no forest land is converted to non-productive except for landings, roads and gravel pits classed as permanent access. The percentage of each new block harvested that is converted to non forest land (permanent access structures) is a constant 8.1%.

Legal Requirements:

FPC: Forest Road Regulation, B.C. Reg. 106/98.
Forest Service Road Use Regulation, B.C. Reg. 173/95.
Operational Planning Regulation, B.C. Reg. 107/98.
Timber Harvesting Practices Regulation, B.C. Reg. 109/98.
Guidebooks: Soil Conservation, Soil Conservation Surveys, Soil Rehabilitation

FRPA: Generally 7% Permanent Access unless topography and existing infrastructure deems otherwise

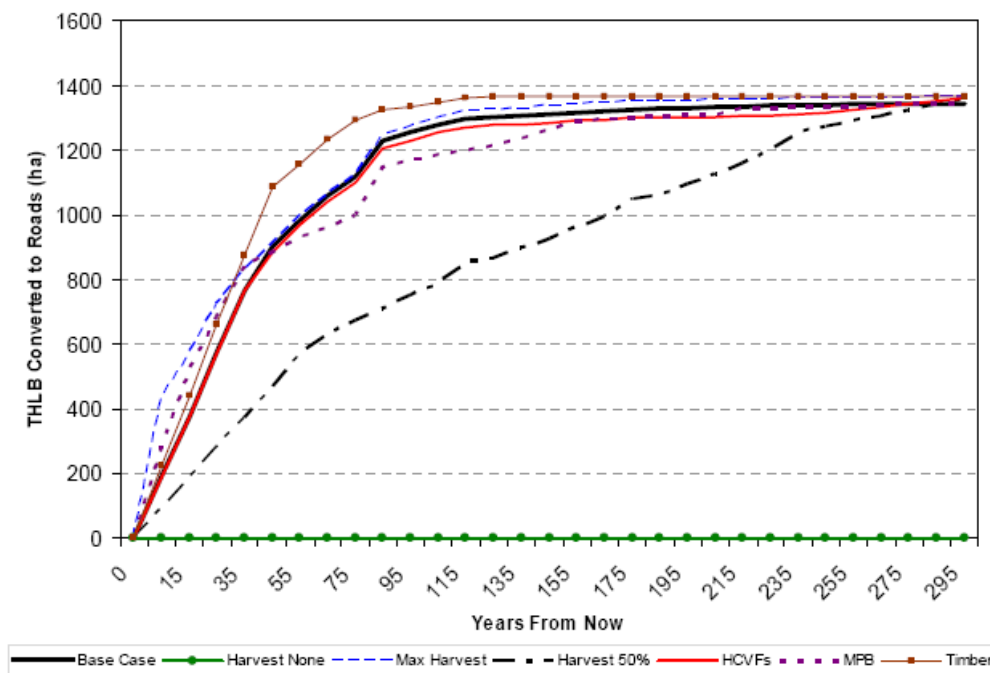
Forecasting and Probable Trends of Measures:

This measure is not explicitly forecasted however the assumption that a certain percentage of the THLB will continue to be converted to non-forest use (i.e. roads) 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 17 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.

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Figure 11: Projection of THLB land converted to non-productive land in the DFA over time



Monitoring and Reporting:

The data that is required for monitoring is the number of hectares of productive forest area lost due to conversion to a non-forest use. This data collection and analysis is essentially a GIS exercise that can be completed at 5 year intervals in conjunction with TSR. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

Formula: $\%ACN = (AC / TAT) \times 100$

Variables: $\%ACN$ – Percent of area converted to non-forest land use within the THLB
AC – Area of THLB converted to non-forest land use
TAT – Total area of THLB

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

Measure 1-2.4 Patch size Distribution

Measures:

1-2.4 Percent patch size distribution by Natural Disturbance Type

Targets (Variance):

Trend towards patch size distribution targets defined in the LU Planning Guide by Natural Disturbance Type over a 5 year period

What is this measure 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

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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

<u>NDT</u>	<u>BEC Zone</u>	<u>Very Early</u>	<u>Early</u>	<u>Mid</u>	<u>Mature</u>	<u>Old</u>
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).

The patch size distribution targets are long term and it is not the intention to achieve the targets within the time frame of the FSP. Conditions such as social, economic, biological and harvest priority factors may prevent the targets from being achieved in the short term.

Current Condition and Practices:

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.

Timber harvest cutblocks can exceed the 40 ha maximum clear-cut limit as specified in section 64 (2), (3) and (4) of the FRPA. In support of section 64 (2)(ii), to the extent practicable, the structural characteristics of a cutblock after timber harvesting will resemble an opening that would result from a natural disturbance.

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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'.

For the term of Canfor's FSP, 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.

Legal Requirements:

There are no legal requirements for patch size distribution or targets.

Forecasting and Probable Trends of Measures:

Calculating patch size distributions can be added on to the representation analyses relatively easily because they involve the same GIS data base. Modelling 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.

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 which 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 measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The status of the Report will be updated in SFMP Annual Report.

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

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Indicator	1-3. The amount, distribution, and heterogeneity of terrestrial and aquatic habitat elements and structure important to sustain biological richness are sustained.
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Indicator 1-3 is considered a “coarse” to “medium filter” approach that involves both landscape-level components and stand-level habitat components. Indicator 1-3 is intended to complement Indicator 1-1 by focusing on key habitat elements and landscape structures that can be manipulated or impacted by forest management, and with which a large portion of vertebrates are likely associated. Habitat measures are considered within two groups: those that are primarily stand level features (1-3.1) and those that usually result from the juxtaposition of stands or cover larger areas (1-2.2).

Six key habitat elements for terrestrial vertebrates have been identified by Bunnell et al. (1999²⁶, 2000²⁷) that can be impacted by forestry activities. These include dead and dying trees (snags), downed wood (coarse woody debris), riparian habitat, deciduous forest types, shrubs and seral (structural) stages. The following suite of locally developed measures addresses both terrestrial and aquatic habitat²⁸ elements:

1-3.1 Habitat elements – dead standing trees (snags); coarse woody debris; riparian areas; shrub areas; forest types (deciduous)

Measure 1-3.1 Habitat Elements

<u>Measure:</u>	<u>Target (Variance):</u>
Dead standing trees on harvested areas – THLB	100% of cutblocks will contain retention areas (consisting of high value existing snags or snag recruitment areas) greater than 0.25 ha such that any clear cut area is no more than 500m from a forest edge.
Stand level retention by Landscape Unit and BEC variant	WTPs will be established consistent with Provincial WTP strategies and Biodiversity guidebook targets. Targets for each LU/BEC combination have been developed. (See Appendix 1.7: Habitat Element Supporting Tables)
Coarse woody debris on harvested areas – THLB	CWD Targets by BEC consistent with Tembec and Canfor research (See Appendix 1.7: Habitat Element Supporting Tables)
Riparian areas – THLB	a) 100% compliance with riparian strategy/standards as defined in approved FSP/FDPs b) Riparian ecosystem types with <2000 ha represented in the East Kootenays will be reserved from harvest.
Shrub areas across the CFLB	Shrub areas greater or equal to baseline levels
Deciduous areas across the CFLB	a) 90% of cutblocks with a deciduous component pre-harvest in the THLB will have a deciduous component post-harvest, including mature and regenerating trees b) Track the trend in the NHLB (using updated inventory information)

²⁶ 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.

²⁷ Bunnell, F.L. 2000. Report to the Arrow IFPA on criteria and indicators of sustainable forest management. Centre for Applied Conservation Research, UBC Vancouver, BC. Prepared for Arrow IFPA, Slocan, BC.

²⁸ Forestry activities can impact both terrestrial habitat elements as well as streams or aquatic habitat elements. Terrestrial habitat in and around water sources are addressed under the riparian terrestrial element within this indicator. Water quality and quantity elements are covered under Indicator 9-5 further in this SFM Plan.

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What is this measure and why is it important?

This measure addresses the availability of certain habitat elements that are important for the continued maintenance of forest-dwelling vertebrate and invertebrate species within the DFA. For habitat elements that do not have detailed habitat data available, the interim targets rely on conformance. These targets will be modified to reflect improved data as it becomes available.

The elements or sub-measures listed above provide critical foraging, breeding or shelter habitat to many species of birds, mammals, amphibians, insects, bryophytes and fungi. Species rely not only on the amount and distribution of these habitat features but also on specific characteristics. For example, the size and decay class of standing dead trees determines their utility for cavity-nesting bird species, and riparian-associated shrubs are used differently by shrub-nesting birds than are upland-associated shrubs.

Monitoring the abundance, distribution and characteristics of important habitat elements is essential to assess the long-term effects of forest management strategies on forest-dwelling vertebrate species. This requires the development of monitoring programs that target not only specific habitat elements, but also the species (or set of species) that utilize them. For example, a comprehensive monitoring strategy for dead and dying trees (snags) would include several components, beginning with an assessment of current conditions (e.g. existing data on snags and snag-associated species in the DFA) and the development of specific monitoring questions (Houde 2003²⁹). Based on the type and priority of questions posed, the next steps may include the design and implementation of a field survey program to collect data on pre- and post-harvest snag density, distribution, size and decay state across particular habitat types within the managed land base. A second and complementary survey program could be developed to collect data on the presence, abundance and/or distribution of select (indicator) snag-associated species (e.g. woodpeckers and other cavity-nesting birds) within the same areas from which the snag data were gathered. The accumulation and analysis of this data will produce results that should feed back to management, potentially leading to revisions in management activities and strategies.

Specific habitat elements such as shrubs and hardwoods also play an important role in carbon sequestration for the DFA. This contribution is assessed under measure summaries for Criterion 3: Global Carbon Cycles below.

How are targets established?

Dead standing:

Work is being completed on developing targets for dead standing (snags) retention from a qualitative and a quantitative perspective. At this time, there is no conclusive information available to the Radium DFA. Operationally, snags are left within wildlife tree patches but the numbers and quality have not been determined. Canfor plans to design and implement a field survey program to collect data on pre- and post-harvest snag density, distribution, size and decay state across particular habitat types within the managed land base. Focus will be on BEC units that representation analyses show are most extensively managed and that have the least amount in non-harvestable areas, making stand level retention in the Montane Spruce the first priority. A second study, to look at distribution and relative abundance of selected snag-using species in those areas where snag abundance has been measured may be initiated in the following year. As more information comes available, the target will be revised.

²⁹ Houde, I. 2003. Steps to design a program to monitor biological diversity in managed forest landscapes. Prepared for Slocan Forest Products, Fort Nelson, BC.

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Stand level retention:

Wildlife Tree Retention (WTR) targets are currently set by landscape unit and ecosystem type. The targets include a landscape minimum retention and a spatial distribution of WTR. WTR consist of wildlife tree patches and individual tree retention in partial cut stands.

Coarse woody debris:

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 1999³⁰, Feller 2003³¹). 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. Key patterns identified 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).

A study in the East Kootenay comparing 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 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.

Riparian areas:

Riparian management objectives/targets are subsequently described within the site 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 as well as conformance with the targets established through the ecosystem representation analysis.

Shrubs:

Shrubs are common in riparian areas, and readily enter larger forest openings, particularly on moist sites. As a stand closes, shrubs are suppressed by the taller trees, and remain uncommon until the stand naturally opens. Many vertebrates respond positively to shrub abundance, which is influenced by forest

³⁰ 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.

³¹ Feller -

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practices (Bunnell 2000)³². In general, as forest canopy increases and understory decreases, the abundance of understory foragers declines (Bunnell et al 1999)³³.

There is little information locally as to what adequate levels of shrub habitat should be³⁴. The target reflects that Canfor and BCTS can impact the amount of shrub habitat in the THLB (i.e. creating habitat through openings or preserving it in riparian areas) but they do not control the natural succession in the NHLB. The target was set in order to ensure that at least the current baseline amount of shrub habitat is retained in the THLB. The target also includes tracking the trend for shrub habitat in the NHLB using forest cover updates in order to have a complete picture for the DFA.

Deciduous forest type areas:

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

There is no local information available to determine what levels of hardwood habitat should be maintained. The target was set in order to ensure that at least the current baseline amount is retained (or 90% of pre-harvested cutblocks). Timber supply review information assumes that deciduous areas will come back to deciduous state, and so the target will be met unless an aggressive program of deciduous control is deliberately instituted, which has never been contemplated. The target also includes tracking the trend for hardwood habitat in the NHLB using forest cover updates in order to have a complete picture for the DFA.

Current Condition and Practices:

Dead standing:

For past harvesting activities, the requirements for wildlife tree retention were based on FPC – Landscape Unit Planning Guidebook and Forest Development Plan targets. Operational activities conducted under the FDP are 100% compliant with the FDP targets.

The above stated target is based on a new FRPA/FSP requirement. In the future this target will better achieve long term wildlife tree retention objectives at the stand and landscape level.

Based on the modelling/forecasting project, current large (>20 cm dbh) snag densities are estimated to be 50-143 snags/ha in mature natural stands³⁵ and 5-7 snags/ha in mature managed stands. The current average snag density on the THLB is estimated to be 47 snags/ha. A large portion of the managed stand snag estimate comes from wildlife tree retention. Stands managed on economic rotations are not expected to produce an abundance of snags naturally. Snags are also present on the significant area of non THLB land base in the DFA (riparian areas, inoperable, sensitive terrain, etc).

³² Bunnell, F.L. 2000. Report to the Arrow IFPA on criteria and indicators of sustainable forest management. Centre for Applied Conservation Research, UBC Vancouver, BC. Prepared for Arrow IFPA, Slocan, BC.

³³ Bunnell, F.L., Kreamsater, 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.

³⁴ Adequate levels for some bird species are being estimated during breeding bird surveys.

³⁵ See Appendix C, 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.

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Stand level retention:

Wildlife Tree Retention (WTR) targets are currently set by landscape unit and ecosystem type. The targets include a landscape minimum retention and a spatial distribution of WTR. WTR consist of wildlife tree patches 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.³⁶ 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.

Coarse woody debris:

Current coarse woody debris (CWD) volumes are estimated to be 66-144 m³/ha in mature natural stands³⁷. Current average CWD volume across the THLB is estimated to be 70 m³/ha. CWD volumes in managed stands vary widely based on age – it has been demonstrated that managed stands experience an initial input of CWD after disturbance/harvest and then decline as existing CWD decays, until the stand matures and begins to generate new CWD. The input of CWD following harvest depends strongly on utilization standards and other policies related to leaving wood on the ground. The model used post-harvest CWD data as parameters for first rotation stands from Canfor and Tembec, and an assumed input of 25% of pre-harvest volumes for managed stands³⁸.

Riparian areas:

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 clear cut 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. Canfor has adopted new operating procedures around small wetlands not adequately protected within FRPA guidelines.³⁹

Shrubs:

Baseline data analysis indicates approximately 34,000 ha (9%) of the DFA's CFLB currently exists in shrub dominated ecosystems⁴⁰.

Deciduous forest type areas:

Baseline data analysis indicates approximately 10,800 ha (4%)⁴¹ of the DFA's CFLB currently exists as deciduous/hardwood species. This is an effective area obtained by multiplying the area of stands with some deciduous component by the % deciduous that occur within them, and adding the area in pure deciduous stands outside the THLB. The rationale for determining this effective area is due to the natural lack of deciduous presence and efforts to avoid deciduous during layout or inclusion into reserves (i.e. WTPs) or associated with riparian management areas.

³⁶ 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.

³⁷ Appendix C, Table 1. Range exists because of variations between ecosystems. SFMP Scenario Forecasting. 2004.

³⁸ Appendix D. SFMP Scenario Forecasting. 2004.

³⁹ 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.

⁴⁰ Time 0 forecasted value. Methodology provided in Table 3. SFMP Scenario Forecasting. 2004.

⁴¹ Time 0 forecasted value. Methodology provided in Table 3. SFMP Scenario Forecasting. 2004.

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Hardwoods are not harvested as a general practice in the Radium DFA. They are inventoried pre-harvest during a timber cruise. Post harvest recording of hardwoods occurs during regeneration and free growing silviculture surveys. Many hardwoods are associated with riparian management areas that are managed according those practices.

Legal Requirements:

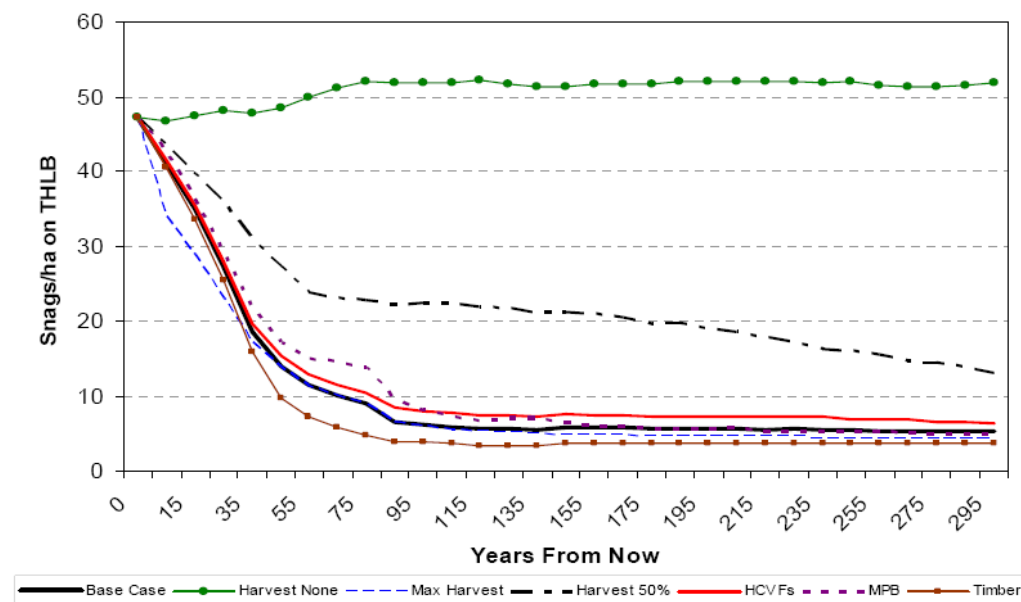
<u>Habitat Element</u>	<u>Legislation</u>	<u>Requirements</u>
Wildlife Tree Retention (WTR)	<i>FRPA</i> : FPPR Sec 66	Min 7% WTR for all cutblocks harvested in one year and 3.5% for each cutblock unless specified otherwise in FSP.
Coarse Woody Debris (CWD)	<i>FPC</i>	Required qualitatively within site plans.
	<i>FRPA</i> : FPPR Sec 68(1)	4 logs/ha, each being 2 m and 7.5 cm diameter at one end unless specified otherwise in FSP.
Riparian Area	<i>FRPA</i> : FPPR Sec 47-52	

Forecasting and Probable Trends of Measures:

Dead standing:

Figure 12 illustrates the average snags densities on the THLB over time for each scenario. Densities are initially high for all runs (47 snags/ha) because a significant portion of the THLB is still in natural stand conditions and older age classes. The No Harvest scenario shows snag densities increasing slightly over time as stands age and existing managed stands revert to more natural conditions. The Timber Focus scenario shows the sharpest drop in snag densities and the lowest overall density 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 few snags naturally in that timeframe.

Figure 12: Projection of dead standing density on DFA THLB



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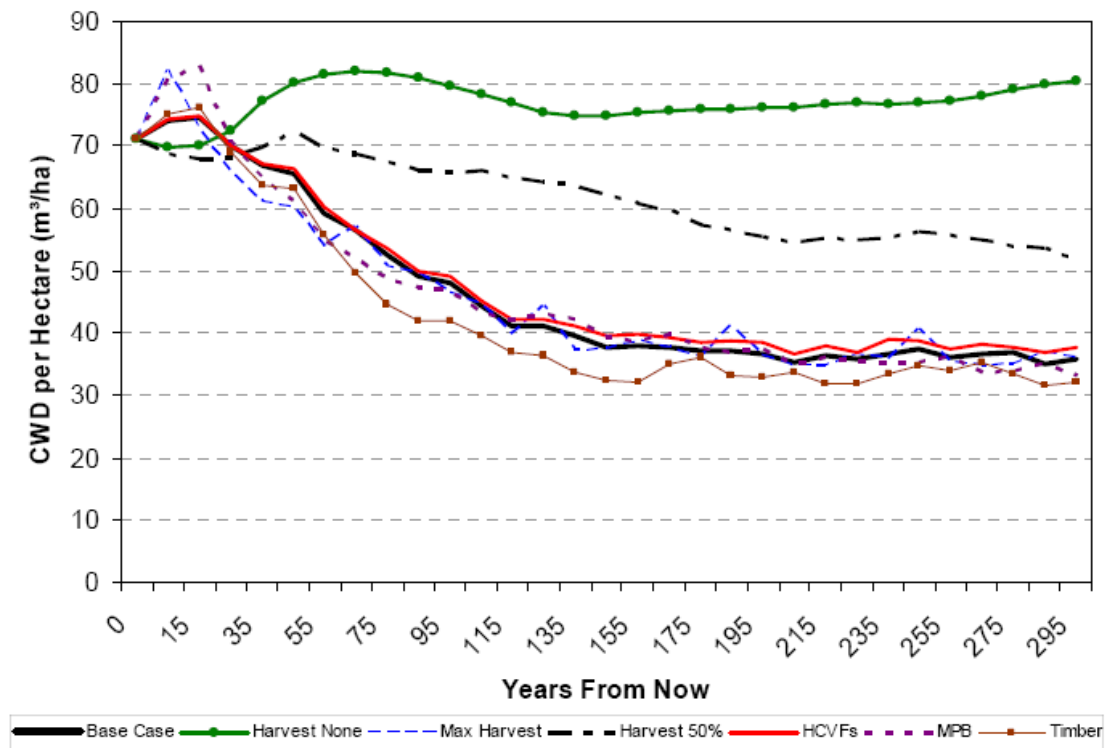
Stand level retention:

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.

Coarse woody debris:

Figure 13 shows average CWD volumes on the THLB over time for each scenario. Volumes are initially high for all runs (70 m³/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 13: Projection of CWD Levels on DFA THLB



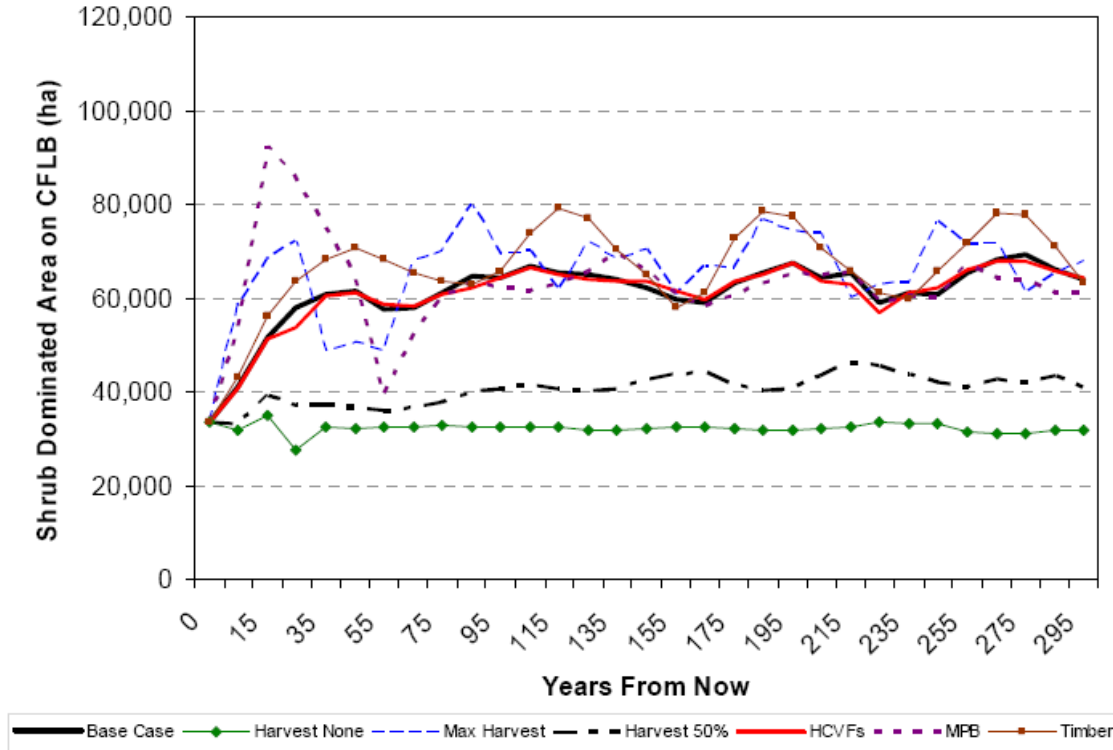
Riparian areas:

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 measure relates to compliance with legal requirements and the forecast for it is that Canfor/BCTS will remain in compliance.

Shrubs:

Figure 14 shows the area of the DFA's CFLB that occurs as shrub dominated ecosystems over time for each scenario. Under the No Harvest scenario, the amount of shrub area is maintained relatively constant, while the scenarios that implement harvesting show a strong increase in shrub area. The amount of shrub area directly correlates with the amount and timing of harvesting occurring in the scenario. Harvesting generates young seral stands which often experience a shrub dominated phase. In general, the younger the land base, the higher the proportion of shrub dominated ecosystems.

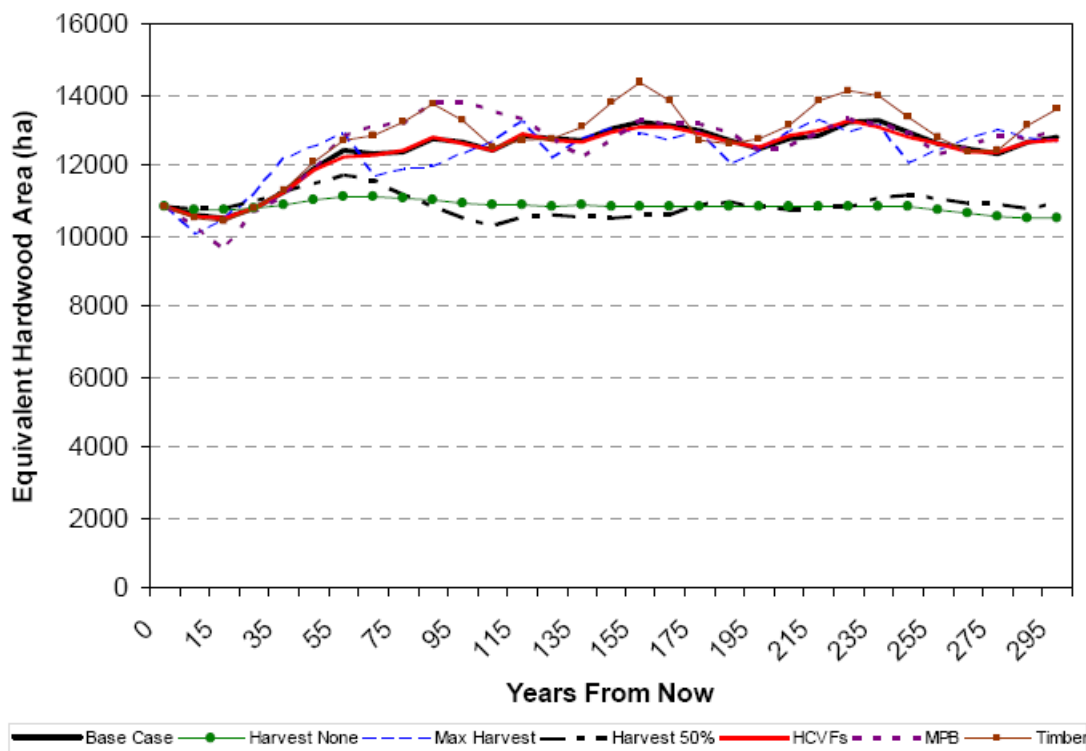
Figure 14: Projection of Shrub Area in DFA CFLB



Deciduous forest type areas:

Figure 15 shows the equivalent hardwood area of the DFA's CFLB over time for each scenario. Under both the No Harvest and 50% of Base Case scenarios, the amount of hardwood area remains relatively constant, while any of the rest of the scenarios show an increase in equivalent hardwood area. Much like the shrubs, the amount of hardwood area is directly correlated with the amount and timing of harvesting occurring in the scenario. Harvesting generates young seral stands which have a higher incidence of hardwoods than mature stands. In general, the younger the stand – the higher the proportion of hardwoods on the land base. Because of the importance of old hardwood as habitat for organisms (particularly cavity nesters) decline in proportions of hardwoods with age suggests that particular attention be given to tracking amounts of older hardwoods.

Figure 15: Projection of Effective Hardwood Areas on DFA CFLB



Monitoring and Reporting:

Dead standing:

A variety of methods will be utilized to monitor these sub-measures: tracking of WTP; some inventory (e.g. Silviculture survey post harvest & free-to-grow); modelling; and measures noted under How targets are established. A data collection form needs to be designed. Pre harvest information could be compiled from cruise compilations.

The final harvesting inspection will identify if the retention level of snags and/or live trees prescribed in the site plan has been followed. Any changes from the site plan prescribed level of snags and/or live trees to be left after harvesting and what actually remains on the site will be noted. Corrective action plans will be developed and implemented, if required.

Stand level retention:

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

Coarse woody debris:

Post harvest data collection CWD will be completed in conjunction with waste and residue surveys. Monitoring frequency will be post harvest, and analysis will be every 5 years (TSR or major changes to inventory or landbase definition).

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Riparian areas:

The location, classification and RRZ (Riparian Reserve Zone) requirements will be included in site 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 site 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/BCTS, 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.

Shrubs:

Shrub habitat will be monitored through forest cover updates with field estimates of % shrub cover for shrubs less than 2m and shrubs between 2-10m (Cruising, Regeneration & Free-to-grow surveys). As new data become available, changes in shrub cover will be tracked via comparisons between the previous and the latest version of the forest cover database.

Deciduous forest type areas:

Deciduous forest type areas will be monitored through forest cover updates. As new data become available (i.e. silviculture surveys), changes in forest cover types will be tracked via comparisons between the previous and the latest version of the forest cover database. Deciduous summaries will also be updated as additional VRI plots are established. Tracking will include both amount and age distribution of deciduous cover.

All sub-measures:

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

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

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Indicator	1-4. Native forest-dwelling species or species guilds are well distributed throughout their range in the DFA.
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Indicator 1-4 is intended to verify Indicators 1-1, 1-2 and 1-3 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 more “catch all” approaches of Indicators 1-1, 1-2 and 1-3. Indicator 1-4 also addresses forest-dwelling species of social concern that are identified under higher level plans or species at risk identified at regional levels.

Indicator 1-4 differs from Indicators 1-1, 1-2 and 1-3 in that it 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.⁴² Given the incomplete information and limited local expertise for non-vertebrates, this first version of 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 measures for biological diversity focusing on lichens, bryophytes and fungi (Houde 2004).⁴³ 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.⁴⁴ 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 or measures, 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.⁴⁵

Two broad measures are used to assess species:

- 1-4.1 Vertebrate species are assigned to monitoring groups
- 1-4.2 Select species are used to monitor the response of groups

Measure 1-4.1 Vertebrate Species – Monitoring Groups

Measure:

1-4.1 Number of forest management activities consistent with management strategies for vertebrate species groupings (including Species at Risk and selected focal species)

Target (Variance):

0 non-conformances or non-compliance issues with established management strategies for each species groupings

What is this measure and why is it important?

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

⁴²

⁴³ Houde, I. 2004.

⁴⁴ 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.

⁴⁵ 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.

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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 1-1 and 1-3 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. Indicator 1-4 is 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) it accounts for the likely presence (where and when) of individual species over the entire DFA under different management regimes, and 2) by addressing 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 favourable habitat is available at any time and how that habitat is distributed.⁴⁶ Some species can be accounted for by relatively simple GIS layers; 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 all⁴⁷ 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);
- 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:

⁴⁶ 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.

⁴⁷ Group 4 species are an exception because their habitat is too finely discriminated to be included in GIS layers. For these species specifically designed Standard Operating Procedures have been created so appropriate action can be undertaken when that habitat is encountered in the field (Kremsater and Bunnell 2007).

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- 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

How are targets established?

Species have been assigned to groups (Bunnell et al 2007).⁴⁸ 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. We expect 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 (see measure 1-4.2). A broader description of each group, members of the group and associated approaches to monitoring is provided in Bunnell’s report⁴⁹. 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.

Current Condition and Practices:

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).
- 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

⁴⁸ Group 4 species are an exception because their habitat is too finely discriminated to be included in GIS layers. For these species specifically designed Standard Operating Procedures have been created so appropriate action can be undertaken when that habitat is encountered in the field (Kremsater and Bunnell 2007).

⁴⁹ (Kremsater and Bunnell 2007).

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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.⁵⁰

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.

Legal Requirements:

FRPA: Species at Risk Notices have been established in the Rocky Mountain Forest District for the following species: Coeur d'Alene Salamander, Rocky Mountain Tailed Frog, Flammulated Owl, Lewis's Woodpecker, and Badger. Only the latter three occur within the DFA.

Forecasting and Probable Trends of Measures:

Forecasting does not apply to this measure. 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.

Monitoring and Reporting:

A report was developed (Bunnell, 2007)⁵¹ for the Radium DFA, which provides the lists of species in each group. The groups and monitoring approaches are:

- 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:

0-10 years old;
11 to 30 years old;
Deciduous 31 to 90 years old
Deciduous >90 years old

⁵⁰ 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.

⁵¹ Bunnell, F.L. and P. Vernier. 2007. *Vertebrate Species Accounting System for the Radium DFA*.

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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 listed under group 2 in Appendix XX.

- Group 3** Species with strong dependencies on specific elements (e.g. snags or shrubs as listed in Indicator 1.3). Some of these species are generalists with respect to stand age, provided that the specific habitat elements required are present. Projecting and reporting the elements under Indicator 1.3 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 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 indicator 1.2 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

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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.

A broader description of each group, members of the group and associated approaches to monitoring is provided in Appendix XX. The appendix includes Group 6 which includes species occurring within the DFA that are not forest-dwelling.

Measure 1-4.2 Monitoring Selected Vertebrate Species

Measure:

1-4.2 Select vertebrate species are chosen to monitor effectiveness of forest planning and practice in sustaining species richness

Target

(Variance):

1 (0) – March 2009

What is this measure and why is it important?

This measure 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 (measure 1-4.1), 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

How are targets established?

Under the previous measure (1-4.1), species are monitored using general trends in habitat types, elements and patterns. For measure 1-4.2 the targets are to identify focal species then track their trends and habitat associations. The first task is to select species.

Table 18 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).

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Table 18: Potential focal species used in assessing responses to habitat elements

Species ⁵²	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

⁵² All but the Black-headed Grosbeak and Gray Catbird in Table 18 are relatively common within the DFA and thus should provide trend estimates over time.

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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).

Current condition:

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 indicator 1-4.1 will help inform where forest activities are most extensive and thus help determine best locations for monitoring.

Legal Requirements:

N/A

Forecasting and probable trends of measures:

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 field work. Precision analyses can indicate the time required to obtain reliable trend information.

Monitoring and reporting:

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.

Reports from field studies and other records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent analysis of the data will be contained within the SFMP Annual Report.

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

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Indicator	1-5. Government designated protected areas and sites of special biological significance are sustained at the site and sub regional level
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This is addressed by the following locally developed measures:

1-5.1 Management activities consistent with established objectives

Measure 1-5.1 Designated Protected Areas & Special Sites

<u>Measure:</u>	<u>Target (Variance):</u>
1-5.1 Hectares of forest management activities consistent with the established objectives for parks, reserves, protected areas, biologically significant areas and including areas with specific wildlife management plans	0 ha in non-compliance

What is this measure and why is it important?

This measure ensures compliance of forest management practices with the established objectives and measures 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?

Due to the significance and rarity of these sites, the signatories have committed to managing 100% of these sites as part of the Forest Stewardship Planning process.

Current Condition and Practices:

Parks, reserves, and protected areas, and old seral forests are identified in TSR3.

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.

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 are reserved from harvest.

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

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Legal Requirements:

FRPA: Government Action Regulation for UWR in East Kootenays – Practice Requirement

Forecasting and Probable Trends of Measures:

Forecasting does not apply to this measure.

Monitoring and Reporting:

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

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

Indicator	1-6. Forest management activities will conserve the genetic diversity of tree stock
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The intent of this indicator is to conserve genetic diversity. Although genetic diversity is 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. This is reflected in the development of indicators 1-1, 1-2 and 1-3.

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 and BCTS plant ecologically appropriate tree species, as well as manage for natural regeneration of coniferous trees.

This indicator is addressed by the following locally developed measures:

- 1-6.1 Percentage of coniferous species seeds – accordance with the Tree Seed and Cone Regulation or Chief Forester’s Standards for Seed Use
- 1-6.2 Percentage of natural regeneration

Measure 1-6.1 Genetic Variability – Conifer Seeds

Measure:

1-6.1 The percentage of seeds for coniferous species collected and seedlings planted in accordance with the Tree Seed and Cone Regulation or Chief Forester’s Standards for Seed Use

Target (Variance):

0 non-compliance or non-conformances with the Standards

What is this measure and why is it important?

Genetic diversity of seedlings used for reforestation in BC is ensured through the Ministry of Forest & Range’s (MoF) 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 MoF licenses tree seed orchards that 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

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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” (Ministry of Forests Tree Improvement Branch publication). Transfer guidelines will be followed when prescribing reforestation measures in operational plans.

How are targets established?

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

Current Condition and Practices:

Cone collection within the DFA is carried out according to provincial standards and policies. In addition, provincial seedling stock type selection and ordering guidelines govern seedling selection and ordering in the DFA. Provenance guidelines and policies for tree seedling establishment also govern the ecosystems and elevation ranges that seedlings can be planted throughout the DFA.

Canfor and BCTS plant 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).

Legal Requirements:

FPC & FRPA: Stocking standards are specified in Forest Development Plans (FDPs) or Forest Stewardship Plans (FSP) by ecosystem type – Species by ecosystem type

Forecasting and Probable Trends of Measures:

Spatial forecasting will not be undertaken for this measure. It is anticipated that Canfor and BCTS will be in compliance with this measure as required by law.

Monitoring and Reporting:

The data required to monitor this measure 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.

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

Measure 1-6.2 Genetic Variability – Natural Regeneration

Measure:

1-6.2 The percentage of natural regeneration

Target (Variance):

Greater than or equal to 8% of area harvested will be restocked by natural regeneration over a 5 year period

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What is this measure and why is it important?

Natural regeneration of local tree species contributes to the genetic diversity for those species. As with measure 1-6.1, maintenance of genetic diversity is important in ensuring that tree species are adapted to local conditions and can withstand natural disturbance events and agents.

How are targets established?

The target reflects current management practices.

Current Condition and Practices:

Natural regeneration contributes to the overall regeneration of trees within the DFA (14% of the THLB). Canfor estimates since 1987 to present that within its operating area, natural regeneration contributes approximately 9.9% of all cutblocks are completely naturally regenerated. 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.

Legal Requirements:

N/A

Forecasting and Probable Trends of Measures:

Spatial forecasting will not be undertaken for this measure.

Monitoring and Reporting:

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

Formula: $\%PNR = 5 \text{ year avg. } (TSPH - \text{Planted SPH})/TSPH \times 100$

Variables: **%PNR** – Percentage of natural regeneration in prescribed areas
 TSPH – Total stems per hectare in prescribed areas (inventory label)
 Planted SPH – Total planted stems per hectare in prescribed areas (-5% mortality)

The average TSPH and Planted SPH from Free Growing surveys is used for any given year.

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

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Criterion 2	The productive capability of forest ecosystems within the Timber Harvesting Land Base (THLB) is sustained.
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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 have effects the 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 (temporal), 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.

Suggested indicators from SFM Framework to support the maintenance of productive capability by measuring the maintenance of the rate of production (process and resiliency) and maintaining a stable base of forest available for timber production:

2-1 Area and percent of forest land with diminished biological components

2-2 Area disturbed in the THLB

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

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LINK TO OTHER CRITERION/INDICATORS

- Criterion 1 – production of biomass in terms of habitat
- Criterion 3 – production of biomass in terms of carbon sequestration
- Criterion 5 – production of biomass in terms of wood supply

Indicator	2-1. Biological components of forest soils are sustained
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Sustaining forest ecosystem productivity requires determining and designing forest practices that will maintain key soil resources to ensure that harvesting does not cause continual degradation of site quality over time.

Site productivity has been shown to be a function of a number of environmental factors ranging from soil moisture and nutrient availability to the chemical and physical properties of soil and local climate. The organic nutrient pool in soil has been known to have a major influence upon site productivity because of its effects upon physical (e.g. bulk density, water holding capacity), biological (e.g. microbial populations) and chemical (e.g. cation exchange capacity) properties of soils (Chen and Aviad 1990). For this reason, the following are “*suggested academic seed measures*” from the SFM Framework:

- Soil nutrients
- Forest floor mass
- Humus mass
- Soil bulk density

In the Radium DFA, it was determined that the above measures would prove difficult without more clarity to the applicability of these measures. In the interim it was acknowledged that many biological components of forest soils can be negatively impacted by management activities and therefore a set of interim measures was needed. Since Indicator 2-1 is designed to ensure that management activities do not exceed the resilient capacity of a given forest ecosystem the Radium PAG determined that resilience could be assessed using surrogates of site quality. Resilience is a function of the extent to which ecosystem processes are disrupted, their rate of recovery, and the time over which those processes operate before another disturbance event.

The following measures were developed to support the Radium DFA SFMP.

- 2-1.1 Site Index by inventory type group for harvested areas
- 2-1.2 Amount of coarse woody debris on harvested areas

Measure 2-1.1 Site Index

Measure:

2-1.1 Site Index by inventory type group for harvested areas

Target (Variance):

Average post harvest site index (at free growing) will not be less than the average pre-harvest site index on harvested blocks

What is this measure and why is it important?

Site index (SI) is an expression of the forest site quality of a stand, defined as the height of the dominant or co-dominant trees in a stand at a specified age. Site index equations are calculated for individual species using mensuration data. It is commonly used as an indicator of site productivity as it infers that trees or stands with greater growth at a given age have access to more key resources required for biomass production. The higher the site index for a given species in a given region, the higher the productivity or

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the quality of the site. Site index is sensitive to changes in ecological variables including soil nutrients, soil moisture, and others.

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

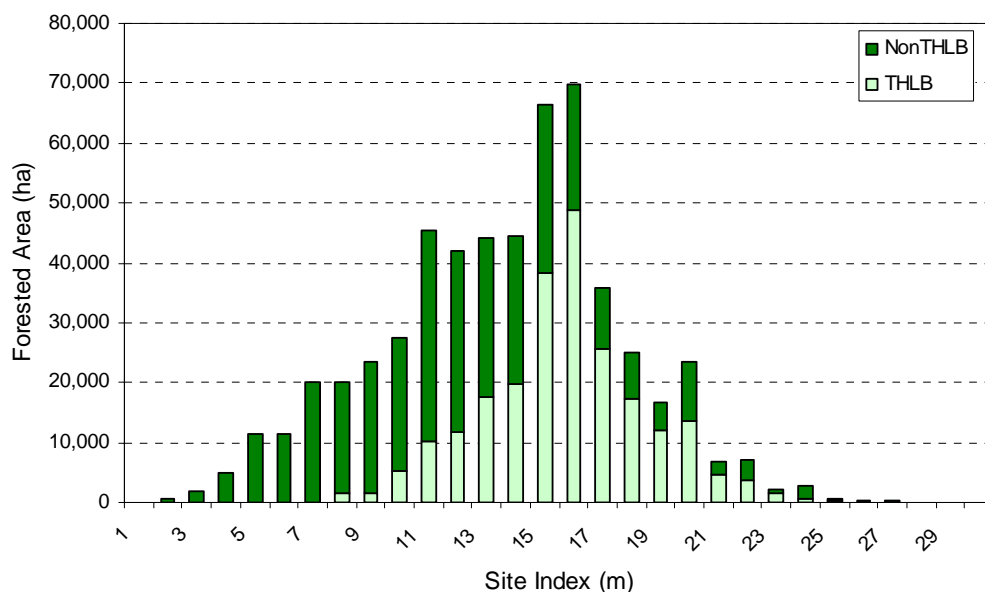
Site index is considered to be an *interim measure* of this indicator. More direct measures of the biological components of the productive capability of forest ecosystems in the THLB have been proposed as part of the SFM Framework (see Plan to plan measures at the end of this Indicator description).

How are targets established?

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

Current Condition and Practices:

Figure 16: Site Productivity by Landbase Type (Existing Inventory Estimates)



A summary of area by site productivity as indicated by existing inventory estimates is shown in Figure 16. This figure indicates that the THLB area is heavily skewed toward the portion of the land base with higher site indexes. As per the low site index netdown criteria listed in Appendix B of the TSR3 Document, no THLB area occurs where site index is less than 8 and only small portions with site indices from 8 – 13 are included in the THLB. The average site index in the THLB is 15.7m and the average site index in the CFLB is 13.6m.

The average site index for all future managed stands on the THLB was calculated as 18.2m using the SIBEC site index adjustment process (see Appendix B – Section 4.1.2 TSR3 document). This is 2.5m or 15.9% higher than the current inventory estimate.

Pre- and post-harvest site index is estimated by Biogeoclimatic Zone site series and leading species tables provided by the Ministry of Forests and Range for both Canfor and BCTS.

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Legal Requirements:

There is no legal requirement to track and/or report site index information.

Forecasting and Probable Trends of Measures:

Site index is a fundamental value used in the modelling of growth and yield of stands to forecast future stand volume and timber supply. It is assumed that site index of a stand will not change over time, with or without disturbance. As such, site index measures are not explicitly forecasted or projected, but are built into planning scenarios as part of timber supply projections.

Monitoring and Reporting:

The data that is required to monitor this measure is post-harvest site index (SI) by block during free growing silviculture surveys on previously harvested areas within the THLB assessed on a 5 year rolling average. Pre-harvest data will be obtained as part of inventory information by the planning forester. The monitoring and analysis of post-harvest SI will occur annually through Canfor/BCTS' individual silviculture survey program.

Currently, the pre-harvest data exists as part of forest cover labels as part of the VRI or Forest Cover Map. Individual site index measurements for blocks are aggregated into larger Inventory Type Group measurements to produce the Radium results described above. As post-harvest data will be obtained on a block basis, it will be necessary to extract the individual pre-harvest data measurement from the aggregated database to make direct comparisons.

The silviculture forester will compare the pre-harvest SI in each block to the recorded post-harvest SI, and report this information in the SFMP Annual Report. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures.

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

Measure 2-1.2 Coarse Woody Debris

Measure:

2-1.2 Amount of coarse woody debris on harvested areas

Target (Variance):

CWD Targets by BEC consistent with Tembec and Canfor research (See table – Appendix 1.7: Habitat Element Supporting Tables)

What is this measure and why is it important?

Beyond providing food and habitat for vertebrates and invertebrates as well as growing sites for plants, coarse woody debris 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 *interim measure* 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 unsalvaged timber. Within the NHLB it is assumed that natural processes will result in the maintenance of appropriate levels of CWD.

How are targets established?

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

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field sampling. Data has been collected in many BEC's since 2001. The CWD targets that *FOREST* has accepted are presented in Appendix 1.7: Habitat Element Supporting Tables.

Current Condition and Practices:

See Measure 1-2.1 – CWD

Legal Requirements:

See Measure 1-2.1 – CWD

Forecasting and Probable Trends of Measures:

See Measure 1-2.1 – CWD

Monitoring and Reporting:

See Measure 1-2.1 – CWD

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

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

Planned Measures for Indicator 2-1

The interim measures described above will be used while Canfor continues to test and investigate the specifics of operational implementation of potential measures for use in the Radium DFA. This approach, described below, has been recommended by a team of forest ecologists from the University of British Columbia working in collaboration with Canfor foresters. The intent is to maintain the capability of the timber harvesting landbase to supply forest products in perpetuity, without compromising its capacity to also supply a range of additional values (such as habitat provision and non-timber benefits). Measures for this indicator were selected that have a demonstrated link to ecosystem production and were relatively easy to measure. These potential measures include:

- total soil nitrogen
- forest floor mass
- humus mass
- soil bulk density

A research project is proposed to test the effectiveness of these proposed measures. If the project is successful, the results of the research project will be peer reviewed and presented to the *FOREST* for their review and vetting. Once there are operational protocols to implement the assessment of these measures, they may be incorporated into the SFM Plan.

This will continue to be a priority project for Canfor.

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Indicator	2-2. Productive land-base loss as a result of forestry activities is minimized
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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. This indicator tracks the status and trend of forest land base that remains productive.

The following measures were developed to support the Radium DFA SFMP.

- 2-2.1 Area of THLB converted to non-forest land use through forest management activities
- 2-2.2 Percent of cutblock area having roads/landing construction due to forest management activities
- 2-2.3 Percent of long term detrimental soil disturbance

Measure 2-2.1 Forest Converted to Non-Forest Land use

Measure:

Target (Variance):

2-2.1 Road densities not to exceed the legal requirements for amounts of roads (permanent access structures 7% provincially) 5% (+/-2%) of THLB

What is this measure and why is it important?

In order to assess the maintenance of the productive capability of the land base, this measure specifically tracks the amount of productive land base loss due to various non-forest uses. Removal of the productive land base occurs as a result of permanent access structures, including roads, landings and gravel pits, as well as converting forested areas to non-forest land use, such as range and mineral exploration.

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

How are targets established?

The target is established based on the current conditions in the DFA. Ideally, there would be no conversion of forest land to non-forest land use, however, to address assumptions with TSR3, the SFM Plan accounts for a 1% reduction in the THLB allowing for future road construction.

The legal requirements for roads should be the minimal targets for the DFA. Where possible the actual amount of road should fall below the legal 7%. Although the literature is sparse, some general recommendations around roads can be made – reduce density where possible; concentrate harvesting where possible to reduce active road, and construct roads no wider than safety considerations merit. The amount of road should be investigated when comparing management scenarios. Scenarios with the lesser amounts of roads can be chosen over other scenarios.

Current Condition and Practices:

Currently, information on permanent access structures is being quantified for the Invermere TSA through a multi year project which is to be completed by March 2008. The final results of this project will provide an accurate estimate of the area of THLB converted to non-forest land use through forest management activities in the Invermere TSA. The results will be used in the next TSR analysis.

As of 2006, no forest land is converted to non-productive except for landings, roads and gravel pits classed as permanent access. The percentage of each new block harvested that is converted to non forest land (permanent access structures) is a constant 8.1%.

Currently, information on permanent access structures is being quantified for the Invermere TSA through a multi year project which is to be completed by March 2008. The final results of this project will

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provide an accurate estimate of the area of THLB converted to non-forest land use through forest management activities in the Invermere TSA. The results will be used in the next TSR analysis.

Legal Requirements:

FPC: Forest Road Regulation, B.C. Reg. 106/98.
 Forest Service Road Use Regulation, B.C. Reg. 173/95.
 Operational Planning Regulation, B.C. Reg. 107/98.
 Timber Harvesting Practices Regulation, B.C. Reg. 109/98.
 Guidebooks: Soil Conservation, Soil Conservation Surveys, Soil Rehabilitation

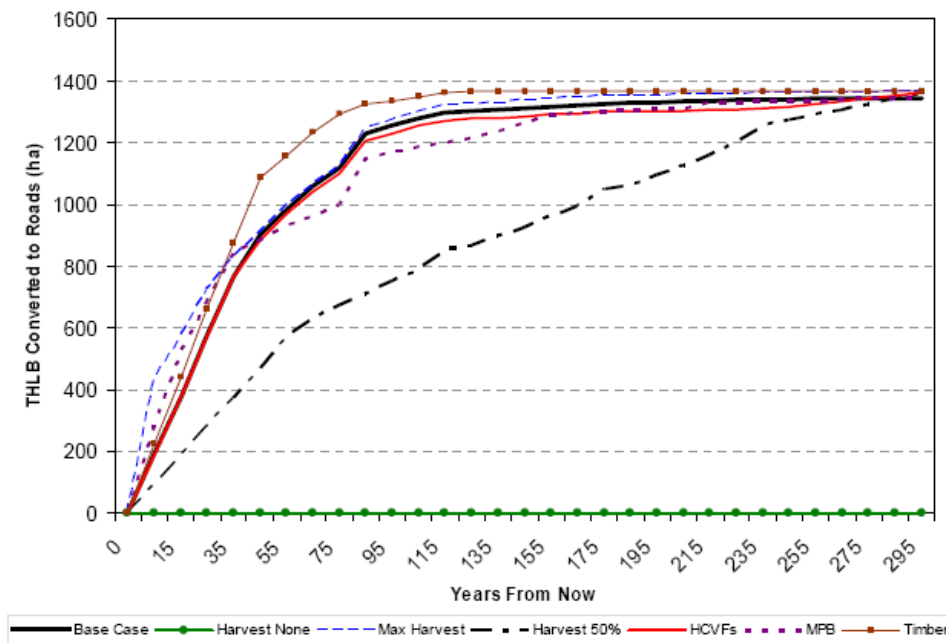
FRPA: Generally 7% Permanent Access unless topography and existing infrastructure deems otherwise

Forecasting and Probable Trends of Measures:

This measure is not explicitly forecasted however the assumption that a certain percentage of the THLB will continue to be converted to non-forest use (i.e. roads) 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 17 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 17: Projection of THLB land converted to non-productive land in the DFA over time



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Monitoring and Reporting:

The data that is required for monitoring is the number of hectares of productive forest area lost due to conversion to a non-forest use. This data collection and analysis is essentially a GIS exercise that can be completed at 5 year intervals in conjunction with TSR. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

Formula: $\%ACN = (AC / TAT) \times 100$

Variables: $\%ACN$ – Percent of area converted to non-forest land use within the THLB
 AC – Area of THLB converted to non-forest land use
 TAT – Total area of THLB

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

Measure 2-2.2 Road/Landing Construction

Measure:

2-2.2 The percentage of cutblock area having roads/landing construction due to forest management activities

Target (Variance):

Legal limit of <7% of cutblock as per FPPR sec 36

What is this measure and why is it important?

This measure quantifies the amount of productive land base loss due to road and landing construction. In order to continue with timber harvesting within the THLB, new roads and landings will need to be constructed over time in order to access available timber. Forest managers must balance the development of new roads in a road network system with the maintenance of existing roads, as well as the removal and rehabilitation of some existing roads.

An appropriate level of deactivation is required for all access roads no longer required for resource management, particularly if the intent is to minimize impacts to wildlife and wildlife habitat. It would stand to reason that it is also acceptable to deactivate roads to minimize impacts on soils and water. Full road deactivation would require the area to be rehabilitated back to productive land.

While it is unlikely that no more roads will be developed, the percentage of the land base classified as road and/or landings should be minimized in order to minimize the loss of the productive land base as a result of forestry activities.

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

How are targets established?

Canfor and BCTS currently follow the legislative requirements under the Forest and Range Practices Act for the percentage of road and landing construction. The *FOREST* supports the default targets under the new FRPA as sufficient. It should be noted that within the legal requirements (FPPR) there is tolerances for the 7% target.

Current Condition and Practices:

Currently, information on permanent access structures is being quantified for the Invermere TSA through a multi year project which is to be completed by March 2008. The final results of this project will

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provide an accurate estimate of the area of THLB converted to non-forest land use through forest management activities in the Invermere TSA. The results will be used in the next TSR analysis.

Road widths in Table 19 represent an average unproductive width for each of the road types shown as per the TSR3 document. Widths for railways and power lines were taken from the Invermere TSR2 analysis.

For TSR3 a complete roads layer for the TSA was developed in 2003 by adding recently constructed roads to existing district roads coverage. Each road was assigned a type and then buffered to the widths shown below. The buffered areas were considered unproductive and were netted out of the crown forested land base. The difference between the total area and excluded area in Table 19 is because some of this area was already removed due to ownership or non-productive status in the forest cover file.

Currently, information on permanent access structures is being quantified for the Invermere TSA through a multi year project which is to be completed by March 2008. The final results of this project will provide an accurate estimate of the area of THLB converted to non-forest land use through forest management activities in the Invermere TSA. The results will be used in the next TSR analysis.

Table 19: Access feature classification

Access feature/ class	Road length (km's)	Road width (metres)	Percent Reduction	Total Area (hectares)	Area Excluded (ha)
Highway	318	40.0	100%	9,225	6,330
Secondary Road	1,039	15.9	100%		
Logging Road	6,207	8.5	100%		
Trail	2,325	3.0	100%		
Railway	218	33.8	100%	616	81
Power Line	216	49.0	100%	734	66
Totals				10,575	6,477

Note: Overlap between these features and non-forested areas⁵³ in exist but no double counting occurs during net-downs.

* This gross area is less than the area obtained by multiplying road lengths and widths. This was because the GIS coverage did not double count overlaps between feature types or the buffer overlaps that occurs at all intersections.

Table 20: Unclassified roads, trails, and landings

Feature Type	Reduction percent (%) applied to existing harvested areas	Total area (ha)	Area Excluded	THLB	% of THLB
Access Features	Refer to area in Table 19	10,575	6,477	-	-
In block Trails	4.5% (SBFEP soil disturbance surveys in 1994/95 + professional judgment)	4,841	2,965	-	-
In block Landings	2.0% (1/4 ha landing per 8 ha harvested – reduced by 1% for overlap with roads)	2,151	1,317	-	-
Totals	Existing access features plus existing trails and landings	17,567	10,759	-	-
				233,873	4.6%

⁵³ Table 3 of 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.

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Based on estimates provided by the Regional Pedologist for TSR2, reductions to account for in-block trails and landings are defined as shown in Table 20. These estimates take into account varying practices throughout different time-periods in the TSA, and how these practices have improved over time, to reduce the unproductive area created by landings and logging trails. The values remain unchanged from TSR2. These percentages were translated into equivalent areas (i.e., 4.5% of logged area –107,578 = 4,841 ha) and then applied spatially through enlarged buffers on existing logging and secondary roads. The total netdown for existing roads, trails, and landings can be found in Table 20 above.

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

Legal Requirements:

Legal limit of < 7% of cutblock as per FRPA: FPPR S.36

Forecasting and Probable Trends of Measures:

This measure is not forecasted however, the assumptions (which are relatively static) for future reductions in roads, landings and seismic can be stated. Areas removed from the forested area will be projected as part of future scenario planning and monitored against.

Monitoring and Reporting:

The data required for monitoring is the number of hectares of productive forest area lost due to construction of roads and landings. Data collection and analysis is essentially a GIS exercise that can be completed at 5 year intervals. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report. Non-permanent access roads that are rehabilitated should be tracked as gains to the productive forest area.

Formula: $\%RLP = (RL / CB) \times 100$

Variables: $\%RLP$ – Percentage of cutblock area with roads/landings
 RL – Number of hectares of roads/landings due to forest management activities
 CB – Number of hectares of cutblocks

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

Measure 2-2.3 Long Term Detrimental Soil Disturbance

Measure:

2-2.3 The percentage of long term detrimental soil disturbance as a result of forest management activities

Target (Variance):

- 1) Landscape: Average 4.5% (+/-2%) over all cutblocks over a 5 year period.
- 2) Stand: For a cutblock, 10% disturbance on high hazard areas and 5% on very high hazard areas as defined in soil conservation guidebook.

What is this measure and why is it important?

This measure tracks the percentage of long term detrimental soil disturbance at a site level (i.e. cutblock) where long-term detrimental soil disturbance is defined for blocks with compaction or water table issues lasting approximately 10 years post-harvest or post-silviculture activity.

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

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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.

How are targets established?

At the landscape level, the target was established following a TSR study (1995/95) applicable to the TSA.

At the cutblock level, the legal requirements under FRPA serve as the targets.

Current Condition and Practices:

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% (see Table 20).

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

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 and BCTS can be found in Appendix 1.3: Practices Analysis.

Legal Requirements:

FPC & FRPA: For a cutblock, 10% disturbance on high hazard areas and 5% on very high hazard areas as defined in soil conservation guidebook.

Forecasting and Probable Trends of Measures:

Forecasting does not apply to this measure.

Monitoring and Reporting:

The data required to monitor this measure is derived from ocular estimates and site degradation surveys of soil disturbance on blocks post-harvest.

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Formula: $\%LTSD = (LTD / TAT) \times 100$

Variables: **%LTSD** – Percent of long term soil disturbance in the THLB
LTD – Total area (ha) of THLB with long term disturbance
TAT – Total area (ha) of THLB

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

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

Indicator	2-3. Total growing stock of merchantable and non-merchantable tree species on forest land available for timber production
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Indicator 2-3 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 favourable 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. Indicator 2-3 is intended to maintain an appropriate representation of stand types of the THLB.

The following measures were developed to support the Radium locally developed SFMP:

- 2-3.1 Regeneration delay period
- 2-3.2 Percentage compliance with regeneration standards set in FSP
- 2-3.3 Percentage of area in compliance with free growing requirements

Measure 2-3.1 Regeneration Delay

<u>Measure:</u>	<u>Target (Variance):</u>
2-3.1 Regeneration delay period	0 non-compliance or non-conformance with Regeneration Delay period as specified in each Site Plan

What is this measure and why is it important?

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 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 measure 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 sequestration.

How are targets established?

The target for this measure is established based on the current legal requirements for stocking standards.

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Current Condition and Practices:

Canfor and BCTS are 100% compliant with this measure. 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 and BCTS can be found in Appendix 1.3: Practices Analysis.

Legal Requirements:

FPC & FRPA: Stocking standards are specified in Forest Development Plans (FDPs) or Forest Stewardship Plans (FSP) by ecosystem type – typically 700 min – 1200 sph and 600 min – 1000 sph. Regeneration delay is typically 7 years.

Forecasting and Probable Trends of Measures:

Forecasting does not apply to this measure. However, regeneration delay is an important aspect of modelling because it is fundamental in determining timber supply and other important values.

Monitoring and Reporting:

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 acceptable species. The results of all surveys are maintained in Canfor and BCTS databases (currently Phoenix for Canfor and Genus for BCTS). 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 and BCTS' databases.

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

Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. This information is required by block but will be reported as an average for all blocks regenerated annually. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

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

Measure 2-3.2 Compliance with Regeneration Standards

Measure:

2-3.2 Compliance with regeneration standards set in FDP/FSP

Target (Variance):

0 non-compliance or non-conformance with the Standards

What is this measure and why is it important?

Regeneration standards exist to ensure that appropriate species are reforested on harvested areas to within acceptable numbers. The Ministry of Forests and Range 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

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desired density and species composition of future stands. Compliance with this measure is an important to ensure long term productivity.

How are targets established?

The legal requirements identified by the FSP serve as the target for this measure.

Current Condition and Practices:

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

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

Legal Requirements:

FPC & FRPA: 100% compliance – no tolerance

Forecasting and Probable Trends of Measures:

Forecasting does not apply to this measure.

Monitoring and Reporting:

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 Canfor and BCTS databases (currently Phoenix for Canfor and Genus for BCTS). 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 and BCTS' databases.

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

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

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

Measure 2-3.3 Compliance with Free Growing

Measure:

2-3.3 Compliance with free growing requirements

Target (Variance):

0 non-compliance or non-conformance

What is this measure and why is it important?

This measure tracks the percentage of harvested blocks that meet free growing obligations across the DFA, thereby ensuring sustained productive capability of forest ecosystems. A free growing stand is defined as a stand of healthy trees of a commercially valuable species, the growth of which is not impeded by competition from plants, shrubs or other trees. The free growing dates are established based on the biogeoclimatic classification of the site and the tree species prescribed for planting or left for natural after harvest.

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

How are targets established?

The legal requirements set out in FRPA represent the target for this measure. This strategy is supported by the *FOREST*. The target must be met on every cutblocks, however a summary of all blocks for both Canfor and BCTS will be used for this measure. The target is meant to be reported annually as blocks become eligible for free growing status.

Current Condition and Practices:

100% of Canfor⁵⁴ and BCTS compliance.

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

Legal Requirements:

FPC & FRPA: 100% compliance – no tolerance

Forecasting and Probable Trends of Measures:

Forecasting does not apply to this measure. However, free growing status is an important aspect of modelling because it is fundamental to determining timber supply and other important associated values.

Monitoring and Reporting:

Free growing dates for each harvested stand are recorded and maintained in Phoenix at Canfor and in Genus at BCTS. Each cutblock is surveyed when the free growing dates approach to ensure the free growing standard has been met and that the stand is fully stocked and performing successfully. The results of all surveys are also summarized and maintained in Canfor's and BCTS' databases. If a survey indicates that the stand has not achieved free growing by the required date, corrective actions will be prescribed in order to remedy the situation while still meeting the late free growing deadlines. Despite all efforts, some areas will not meet the free growing standard by the late date and the site plan must be amended to extend the critical dates so that continued treatments can be applied in an effort to fulfil the free growing obligation.

Once free growing status has been achieved, the licensee must submit a report to the Ministry of Forests and Range that will update the status of the cutblock on the government database. Canfor and BCTS track these reports internally, and this measure can be tracked and monitored through government reports submitted annually at the end of May. Reporting will also occur annually within the SFMP Annual Report. This information is required by block but will be reported as an average for all blocks regenerated annually.

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

⁵⁴ Data Source: Canfor Silviculture Manager– Personal Communication, November, 2004

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Indicator	2-4. No net detrimental loss in productivity as a result of forest related slope instability.
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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. This indicator tracks the status and trend of forest land base that remains productive. This is addressed by the following locally developed measure:

2-4.1 Number of hectares of landslides resulting from forestry practice

Measure 2-4.1 Landslides

Measure:

2-4.1 Number of hectares of landslides resulting from forestry practices

Target (Variance):

0 ha in THLB (for slides >0.5 ha in size)

What is this measure 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 measure has been established based on consultation with the *FOREST*.

Current Condition and Practices:

Canfor has had past occurrences of landslides resulting from foresting practices. However, in the last two years there have been no 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.

As of this date, there have not been any landslides initiated due to forestry operations by BCTS in the past two years.

Legal Requirements:

FPC & FRPA: N/A

Forecasting and Probable Trends of Measures:

Forecasting does not apply to this measure. 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.

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

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

Indicator	2-5. Natural disturbance levels and risk levels are managed for such that resistance to catastrophic change and the ability to recover on the landscape level is sustained.
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Natural disturbance levels and risk levels are managed for such that resistance to catastrophic change and the ability to recover on the landscape level is sustained. The process of renewal restores productive capability between disturbance events. It is important to ensure that effective strategies are in place in order address the impacts of large natural disturbance events on the range of forest related values in the DFA. This is addressed by the following locally developed measure:

- 2-5.1 Significant detected natural disturbance damaging events – treatment plans prepared and implemented

Measure 2-5.1 Catastrophic Natural Disturbance Events

Measure:

2-5.1 Percentage of significant⁵⁵ detected natural disturbance damaging events threatening the THLB which have treatment plans prepared and implemented

Target (Variance):

1 strategy exists per damaging event or agent

What is this measure and why is it important?

Once assessments of potentially damaging natural disturbance events or agents are in place, this measure ensures that management strategies are put in place to deal with any events or agents. Endemic levels of damaging agents are expected in the DFA. Strategies will be developed for damaging agents that begin to exceed historic endemic levels. These levels will be discussed with the MoF as per current procedures to determine when a strategy is required.

How are targets established?

The target for this measure is established based on consultation with the *FOREST*. The target is simply to develop strategies for natural disturbance agents and for fire.

⁵⁵ A significant natural disturbance event is defined as an area greater than 500 ha.

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Current Condition and Practices:

In addition to the historical and current forest health as described in more detail within Section 6.1.2 Natural Disturbance Regime, the current FDP's list strategies for local forest pest outbreaks, salvage due to fire and windthrow applicable to the operating area for that FDP. Similarly, the Rocky Mountain Forest District Forest Health strategy outlines strategies and treatment plans for significant natural disturbance events. The large wildfires of 2003, for example, each had an overall treatment plan developed that encompassed salvage harvesting, deactivation, rehabilitation and reforestation among other things. Often the treatment plans are developed jointly with the Ministry of Forests and Range and industry staff as district-wide plans. Currently Canfor and BCTS are 100% compliant with the measure.

Legal Requirements:

FPC & FRPA: Forest Fire Prevention and Suppression Regulation, B.C. Reg. 169/95.

Forecasting and Probable Trends of Measures:

The forecast for this measure is that as a damaging event or agent is reported, and a strategy will be developed to reduce potential impact.

Monitoring and Reporting:

Government agencies, Canfor and/or BCTS will identify when a significant natural disturbance damaging event has occurred/is occurring in the THLB. Once identified, one of the three will take responsibility for developing treatment plans which will describe implementation strategies. Canfor and BCTS will establish and maintain a summary of significant damaging events and their estimated incidence, current status and potential impact on a range of forest values in the DFA. Tracking will occur as part of forest cover updates and the TSR process.

The frequency of monitoring and analysis will be at a minimum on an annual basis. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. Reporting will also occur annually in the SFMP Annual Report.

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

Radium DFA Sustainable Forest Management Plan

Criterion 3	Forest ecosystem contributions to global ecological cycles are sustained within the DFA
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Forest ecosystems are an integral part of the global carbon cycle as trees and soils absorb and release carbon dioxide (CO₂) through carbon uptake and decomposition. Trees can store carbon in their plant tissues through the process of photosynthesis and could potentially exist as a significant carbon pool, particularly in old forests. When trees are harvested, or when a natural disturbance such as fire occurs, the carbon 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 initiatives such as the Montréal Process, carbon requirements for forest certification, and the 2002 ratification of the Kyoto Protocol by Canada, which commits Canada to having to meet its greenhouse gas emission (GHG) reduction targets of 6% from 1990 levels by the year 2012. With current trends of increasing GHG emissions, it is predicted this will approximate a 33% reduction from current (2002) level emissions, or approximately 240 Mt of carbon (Government of Canada 2002). Forests and agricultural soils in Canada are projected to provide a carbon sink of 30 Mt of carbon by continuing with current management practices. This could be increased by additional activities (Government of Canada 2002). Although the targets set out in the Kyoto Protocol are considered national level objectives by policymakers, local forest managers will have the opportunity to support it on the ground.

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

Indicator	3-1. The total forest ecosystem biomass and carbon pool is sustained
------------------	---

The Intergovernmental Panel on Climate Change (IPCC), which makes recommendations for the implementation of the Kyoto Protocol, advises on the carbon pools that should be accounted. The "total forest ecosystem biomass and carbon pool" include the following:

- above ground biomass,
- below ground biomass,
- litter, deadwood, and
- soil organic matter.

This indicator measures the contribution of forest ecosystems to the total global carbon budget, including absorption and release of carbon. It assesses the change in total forest ecosystem carbon stocks and over time, the annual net change in carbon produces a trend in carbon storage or release. The current capacity is to measure the above ground biomass pool, with further work needed on developing approaches for measuring the remaining pools.

This indicator is addressed by the following locally developed measures:

- 3-1.1 Estimated amount of carbon stored in trees in the TSA (converted from TSR m³/ha) is sustained
- 3-1.2 Estimated carbon in non-tree vegetation (above ground biomass and roots)

Radium DFA Sustainable Forest Management Plan

Measure 3-1.1 Carbon Stored in Trees

Measure:

3-1.1 Estimated amount of carbon stored in trees in the DFA's CFLB (converted from TSR m³/ha)

Target (Variance):

Baseline sustained or increasing trend

What is this measure and why is it important?

Forest carbon has recently become a key SFM value, particularly in view of Canada's international commitment to lower its net carbon outputs to the atmosphere as part of the Kyoto Protocol. Forest ecosystems are an integral part of the global carbon cycle. Trees and vegetation sequester carbon from the atmosphere through the process of photosynthesis. Carbon is stored in several components of forests including tree biomass, plant biomass, coarse woody debris, forest floor litter and soil. Forest soils are a large but relatively stable reservoir of carbon with minimal changes over time. In contrast, variations in carbon storage in tree biomass are the dominant factor regulating temporal patterns in total ecosystem storage. Timber harvesting results in biomass carbon being transferred for use in forest products or the production of bio-energy while breakage and waste from timber harvesting can contribute to the detritus carbon pool. Discarded forest products are recycled, burned, or stored in landfills, hence, with each activity resulting in different rates and forms of carbon release.⁵⁶

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

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

How are targets established?

Future targets maybe developed with provincial and possibly national input (March 2008). The current target however, has been based on the recommendation from Canfor/BCTS arising from body of work already existing; accepted by *FOREST* as being the most practical option for measurability. The target for this measure has been established as the baseline condition with further qualification that the current condition is maintained or that the trend increases. Trends will show annual net change in carbon pool in trees.

Even without harvesting, but with natural disturbance, future carbon storage may be less than current condition. For that reason baseline information will have to be dynamic over time as well (i.e. a baseline with current harvesting levels and assumptions on future natural disturbance).

Current Condition and Practices:

The current mass of carbon stored in trees on the TSA is estimated to be 20.6 billion kg's⁵⁷.

⁵⁶ Canadian Forest Service, Forest Carbon Accounting: <http://carbon.cfs.nrcan.gc.ca>

⁵⁷ Time 0 forecasted value. Methodology provided in Table 3.

Radium DFA Sustainable Forest Management Plan

Legal Requirements:

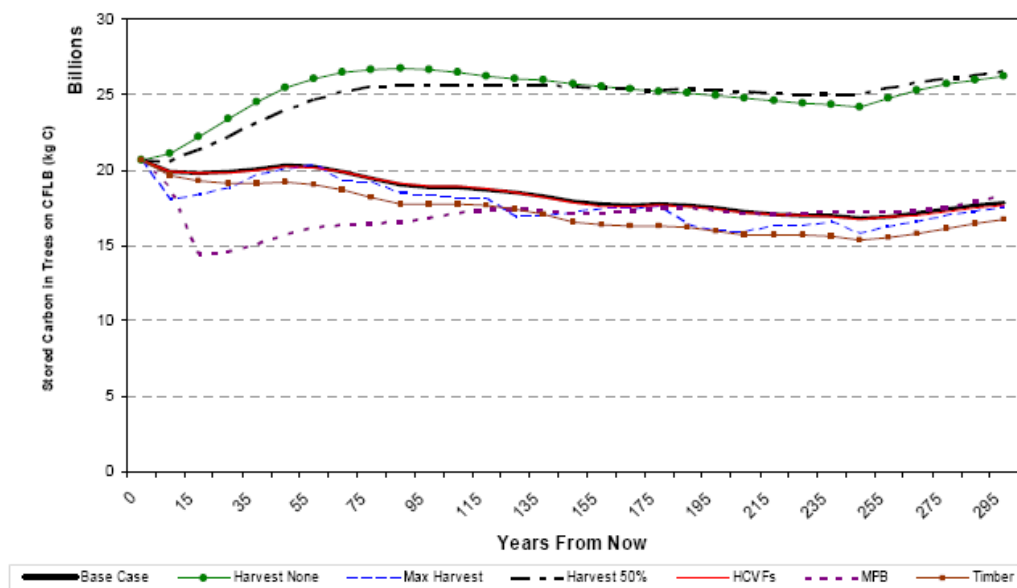
N/A

Forecasting and Probable Trends of Measures:

Figure 18 shows the amount of carbon stored in trees on the TSA over time for each scenario. There is a direct correlation with the volume of growing stock on the land base so those scenarios that accrue growing stock over time (No Harvest & 50% of Base Case) show increases in stored carbon over the first 75 years and then a stable trend for the rest of the planning horizon. This occurs because age class distributions normalize in relation to the growth rates and rate of disturbance on the land base. The carbon stored by the 50% of Base Case run is overestimated because the portion of the THLB where harvesting is not occurring (but could have) would be expected to experience natural disturbances – but they were not modelled.

The rest of the scenarios show similar long term trends where the amount of stored carbon declines over a 170 yr period and then stabilizes. The Timber Focus run stores the least amount of carbon in the long term because it reduces growing stock more than other runs by maintaining young stands on more of the land base. The MPB run can be seen to significantly reduce carbon in the short term as a result of the modelled stand mortality.

Figure 18: Projection of Carbon Stored in Trees on the CFLB in the Invermere TSA



Monitoring and Reporting:

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

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

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

Measure 3-1.2 Carbon Stored in Non Tree Vegetation

Measure:

3-1.2 Estimated carbon in non-tree vegetation (above ground biomass and roots)

Target (Variance):

TBD – April 2008

What is this measure and why is it important?

The rationale for the importance of the non-tree vegetation measure to the sustainability of carbon cycles is the same as for trees (3-1.1). However, this component of the forest carbon pool is likely to consistently act as a carbon sink over the course of a harvest rotation and across the DFA (i.e. not for a specific cutblock) whereas the tree component will act as both a sink and a source, depending on the silvicultural stage of the forest.

How are targets established?

Targets are likely to be developed with provincial and possibly national input.

Corporately, Canfor is reviewing the Carbon budget model (CBM) from Canadian Forest Service to determine its applicability for many of Canfor's operations, including the Radium DFA. Currently, the model is not capable of dealing with carbon stored in non-tree vegetations. This component of forecasting is undergoing further study by Canfor.

Current Condition:

Current condition information is currently not available for carbon estimates in non-tree vegetation.

Legal Requirements:

N/A

Forecasting and Probable Trends of Measures:

Researchers at the Canadian Forest Service are designing an operational forest carbon account tool to aid forest managers in the assessment of carbon budgets. The Carbon Budget Model (CBM) may track the carbon in some of the non-treed vegetation. The details of the components in non-tree vegetation (i.e. understory, roots, soils, CWD, and snags) that will be modelled will depend on the information available in the CFS-Carbon Budget model (CBM-CFS). CBM-CFS3 (version 1.0) was made public in October 2005. Corporately, Canfor is reviewing this model to determine its applicability for many of Canfor's operations, including the Radium DFA. This component of forecasting needs further study.

Monitoring and Reporting:

Monitoring of this measure will occur through periodic assessments of non-tree vegetation biomass using volume to biomass conversion factors and biomass to carbon expansion factors. An actual sampling system will be an important component of monitoring to either verify the rough calculations and modelling or to improve the biometric volume-biomass-carbon relationships. The monitoring plan will be developed once the CFS model is finished and implemented.

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

Radium DFA Sustainable Forest Management Plan

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

Indicator	3-2. The forest products carbon pool is maintained or increased
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This indicator assesses the “contribution of forest products to the global carbon budget” by measuring the role that forest products play in the sequestration, cycling, or emission of carbon. Harvested wood releases its carbon at rates dependent upon its method of processing and its end-use. Provided the forest is fully regenerated, forest harvesting could result in a net reduction in carbon emissions if the wood that is harvested is used for long-term products such as lumber. Furthermore, if wood is used as a substitute for fossil fuels or other energy-intensive sources, there are positive benefits to the carbon cycles. Among the scientific community, there are no agreed-upon standards and guidelines for forest products carbon accounting.

What is generally involved is the chain of custody or the tracking of forest carbon from trees once harvested to the mill and to the end-use. At each step of the tracking system, the amount of wood (volume, biomass and/or carbon) is determined. For example, the amount of wood allocated to each forest product category or carbon pool (i.e. lumber, veneer, pulp, paper) would have to be determined. Once the wood or carbon enters into a pool, it may follow a yet to be determined carbon decay rate or the expected lifetime of that product. However, some of the wood particularly, waste wood may be burned, recycled or entered into the landfill. Carbon in these pools must also be accounted for as emissions or storage. Some estimates of decay rates and assumptions to the fate of the products may be made and are available in the literature. However, a detailed assessment may be made during each step to verify the carbon assumption or to develop the carbon decay rates. There is little work that is available at the operational forest management level. The Canadian Forest Service is developing the Carbon Budget Model for use as part of operational planning, therefore the current measures are under development as:

3-2.1 Plan to plan based on report and process being developed by Canadian Forest Service

Measure 3-2.1 Carbon Pool – Forest Products

Measure:	Target (Variance):
Plan to plan based on report and process being developed by Canadian Forest Service	TBD – April 2008

What is this measure and why is it important?

This measure evaluates the role that forest products play in the sequestration, cycling, or emission of carbon. Harvested wood releases its carbon at rates dependent upon its method of processing and its end-use. Provided the forest is fully regenerated, forest harvesting could result in a net reduction in carbon emissions if the wood that is harvested is used for long-term products such as lumber.

How are targets established?

Among the scientific community, there are no currently agreed upon standards and/or guidelines for forest products carbon accounting. However, there are several projects underway that are potentially related to this measure including the CFS approach discussed above.

Corporately, Canfor is reviewing the Carbon budget model (CBM) from Canadian Forest Service to determine its applicability for many of Canfor’s operations, including the Radium DFA. Currently, the model is not capable of dealing with carbon stored in Forest Products. This component of forecasting is undergoing further study by Canfor.

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The appropriate measure and target will be determined by April 2008.

Current Condition and Practices:

TBD in 2008 as related to process being developed by Canadian Forest Service.

Legal Requirements:

N/A

Forecasting and Probable Trends of Measures:

Process TBD by April, 2008.

Monitoring and Reporting:

To determine the carbon in forest products, a detailed, transparent and verifiable wood product tracking system would be required along with some assumptions in processing and product lifetime. A chain of custody, or the tracking of forest carbon from trees, once harvested to the mill and to the end-use, would be required for monitoring. At each step of the tracking system, the amount of wood (volume, biomass and/or carbon) allocated stored or emitted in each forest products by end-use category or carbon pool (i.e. lumber, veneer, pulp, paper) would be determined. Estimates of decay rates and assumptions to the fate of the products are required to be made.

Some of the information that may be collected for this purpose is:

- Volume or biomass in each forest product category or end-use
- Manufacturing processes (i.e. multi-paths for the fate of carbon in wood products)
- Product lifetime or carbon decay rates for each forest product pool
- Decay rate for landfill

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

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

Radium DFA Sustainable Forest Management Plan

Indicator	3-3. The processes that take carbon from the atmosphere and store it in forest ecosystems will be sustained
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As discussed, given 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. Indicators 3-1 and 3-2 will track long term changes in DFA forests as a net carbon sink or source.

Whereas, Indicator 3-3 ensures that the biological processes that contribute to the uptake of carbon and the role of forests as a sink are measured as part of sustainable forest management. This is addressed by the following locally developed measures:

3-3.1 Carbon Sequestration rate in the forest ecosystem

Measure 3-3.1 Carbon Sequestration

Measure:

3-3.1 Average Carbon Sequestration rate in forest ecosystems in the DFA (Mg C/year)

Target

(Variance):

TBD – April 2008

What is this measure and why is it important?

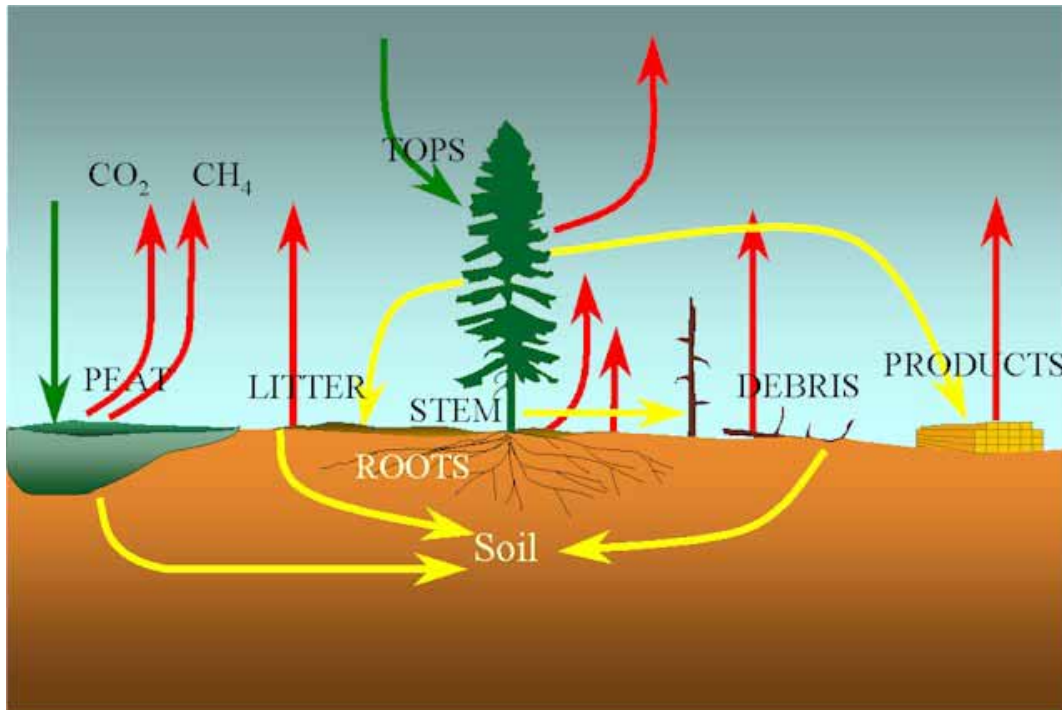
The process that takes carbon from the atmosphere and stores it in forest ecosystems is termed carbon sequestration. The calculation of average net carbon sequestration rates within the timber supply area allows for a long-term evaluation of effects of management activities and/or natural disturbance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

Indicators 3-1 and 3-2 assess the net changes in forest ecosystem carbon pools (including live and dead organic matter and forest products). Carbon pools, and their changes over time, indicate whether the processes responsible for carbon sequestration are being maintained and that is addressed within this indicator (3-3). A net increase in the carbon pool is a result of increased sequestration.

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A stylized vision of the carbon flow in a forest ecosystem is summarized in the following figure:

Figure 19: Carbon Flow in the Forest Ecosystem



(http://www.carbon.cfs.nrcan.gc.ca/index_e.html)

How are targets established?

Targets TBD based on FIA project to be completed in April 2008.

Current Condition and Practices:

TBD

Legal Requirements:

N/A

Monitoring and Reporting:

In the future, carbon sequestration rate (total Mg C/year) will be determined by calculating the average incremental change in carbon storage from one time period to the next. Carbon sequestration will depend on the entire forest (young and old).

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

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

5.1.2 Economic Values

Criterion 4	The flow of economic benefits derived from management unit forests through the forest industry is sustained
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For many rural communities in British Columbia, timber harvesting, milling and management provides the largest local economic benefit within a management unit. SFM plans and practices have the potential to substantially impact the economic value of timber products from an area, and thus this issue warrants its own criterion. This criterion measures the direct economic benefits derived from timber products for a management unit. Sustaining the economic benefits that come from the forest industry is one of the keys to community stability in rural British Columbia.

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

In order to determine if the economic benefits from the forest industry are sustained or not, indicators must be chosen that reflect what the benefits are and where they are going. As outlined in the report associated with economic C&I, these indicators reflect the framework recommended by Mittelstaedt et al. al. for the timber value dimension by evaluating the value (4-1), distribution (4-2, 4-3, 4-4) and resilience (4-5) factors of sustainability. An indicator for the portion of the economic value that is distributed to ‘corporate’ interests is not included because this information (profit and depreciation) is not publicly available.

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

In some cases the indicators (e.g. 4.5) are not in the control of the forest industry but are included in this plan due to their importance to the community. The resilience of the community to sustain itself outside of the forest industry is still an important indicator for the forest industry in terms of its ability to attract and maintain a skilled workforce. Targets for such indicators have not been set.

Indicator 4-1 measures the ‘augmented income’ or economic value of timber products from the management unit under a particular SFM plan. It reflects the total economic value of timber products from the area as the total value of timber products.

Indicator 4-2 measures the ‘distribution’ of the economic value of timber harvesting to citizens. The employment and income generated by forestry operations locally, regionally and provincially indicates the portion of the log value that employees receive.

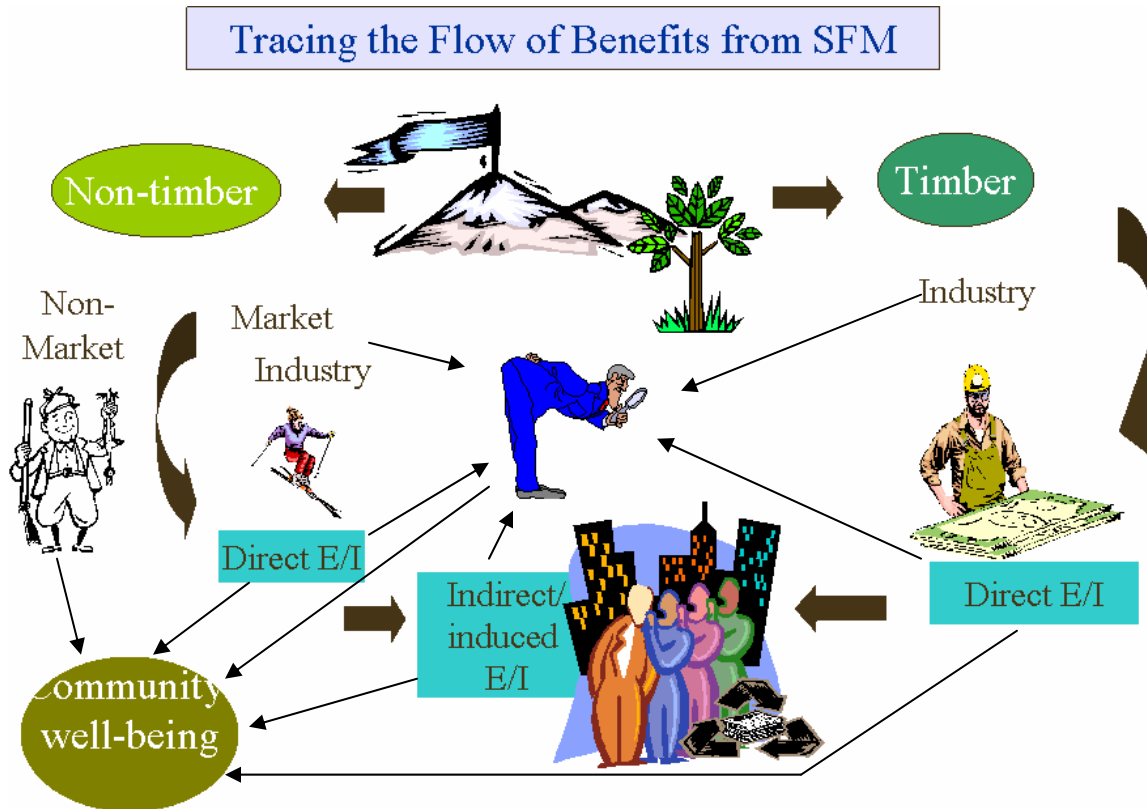
Indicator 4-3 measures the ‘distribution’ of the economic value of timber harvesting to municipal, regional and provincial governments through stumpage, taxes and other fees.

Indicator 4-4 measures whether First Nations have opportunities to share in a portion of forestry related economic benefits.

Indicator 4-5 measures the ‘resilience’ of the forest sector to continue to produce timber values using the approaches outlined in the local SFM Plan.

Indicator 4-6 measures the economic impact or the mitigation of economic impact due to damaging events or agents. (Note: this indicator was added subsequent to the academic process.)

Figure 20: Tracing the Flow of Benefits from SFM



Source: Cindy Pearce Presentation to FOREST – October 2005

LINK TO OTHER CRITERION/INDICATORS

- Criterion 2 – productive capability of forest ecosystems
- Criterion 5 – flow of marketed non-timber economic benefits
- Criterion 6 – contribution to a diversified local economy
- Criterion 7 – forest management decisions are informed – social & cultural values
- Criterion 9 – quality of life

Indicator	4-1. Timber harvesting continues to contribute to economic well-being
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This indicator measures the ‘augmented income’ or economic value of timber products from the DFA. It reflects the total economic value of timber products harvested from the area. Timber products are measured at the log yard stage, not as final products, as tracing log flows and production costs is generally proprietary information.

Valuing how timber harvesting contributes to economic well being can be as simple as tracking the number of jobs created or as complex as attempting to value standing trees in relation to products they can create. While the valuing the forest in relation to products, this is very difficult to do and involves proprietary information.

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Bettencourt (1992) suggested that the residual value of standing wood reflects the price that buyers are willing to pay for it whereas sellers consider this ... value as the minimum price they would be willing to accept, taking into account their production costs.⁵⁸

As well, Lecturers at the University of Toronto⁵⁹ summarized valuation as:

- Assuming the timber is grown only for lumber production, what is the maximum amount a logger would be willing to pay for stumpage?
- Competitive markets, the mill is a price taker in product markets
- Buyer's maximum willingness to pay ...
 - = End product price
 - Cost of manufacturing and distributing the end product
 - Cost of logging and hauling
 - = Conversion return

In essence, a simplistic way to value the harvest is to determine what someone is willing to pay for the trees.

The following seven measures have been identified to monitor that timber harvesting contributes to the economic well-being of the Radium DFA:

- 4-1.1 Projected timber supply over time is stable
- 4-1.2 Actual harvest volume
- 4-1.3 Harvested area regenerated to target species composition

Measure 4-1.1 Projected Timber Supply

Measure:

4-1.1 Projected timber supply over time is stable

Target (Variance):

321,094 m³ (+/- 10%)

WHAT IS THIS MEASURE AND WHY IS IT IMPORTANT?

Timber supply stability is important to the community (including workers and local government), the corporation and the province as a whole. It is a component in investment decision making for corporations and their shareholders. It provides government the ability to track revenue and to set budgets.

This measure ensures that planning estimates the timber supply for future years which will allow for long term planning to take place, thereby allowing stability for investment in the area's industry.

How are Targets established?

Canfor and BCTS work together to undertake the initial analysis to recommend an AAC under the Timber Supply Review (TSR) process. Their recommendations are analysed by the MoF's Chief Forester who then determines the AAC for the DFA. The actual AAC is outside of the direct control of Canfor and BCTS, however it is important to track AAC levels over time as many measures are directly related to AAC and a lowering or increasing of AAC will be reflected in those measures. The target reflects that

⁵⁸ Source: Forest Valuation for Decision Making – Lessons of experience and proposals for improvement:
http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/003/W3641E/W3641E08.htm

⁵⁹ Source: The Value of the Forest - Forest Valuation and Appraisal University of Toronto
http://www.forestry.utoronto.ca/socio_economic/courses/for303_class5.ppt

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portion of the Invermere TSA that is accounted for in the DFA. The AAC is recalculated every 5 years and is based on the Timber Supply Review (TSR) process.

Current Condition and Practices:

The current AAC for the DFA allows 321,094 m³/yr (effective November 1, 2005) of harvest volume and is projected to remain stable or increase during the planning horizon (base case scenario). Currently, the AAC for the Invermere TSA, and subsequently reflected for the DFA, has been slightly uplifted to reflect the recent fire and beetle infestation.

Legal Requirements:

Cut control legislation

Forecasting and Probable Trends of Measures:

Forecasting of this measure is an important component of the TSR process. The TSR analysis is based on the best available information and forecasts timber supply over a 300-year period. Analysis of the timber supply is described in terms of short (20 years from now), medium (time between conversion of natural stands to second growth stands) and long-term (point where harvest reaches the expected long term sustained harvest level) harvest. There are a number of models approved for use in forecasting timber supply. Figure 21 and Figure 22 show projected timber harvest levels for the Invermere TSA and the DFA area respectively.

Figure 21: Projected Harvest Levels for the Invermere TSA

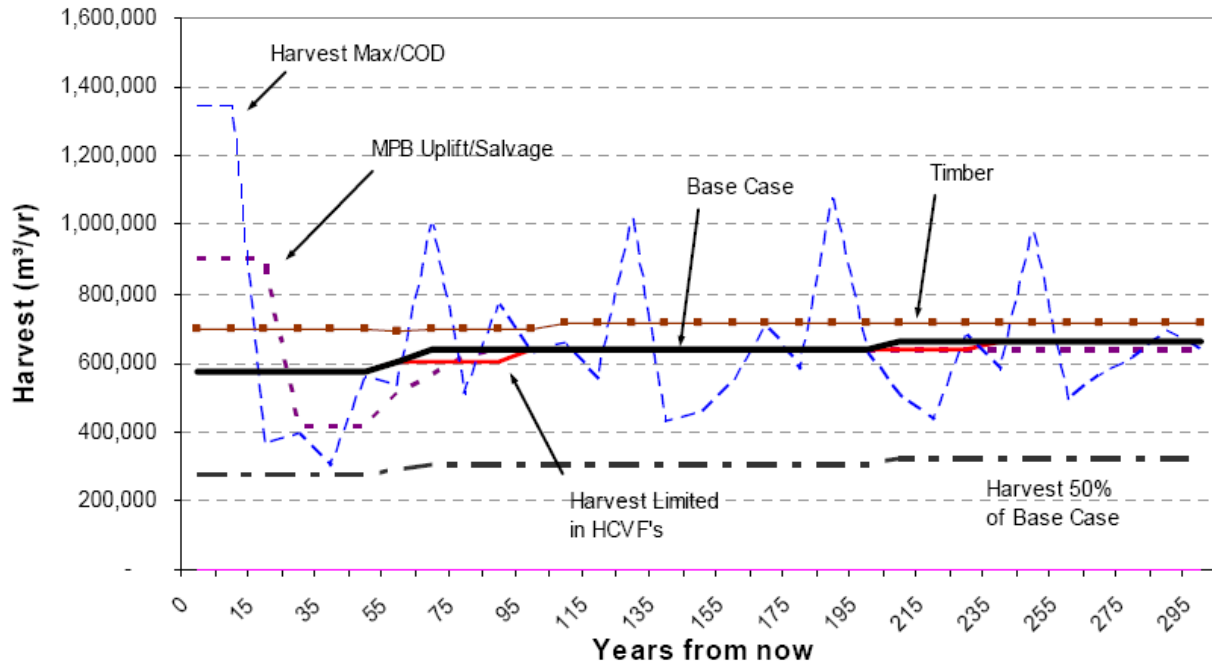
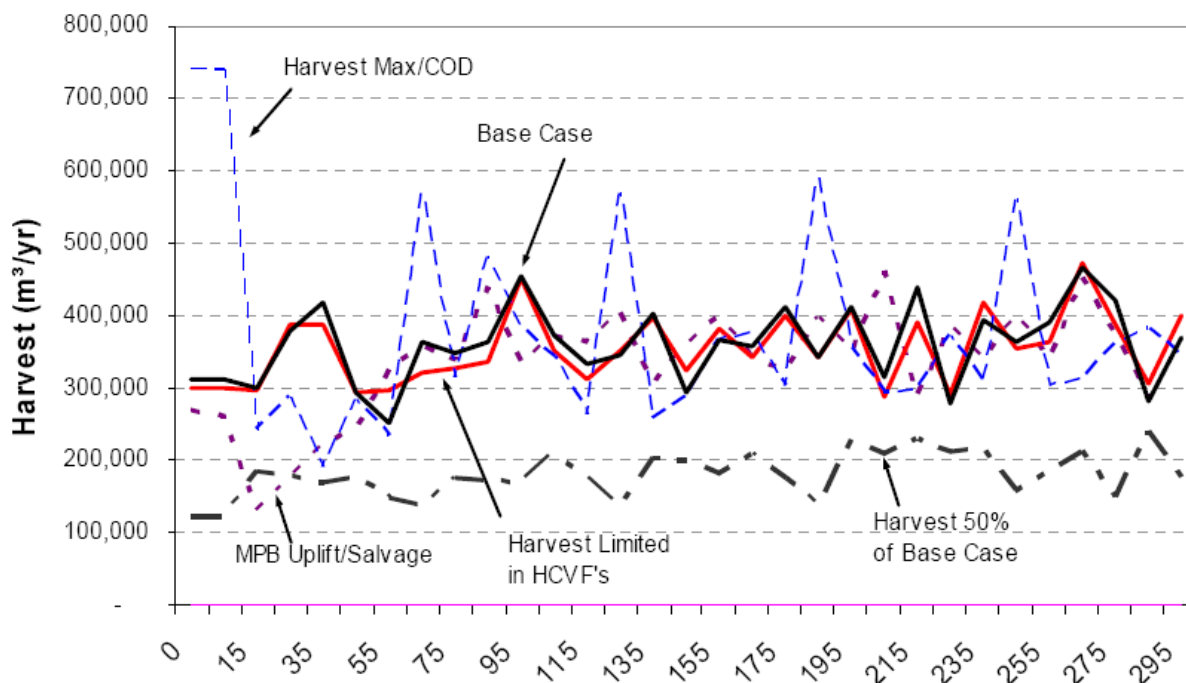


Figure 22: Projected Harvest Levels for the DFA



TSA harvest levels were controlled where the scenario did not specify otherwise. DFA harvest levels are more erratic as they reflect the harvest levels that happen to be correlated with that subset of the TSA.

The base case harvest flow indicates that the current AAC (581,570 m³/yr) can be maintained for 50 years before beginning a series of increases to the long term harvest level (LTHL). This scenario indicates a stable and improving timber supply situation. The Timber Focus, HCVF, and 50% of Base Case scenarios indicate similarly stable timber supply situations, although at different levels of harvest. The HCVF scenario is almost identical to the base case except the future increases in harvest are slightly delayed. The Timber Focused scenario is able to achieve 20% more volume in the short term and 7% more volume in the long term. The 50% of Base Case scenario is able to achieve 50% of the base case harvest volume, as per design.

The mountain pine beetle (MPB) and Max Harvest run both indicate a much more erratic, less stable timber supply situation. In the case of the MPB situation, the lack of stability is caused by the large scale mortality that could result from the current MPB epidemic. The short term harvest level is increased to salvage dead stands and this increase results in a midterm timber supply deficit. In the case of the Max Harvest scenario, the lack of stability is by design in the scenario. The intent is to harvest all timber as soon as it is available/eligible and to avoid any kind of flow constraints – leading to the boom and bust cycles of harvest seen in Figure 21.

Figure 22 shows the DFA harvest over time and indicates a much more erratic timber supply situation. This is an artifact of controlling flow regimes at the TSA level and letting harvest occur wherever in the TSA best fits with harvest priorities. In reality, the harvest flow for each licensee will be smoother because if their current operating area is unable to provide them with their harvest allocation, then operating areas will be adjusted. An interesting result seen on this graph is the significantly reduced initial harvest level for the MPB run relative to what is experienced at the TSA level. For the TSA, the MPB run showed short term harvest volumes well in excess of the base case but this is not true in the DFA. This occurs because the model is pursuing high priority stands for salvage (>60 yrs old, >40% PI)

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in the short term and these stands occur disproportionately in the southern half of the TSA (outside the DFA area).

Monitoring and Reporting:

The TSR process utilizes information across economic, social and ecological values. Information is gathered from the following sources:

- Previous TSR's
- Existing forest cover inventory information
- Vegetation Resources Inventory
- Growth and yield curves for local species
- Current management assumptions
- Local social and economic data (employment, taxes, projected government revenues, employment etc.)

Some of this information is gathered and updated annually and some is gathered at the beginning of the TSR process (i.e. every 5 years). In making a determination, the Chief Forester requests that the licensees update key knowledge gaps prior to the next TSR. This information improves the monitoring and forecasting abilities necessary to accurately set an AAC.

This is a process measure and monitoring will consist of reporting out on the measure following TSR and monitoring trends. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

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

Measure 4-1.2 Actual harvest volume

Measure:

4-1.2 Actual harvest volume is meeting the timber supply allocation within cut control limits

Target (Variance):

+/- 10% of AAC over 5 years

What is this measure and why is it important?

This measure calculates the actual volume that has been harvested in the DFA during the reporting year. This is an important calculation as it provides financial information for the involved parties, as well as updated statistics for cut control and forest dynamics information.

How are targets established?

The target is established by the Forest Act which dictates that each licensee must harvest their volume within +/- 10% of their allocated annual allowable cut based on a 5 year cut control period.

Current Condition and Practices:

Canfor's Annual Allowable Cut (AAC) is currently 231 005m³ with the 5 year cut control period (Table 21) beginning January 1, 2002 and ending December 31, 2006. Canfor will schedule the appropriate volume in 2006 in order to achieve the 5 year (+ 10%) cut control volume.

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

Calendar Year	2002	2003	2004	2005 ⁶⁰	2006	Total
AAC (m ³)	231,005	231,005	231,005	231,005	231,005	1,155,025
Timber Cut Under Licence and RP	272,247	284,378	238,792			
Timber Wasted or Damaged			5,742			
Timber Cut w/o Authorization						
Total	272,247	284,378	244,534			801,159

Although BCTS does not have any legislated cut control commitments under the Forest Act, BCTS makes every effort to balance over a five year period. BCTS' commitment control period started in 2002 and ends in 2006. Following the Minister's reapportionment letter for Bill 28, BCTS' AAC will be 90,089 m³ starting in 2006.

Table 22: Commitment Control Period – BCTS

Calendar Year	2002	2003	2004	2005	2006
AAC (m ³)	74,049	74,049	74,049	74,049	90,089
Volume Sold (m ³)	87,312	48,750	135,210	49,526	93,709 (planned)

Legal Requirements:

Forest Act

Forecasting and Probable Trends of Measures:

Forecasting of this measure is that Canfor and BCTS will be within +/-10% of their AAC for the end of their cut control period (Jan. 1, 2002 – Dec. 31, 2006). The trend will be to remain within cut control levels for maximum efficiency in the milling operations as well as completing area plans in a timely manner. Trends will be tracked annually.

Monitoring and Reporting:

The volume of timber harvested is tracked by Canfor and BCTS through scaleable reports of billable volume to quota. Canfor, BCTS and the MoF track the amount of wood harvested each year. The total volume cut to date for the 5 year cut control period will be reported in the SFMP Annual Report.

Formula: %RCC = (VC / AAC) x 100

Variables: %PCC – Percentage of cut control achieved
 VC – Volume cut during the one year cut control period
 AAC– annual allowable cut

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

⁶⁰ Awaiting Cut Control Letter from MoF – reporting official cut control numbers

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Measure 4-1.3 Percentage Harvested Area Regenerated to Target Species

Measure:

4-1.3 Percentage of harvested area in compliance with regeneration standards set in FSP

Target (Variance):

100% (10%)

What is this measure and why is it important?

This is a good measure of meeting objectives that is easily understood and very operational. This measure is clearly related to long run economics. It measures the success in establishing second growth forests in harvested areas with approved target species (also known as preferred and acceptable species). Target species for specific sites have been recommended by the MoF on the basis of a species' productivity, reliability, and silvicultural feasibility based on:

- current knowledge of the productive capability of each site series (updated in 2000 to reflect SIBEC)
- silvics of the tree species
- growth and development of existing second growth forests

Species composition is an important component in estimating the growth of a forest which in turn has an impact on the amount of wood available for harvest.

How are targets established?

The target is the percent of harvested area across the DFA that has been regenerated to target species. The target species is set out in the FDP or FSP and forms a legal requirement. Managers must attempt to have 100% of the target species regenerated. Given the fact that target is not always feasible a 10% variance has been set to accommodate natural ingress from non-target species and pests.

Current Conditions and Practices:

Since 1987, Canfor has achieved 100% compliance with regenerating harvested areas back to the prescribed target species composition specified in operational plans.

BCTS has had six blocks where Free Growing status has not been achieved prior to the time frames prescribed.

Legal Requirements:

FPC & FRPA

Forecasting and Probable Trends of Measures:

Growing stock levels, based on species data, is forecasted as part of the TSR process. Trends for this measure should continue as per current conditions. Forecasting is a part of the TSR3 process.

Monitoring and Reporting:

The FDP/FSP set out the reforestation strategy for blocks harvested in the DFA. Individual block site plans also state the regeneration strategies for harvested areas. As stated under indicator 2-3, planted forests will be established within 2 years of harvest (1 year variance); naturally regenerated forests will be established within 4 years after harvest (1 year variance).

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 Canfor's and BCTS' databases. If a survey indicates that the stand has not

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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 and BCTS' respective databases.

Once regeneration has been achieved, then Canfor and BCTS must submit a report to the Ministry of Forests and Range that will update the status of the cutblock on the government databases. Canfor, BCTS and the MoF track these reports internally. This measure can be tracked and monitored through government reports submitted annually at the end of May. Reporting will also occur annually within the SFMP Annual Report. This information is required by block but will be reported as an average for all blocks regenerated annually.

Formula: $\%RTS = (HART / HAR) \times 100$

Variables: **%RTS** – Percentage of harvested area regenerated to target species
 HART – Number of hectares of harvested area regenerated to target species composition
 HAR – Total number of hectares of harvested area regenerated

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

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

Indicator	4-2. Citizens continue to receive a portion of the benefits.
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This indicator measures the 'distribution' of the economic value of timber harvesting to citizens. The employment and income generated by forestry operations locally, regionally and provincially indicates the portion of the log value that employees receive.

The following six measures have been identified to ensure that citizens of the Radium DFA receive a portion of the benefits from timber harvesting:

- 4-2.1 Employment in the forestry sub-sector
- 4-2.2 Income generated from the forestry sub-sector
- 4-2.3 Indirect/induces employment and income estimates
- 4-2.4 Percentage of dollars spent
- 4-2.5 Opportunities exist for Canfor to purchase private wood
- 4-2.6 Amount of corporate donations/sponsors made to the community per year

Measure 4-2.1 Employment in Forestry Sub-sector

Measure:

4-2.1 Employment in the forestry sub-sector locally, regionally and provincially

Target (Variance):

Local – 169 py
 Regional – 169 py
 Provincial – 239 py
 (+/- 10%)

What is this measure and why is it important?

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

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to improve, efficiencies and as new technology comes on stream, the numbers and types of workers fluctuate. This measure is meant to track local trends against regional/provincial trends to determine similarities.

Figure 23: Canfor Radium Mill – Aerial Photo



How are targets established?

The targets for this measure are set during TSR but the actual numbers are derived from Statistics Canada information and apportioned based on the Canfor's and BCTS' influence in the TSA. A comparison of the trends between provincial and local employment will allow some analysis in terms of the sustainability of this measure.

Current Condition and Practices:

Both Canfor and BCTS provide employment or contract work to a number of people in the forest industry. The current AAC supports the following levels of direct employment within the forest sector⁶¹.

⁶¹ Time 0 forecasted value. Methodology provided in Table 3. SFMP Scenario Forecasting, 2004.

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Table 23: Employment within the Forestry Sector

Scale	Direct Employment (Forest Sector)	
	TSA	DFA
Local	170 person years	169 person years
Regional	313 person years	169 person years
Provincial	442 person years	239 person years

Legal Requirements:

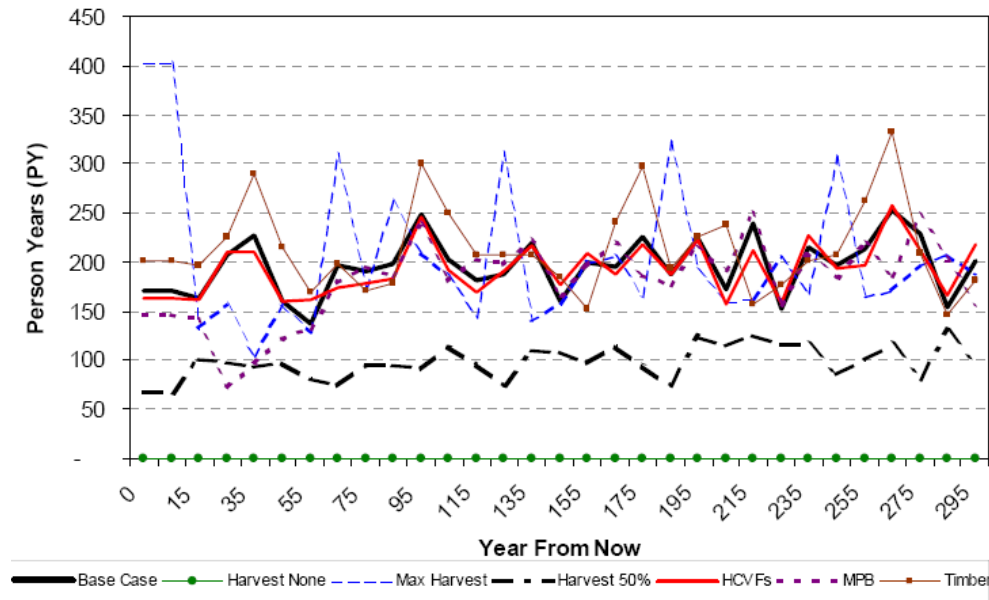
N/A

Forecasting and Probable Trends of Measures:

Forecasting of this measure 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 3.2⁶² and the harvest volumes associated with each scenario, the expected direct employment levels are forecast in Figure 25 through Figure 26 (local, regional, and provincial estimates).

Figure 24: Projection of Local Employment Levels in the Forest Sector (direct PY's employment)

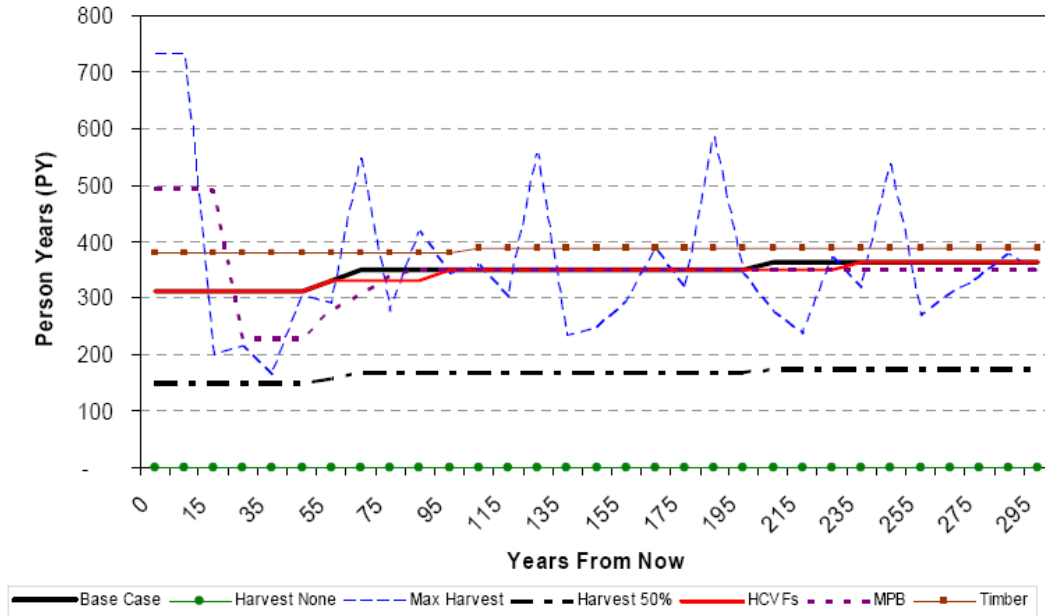


The relationships seen when comparing timber supply in the DFA for each scenario are simply repeated here because employment is directly related to harvest volume. The more harvest that is occurring, the more jobs are present locally.

⁶² Forsite, Interior Reforestation, & Ecological Research. Sustainable Forest Management Plan Scenario Forecasting. Version 1.1 – February 24, 2006. Prepared for Canfor – Radium Woodlands & BCTS.

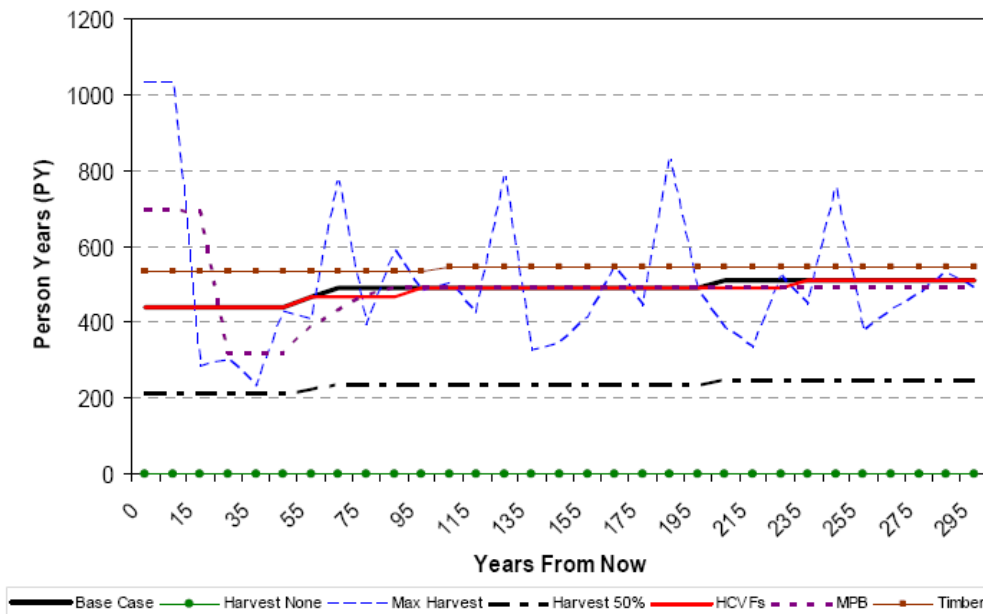
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Figure 25: Projection of Regional Employment Levels in the Forest Sector (direct PY's employment)



The relationships seen when comparing TSA timber supply 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 regionally and provincially. For example, Figure 25 shows that 313 jobs are generated regionally in the forest sector with the current AAC (Base Case scenario), while only 156 jobs would be generated by the 50% of Base Case scenario.

Figure 26: Projection of Provincial Employment Levels in the Forest Sector (direct PY's employment)



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Monitoring and Reporting:

This is a process measure and monitoring will consist of reporting out on the measure and monitoring trends. Canfor and BCTS annually track employment for their staff and estimate employment for contractors. Those numbers will be compared to provincial statistics.

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

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

Measure 4-2.2 Income from Forestry Sub-sector

Measure:

4-2.2 Income generated from the forestry sub-sector, locally, regionally and provincially

Target (Variance):

Local – \$7,424,905
Regional – \$7,424,905
Provincial – \$10,997,557
(+/-10%)

What is this measure and why is it important?

This measure is directly related to measure 4-2.1, however it is meant to measure the income levels associated within the forestry sub-sector. It is important to understand the relationship between actual employment numbers and income that people are earning. Comparing the local and provincial/regional trends is an important aspect in determining local sustainability.

How are targets established?

The targets for this measure are set during TSR based on multipliers but apportioned to reflect the DFA percentage. A comparison of the trends between provincial and local income will allow some analysis in terms of the sustainability of this measure.

Current Condition and Practices:

The current AAC supports the following direct annual income levels within the forest sector.⁶³

Table 24: Annual Income Levels within the Forest Sector

Scale	Direct Income (Forest Sector)	
	TSA	DFA
Local	\$7,460,258	\$7,424,905
Regional	\$13,724,408	\$7,424,905
Provincial	\$20,328,202	\$10,997,557

⁶³ Time 0 forecasted value. Methodology provided in Table 3. SFMP Scenario Forecasting. 2004.

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Legal Requirements:

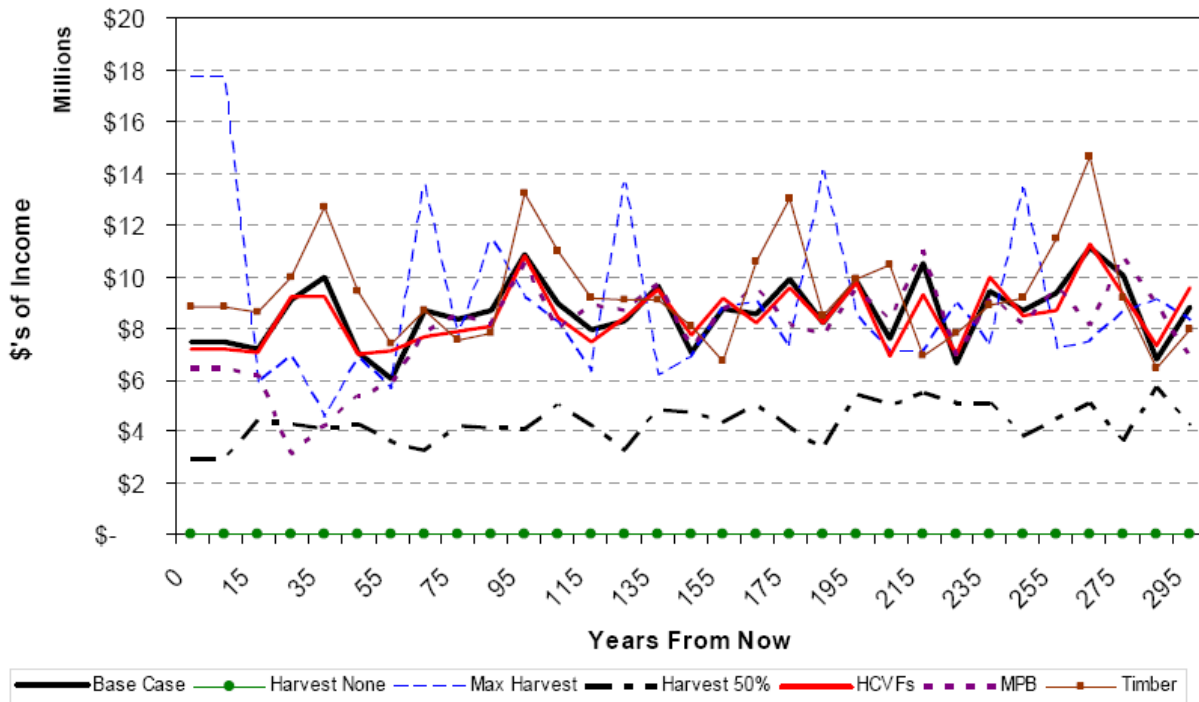
N/A

Forecasting and Probable Trends of Measures:

Forecasting of this measure will consist of utilizing harvest related 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, income figures for most sub-sectors will also increase.

Based on the multipliers defined in section 3.2⁶⁴ and the harvest volumes associated with each scenario, the expected direct income levels are forecast in Figure 27 through Figure 29 (local, regional, and provincial estimates).

Figure 27: Projection of Local Income Levels within the Forest Sector (direct income)

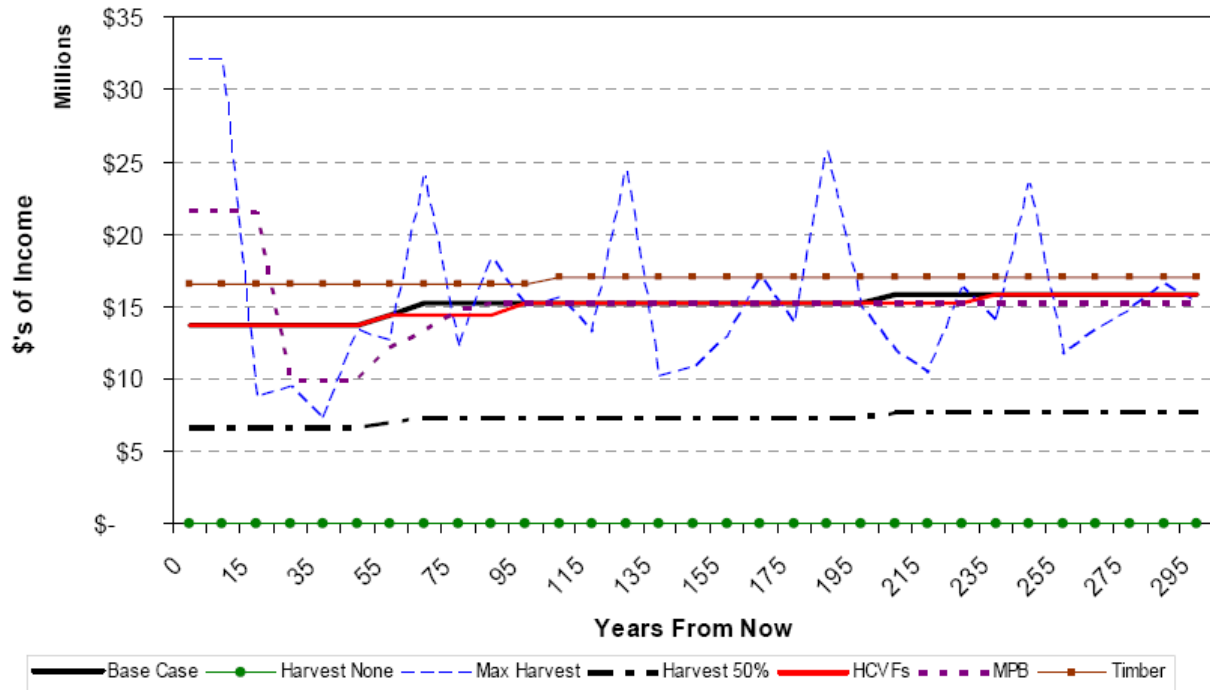


The relationships seen when comparing timber supply in the DFA for each scenario are simply repeated here because income is directly related to harvest volume. The more harvest that is occurring, the more income is generated locally.

⁶⁴ Forsite, Interior Reforestation, & Ecological Research. Sustainable Forest Management Plan Scenario Forecasting. Version 1.1 – February 24, 2006. Prepared for Canfor – Radium Woodlands & BCTS.

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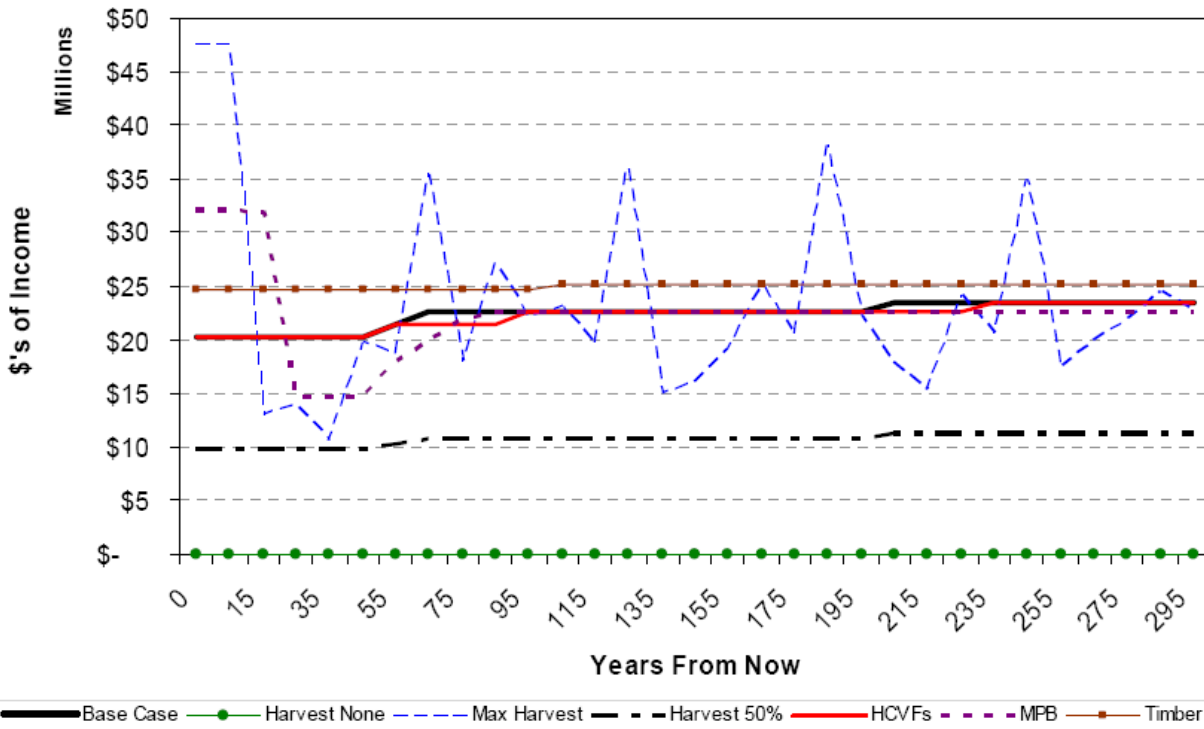
Figure 28: Projection of Regional Income Levels in the Forest Sector (direct income)



The relationships seen when comparing TSA timber supply for each scenario are simply repeated here because income levels are directly related to harvest volume. The more harvest that is occurring, the more income is generated regionally and provincially. For example, Figure 28 shows that \$13.72 million in income is generated regionally in the forest sector with the current AAC (Base Case scenario), while only \$6.57 million in income would be generated by the 50% of Base Case scenario.

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Figure 29: Projection of Provincial Income Levels in the Forest Sector (direct income)



Monitoring and Reporting:

This is a process measure and monitoring will consist of reporting out on the measure and monitor trends. Statistics Canada tracks income for Canadian residents. This information can be summarized for specific geographic areas such as the DFA, and is available every 5 years with new census data. This information will be used to monitor this indicator. A summary of the information will be contained in the SFMP Annual Report.

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

Measure 4-2.3 Indirect/Induced Employment and Income Estimates

Measure:

4-2.3 Indirect/Induced employment and income estimates locally, regionally and provincially

Target (Variance):

Indirect/Induced Employment:
 Local – 62 py
 Regional – 62 py
 Provincial – 264 py

Indirect/Induced Income:
 Local – \$1,957,192
 Regional – \$1,957,192
 Provincial – \$8,481,167
 (+/- 10%)

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What is this measure and why is it important?

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 measures that can be used to determine the resilience of the local economy.

How are targets established?

The TSR process has established appropriate multipliers that are used to predict the indirect/induced employment and income for the DFA. The target reflects the percentage of the multiplier for Canfor and BCTS. Knowing the amount of indirect/induced employment and income can help analyse the diversity of local employment opportunities available in the DFA. This measure is meant to track local trends against provincial trends to see if they are similar.

Current Condition and Practices:

The current AAC supports the following annual income levels within the forest sector (direct) and outside the forest sector (indirect).⁶⁵

Table 25: Indirect Employment due to the Forest Sector

Scale	Indirect Employment (Non Forest Sector)	
	TSA	DFA
Local	62 person years	62 py
Regional	115 person years	62 py
Provincial	488 person years	264 py

Table 26: Annual Indirect Income Levels due to the Forest Sector

Scale	Indirect Income (Non Forest Sector)	
	TSA	DFA
Local	\$7,460,258	\$1,957,192
Regional	\$13,724,408	\$1,957,192
Provincial	\$20,328,202	\$8,481,167

Legal Requirements:

N/A

⁶⁵ Time 0 forecasted value. Methodology provided in Table 3. SFMP Scenario Forecasting. 2004.

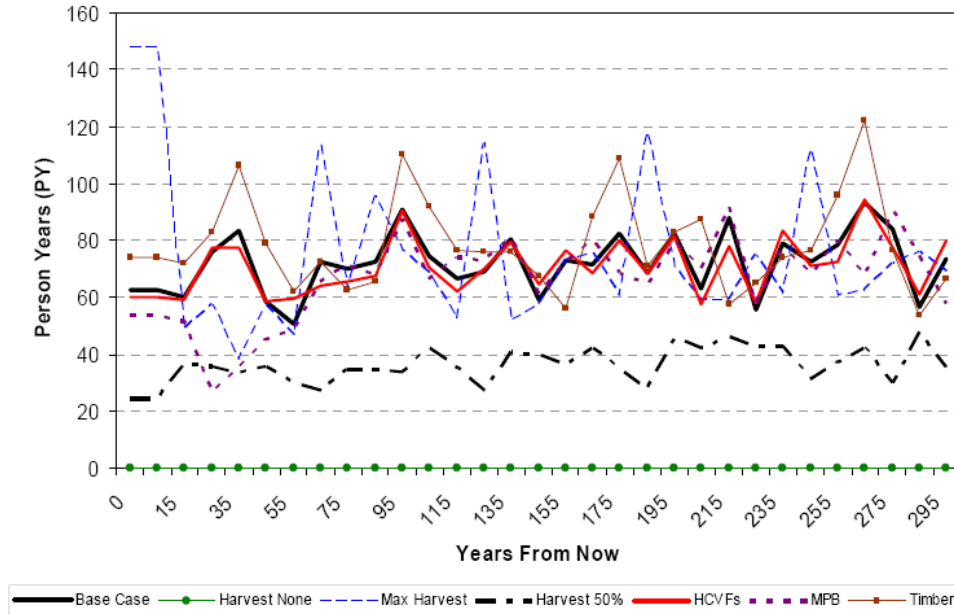
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Forecasting and Probable Trends of Measures:

Forecasting of this measure will consist of utilizing harvest related 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, as well as income figures for most sub-sectors will also increase.

Based on the multipliers defined in section 3.2⁶⁶ and the harvest volumes associated with each scenario, the expected indirect employment and income levels are forecast in Figure 30 through Figure 35 (local, regional, and provincial estimates).

Figure 30: Projection of Local Employment Levels outside the Forest Sector (indirect PY's employment)



⁶⁶ Forsite, Interior Reforestation, & Ecological Research. Sustainable Forest Management Plan Scenario Forecasting. Version 1.1 – February 24, 2006. Prepared for Canfor – Radium Woodlands & BCTS.

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Figure 31: Projection of Regional Employment Levels outside the Forest Sector (indirect PY's employment)

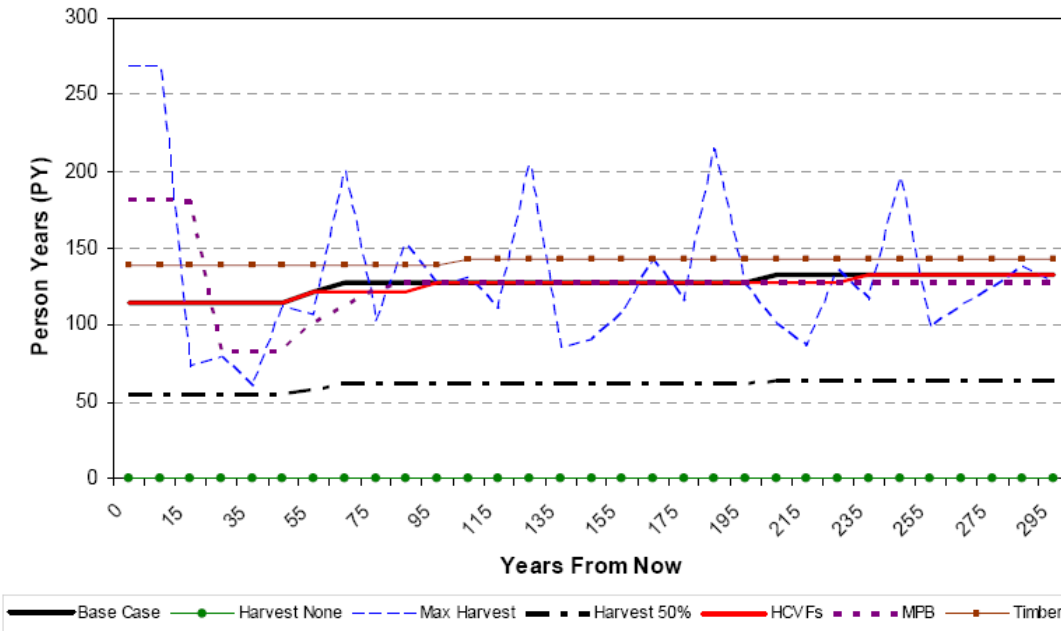
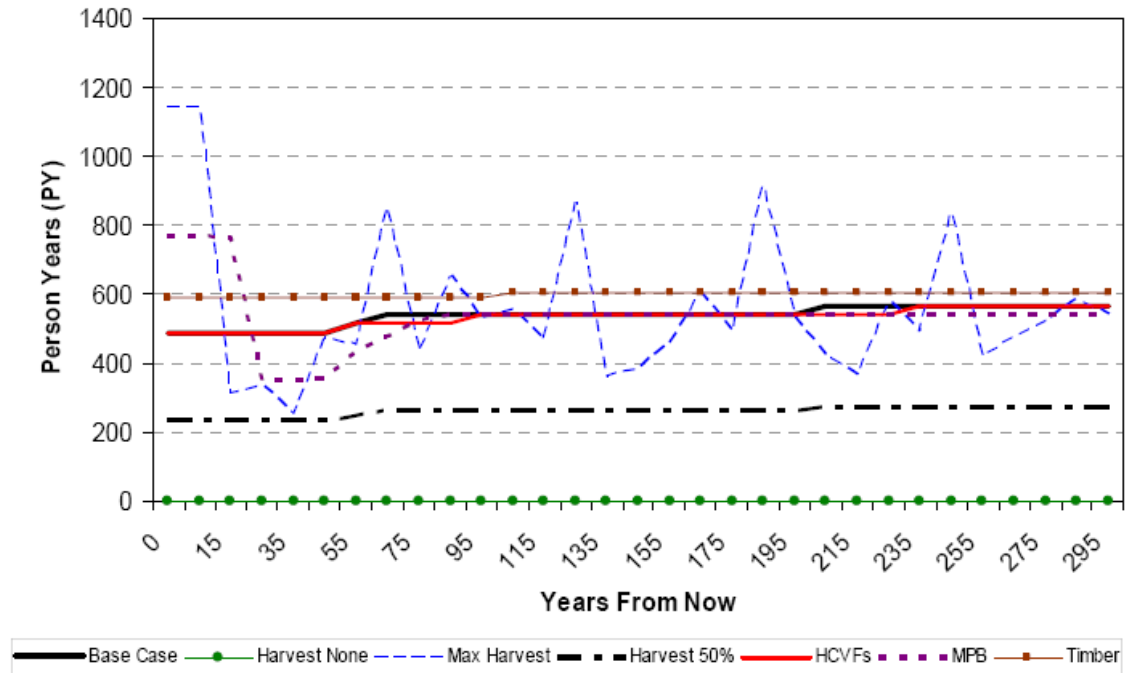
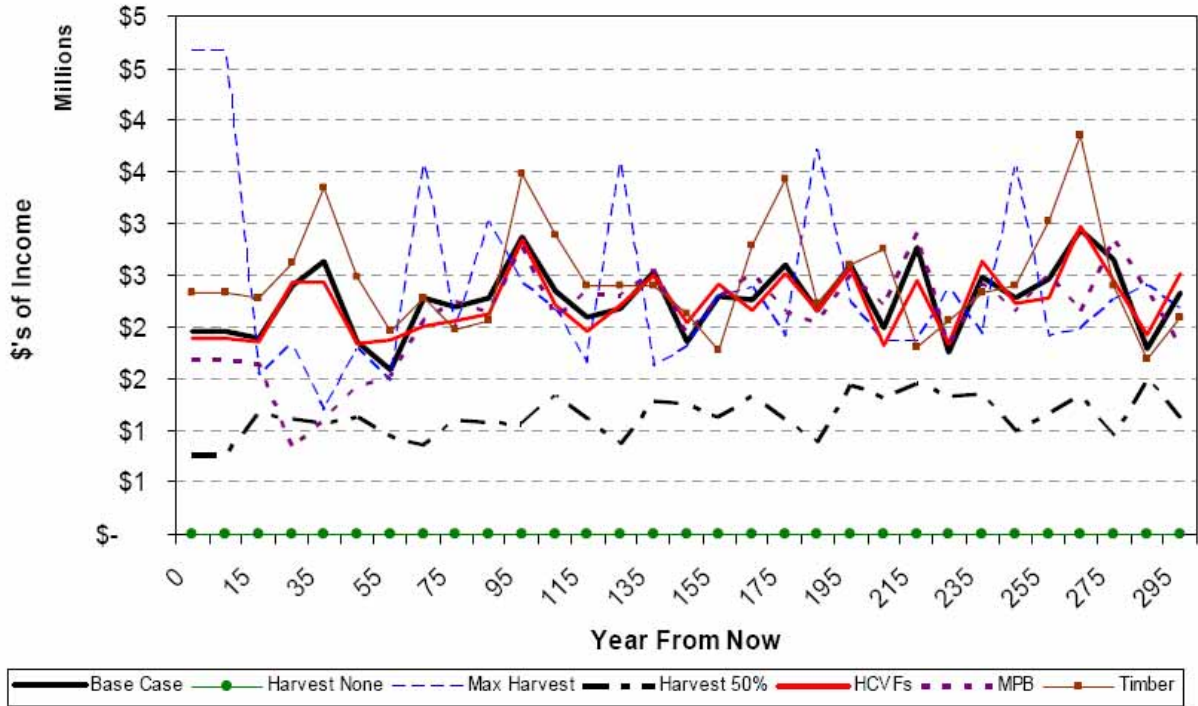


Figure 32: Projection of Provincial Employment Levels outside the Forest Sector (indirect PY's employment)



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Figure 33: Projection of Local Levels outside the Forest Sector (indirect income)



The relationships seen when comparing timber supply in the DFA for each scenario are simply repeated here because income is directly related to harvest volume. The more harvest that is occurring, the more income is generated locally.

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Figure 34: Projection of Regional Income Levels outside the Forest Sector (indirect income)

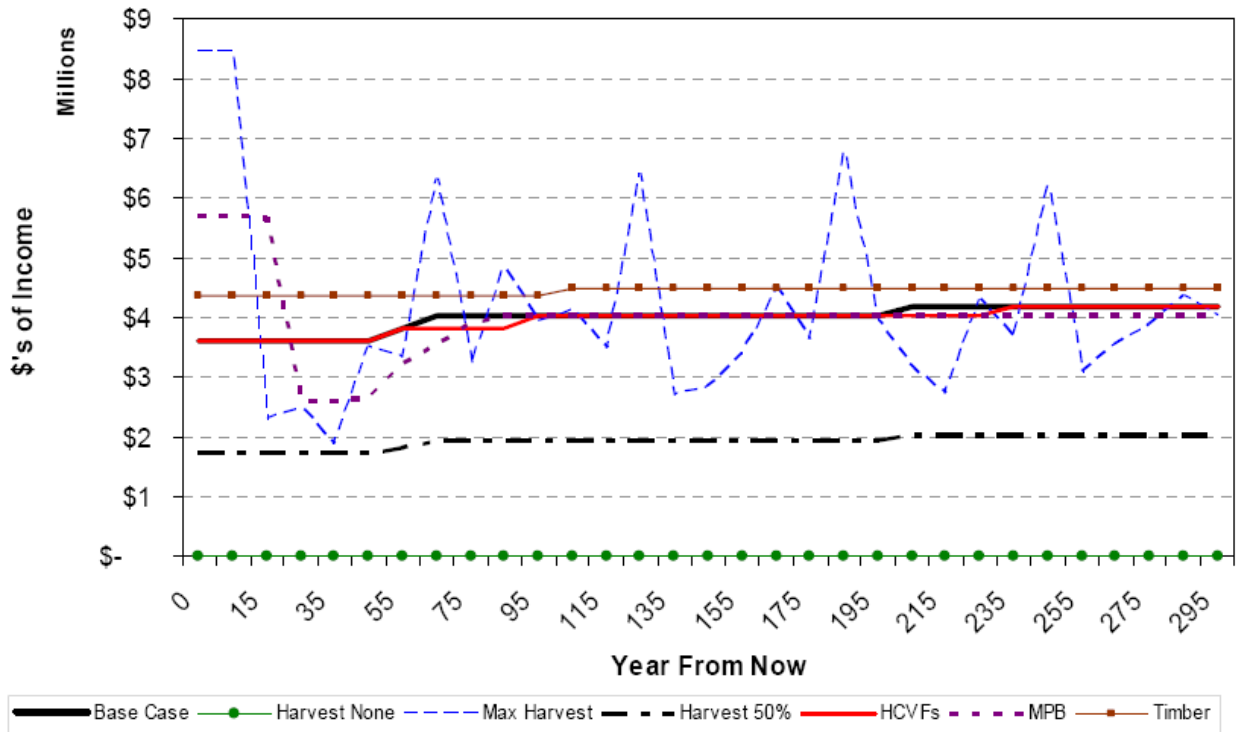
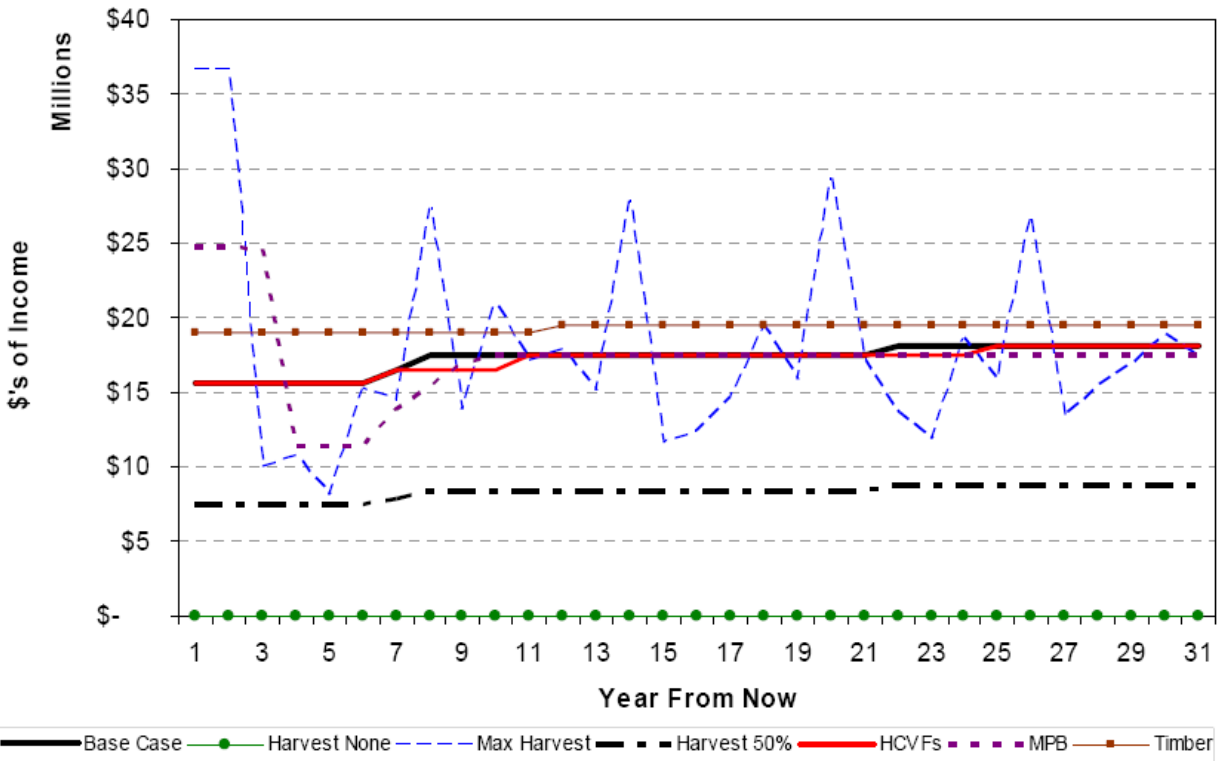


Figure 35: Projection of Provincial Income Levels outside the Forest Sector (indirect income)



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Monitoring and Reporting:

This is a process measure and monitoring will consist of reporting out on the measure and monitoring trends. The TSR process tracks and estimates values for this measure. A summary of the findings will be reported in the SFMP Annual Report.

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

Measure 4-2.4 Percentage of Dollars Spent

Measure:

4-2.4 The percentage of dollars spent locally from the forest sector in proportion to total expenditures

Target (Variance):

Greater than x% (+/- 10%)

What is this measure and why is it important?

This measure 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 measure 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 measure looks at the amount of money spent by Canfor and BCTS locally within the forestry sub-sector. This measure complements the others for this indicator and 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.

How are targets established?

Canfor and BCTS have slightly different costs for the forest industry sector they manage. For instance, BCTS does not have any costs for road building/harvesting/hauling. However, dollars spent are totalled for both. Proposed targets reflect the fact that additional companies sometimes have to be brought in to do work and some flexibility is required to allow for that. Variances are based on the fact that dollars spent locally fluctuate and are dependant on harvesting levels in any given year.

Current Condition and Practices:

Currently there is no data collected for this measure. Canfor and BCTS are to collect 5-year average dollars spent to establish the baseline dollars (i.e. 2011 – 5 years from the first Annual Report 2007). A variance of +/- 10% is based on cut control AAC harvest variations.

The Province of British Columbia is required to follow competitive bidding practices as specified in the Contract Policy Manuals and as well comply with Provincial Agreements on Trade and Commerce. The amount of money BCTS spends annually in the DFA will therefore fluctuate based on how competitive local contractors and suppliers are compared to others outside the DFA for work in the Kootenay Business Area.

Legal Requirements:

N/A

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Forecasting and Probable Trends of Measures:

This measure will not be forecast as dollars spent fluctuates annually. If harvest levels increase, it is expected that, initially, overall employment figures for indirect/induced employment and income will also increase, although not at the same rate as for the forestry sub-sector.

Monitoring and Reporting:

The total dollars spent and dollars spent locally for the forestry sub-sector will be monitored and reported annually from the accounts payable database system for Canfor. Addresses of the contractors will be monitored as well as per the above definition for “local”. BCTS will report on annual basis expenditures by fiscal year for contracts awarded to contractors and suppliers in the DFA.

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

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

Measure 4-2.5 Opportunity to Purchase Wood

Measure:

4-2.5 Opportunities continue to be available for citizens to sell timber to Canfor

Target (Variance):

50% of milling capacity

What is this measure and why is it important?

Local purchases of timber from woodlots, private lands and other non-tenure arrangements can contribute to the local economy. They can also be used as an indication of the diversity and resilience of the local economy. In addition, purchases of wood from the outside that are brought into the community for processing would also have a positive impact on the local community and this should be recognized.

How are targets established?

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.

Current Condition and Practices:

Canfor’s sawmill in Radium Hot Springs utilized more than 60% of sawmill production volume from external sources such as woodlots, private land, other licensees and BC timber sales. The sawmill is expected to continue to require this volume from external sources and provide opportunities for citizens to sell timber within the Radium DFA.

Table 27: Total Net Production Volume in 2005 for Canfor Radium Sawmill

Source	Volume (m3)	Percent of Total Volume
Canfor’s FL A18979 (including off-grade)	263, 186	40.3%
Purchase Volume (Non-quota wood)	389, 281	59.6%
Total Net Production Volume	652, 467	100%

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Total External Sales	85,784	13.1%
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Legal Requirements:

N/A

Forecasting and Probable Trends of Measures:

Both the amount of wood available and the amount needed by Canfor will fluctuate annually and so this measure will not be forecast. Monitoring of the trend will take place.

Monitoring and Reporting:

Canfor tracks the amount of wood it purchases. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. This amount will be summarized and reported in the SFMP Annual Report.

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

Measure 4-2.6 Civic Vitality

Measure:

4-2.6 Amount of corporate donations/sponsors made to the community per year

Target (Variance):

1 List of Donations

What is this measure and why is it important?

This measure indicates a level of financial support to the community from Canfor that will be maintained as a base level commitment to the local area allowing for more direct benefits from the provincial forest resource.

How are targets established?

The target for this measure is one report listing the donations on an annual basis.

Current Condition and Practices:

Within the community of Radium Hot Springs and Invermere, Canfor provides donations and sponsors to various group or organization such as sports teams or development projects. Canfor will determine, for the last 3 years, a baseline of the amount of donations made to the community per year to move towards determining measure targets. Data is provided within the 2006 SFMP Annual Report.

Legal Requirements:

N/A

Forecasting and Probable Trends of Measures:

TBD following the collection of baseline data and development of targets.

Monitoring and Reporting:

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

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

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Indicator	4-3. Governments continue to receive a portion of the benefits
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This indicator is meant to measure the ‘distribution’ of the economic value of timber harvesting to municipal, regional and provincial governments through stumpage, taxes and other fees.

The following measure has been identified to ensure that governments of receive a portion of the benefits from timber harvesting Radium DFA:

4-3.1 Fees paid by industry to appropriate governments

Measure 4-3.1 Fees Paid by Forest Industry

Measure:

4-3.1 Fees paid by industry to municipal, regional and provincial governments

Target (Variance):

0 non-compliance or non-conformances with paying fees on an annual basis

What is this measure and why is it important?

The fees paid by the forest industry, including stumpage, local and provincial taxes and other rents, are an important component of both local and provincial economies. Understanding what the contribution of the forest industry to the economy is an important aspect of economic sustainability. Stumpage and other provincial level fees are paid to the government through Canfor’s head office. Fees from BCTS are a matter of public record.

How are targets established?

The target was presented to PAG and accepted. It is 100% compliance with payment of annual fees due to municipal, regional and provincial government on a timely manner.

Current Condition and Practices:

In 2005 (Jan. 01/05 – Dec. 31/05) the stumpage paid by Canfor to Provincial Governments on FL A18979 was \$2,732,249 for 263,186 m3 at a cost of \$10.38/m3. This information is available through monthly and annual divisional Log Cost Reports.

Table 28: Canfor-Radium Division- Fees paid by industry to governments in 2005

Government Sector	Volume (m3)	Cost/m3	Total cost (\$)
Provincial (stumpage) (rents and permits) Total	263,186	\$10.38	\$2,732,249 <u>\$96,632</u> \$2,828,881
Regional			TBD
Municipal			\$135,231

In 2005 (Jan. 01/05 – Dec. 31/05) BCTS auctioned 120,705 cu m of wood for a total of \$4,652,655 in stumpage.

Harvest of the current AAC generates approximately \$18.64 million in fees to the provincial government (taxes, stumpage, and other fees).

Legal Requirements:

N/A

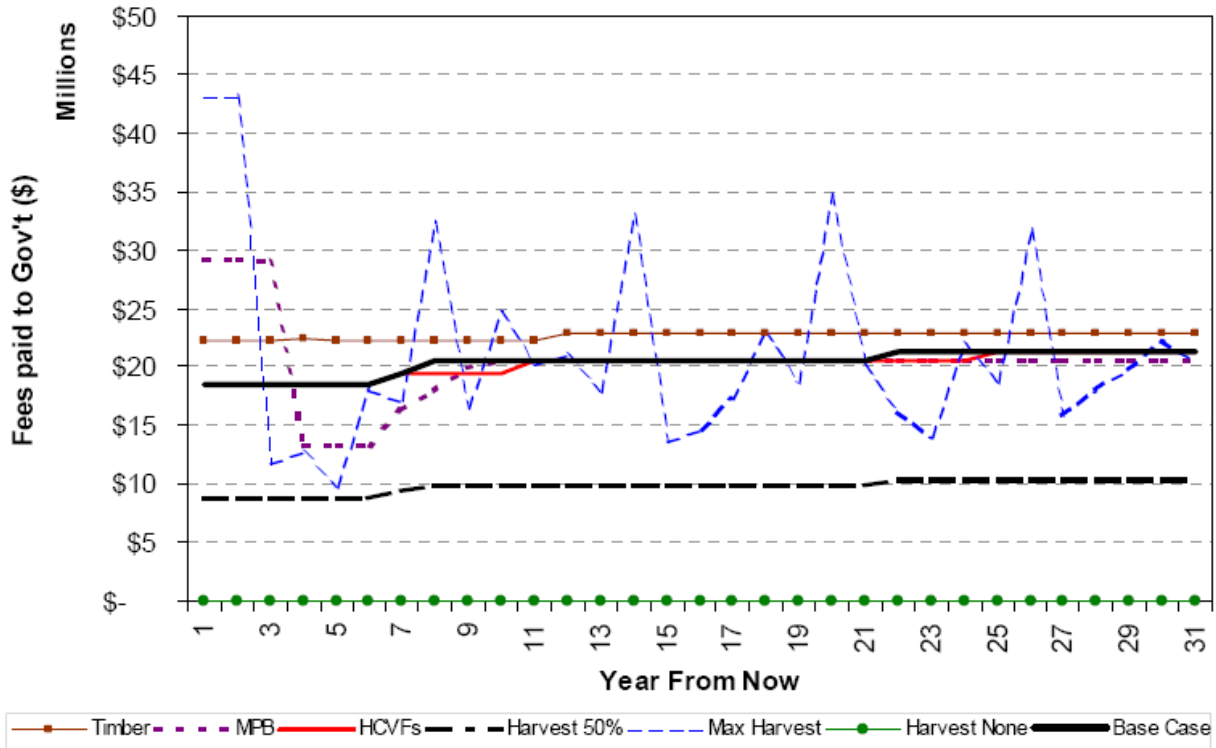
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Forecasting and Probable Trends of Measures:

Local governments set municipal taxes annually. Forecasting will not be done for this measure.

The projections in Figure 36 show a direct relationship between timber harvest volumes and fees paid to the provincial government. The higher the harvest level the more fees are paid.

Figure 36: Projection of Fees Paid to Provincial Government



Monitoring and Reporting:

The data required to monitor this measure is the recorded number of non-conformance or non-compliance with municipal tax information will be summarized and reported out within the SFMP Annual Report.

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

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

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Indicator	4-4. Opportunities to share a portion of the benefits exist for First Nations
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This indicator measures whether First Nations have opportunities to share in a portion of forestry related economic benefits. First Nations have not built up full capacity to capture economic benefits in every management unit in the province and in some cases have no interest in managing forestry related businesses. The forest industry and the provincial government have a direct influence on the opportunities First Nations have to receive a portion of the benefits once their capacity to do so has been developed.

The following measure has been identified to gauge that there is an opportunity for local First Nations to share a portion of the benefit:

4-4.1 Opportunities for First Nations exist

Measure 4-4.1 Opportunities for First Nations

Measure:

Target (Variance):

4-4.1 Number of formal opportunities for local First Nations to enter into contracts with Licensees ≥ 1 opportunity on an annual basis

What is this measure and why is it important?

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

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

How are targets established?

This is a reporting measure and the target established has been agreed to by *FOREST*.

Current Condition and Practices:

All BCTS contracts are open to all eligible bidders, including First Nations. BCTS contracts one AIA project per year.

Canfor is working on a Consultation and Accommodation Agreement as well as a Working Protocol Agreement with the First Nations⁶⁷ which will further expand on the business relationship between Canfor and local First Nation. Table 29 provides a summary of contracts held by Canfor with First Nations.

⁶⁷ Not applicable with BCTS

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Table 29: Summary of Contracts with Canfor Radium and First Nations 1999-2005

Year	Type of Contract									Total
	Employment	Road Building	Other Volume Purchased	Community/Cultural Support & Donation	Logging	Silviculture/Forestry	Capacity Building	Other Contracts*	Training/Education	
2004-2005	1			1	1	2	1	1	1	8
2003-2004				2	2		1	1		6
2002-2003				1			1	2		4
2001-2002	1			1			1	1		4
2000-2001								1		1
1999-2000							1	1		2
TOTAL	2			5	3	2	5	7	1	25
*Other contracts includes research/inventory and Archaeological Services										

Legal Requirements:

N/A

Forecasting and Probable Trends of Measures:

At present, forecasting will not be undertaken for this process measure.

Monitoring and Reporting:

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

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

Radium DFA Sustainable Forest Management Plan

Indicator	4-5. Forest management contributes to a diversified local economy.
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This indicator measures the 'resilience' of the forest sector to continue to produce timber values using the approaches outlined in the local SFM Plan. The forest industry must first be competitive, which is measured by certainty of timber supply, and competitiveness of delivered wood costs. Diversity is measured by the size and types of forestry businesses in the TSA.

The following two measures have been identified to gauge the competitiveness of the forestry sector:

- 4-5.1 Timber supply certainty
- 4-5.2 Percentage Return on Capital Employed

Measure 4-5.1 Timber Supply Certainty

Measure:

4-5.1 Projected timber supply over time is stable

Target (Variance):

321,094 m³ (+/- 10%)

What is this measure and why is it important?

Timber supply certainty is important to the community (including workers and local government), the corporation and the province as a whole. It is a component in investment decision making for corporations and their shareholders. It provides governments the ability to track revenue and to set budgets.

The long term harvest level is the AAC that can be sustained over a long period of time for the DFA given the specified management requirements for other forest resources. As harvesting interacts and potentially affects many of the other measures identified in this SFM Plan over long periods of time, understanding the outcomes of harvest levels are important economically as well as socially and ecologically.

How are targets established?

The long term supply of timber is established through the levels determined by the MoF's Chief Forester who then determines the AAC for the DFA. Each Licensee is given an apportionment of the AAC by the minister. The actual AAC is outside of the direct control of Canfor and BCTS. The target reflects that portion of the Invermere TSA that is accounted for in the DFA. The AAC is recalculated every 5 years and is based on the Timber Supply Review (TSR) process.

Current Condition and Practices:

The current AAC for the DFA allows 321.094 m³/yr (effective November 1, 2005) of harvest volume and is projected to remain stable or increase during the planning horizon (base case scenario TSR3). Harvest levels within the TSA (and the apportionment to Canfor and BCTS) remain within the cut control limits of the AAC.

Legal Requirements:

Cut control legislation

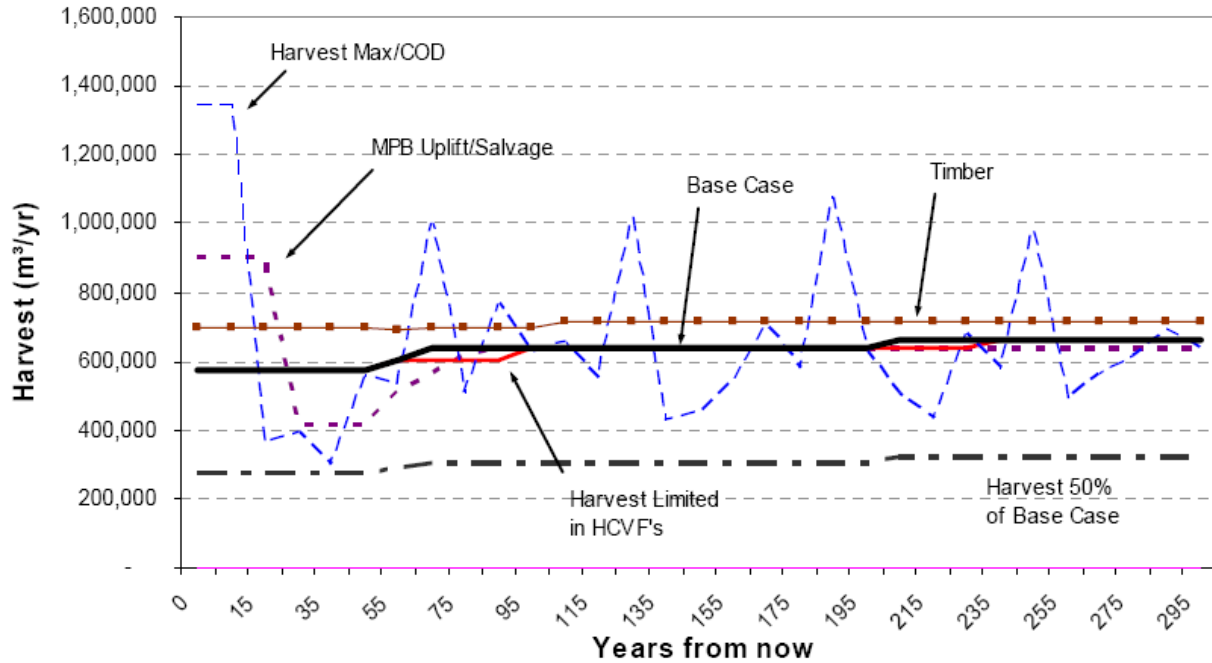
Forecasting and Probable Trends of Measures:

Forecasting of this measure is an important component of the TSR process. The TSR3 analysis is based on the best available information and forecasts timber supply over a 300-year period. Analysis of the timber supply is described in terms of short (20 years from now), medium (time between conversion of natural stands to second growth stands) and long term (point where harvest reaches the expected long

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term sustained harvest level) harvest. There are a number of models approved for use in forecasting timber supply. The model used for TSR3 was the spatially explicit forest estate model developed by Dr. John Nelson at the University of British Columbia (FPS⁶⁸/Atlas). Currently, the AAC is stable and could possibly increase as illustrated in Figure 37.

Figure 37: Projected Harvest Levels for the Invermere TSA



Monitoring and Reporting:

The monitoring protocol is to be determined. However the monitoring frequency will be annually with analysis occurring on the TSR cycle (i.e. 5 yrs). Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

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

⁶⁸ FPS – Forest Planning Studio

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Measure 4-5.2 Percentage Return on Capital Employed

Measure:

4-5.2 The percentage return on capital employed (ROCE) at a primary processing facility or business unit

Target (Variance):

ROCE > the percentage set for ROCE for the division. Measured over a two year period

What is this measure and why is it important?

The existence of a forest industry primary processing facility can have a stabilizing affect on the economy in the DFA. A primary processing facility attracts other businesses and provides revenue to all levels of government. The economic stability of many parts of BC, including the Radium DFA, depends in part on a competitive primary processing facility. In a fluctuating commodity market with numerous competitors, it is important that a primary processing facility continually invest in new technologies, processes and procedures to remain competitive.

- ROCE reflects a company's ability to earn a return on all the capital the company employs.
- $ROCE = \text{Profit before Interest, tax and payable} / \text{Capital Employed}$

The total fixed assets less current liabilities (due within 1 year) are expressed as an average percentage of capital employed. As a company invests in its facilities it accumulates assets. Assets are those items of value that are paid for but not yet expensed. Examples include cash, inventories, buildings, plant and equipment. However, a company will also have liabilities, or items due for payment, for conducting its business such as accounts payable, WCB, and reforestation.

ROCE is a useful measurement for comparing the relative profitability of companies. At the same time, ROCE is an efficiency measure of sorts. ROCE doesn't just gauge profitability as profit margin ratios do, it measures profitability after factoring in the amount of capital used. ROCE indicates the investment in primary processing facilities or business. This investment ensures that a company is remaining competitive relative to its liabilities.

A high ROCE indicates that a larger chunk of profits can be invested back into the company for the benefit of shareholders. The re-invested capital is employed again at a higher rate of return and helps to produce higher earnings-per-share growth. A high ROCE is therefore a sign of a successful growth company. *This measure is only applicable to Canfor.*

How are targets established?

There are no firm benchmarks, but as a very general rule of thumb, ROCE should be at least double the interest rates. An ROCE any lower suggests that a company is making poor use of its capital resources. Consistency is a key factor of performance. A decline in ROCE could signal the loss of competitive advantage. A favourable ROCE is 10% or greater and a very strong ROCE can be greater than 20%. ROCE is currently measured in Radium as a regular business process.

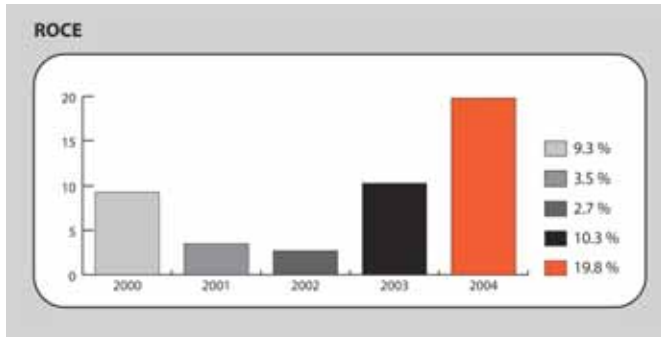
Because ROCE measures profitability in relation to invested capital, ROCE is important for capital-intensive companies or firms that require large upfront investments to start producing goods such as the forest industry.

Current Condition and Practices:

The status of this measure and target can be monitored on a regular basis, and reported monthly in the internal cost statements. This information will be kept confidential in nature, however, overall performance for the year is provided in the annual report to the Canfor shareholders.

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Figure 38: Canfor Corporate ROCE: 2000-2004



For Canfor Radium operations, ROCE in 2005 was below plan levels and well above plan levels in 2004. The two year average for Radium was well above plan levels.

Legal Requirements:

N/A

Forecasting and Probable Trends of Measures:

This is a process measure and modelling is not applicable, however the probable trend of this measure is that this measure will be monitored.

Monitoring and Reporting:

The Monitoring Protocol is that the information will be tracked by Canfor on an annual basis. Information will be reported out of accounts payable system. Records to satisfy this measure will be stored within the Canfor office as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

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

Indicator	4-6. Levels of forest damaging events or agents are managed such that their economic impact is minimized
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This indicator measures the assessment of the potential impact of natural disturbance on the local economy. The Ministry of Forests and Range often uses the term “Forest Health” when discussing certain natural disturbance events or agents. Natural disturbance from agents or events such as fire or insects is a natural part of ecosystem function. Unchecked, large-scale events can have a major impact on the short to medium term economic viability of a DFA. Forest managers have options available to them to assess and manage natural disturbance agents or events before they impact the DFA negatively.

The following two measures have been identified to gauge the effectiveness of managing for forest damaging events or agents:

- 4-6.1 Managing damaging events to minimize economic impact
- 4-6.2 Percentage treatment plans prepared and implemented

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Measure 4-6.1 Managing Damaging Events to Minimize Economic Impact

Measure:

4-6.1 Current assessments of damaging events or agents (current status: risk potential) are maintained

Target (Variance):

1 assessment per damaging event or agent

What is this measure and why is it important?

Insect and disease disturbances have the potential to cause significant economic, social and ecological impacts. The economic impacts can be measured in terms of volume losses. These are often referred to unsalvaged losses for disturbances, which lead to mortality, but incremental losses may also occur due to a variety of insects and diseases. Attempts are made to capture unsalvaged losses in Timber Supply Reviews, but often insufficient background material is available to accurately define these losses. Adaptive management, coupled with hazard rating, will provide information required for future modelling endeavours designed to provide estimates of gains or losses associated with various management scenarios.

This measure would ensure that an assessment is undertaken to determine the risk potential for a wide variety of disturbance events. Assessments of the status and risk posed by events or agents must be conducted ahead of an actual event occurring in order to develop and implement mitigating strategies.

Non Recoverable Losses (NRLs) – The Ministry of Forests and Range provided updated values for Mountain Pine beetle and Douglas-fir Beetle based on data from 1976-2003. The 2003 fires are not included in the wildfire estimates. New projections for MPB indicate that larger unsalvaged losses could be expected in the future.

Table 30: Unsalvaged losses

Description	Annual unsalvaged volume in the THLB (m ³ /year)
Mountain pine beetle	15,673
Spruce bark beetle	38
Douglas-fir bark beetle	307
Balsam bark beetle	302
Dwarf mistletoe	1,763
Catastrophic blowdown / snowpress (mature stands)	330
Non catastrophic in-block blowdown / snowpress (immediately adjacent to logged stands)	5
Non catastrophic blowdown / snowpress (immediately adjacent to roads)	27
Wildlife	5,882
Total	24,327 m³

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

The losses shown above are based on merchantable volume losses. Losses associated with immature stands also impact the rate at which timber becomes available in the TSA but little data are available to estimate the extent or impact of these losses.

How are targets established?

The target is simply to develop assessments for natural disturbance agents and for fire.

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Current Condition and Practices:

Forest health assessments are completed at various planning stages whether they are large events such as mountain pine beetle epidemics or smaller events such as a defoliator outbreaks. This information is available from various sources and can be compiled on an annual basis.

Canfor has completed the following assessments for common forest health agents.

Table 31: Assessments Completed – Forest Health Agent – Mature Forest

<i>Mature Forest Pests</i>					
Pest	Code	Site Plan pre-assessment	Specific Forest Health Assessment	Cruising	Regen or Free Growing Survey
Rust red string rot	DDE	X		X	
Tomentosus rot	DDI	X		X	
Laminated rot	DDL	X		X	
Red ring rot	DDP	X		X	
Lodgepole Pine Dwarf Mistletoe	DMP	X		X	
Armillaria root rot	DRA	X	Pixel Survey		
Atropellis canker	DSA	X		X	
Douglas- Fir bark beetle	IBD	X	Aerial Survey, Beetle Probe, Recci Survey		
mountain pine beetle	IBM	X	Aerial Survey, Beetle Probe, Recci Survey		
Spruce bark beetle	IBS	X	Aerial Survey, Beetle Probe, Recci Survey		
Western hemlock Looper	IDL	X			
Larch Casebearer	IDE	X		X	
Fire	NB	X	Overview flights	X	
Windthrow	NW	X	Overview flights	X	

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Table 32: Assessments Completed – Forest Health Agent – Plantations

<i>Plantation Pests</i>					
Pest	Code	Site Plan pre-assessment	Specific Forest Health Assessment	Cruising	Regen or Free Growing Survey
Armillaria root rot	DRA		Pixel Survey		X
Rhizina root disease	DRZ				X
Lodgepole Pine Dwarf Mistletoe	DMP				X
Western Gall Rust	DSG				X
Stalactiform blister rust	DSS				X
Cooley spruce gall adelgid	IAG				X
Root collar weevil	IWC				X
Pitch nodule moths	ISP				X
Douglas-fir needle cast	DA				X
Drought	ND		Overview flights		X
Frost bud kill	NGK				X
Animal Damage	A				X
Black Army Cutworm	IDA				X
Stem disease	DS				X

Legal Requirements:

N/A

Forecasting and Probable Trends of Measures:

Currently, there is nothing set up to forecast the probable occurrence of economically debilitating fires or insect outbreaks. This will be developed in subsequent years. However, the current mountain pine beetle epidemic has been modelled in the forecasting as a scenario.⁶⁹

Monitoring and Reporting:

Canfor, BCTS and MoF retain records of all significant natural disturbance events or agents. Site level plans will identify event or agent concerns and proposed treatment options. A summary of significant events or agents will be tracked through the EMS Incident Tracking system and the related assessments will be presented in the SFMP Annual Report.

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

⁶⁹ Forsite, Interior Reforestation, & Ecological Research. Sustainable Forest Management Plan Scenario Forecasting. Version 1.1 – February 24, 2006. Prepared for Canfor – Radium Woodlands & BCTS.

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Measure 4-6.2 Percentage Treatment Plans Prepared and Implemented

Measure:

4-6.2 Percentage of significant⁷⁰ detected natural disturbances damaging events threatening the THLB which have treatment plans prepared and implemented

Target (Variance):

1 strategy exists per damaging event or agent

What is this measure and why is it important?

Once assessments of potentially damaging natural disturbance events or agents are in place, this measure ensures that management strategies are put in place to deal with any events or agents. Endemic levels of damaging agents are expected in the DFA. Strategies will be developed for damaging agents that begin to exceed historic endemic levels. These levels will be discussed with the MoF as per current procedures to determine when a strategy is required.

How are targets established?

The target for this measure is established based on consultation with the *FOREST*. The target is simply to develop strategies for natural disturbance agents and for fire.

Current Condition and Practices:

In addition to the historical and current forest health as described in more detail within Section 6.1.2 Natural Disturbance Regime, the current FDP/FSP's list strategies for local forest pest outbreaks, salvage due to fire and windthrow applicable to the operating area for that FDP/FSP. Similarly, the Rocky Mountain Forest District Forest Health strategy outlines strategies and treatment plans for significant natural disturbance events. The large wildfires of 2003, for example, each had an overall treatment plan developed that encompassed salvage harvesting, deactivation, rehabilitation and reforestation among other things. Often the treatment plans are developed jointly with the Ministry of Forests and Range and industry staff as district-wide plans. Currently Canfor and BCTS are 100% compliant with the measure.

Legal Requirements:

FPC & FRPA: Forest Fire Prevention and Suppression Regulation, B.C. Reg. 169/95.

Forecasting and Probable Trends of Measures:

The forecast for this measure is that as a damaging event or agent is reported, and a strategy will be developed to reduce potential impact.

Monitoring and Reporting:

Government agencies, Canfor and/or BCTS will identify when a significant natural disturbance damaging event has occurred/is occurring in the THLB. Once identified, one of the three will take responsibility for developing treatment plans which will describe implementation strategies. Canfor and BCTS will establish and maintain a summary of significant damaging events and their estimated incidence, current status and potential impact on a range of forest values in the DFA. Tracking will occur as part of forest cover updates and the TSR process.

⁷⁰ A significant natural disturbance event is defined as an area greater than 500 ha.

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The frequency of monitoring and analysis will be at a minimum on an annual basis. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. Reporting will also occur annually in the SFMP Annual Report.

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

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Criterion 5	The flow of marketed non-timber economic benefits from forests is sustained
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The forests of British Columbia provide a host of commercial uses across the province. Commercial uses are those for which there is a marketplace and thus those that generate economic benefits. This criterion 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. SFM plans and practices have the potential to substantially impact the economic value of non-timber products from an area.

The need to include a criteria and measures for non-timber forest products was developed in concert with the other two economic criteria for timber products, and the local economy, and their indicators. The 1995 CCFM criteria and indicators were used as a starting point. In 2001 Cindy Pearce was asked to coordinate the development of the economic C&I and later that year Dr. Marty Luckert, a forest sector economist from the Department of Rural Economics at the University of Alberta and Dr. David Haley, a forest economist at University of British Columbia agreed to provide academic advice. Dr. Thomas Maness joined them later that year from the Wood Products faculty at the University of British Columbia, as well as Dr. Peter Boxall, a specialist in non-timber resource values, from the University of Alberta.

This team 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.

With that in mind, only one indicator has been recommended for this criterion at this time. This criterion and indicator link very closely with the C&I for social values. 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.

LINK TO OTHER CRITERION/INDICATORS

- Criterion 2 – productive capability of forest ecosystems
- Criterion 6 – contribution to a diversified local economy
- Criterion 7 – forest management decisions are informed – social & cultural values
- Criterion 8 – forest management and First Nations link to the forest
- Criterion 9 – range of quality of life benefits

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Indicator	5-1. Amount and quality of marketed non-timber forest resources is sustained or enhanced over the long-term as a result of forest management activities
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In the absence of readily available information about the economic values, distribution and resilience of marketed non-timber resource values in the TSA, this indicator requires only an assessment of the ‘units’ of marketed products that would be incorporated in an estimate of values. Cooperative efforts with the commercial interests marketing non-timber resources will be needed to accurately define the other factors for each interest. This work was not undertaken as part of this project as it was seen to be inappropriate for Canfor and BCTS to initiate without an operational SFM planning effort underway.

The following measure has been identified to ensure that the amount and quality of marketed non-timber forest resources identified do not decline over the long-term:

5-1.1 Commercial Non-Timber Forest Products Strategies

Measure 5-1.1 Commercial Non-Timber Forest Products Strategies

Measure:

5-1.1 Number of non-conformances with strategies for commercial non-timber forest products identified in DFA

Target (Variance):

0 non-conformances or non-compliance issues with established management strategies for NTFP’s

What is this measure and why is it important?

The term “marketed” implies that the non-timber forest resource is available for a viable business and information on it is readily accessible. The non-marketed timber resources identified in March of 2007 will assist to establish a baseline. Canfor and BCTS will use this baseline to develop management strategies under FSPs that will sustain benefits over time, within the limitations of Canfor and BCTS’ current forest management activities. The goal of these management strategies for Canfor and BCTS are not degrading the current or future potential for marketed/commercial non-timber benefits as a result of forest management activities and that they contribute to improving the potential, where possible.

How are targets established?

Strategies need to present the potential impacts to marketed/commercial non-timber forest resources and the mitigative measures to maintain those resources. Strategies will be developed by April 2008. Following the implementation of these measures, the target will be for zero non-conformances or non-compliances with the strategies.

Current Condition and Practices:

The following list describes the known marketed non-timber economic activities upon in the DFA:

- Commercial Recreation Lodges and Backcountry Tenure,
- Hunting Guides,
- Trappers,
- Ranchers, and
- Mineral exploration and mines.

Within the Radium DFA, an analysis of the marketed non-timber forest resources was developed and presented to the PAG in March 2007. Further work on this report will result in management strategies.

Currently, there is no description of potential implications of SFM practices on the amount and quality of non-timber resources.

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Legal Requirements:

N/A

Forecasting and Probable Trends of Measures:

Forecasting for this measure entails that the report will exist by 2007.

Monitoring and Reporting:

This is a process measure and monitoring will consist of ensuring there are no non-conformances or non-compliance situations. Results will be reported in the SFMP Annual Report.

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

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Criterion 6	Forest management contributes to a diversified local economy
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This criterion focuses on the ‘resilience’ aspect of SFM, at the community economy level, using diversification as a measure of resilience. The collective implication of SFM on the economy of local British Columbia communities is important. Commercial timber and non-timber forest products result in the creation of financial benefits that are distributed to corporations, labour and governments. These benefits influence community sustainability through their impact on community economies, quality of life and social conditions at a range of geographic scales. In addition, forest management can have both a positive and negative impact on other benefits and opportunities, such as recreation, subsistence uses and domestic watersheds, which directly affect the quality of life, and indirectly affect community economies. As well, business practices (i.e. buying locally where available and economically practical) of the forest industry and government agencies can have an impact on the ability of the local economy to become and remain diversified. Thus this aspect warrants its own criterion.

The economic resilience criterion was developed in concert with the other two economic criterion for timber and non-timber forest products and their indicators (i.e. Criterion 5 and 6).

While a broad range of community indicators for SFM have been proposed, including a range of community social conditions, within the context of SFM Plans developed for timber harvesting, the only relevant criterion that was recommended was community economic diversity as measured by employment and income sources. As well, this information is readily available from government sources.

Communities can better withstand shocks in one sector of the economy if there are other economic sectors that buffer the effects. While the forestry industry does not control or even directly influence other sectors of local economies, the sustainability of communities in terms of providing amenities is directly tied to their ability to maintain or expand their populations through continuity of work opportunities. Thus the ability of the forest industry to attract and keep a skilled workforce is linked to the diversity and resilience of the local economy, and associated amenities.

LINK TO OTHER CRITERION/INDICATORS

- Criterion 4 – flow of economic benefits from the forest industry
- Criterion 5 – flow of marketed non-timber economic benefits
- Criterion 7 – forest management decisions are informed – social & cultural values

Indicator	6-1. Employment and income sources and their contribution to the local economy continue to be diversified
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This indicator measures the resilience of a community to economic shocks in various sectors. The forest industry is one sector within a local community economy. The sustainability of communities is important to SFM in terms of a community’s ability to attract and maintain a skilled workforce for the forest industry. In turn a healthy forest industry provides employment and business opportunities, income and tax bases and thus creates opportunities to attract other businesses and amenities to a community.

The indicator tracks employment and income in each sector of the local economy. Examples of what “local” means include those businesses and people who have an address in a community (rural or urban based) within a management unit or defined forest area. The two measures for this include:

- 6-1.1 Employment supported by each sector of the local economy
- 6-1.2 Contribution of income sources from each sector of the local economy

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Measure 6-1.1 Employment by Sector – Local Economy

Measure:

6-1.1 Employment supported by each sector of the local economy (actual and percentage of total employment)

Target (Variance):

Average Local Forestry Annual Employment– 263 person years and 19% of total employment sectors (+/- 10%)

Report out on other sectors

What is this measure and why is it important?

Although the forest industry cannot directly control the diversity of the economy for the community in which it operates, understanding the impact of that diversity is an important component of SFM. If the community is not economically diverse, it will not be resilient to economic shocks. If shocks occur that the community is not able to recover from, services could decline and thus skilled workers and their families may move to more stable areas. This measure will include both the actual person-years of employment within each economic sector, and the % of total employment contributed by each sector.

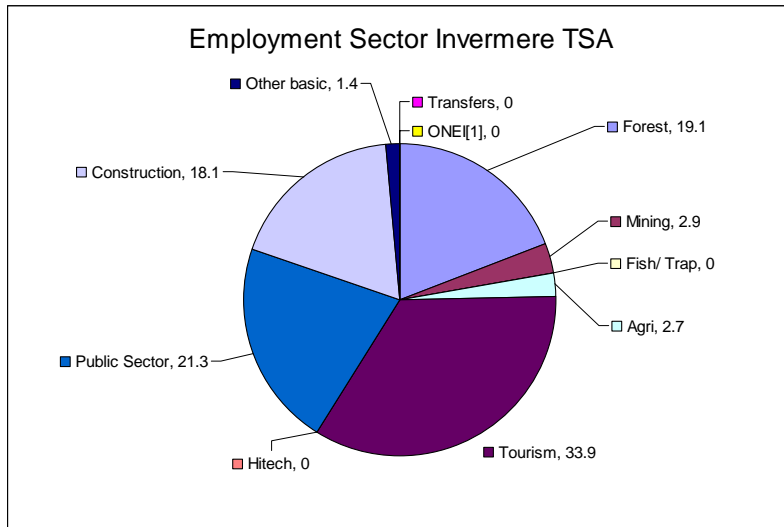
How are targets established?

The target for this measure is based on Statistics Canada numbers that are collected during TSR that occurs every 5 years. This target is intended to be the “average” forestry employment over a 5 year period. It must be remembered that most of the economic diversity of a community is out of the direct control of the forest industry. For this reason, the input from the PAG was to ensure that the target was in control of forest industry. The target simply reflects the forestry portion of the measure and we will report out on the other sectors

Current Condition and Practices:

TSR3 was completed in 2005 and it has outlined the employment supported by each sector of the local economy. This information will be updated regularly during subsequent TSR analysis periods with the next TSR to be completed by 2010.

Figure 39: Employment Sector Invermere TSA



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Table 33: Basic Sector Employment and Employment Income Distribution (% share) for Invermere TSA

	Forest	Mining	Fish/ trap	Agri	Tour- ism	Hitech	Public sector	Const- ruction	Other basic	Trans- fers	ONEI ⁷¹	Total ⁷²
2000 Employment income	18.9	1.9	0	0.8	15.7	0	18.7	13.8	0.7	13.5	15.9	100
2000 Employment	19.1	2.9	0	2.7	33.9	0	21.3	18.1	1.4	-	-	100
1995 Employment	19.7	2.9	0	3.7	35.3	0	21.7	14.1	2.6	-	-	100

Source: BC Stats

Table 34: Canadian Forest Products annual average harvests and employment, Invermere TSA 2001-2003

	Result
Harvest	Timber volume (m³)
Allowable Annual Cut (AAC)	231 005
Annual average harvest, 2001-2003	270 000
2003 harvest	326 000
Employment	Person-Years (PYs)
Harvesting	49
Log transport	10
Road construction & maintenance	5
Silviculture	7
Timber processing	112
Total	183

Source: TSR 3 Analysis Report

Table 35: BCTS Annual Average Harvests and Employment, 2001-2003

	Result
Harvest	Timber volume (m³)
Allowable Annual Cut (AAC)	74 049
Annual average harvest, 2001-2003	104 505
2003 harvest	104 411
Employment	Person-Years (PYs)
Harvesting, planning & administration, log transport, and road construction & maintenance	31
Silviculture	3
Timber processing	46
Total	80

Source: TSR 3 Analysis Report

Legal Requirements:

N/A

⁷¹ Other non-employment income (ONEI), mainly investment and pension income

⁷² Totals do not add up to 100% due to rounding.

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Forecasting and Probable Trends of Measures:

This measure is a process measure that will be reported out during TSR.

Monitoring and Reporting:

This is a process measure and monitoring will consist of reporting out on the measure and monitoring trends. Statistics Canada Census Data will be used to monitor this measure. Status and trends will be reported in the SFMP Annual Report as new Statistics Canada Census Data becomes available (i.e. every 5 years).

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

Measure 6-1.2 Income by Sector – Local Economy

Measure:

6.1.2 Contribution of income sources from each sector of the local economy (actual and percentage of total income)

Target (Variance):

Average Local Forestry Annual Income– greater than \$48 700 and 19% of total income sources (+/- 10%)

Report out on other sectors

What is this measure and why is it important?

This measure is directly related to 6-1.1 and is meant to measure the contribution of income sources as part of the economic benefit derived from each sector of the local economy.

How are targets established?

The target for this measure is based on Statistics Canada numbers that are collected during TSR that occurs every 5 years. This target is intended to be the “average” annual forestry income over a 5 year period. It must be remembered that most of the economic diversity of a community is out of the direct control of the forest industry. For this reason,, the input from the PAG was to ensure that the target was in control of forest industry. The target simply reflects the forestry portion of the measure and we will report out on the other sectors

Current Condition:

TSR3 was completed in 2005 and it has outlined the contribution of income supported by each sector of the local economy. This information will be updated regularly during subsequent TSR analysis periods with the next TSR to be completed by 2010.

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Figure 40: Employment Income Invermere TSA

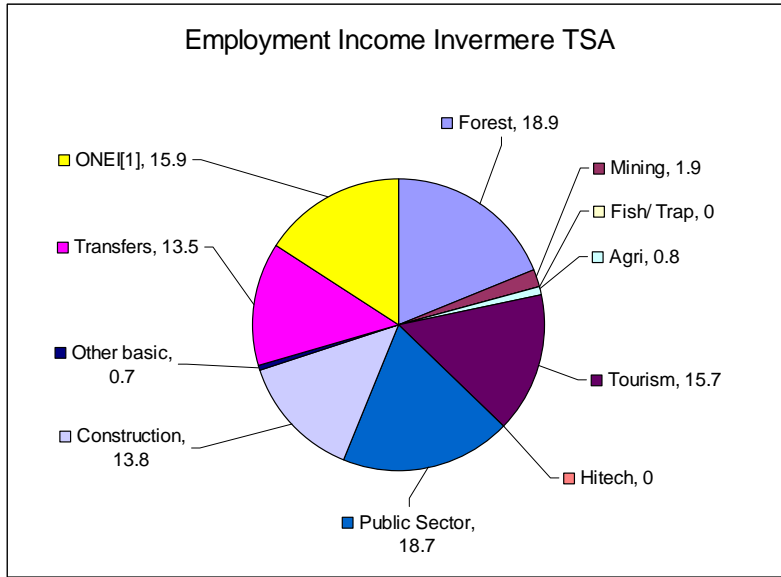


Table 36: Invermere TSA Avg. Income Stats 2001 Census

Industry	Income	Indirect Multiplier	Indirect & Induced Multiplier
Logging	\$44 642	1.18	1.27
Saw milling	\$42 555	1.29	1.43
Pulp manufacturing	\$58 995	1.59	1.62
Coal mining	\$55 176	1.31	1.39
Government services	\$42 258	1.12	1.21
Accommodation services	\$20 461	1.08	1.13
All industries average	\$31 899	-	-

Legal Requirements:

N/A

Forecasting and Probable Trends of Measures:

This measure is a process measure that will be reported out during TSR.

Monitoring and Reporting:

This is a process measure and monitoring will consist of reporting out on the measure and monitoring trends. Statistics Canada Census Data will be used to monitor this measure. Status and trends will be reported in the SFMP Annual Report as new Statistics Canada Census Data becomes available (i.e. every 5 years).

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

5.1.3 Social Values

Criterion 7	Decisions guiding forest management on the DFA are informed by and respond to a wide range of social and cultural values
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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.

This Criterion and the three associated indicators were developed by a team led by Dr. Stephen Sheppard⁷³, and was supported by a number of students and researchers over a 5 year period. Dr. Michael Meitner⁷⁴ of University of British Columbia oversaw components of the survey that were tested under the Arrow IFPA. The C&Is on social issues for the SFM Framework have been developed using the Arrow Forest District as a pilot area and through a combination of:

- A broad review of other C&I systems and precedents, including Canada’s model forests (von Mirbach, 2000), Canadian Council of Forest Ministers (1995 and 2002),
- CIFOR (Mendoza et al., 1999), Forest Stewardship Council (2000), and the UK Forestry Standard (Forestry Commission, 1998).
- Interpretations from the results of the mail-survey of social values in the Arrow Forest District, and
- Discussions with local forest practitioners and focus group workshops with multiple stakeholder groups in the Arrow Forest District.

Indicator 7-1 is meant to measure the opportunities for and effectiveness of public (defined as area residents, stakeholders and interested parties) participation in the development of local forest management strategies.

Indicator 7-2 measures how information is exchanged within the DFA. It also measures the effectiveness of the information exchange.

⁷³ Collaborative for Advanced Landscape Planning, Department of Forest Resources Management, University of British Columbia

⁷⁴ Meitner, J., S.R.J. Sheppard, H. Harshaw and N. Wilson. 2001. Arrow Forest District Social Values Survey: Final Report. Technical Report submitted to the Arrow Innovative Forest Practices Agreement. Nelson, B.C.

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Indicators 7-1 and 7-2 are unique in that they do not reflect the management of specific forest resources. Instead they measure the effectiveness of public and stakeholder input into the decision making.

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.

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

Indicator	7-1. Forest Management planning adequately reflects the interests and issues raised by the public (tenure holders, residents and interested parties) in the DFA through an effective and meaningful (to all participants) public participation process.
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There is a long history of stakeholder and public involvement in forestry related planning in British Columbia. However, involvement processes have not always been satisfactory, either for the participants or the planners. Key stakeholders are sometimes overlooked, and participation approaches are sometimes inappropriate for the time, resources, and interests of stakeholders. As well, decision makers are seldom provided with information outlining the number of stakeholders with particular interests when deciding on forest management plans.

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

This is addressed within the suite of five measures as follows:

- 7-1.1 Comprehensive stakeholder analysis
- 7-1.2 Implementation of a communication / participation plan
- 7-1.3 Effective public advisory group
- 7-1.4 Equitable and inclusive deliberation process
- 7-1.5 Reciprocal exchange of social values / opinions

Measure 7-1.1 Stakeholder Analysis

Measure:

7-1.1 Implementation and annual update of a comprehensive stakeholder analysis of affected and interested parties

**Target
(Variance):**

Annual Updates

What is this measure and why is it important?

Effective sustainable forest management planning for public land requires appropriate involvement of a variety directly affected or interested people in the development and implementation of plans. In order

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for a public process to be effective, a comprehensive list of affected and interested parties must be considered. A stakeholder analysis provides the structured, explicit identification of human uses and interests in a particular management unit. By identifying the organizations and individuals associated with those uses and interests it allows a fresh, transparent assessment of the stakeholders who should be included in these processes.

This measure helps define appropriate public input processes for the sustainable forest management plan. This measure is directly linked to the subsequent measures in this indicator.

How are targets established?

This measure was established as part of the SFM Framework and has been accepted by the *FOREST*. It is a process measure established to ensure that a Stakeholder Analysis is completed and kept current. A variance for this target is not considered appropriate.

Current Condition and Practices:

Canfor has completed a stakeholder analysis for the Radium DFA that has identified each forest-based use and interest with possible organizations and individuals who might represent this use or interest. This information has been collated and entered into a tracking database. In addition, an analysis was completed by the participants to select the public advisory group (PAG).

The procedure determined was as follows:

1. A list was compiled of the public that attended the open house and expressed interest in participating on a PAG.
2. A list was compiled of people that attended the meeting that would be knowledgeable and suitable candidates; but whom had not signed up for the PAG.
3. A list was compiled of people that had not attended the open house; but were deemed to be knowledgeable and suitable candidates.
4. For each member on the list, it was noted if they belonged to or had an affiliation to a variety of interest "types". The list was developed with consultation with social specialist, they included:

Table 37: Suitable Candidates

- Commercial Recreation
- Public Recreation
- Water interests
- Hunting Guides
- Mineral exploration and mines
- Ranchers
- Trappers
- Woodlot owner
- Christmas tree tenure holder
- Private land
- Labour Group
- Forestry Contractors
- Government, Local
-
- Government, Provincial
- Government, Federal
- 1st Nations
- Non-Government Organization
- Private Land Conservation Groups
- Economic Development
- Environment
- Fish & Wildlife
- Public
- Raw wood users

Each candidate member was also categorized as Environment, Economic, or Social interest, to ensure that a suitable cross section of participation was being maintained. The list of candidates was then summed by interest group to see how many of each group was represented. Many candidates met more than one

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interest category and therefore in most cases was “preferred” over a candidate that only represented one interest area. In addition, during the second PAG meeting, the PAG group brainstormed interest groups in the area that should potentially be involved. They also filled out questionnaires regarding the specific interest areas they represented. From the brainstorming only one area had not been specifically noted “Private Land Conservation Groups” such as Nature trust. Two key people were identified for contact by the facilitator to invite them to join the group. The East Kootenay Compensation Program (EKCP) member h indicated he was unable to participate at this time. A representative of Nature Trust asked that a ToR be sent over to review, and he would let us know if he would be able to be involved.

The First Nations have formally stated that they do not want to participate as PAG members. First Nations within the East Kootenays include two Tribal Councils and five First Nation Bands. These include:

Tribal Councils	Bands	Located in DFA
Ktunaxa Treaty Council	Akisiq’nuq First Nation Band (Columbia Lake Band)	Yes
	St. Mary’s Band	No
	Lower Kootenay Band	No
	Tobacco Plains Band	No
Shuswap Nation Tribal Council	Shuswap Band	Yes

A group of observers may also be attending at times; MoF, WLAP, MSRM, and Tembec are expected.

The stakeholder database is reviewed and kept up to date on an annual basis. A contacts database is currently being developed to formalize public comment and referral procedures that will spatially link concerns to geographic areas.

A stakeholder survey was completed in March 2006 by the University of British Columbia to gauge the range of public interest in forest-base use.

Legal Requirements:

N/A to the requirement of a stakeholder database

Forecasting and Probable Trends of Measures:

This is a process measure and modelling is not applicable, however the probable trend of this measure is that the Stakeholder Analysis be updated regularly.

Monitoring and Reporting:

The data required to monitor and report out on this measure is that an updated database reflecting current contact information exists. The frequency of monitoring will be annual. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

The position/person responsible for ensuring the information needed is gathered and captured in the Stakeholder Analysis or contacts database will be identified in Appendix 1.6: Responsibility Action Matrix.

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Measure 7-1.2 Communication / Participation Plan

Measure:

7-1.2 Development and implementation of a communication / participation plan, with early input from a range of stakeholder representatives

Target (Variance):

1 Plan – Date:
March 2008

What is this measure and why is it important?

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. For this reason, 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. This process must be established by the range of those involved in the process.

As well, communication / participation with parties outside of a formal public advisory group is required to ensure SFM. Within the DFA however, a comprehensive communication / participation plan and formalized procedure is required that takes into account early input from a range of stakeholders. This plan will be developed in 2006 for the DFA and will consider a range of communication tools including newspaper articles, website, mail-out notifications, newsletters or surveys.

This measure was developed to address the terms “effective and meaningful” found in the indicator.

How are targets established?

This is a process measure established to ensure that one communication / participation plan is developed and implemented. A variance for this target is not considered appropriate.

Current Condition and Practices:

Currently, Canfor and BCTS have a standard practice to contact individuals or organizations by mail outs during Forest Development Plan (FDP) / Forest Stewardship Plan (FSP) review and comment periods. The review and comment period is 60 days unless otherwise reduced and approved by the District Manager for emergency situations. Few comments arise from the FDP/FSP reviews. However, the comments that do surface are addressed promptly with written replies and sometimes field visits.

Public concerns outside of the FDP/FSP review and comments are addressed through a public review and comment form that identifies the who, what, when, where, why of the concerns and the action plans that are necessary to address the concern.

For many landscape units, Total Resource Plans (TRPs) were completed in the TSA. The TRP's contained terms of reference and identified local issues and concerns. The plans attempted to address these concerns through integrated resource management. Over the last 5 years TRP's have not been updated.

Both Canfor and BCTS are meeting the minimum legal requirements for review and comment of operational plans. Forest Development Plan/Forest Stewardship Plan – 60 day review and comment period prior to final approval by Ministry of Forests. Review and comment period can be reduced if approved by district manager for emergency situation (e.g. Mountain pine beetle).

Within the scope of the PAG, the Terms of Reference is considered the communication / participation plan. It was developed and agreed too by the PAG, Canfor and BCTS.

With regards to the requirement for a communication / participation plan beyond the scope of the PAG, Canfor and BCTS are committed to the development of an appropriate plan by the March 2008.

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Legal Requirements:

N/A for the establishment of a communication / participation plan but consultation is legally required.

Forecasting and Probable Trends of Measures:

This is a process measure and modelling is not applicable. However the trend of this measure is that the communication/participation plan will exist and be updated as required under the terms of reference. Implementation of the accepted communication strategies will occur following March 2008.

Monitoring and Reporting:

The data required to monitor and report out on this measure is that a communication / participation plan exists. The frequency of monitoring will be annual although the updating of this plan will be every three to five years. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

The position/person responsible for ensuring the information needed is gathered and captured in the Stakeholder Analysis or contacts database will be identified in Appendix 1.6: Responsibility Action Matrix.

Measure 7-1.3 Effective Public Advisory Group

Measure:

7-1.3 The existence of an effective public advisory group as indicated by the satisfaction of advisory group members

Target (Variance):

Satisfaction Survey – average score > 3.5

What is this measure and why is it important?

Building on the earlier two measures under this indicator, this measure 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.

This forum is designed to provide interested parties with an opportunity to influence decisions and to provide input on important issues, as well as learn about many aspects of SFM and forestry operations. Canfor and BCTS consider the public input seriously and demonstrates that it is responsive to and respectful of this input. The TOR (described in Measure 7-1.2 Communication / Participation Plan) explains how decisions are reached within the public advisory group.

The strength of this group is two-fold: 1) to assist with decision-making processes that guide forest management; and 2) to promote awareness and capacity building for both the group and the forest managers. This measure ensures that the public advisory group is satisfied with the processes and outcomes.

How are targets established?

This is a process measure established to ensure that an advisory group is in existence, and that it is fulfilled. A satisfaction survey was used to measure satisfaction.

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Current Condition and Practices:

Canfor and BCTS have formed a public advisory group (PAG) in 2005 that contains a range of interests or organizations. In a satisfaction survey completed in January 2006, the PAG group has indicated that the overall satisfaction of the group is 3.9. In order to achieve the target, the PAG group 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.

Figure 41: FOREST – Public Advisory Group “out in the field”



Legal Requirements:

N/A for the establishment and satisfaction of an advisory group. However, meaningful public participation is a requirement for CSA certification.

Forecasting and Probable Trends of Measures:

This is a process measure and modelling is not applicable. However the probable trend of this measure is that the public advisory group will have satisfaction with the process and outcome on average of 3.5 or better.

Monitoring and Reporting:

The data required to monitor and report out on this measure 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.

The position/person responsible for ensuring the information needed is gathered and captured in the Stakeholder Analysis or contacts database will be identified in Appendix 1.6: Responsibility Action Matrix.

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Measure 7-1.4 Equitable and Inclusive Deliberation Process

Measure:

7-1.4 Conduct of an open public process prior to Government approval of operational plans, or any major amendments

Target (Variance):

0 non-compliance or non-conformance with legal advertising & internal SOP

What is this measure and why is it important?

When public, stakeholders and First Nations 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 of this SFM Plan has been one opportunity for the public, stakeholders and First Nations to participate in discussing forest management decisions. Other major forest management decisions are presented to the public during the development of operational plans, such as, FDPs and FSPs. As part of the communication / participation plan being developed for measure 7-1.2, recommendations for a conduct of an open public process will be developed for future operational plans, specifically FSPs, and major amendments. In order to be equitable and inclusive, the plan will make allowances for different linguistic, cultural, geographic, or informational needs of all interested parties. The plan needs to describe the scope and intent of “open public process”.

The measure is meant to ensure that an equitable and inclusive public deliberation follows the legal requirement prior to making major forest management decisions.

How are targets established?

This measure was established as part of the SFM Framework and has been accepted by the *FOREST*. It is a process measure established to ensure that legal requirements are followed. A variance for this target is not considered appropriate.

Current Condition and Practices:

Currently, Canfor and BCTS have a standard practice to contact individuals or organizations by mail outs and newspaper advertisement during Forest Development Plan (FDP) and Forest Stewardship Plan (FSP) review and comment periods. Operationally forest managers rely on verifying appropriate contact through the use of checklists, such as Site Plan EOP/Checklist as well as Major/Minor Amendment Checklist. Both Canfor and BCTS are in compliance with the legal advertising and internal SOPs.

The review and comment period is 60 days unless otherwise reduced and approved by the District Manager for emergency situations. Few comments arise from the FDP/FSP reviews. However, the comments that do surface are addressed promptly with written replies and sometimes field visits. The Radium DFA is currently meeting the specified target.

Legal Requirements:

FPC & FRPA: Review and comment requirements

Forecasting and Probable Trends of Measures:

This is a process measure and modelling is not applicable. However the probable trend of this measure is that conduct of an equitable and inclusive public deliberation process exists, will continue to exist and will be executed 100% of the time, prior to making major management decisions.

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Monitoring and Reporting:

The data required to monitor and report out on this measure is the recorded number of non-compliances with legal advertising and/or non-conformance with the internal SOP. The frequency of monitoring will be annual. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

The position/person responsible for ensuring the information needed is gathered and captured in the Stakeholder Analysis or contacts database will be identified in Appendix 1.6: Responsibility Action Matrix.

Measure 7-1.5 Open and Transparent Reciprocal Exchange of Social Values / Opinions

<u>Measure:</u>	<u>Target (Variance):</u>
7-1.5 Documentation of open and transparent reciprocal exchange of social values/opinions, their influence on decisions, and participant satisfaction	1 Process

What is this measure and why is it important?

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. This measure is tied to measure 7-1.4 and ensures that the process set up for that measure, the responses and the participant's satisfaction will be documented.

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.

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. Another important matter to document is the satisfaction of the interested party with the exchange and the result. This measure 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.

The term reciprocal implies that both sides will learn from each other and use that learning to improve communications.

How are targets established?

This is a process measure established to ensure that Canfor and BCTS 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. This measure requires documenting information exchange, influence on decisions and participation satisfaction exists. It has been determined

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by FOREST that “participant satisfaction” needs to be defined. This will more likely occur within the development of the communication / participation plan.

Current Condition and Practices:

Currently, Canfor and BCTS, outside of the PAG process, do not have a process in place to document reciprocal exchange of social values/opinions, their influence on decisions and participant satisfaction. However, Canfor and BCTS commit to promptly responding in writing and will follow-up with field visits, when needed.

In combination with measure 7-1.2 a process will be developed in 2008 that outlines responses made, influence on decisions and a summary of satisfaction.

Legal Requirements:

N/A for the establishment and satisfaction of an advisory group. However, meaningful public participation is a requirement for CSA certification.

Forecasting and Probable Trends of Measures:

This is a process measure and modelling is not applicable. Forecasting for this measure consists of the process existing and that it is documented. The expected trend for this measure is that it continues to exist and that the information continues to be utilized in future management decisions.

Monitoring and Reporting:

The data required to monitor and report out on this measure is the documentation of information exchange opportunities. The frequency of monitoring is during and after any SFM participation process. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

The position/person responsible for ensuring the information needed is gathered and captured in the Stakeholder Analysis or contacts database will be identified in Appendix 1.6: Responsibility Action Matrix.

Indicator	7-2. Community understanding and capacity to participate in forest management planning is improved through information exchange between DFA forest resource managers and the public through a varied and collaborative planning approach in order to facilitate capacity building in the community.
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This indicator measures how information is exchanged in the DFA, as well as the effectiveness of the information exchange. This is accomplished by the following two measures:

- 7-2.1 Communication opportunities with the public
- 7-2.2 Reciprocal knowledge exchange

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Measure 7-2.1 Communication Opportunities for the Public

<u>Measure:</u>	<u>Target (Variance):</u>
7-2.1 Number and type of communication, extension and planning activities with the public annually about forest management plans (SFMP and operational plans) and operations	Minimum 5

What is this measure and why is it important?

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 will be developed. Each of these communication opportunities will be tested to ensure they are effective for those participating. Measure 7-2.1 which ensures that there are a number of different communications with the public is closely linked with measure 7-2.2, which addresses the reciprocal exchange of that information. Effectiveness has not been defined in this measure, this term will be better articulated upon the development of the processes in Measure 7-1.2 and 7-1.4. As well, FOREST has requested that “community” within the Indicator be defined.

How are targets established?

A proposed target for this measure is a minimum of 5 communications, initiatives/activities annually. Revisions to this target will take place once the report for measure 7-1.2 and measure 7-1.4 is completed.

Current Condition and Practices:

The formation of a PAG has begun to address the measure and associated target – the PAG has met and exchanged information at over 13 separate meetings, field trips, and open houses during the last year. In combination with measure 7-1.2 a process will be developed in 2006 to progress towards the target of a minimum of 5 communications.

Public operation tours are offered during the summer months, every two weeks. An average of 30 people per tour is guided through the planning, harvesting, silviculture and sawmilling operations.

Legal Requirements:

N/A to specify the number and type of communication opportunities

Forecasting and Probable Trends of Measures:

This is a process measure and modelling is not applicable. However the probable trend of this measure is that through the continuation of the *FOREST*, and with exchanges such as those described above, the knowledge and understanding of SFM and forest management in the local community will increase.

Monitoring and Reporting:

This is a process measure and monitoring will consist of reporting out on the measure. This may include a summary of responses to questions posed about satisfaction with communication or documented interviews and questionnaires. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

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

Measure 7-2.2 Reciprocal Knowledge Exchange

Measure:

7-2.2 Demonstration of reciprocal knowledge exchange (i.e. local First Nation &/or community expresses increased knowledge of SFM and technical expert incorporates local knowledge into forest management decisions/plans)

Target (Variance):

Minimum of 1 example of reciprocal knowledge exchange on an annual basis (increasing trend)

What is this measure and why is it important?

Merely undertaking meetings and providing extension on what has been done does not ensure that the communication with First Nation and/or local stakeholders has been effective. This measure is meant to ensure that there is a process in place that allows for forestry management related information exchange between the First Nation, communities and stakeholders in the DFA and Canfor/BCTS.

This measure is directly related to 8-2.1 and 8-2.2 such that forestry managers are informed as to what is important to First Nations regarding the impact of forestry strategies on First Nations interests and First Nations are informed about the processes and implementation strategies that forestry managers are recommending.

As part of the development of measure 7-2.1, an approach for measuring whether or not the information provided to First Nation, the community and stakeholders has resulted in increased knowledge of SFM will have to be developed. An informed First Nation/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.

How are targets established?

The ultimate target for this measure is that local First Nation and community knowledge of SFM will increase by over time. For now, a minimum of 1 knowledge exchange will occur from communication activities. For this measure the types and numbers of exchanges between First Nation, the local community and Canfor/BCTS needs to be established as a baseline. The target is an increasing trend of satisfaction from this baseline data. This will include tracking input from First Nation and the public/groups. The content of the information exchange and the level of satisfaction are discussed under measures 8-2.1, 8-2.2 and 8-2.3. Increased understanding and awareness of forest management issues and activities is the desired future condition. The process for developing an approach to measure this will be developed as part of the reports for measure 7-2.1 and measure 7-1.5. A baseline for the level of current knowledge will first be established using the *FOREST* process as a start.

Current Condition and Practices:

Currently, Canfor and BCTS, outside of the PAG process (which has had extensive reciprocal exchange of information), do not have a process in place to document reciprocal exchange of social values/opinions, their influence on decisions and participant satisfaction. In combination with measure 7-1.2 and 7-1.5 a process will be developed in 2008: an effective communication/participation plan.. The process will outline responses made, influence on decisions and a summary of satisfaction.

Legal Requirements:

N/A to require reciprocal exchange of information

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Forecasting and Probable Trends of Measures:

The forecast for this measure is that knowledge of SFM (as defined in a series of questions) will increase over time. The trend for this measure is that knowledge will increase for involved people and will increase for new participants into the *FOREST*. Modelling is not applicable to this measure as it is a process measure.

Monitoring and Reporting:

This is a process measure and monitoring will consist of reporting out on the measure. This may include input from *FOREST* members, Canfor and BCTS or comments from the FDP/FSP process. The frequency of monitoring will be determined once the process for reciprocal exchange has been developed. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

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

Criterion 8	Forest management sustains or enhances the cultural (material and economic), health (physical and spiritual) and capacity benefits that First Nations derive from forest resources
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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 Criterion 8, as described in the SFM Framework, recognizes the importance of the physical and economic dependence of indigenous people on forest resources, as well as the normative and spiritual elements. The proposed indicators represent a blend of legal commitments and the obligations resource managers have in ensuring that First Nations unique cultural, spiritual and economic needs are addressed within the SFM Framework.

This Criterion was developed under the supervision of Dr. Stephen Sheppard with PhD student John Lewis. They used a combination of screening and clean-slate approaches. The proposed criterion and indicators were reviewed with a subset of Slocan⁷⁵ managers and planners and revised then for comment.

The development of this Criterion takes into account the responsibility that resource managers have in ensuring that First Nations have access to forest resources for a variety of needs, but also recognizes that they do not have a responsibility to force capacity within First Nations.

Indicator 8-1 is meant to ensure that recognized and legal Aboriginal and Treaty Rights are identified, managed for and monitored.

Indicator 8-2 is intended to ensure that management of forests should provide and improve access to resources for survival and maintenance of traditional values and heritage.

Indicator 8-3 recognizes the breadth of values that different stakeholders place upon forests, including economic, cultural, spiritual and aesthetic values, and the need to accommodate the plurality of values that are associated with forest resources.

⁷⁵ This criterion and indicators was developed under the company of Slocan Forest Products and since adopted by Canfor since the merger of Slocan/Canfor in 2005.

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Indicator 8-4 reflects the extent to which First Nations participate in forest management. Ultimately, active participation reflects the relationship of people with the land.

LINK TO OTHER CRITERION/INDICATORS

- Criterion 4 – flow of economic benefits from the forest industry
- Criterion 5 – flow of marketed non-timber economic benefits
- Criterion 7 – forest management decisions are informed – social & cultural values
- Criterion 9 – range of quality of life benefits

Indicator	8-1. Aboriginal and treaty rights are respected.
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This indicator is meant to ensure that recognized and legal Aboriginal and treaty rights are identified, managed for and monitored. This is addressed with the following three measures:

- 8-1.1 Compliance with legally established Aboriginal and Treaty Rights
- 8-1.2 Opportunity to comment on plans by Affected First Nations

Measure 8-1.1 Aboriginal and Treaty Rights

Measure:

8-1.1 Compliance with legally established Aboriginal and Treaty Rights

Target (Variance):

0 non-compliance incidents in the DFA

What is this measure and why is it important?

Forest management strategies and practices can impact resource attributes important to First Nations. Canfor's and BCTS' participation in implementation of treaty and use rights strategy ensures that forest management strategies are maintaining access to resource attributes important to First Nations. This measure assumes that either First Nations identify treaty and use rights strategies or that they can be predicted and accommodated through planning efforts. It is Government's responsibility to negotiate treaty rights, and it is the licensees responsibility to be compliant with those rights.

How are targets established?

This measure is a compliance measure requiring Canfor to be compliant with all legal treaty and use rights. A variance from this target is not considered appropriate.

Current Condition and Practices:

The latest Haida and Taku decisions established that an aboriginal right does not have to be legally established to induce the Crown's duty to consult. While third parties (or agents of the Crown) do not owe a duty to consult or accommodate the interests of First Nations, the Crown may delegate some elements of the consultation process to third parties. Canfor does not currently have a formal documented dispute resolution procedure. Currently, Canfor contacts the respective Aboriginal (First Nations) group when advertising FDP/FSPs and when proposing the use of herbicides for forest management activities. When disputes arise, open communication and dialogue between the affected Aboriginal (First Nation group) and Canfor is pursued to resolve the dispute, including telephone conversations, emails, facsimile correspondence and face-to-face informal meetings. Although a dispute resolution process exists, it is not formal and it is not documented. A formal process will be researched and developed.

The Kxtunaxa Treaty Council (KTC) is currently in Treaty negotiation. Canfor and BCTS are in compliance with current legal requirements.

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Legal Requirements:

Compliance with legal treaty rights.

Forecasting and Probable Trends of Measures:

As a process measure, the forecast is that procedures will exist. Modelling is not applicable to this measure as it is a process measure.

Monitoring and Reporting:

The data required to monitor and report out on this measure is the recorded number of non-compliance. The frequency of monitoring will be annual. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

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

Measure 8-1.2 Opportunity to Comment on Plans

Measure:

8-1.2 Affected First Nations are provided the opportunity to comment on forest stewardship plans and the SFM Plan

Target (Variance):

Minimum 1 opportunity per plan

What is this measure and why is it important?

This measure ensures that First Nations have been provided with the opportunity to review and comment on the forest management and operational plans for areas that are of interest to them.

How are targets established?

Currently KNC representatives are reviewing measures and will provide suggestions. At this point, no response for this measure and target has been received by the SFM Participants. The target was presented to *FOREST* and has been accepted at this point. The measure and target may change when First Nation chose to engage more fully.

Current Condition and Practices:

Currently, both Canfor and BCTS are responsible for consulting with First Nations prior to implementing forest management plans and operational plan. The provincial government also has a responsibility for consultation with First Nations for all plans submitted for approval by outside parties. The Radium DFA has met the minimum target specified in the SFMP. Communication and Accommodation Agreements as well as Working Protocol Agreements will be developed in 2006 to improve upon this minimum target. The SFM Plan was presented to the KNC and the bands but no comments have been received at this time. As well, Canfor has provided the FSP to the KNC and the bands. Comments received were tracked (FSP Public Review & Comment Package) and incorporated into the FSP. BCTS is in the process of developing their FSP and it will be presented at such time.

Legal Requirements:

The Provincial Government has mandated the preparation by licensees of stewardship plans for their operations on provincial forest lands. The legislative mandate for Forest Stewardship Plans is the Forest and Range Practices Act (FRPA) with its supporting legislation and regulations, which are intended to ensure that forest and range activities are sustainable by setting objectives on key values to conserve the

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integrity of the environment (Province of British Columbia 2004). Operators are to be held accountable for results and strategies in their forest stewardship plan to ensure the conservation of a wide range of values including soils, timber, wildlife, water, fish, biodiversity, cultural heritage resources, forage and plant communities (ibid.). Additional supporting legislation includes the Heritage Conservation Act with regard to archaeological resources and with regard to more specific definitions of some of the objectives, the Kootenay-Boundary Higher Level Plan Order.

Forecasting and Probable Trends of Measures:

This is a process measure and modelling is not applicable, however the probable trend of this measure is that a minimum of 1 opportunity/plan will be provide to First Nations.

Monitoring and Reporting:

The data required to monitor and report out on this measure is that a minimum of one opportunity/plan has been made. The frequency of monitoring will be annual. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

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

Indicator	8-2. Local management is effective in controlling maintenance of, and access to, resources for First Nations
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This indicator is intended to ensure that management of forests should provide and improve access to resources for maintenance of traditional values and heritage. This is addressed through the following three measures:

- 8-2.1 Access to resources
- 8-2.2 Reciprocal Exchange of Social Values / Opinions

Measure 8-2.1 Access to Resources for First Nations

Measure:

8-2.1 Success in implementing and monitoring management practices related to not impeding access to identified resources for First Nations through strategies articulated in Forest Stewardship Plans (FSP) and/or First Nations/Licensee agreements

Target (Variance):

0 non-compliance or non-conformance with regard to results or strategies outlined in Forest Stewardship Plans, First Nations Agreements or Contractual Agreements

What is this measure and why is it important?

This measure is to ensure that Canfor and BCTS implement and monitor management practices so as to ensure that they do not impede the access to identified resources. Clarity is required on this measure from First Nations.

How are targets established?

The target was established to be zero non-compliance or non-conformance with regard to results or strategies outlined in Forest Stewardship Plans, First Nations Agreements or Contractual Agreements.

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Current Condition and Practices:

Management practices in Canfor and BCTS have been 100% compliant with existing Forest Development Plans and operational plans with regard to strategies to not impede access to identified resources for First Nations. Canfor 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 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 and harvest strategies. 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.

Also, 100% of the access on BCTS forest service roads or on Canfor's logging roads in the DFA is not restricted unless agreements have been made with other stakeholders through the input from Forest Stewardship Plans or Forest Development Plans. Access is only restricted to vehicular traffic and quad or horseback access is maintained depending on the location and objectives associated with the road. Access control is generally in the form of physical barriers such as lock blocks or gates. In addition, First Nations/Licensee agreements are currently being negotiated and provisions are provided to adhere to other stakeholder interests on the land base.

Furthermore, extensive road monitoring programs are in place based on a road risk rating system. Active maintenance activities are scheduled on all forest service roads and Canfor logging roads. Some 'wilderness roads' have been designated for forest service roads in the DFA where minimal road maintenance occurs. However, access is not impeded on wilderness roads.

Finally, Canfor is currently working on a "Consultation and Accommodation Agreement" and "Working Protocol Agreement" with the KNC. These agreements will set a baseline from which Canfor and the First Nations 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 first nations resources, clear consultation, capacity building, accommodation, recognition and respect.

Legal Requirements:

FRPA – (FPPR), Section 10; Heritage Conservation Act

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Forecasting and Probable Trends of Measures:

This is a process measure and modelling is not applicable, however the probable trend of this measure is that the Stakeholder Analysis be updated regularly.

Monitoring and Reporting:

The data required to monitor and report out on this measure is a record of the compliance/conformance with this measure. The frequency of monitoring will be annual. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

The position/person responsible for ensuring the information needed is gathered and captured in the Stakeholder Analysis or contacts database will be identified in Appendix 1.6: Responsibility Action Matrix.

Measure 8-2.2 Open and Transparent Reciprocal Exchange of Social Values / Opinions

Measure:

8-2.2 Documentation of open and transparent reciprocal exchange of social values/opinions, their influence on decisions, and participant satisfaction with regards to First Nations

Target

(Variance):

1 Process

What is this measure and why is it important?

Transparent public processes which enable input from a First Nations, and which promote improved and shared understanding of sustainable forest management, can lead to greater 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 the SFM Participants. This measure is tied to measure 7-1.4 and 7-1.5 and ensures that the process set up for that measure, the responses and the First Nation's satisfaction will be documented.

In order for interested First Nation 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, First Nation 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 First Nation on purely internal proprietary and confidential matters.

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. Another important matter to document is the satisfaction of the interested party with the exchange and the result. This measure 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.

The term reciprocal implies that both sides will learn from each other and use that learning to improve communications.

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How are targets established?

This is a process measure established to ensure that Canfor and BCTS resource managers continue to learn from the First Nation, that the First Nation continues to learn about forest management, and that new understandings are applied to future forest planning management. This measure requires documenting information exchange, influence on decisions and participation satisfaction exists. It has been determined by *FOREST* that “participant satisfaction” needs to be defined. This will more likely occur within the development of the communication / participation plan.

Current Condition and Practices:

Currently, Canfor and BCTS, outside of the PAG process, do not have a process in place to document the level of satisfaction with access to forest resources. In combination with measure 7-1.2 a process will be developed in 2008 that establishes level of satisfaction as baseline from which future trends can be monitored over time.

However, to date Canfor has not received any negative responses or complaints from First Nation with regards to this measure. Positive working relationships exist with the desire to move towards working agreements between the parties.

Legal Requirements:

N/A – requirement to for satisfaction levels to be determined

Forecasting and Probable Trends of Measures:

Forecasting for this measure will be that the trend (established through monitoring) for satisfaction is maintained or increasing. Modelling is not applicable to this measure as it is a process measure.

Monitoring and Reporting:

The data required to monitor and report out on this measure is the documentation of information exchange opportunities. The frequency of monitoring is during and after any SFM participation process. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

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

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Indicator	8-3. The relationship between forest management and First Nations culture is acknowledged as important
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This indicator recognizes the breadth of values that different stakeholders place upon forests including economic, cultural, spiritual and aesthetic values, and the need to accommodate the plurality of values that are associated with forest resources. This is addressed with the following two measures:

8-3.1 Consideration and accommodation of known First Nation cultural issues

8-3.2 Consideration and accommodation of First Nations rights and interests of Non Timber Forest Products (NTFP)

Measure 8-3.1 Consideration and Accommodation of Known First Nations Cultural Issues

Measure:

8-3.1 Forest management plans demonstrate consideration and accommodation of identified First Nations cultural issues by protecting or enhancing culturally sensitive areas/features

Target (Variance):

0 non-compliance or non-conformance with forest management plans that include strategies to accommodate culturally sensitive areas

What is this measure and why is it important?

This measure contributes to respecting the social, cultural and spiritual needs of local First Nations 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 First Nations to identify, define and develop management strategies that encompass traditional values and uses is an important component of the forest industry's SFM initiative. The definition of "consideration" and "accommodation" will be determined through discussions with KNC.

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 First Nations, 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.

Current Condition and Practices:

See Measure 8-2.1

Legal Requirements:

FRPA – (FPPR), Section 10; Heritage Conservation Act

Forecasting and Probable Trends of Measures:

Forecasting for this measure will be that Canfor and BCTS operational plans will articulate how identified culturally sensitive areas/features will be protected.

Modelling is not applicable to this measure as it is a process measure.

Monitoring and Reporting:

The data required to monitor this measure 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.

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The frequency of monitoring will be annual. Applicable records to satisfy this measure, while protecting privacy and confidentiality of First Nations, will be stored. These records will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent analysis of the data will be contained within the SFMP Annual Report.

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

Measure 8-3.2 Consideration and Accommodation of First Nations Rights and Interests of Non-Timber Forest Products

Measure:

8-3.2 Forest management plans demonstrate consideration and accommodation of First Nations' rights and interests in known Non-Timber Forest Products (NTFPs)

Target (Variance):

100% of forest management plans include strategies to accommodate rights and interests in known NTFP

What is this measure and why is it important?

In the past, First Nations have traditionally used the forests to create non-timber forest products. This ability has been, and potentially continues to be, an important aspect of First Nations' culture. Where First Nations' rights and interests in known NTFPs have been identified, it is important that Canfor and BCTS forest management plans consider and accommodate the NTFP so that they can be sustained.

How are targets established?

This measure is a process measure ensuring that Canfor and BCTS are demonstrating consideration and accommodation of First Nations' rights and interests in known NTFPs within the forest management plans through the strategies.

Current Condition and Practices:

See Measure 8-2.2

Legal Requirements:

FRPA – (FPPR), Section 10; Heritage Conservation Act

Forecasting and Probable Trends of Measures:

Forecasting for this measure will be that Canfor and BCTS forest management plans will articulate how First Nations' rights and interests in known Non-Timber Forest Products will be accommodated.

Modelling is not applicable to this measure as it is a process measure.

Monitoring and Reporting:

Monitoring for this measure will consist of ensuring that when identified, the NTFP area or feature will be identified in future FSPs. The frequency of monitoring is anticipated to be annual. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The SFMP Annual Report will describe how Canfor and BCTS are accommodating First Nations' rights and interests in known Non-Timber Forest Products if any have been identified

Formula: $\%PFPP = (FPS / TFP) \times 100$

Variables: $\%PFPP$ – Percentage of forest management plans including strategies for NTFP

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FPS – Number of forest management plans including strategies to accommodate rights and interests in known NTFP

TFP – Total number of forest management plans

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

Indicator	8-4. First Nations are provided with detailed, reciprocal knowledge pertaining to forest use as well as forest management plans prior to government approval and implementation
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This indicator and its associated measures reflect the extent of which First Nations participate in forest management. Ultimately, active participation reflects the relationship of people with the land. This is addressed with the following four measures:

- 8-4.1 Accessibility of data showing baseline cultural uses
- 8-4.2 Logging details accessibility to First Nations
- 8-4.3 Meaningful First Nations participation
- 8-4.4 Comprehension of management plans

Measure 8-4.1 Accessibility of Data Showing Baseline Cultural Uses

Measure:

8-4.1 Accessibility of plans, maps, and /or visual simulations showing baseline cultural uses of local forest resources

Target (Variance):

100% of areas proposed

What is this measure and why is it important?

First Nations are completing a Land Use Plan of their Traditional Areas. In some cases, this information is considered confidential by First Nations. In order to accommodate other measures under this Criterion, Canfor and BCTS will need some level of access to these plans. While Canfor and BCTS 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 First Nations' concern for privacy.

How are targets established?

In order to effectively meet other measures under this Criterion, when plans, maps and/or visual simulations showing baseline cultural uses of local forest resources are made available for use by Canfor and BCTS, they must make every effort to review them. The target of 100% has been set but it is understood that not all information or locations of baseline cultural uses will be made available to Canfor and BCTS. This will be at the discretion of the First Nations.

Current Condition and Practices:

Currently, Canfor and BCTS have limited access to plans and maps that show baseline cultural uses of local forest resources. Generally, exchange of these values occurs during Forest Development/Forest Stewardship plan review and comment periods. The KNC land and resource department is currently outlining traditional use maps. Canfor and BCTS will consult with First Nations in 2006 to work towards

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the target outlined in the SFMP. Canfor's Consultation and Accommodation Agreement and Working Protocol Agreement will aid to achieve this target.⁷⁶

To date the exchange includes First Nations providing Archaeological Overview Maps, and Canfor providing FDP/FSP's.

Legal Requirements:

N/A

Forecasting and Probable Trends of Measures:

Forecasting for this measure will be that any plans developed by First Nations or on behalf of First Nations regarding baseline cultural uses of local forest resources made available to Canfor and BCTS will be reviewed and that First Nations privacy concerns will be accommodated.

Modelling is not applicable to this measure as it is a process measure.

Monitoring and Reporting:

The data required to monitor this measure is quantifying the number of First Nations specific plans that exist and the number of times those plans are made accessible.

Formula: $\%AP = (PMA / TAP) \times 100$

Variables: **%PAP** – Percentage of accessed plans
 PMA – Plans accessed
 TAP – Total plans made accessible

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

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

Measure 8-4.2 Logging Details Accessibility to First Nations

Measure:

8-4.2 Accessibility of current plans, maps and/or visual simulations prior to government approval that outline logging details such as cutting areas, road construction and include temporal aspects

Target (Variance):

100% of plans and maps are available

What is this measure and why is it important?

Canfor and BCTS develop plans, maps and/or visual simulations that outline logging details such as cutting areas, road construction, and other management strategies. In order for First Nations to effectively provide input into any potential interactions between their identified uses and forest management, all relevant material must be made accessible to First Nations. In order to accommodate other measures under this Criterion, First Nations will need some level of access to these plans.

⁷⁶ Not applicable for BCTS

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How are targets established?

In order to effectively meet other measures under this Criterion, plans, maps and/or visual simulations showing logging details such as cutting areas and road construction must be made available for use by First Nations. Temporal aspects, such as schedules for road construction and harvesting must be included as part of the plans. As other targets for measures under this Criterion have been set at 100%, this target must be set at the same level. A variance from this target is not considered appropriate.

Current Condition Practices:

Currently, Canfor and BCTS achieve the target by providing 100% of current plans and maps during the Forest Development/Forest Stewardship Plan review and comment process that outline logging details such as cutting areas and road construction, including temporal aspects.

Legal Requirements:

FRPA

Forecasting and Probable Trends of Measures:

Forecasting for this measure will be that any plans developed by Canfor and BCTS regarding logging details will be made accessible to appropriate First Nations contacts. Modelling is not applicable to this measure as it is a process measure.

Monitoring and Reporting:

The data required to monitor this measure is quantifying the number of tactical level plans detailing logging opportunities that exist and the number of times those plans are made accessible.

Formula: $\%AP = (PMA / TAP) \times 100$

Variables: $\%AP$ – Percentage of available plans
 PMA – Plans made available
 TP – Total plans

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

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

Measure 8-4.3 Meaningful First Nations Participation

Measure:

8-4.3 Degree of meaningful First Nations participation enabled through culturally appropriate opportunities for inclusive participation

Target (Variance):

0 non-compliance or non-conformance with legal requirements

What is this measure and why is it important?

This measure will contribute to respecting the social, cultural and spiritual needs of the people who traditionally and currently use the DFA for the maintenance of traditional aspects of their lifestyle. 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.

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The majority of the opportunities provided to Aboriginal people will be initiated and re-initiated during the SFM and FSP processes. In order for participation by First Nations to be meaningful, the opportunities for inclusive participation must consider culturally appropriate methods for presenting information and discussing issues with First Nations' members.

This measure is linked to a number of other measures under this Criterion in terms of how material should be presented. An assessment of culturally appropriate methods for discussing issues with First Nations will be developed as part of the project for measure 8-3.1 and will build on work being developed corporately at Canfor.

The definition of "culturally appropriate opportunities" will be determined through discussions with KNC.

How are targets established?

There are legal guidelines available for Canfor and BCTS to interact with First Nations. At present, lacking a more formal process, the target established for this measure is that there will be 100% compliance with legal requirements. As First Nations and Canfor/BCTS evolve their relationships under the other measures, this measure will also evolve to more specific and locally relevant methods for communicating. The target will be revised as culturally appropriate opportunities are defined through discussions with First Nations.

Current Condition and Practices:

Currently, Canfor and BCTS partially achieve the target by providing a 60 day review and comment period for Forest Development/ Forest Stewardship Plans (100% compliant). However, this process is not always appropriate to provide opportunities for inclusive participation. Canfor and BCTS will move toward the targets in 2006 by tracking the number and type of events in combination with measure 8-4.4.

The following documents/events have been delivered by Canfor: FDP, FSP, SFMP, Working Protocol Agreement Meetings, and Non-Replaceable Forest License agreements.

Legal Requirements:

FPC and FRPA

Forecasting and Probable Trends of Measures:

Forecasting for this measure will be that any legal requirements for First Nations participation in forest management planning with Canfor and BCTS will be followed. These interactions will be culturally appropriate. Modelling is not applicable to this measure as it is a process measure.

Monitoring and Reporting:

The data required to monitor this measure is the record of non-compliance or non-conformance with the legal requirements of required participation events and the events are undertaken.

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

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

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Measure 8-4.4 Comprehension of Management Plans

Measure:

8-4.4 Degree of First Nations comprehension of management plan and monitoring information

Target (Variance):

Minimum of 1 example of comprehension of a management plan on an annual basis (increasing trend)

What is this measure and why is it important?

This measure was designed to determine the comprehension level of the First Nations 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 First Nations 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.

How are targets established?

The ultimate target for this measure is that First Nation comprehension of forest management planning and monitoring will increase by December, 2006. For now, a minimum of 1 example of comprehension of a management plan will occur. Currently this process does not exist. Prior to revising the targets, it will have to be tested to establish what the baseline is and what appropriate methods of communication may be available. However, the target is an increasing trend of comprehension from the baseline data.

Current Condition:

No information is currently tracked for this measure. In combination with measure 7-1.2 and 7-1.5 a process will be developed in 2008 that outlines how the degree of comprehension will be reported out on an annual basis.

Legal Requirements:

N/A – requirement for comprehension

Forecasting and Probable Trends of Measures:

This is a process measure. It is anticipated that forecasting of this measure consists of ensuring that the trend for comprehension is increasing. Modelling is not applicable to this measure as it is a process measure.

Monitoring and Reporting:

Monitoring for this measure will consist of asking appropriate First Nations 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.

The frequency of monitoring will be annual. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures.

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

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Criterion 9	Forest management sustains ongoing opportunities for a range of quality of life benefits
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The forest provides many values to our society beyond basic needs (e.g. food, water, employment, etc.). Research has established that issues such as cultural identity (of both aboriginal and non-aboriginal people), community recreation opportunities, and scenic resources contribute to the desirability, and therefore viability, of communities, as well as the potential for tourism. Influences of forestry on safety of forest workers, visitors, and residents are also a major issue in areas of the DFA, due to factors such as fire.

The range of quality of life Criterion and the four associated indicators were developed by a team led by Dr. Stephen Sheppard⁷⁷, that was supported by a number of students and researchers over the years. The C&Is on social issues for the SFM Framework have been developed using the Arrow Forest District as a pilot area and through a combination of:

- A broad review of other C&I systems and precedents, including Canada's model forests (von Mirbach, 2000), Canadian Council of Forest Ministers (1995), CIFOR (Mendoza et al., 1999), Forest Stewardship Council (2000), and the UK Forestry Standard (Forestry Commission, 1998);
- Interpretations from the results of the mail-survey of social values in the Arrow Forest District;
- Discussions with the local forest practitioners and multiple stakeholder groups through focus group workshops in the Arrow Forest District.

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

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

Indicator 9-1 measures and monitors outdoor recreation opportunities and resources.

Indicator 9-2 measures the degree of visual impact on the landscape and the level of aesthetic satisfaction in viewers of public lands.

Indicator 9-3 measures how well unique or significant places and features are identified and protected for Aboriginal and non-Aboriginal users of the Management Unit.

Indicator 9-4 measures the impact of forest management strategies in relation to safety incidences for both forest workers and other community resident and area users.

Indicator 9-5 measures the impact of forest management strategies on water quality and quantity.

⁷⁷ Collaborative for Advanced Landscape Planning, Department of Forest Resources Management, University of British Columbia

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Indicator	9-1. Resources and opportunities for recreation are maintained or enhanced
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Outdoor recreation in British Columbia is increasing, both on Crown land and in protected areas.⁷⁸ Within the DFA outdoor recreation activities are not only diverse but also increasing in popularity and economic growth by tourists and residents.

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

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

- 9-1.1 Inventory of recreation
- 9-1.2 Sustain baseline levels of recreation sites/facilities
- 9-1.3 Participate in the development of a recreation strategy

Measure 9-1.1 Inventory of recreation

Measure:

9-1.1 An inventory of interpretive forest sites, recreation sites, recreation trails and features will be made

Target (Variance):

Maintain database as required

What is this measure and why is it important?

This is one in a series of three measures that monitor the outdoor recreation resources and opportunities. This measure in particular deals with inventorying the current level of forested areas (amount and percentage) utilized for outdoor recreation. It captures the recreation activity type thereby giving assurance that a variety of recreation activities will be available for future generations. This measure is important because it monitors that the land base compatible for outdoor recreation is sustained.

How are targets established?

This target was confirmed acceptable by the *FOREST*.

Current Condition and Practices

In fulfilment of the target for this measure, an inventory of forest site, recreation sites and recreation trails is maintained by the Kootenay-Spatial Warehouse and Exchange⁷⁹ of which Canfor and BCTS are full reciprocal participants. This information is displayed on Forest Stewardship Plan maps.

Legal Requirements:

Licensees are responsible for establishing a result or strategy under the Forest and Range Practices Act for Interpretive Forest Sites, Recreation Sites or Recreation Trails. (*FRPA section 181, and 56, Forest Practices Code section 6,*)

⁷⁸ BCMELP 2001; The Legacy Panel 1999; BC MoF 1995

⁷⁹ See Section 8.1 Information Management System

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Forecasting and Probable Trends of Measures:

This is a process measure and modelling is not applicable.

Monitoring and Reporting:

The list of interpretive forest sites, recreation sites, recreation trails and features will be maintained and updated every five years. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The current condition will be reported in the SFMP Annual Report.

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

Measure 9-1.2 Maintain Current Condition – Recreation Sites/Facilities

Measure:

9-1.2 Existing interpretive forest sites, recreation sites and recreation trails and their associated objectives, as identified in Measure 9.1.1, will be maintained to their current condition following forestry activities in the area

Target (Variance):

0 non-compliance or non-conformance with established interpretive forest sites, recreation sites and recreation trails and their associated objectives

What is this measure and why is it important?

The number of recreation sites/facilities is a more rigorously defined measure of recreation opportunity and complements the previous measure. Within the DFA there are a number of established recreation sites and facilities. Continued availability of these sites and facilities allow local residents and tourists the opportunity to utilize the areas. Tourist facilities are essentially a part of an area's economy; crown forested land areas near the facility can be used for recreation purposes. Recording the number of recreation sites and facilities can help managers determine locally appropriate forest management strategies.

How are targets established?

It should be noted that management of the existing facilities is beyond the control or influence of Canfor and BCTS. If the managing agencies decide to reduce the number of recreation sites available in the future, the change may not be related to sustainable forest management but possibly could reflect negatively on Canfor and BCTS. For this reason, the intent of the target is to ensure that there is no degradation to the condition of existing recreation sites and facilities due to Canfor and BCTS forest management activities. A variance for this target is not considered appropriate.

Current Condition and Practices:

Currently, Canfor/BCTS have 0 non-compliance and 0 non-conformances with this measure. Canfor/BCTS has proposed a result or strategy for the recreation objective set by government under the Forest Planning and Practices Regulation. Recreation objectives for each of the recreation features identified in the FSP outline the class of use (motorized vs. non-motorized, primitive vs. semi-primitive etc). The FSP strategy solidifies many of the current practices commonly taken under the current Forest Development Plan to manage recreational resources values. Canfor's/BCTS' environmental management system (EMS) tracks conformance and compliance to strategies or results specified in legislation or Canfor/BCTS commitments. Canfor/BCTS will be reviewing its current process and procedures in 2006 to ensure compliance with this measure.

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Note also that Wilderness recreational opportunities being provided in adjacent National Parks will be considered and supported through complementary forest management activities along park boundaries.

Legal Requirements:

Licenses are responsible for establishing a result or strategy under the Forest and Range Practices Act for Interpretive Forest Sites, Recreation Sites or Recreation Trails (*FRPA section 181, and 56, Forest Practices Code section 6*).

Forecasting and Probable Trends of Measures:

Forecasting of this measure will be that there is no net decline from baseline of existing interpretive forest sites, recreation sites and recreation trails and their associated objectives as identified through the FDP and FSP planning process. Future trends will be dependant on growth of the tourism industry locally, continued interaction with recreation/tourism groups and FOREST. This is a process measure and modelling is not applicable.

Monitoring and Reporting:

The data required to monitor this measure will be the recorded number of non-compliances or non-conformances. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

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

Measure 9-1.3 Participate in the Development of a Recreation Strategy

Measure:

9-1.3 Encourage and participate in the development of a strategy to balance primitive, semi-primitive and developed recreation opportunities (and associated quality of experience)

Target (Variance):

Encourage & participate in Recreation / Access planning

What is this measure and why is it important?

This measure is intended to ensure that Canfor and BCTS encourage and participate in the development of a strategy on recreation opportunities.

How are targets established?

Given the need for a comprehensive access management plan for the DFA and the fact that other industrial users have an influence on access, it was decided by the *FOREST* that Canfor and BCTS have control on access only as it relates to forest management activities. A variance for this target is not considered appropriate.

Current Condition and Practices

Currently, there is no process in place for either Canfor or BCTS to participate in the development of a strategy to balance primitive, semi-primitive and developed recreation opportunities. Canfor and BCTS will discuss this opportunity with the appropriate provincial government over the next 2 years.

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Legal Requirements:

Licensees are responsible for establishing a result or strategy under the Forest and Range Practices Act for Interpretive Forest Sites, Recreation Sites or Recreation Trails (*FRPA section 181, and 56, Forest Practices Code section 6,*).

Forecasting and Probable Trends of Measures:

Forecasting of this measure is that Canfor and BCTS will encourage and participate in the development of a strategy on recreation opportunities. This is a process measure and modelling is not applicable.

Monitoring and Reporting:

The data required to monitor this measure will be a comparison of updated FSP data (# km of active roads made unacceptable for recreation use level) to baseline. Monitoring is anticipated to occur with the planning cycle and annual reporting of this measure is anticipated. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent information/analysis of the data will be contained within the SFMP Annual Report.

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

Indicator	9-2. Visual quality of harvested/managed landscape is acceptable to a broad range of residents, stakeholders and visitors
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Visual quality has been demonstrated to be a significant social value in its own right. It also potentially contributes significantly to the tourist economy. Recent research has also demonstrated links between visual quality and the social acceptability of forest harvesting practice⁸⁰.

This indicator measures the degree of visual impact on the landscape and the level of aesthetic satisfaction in viewers of public lands. The measures address outcomes by means of expert methods of analysis by trained landscape specialists, as well as public perceptions gathered from representative area users. One measure also addresses procedures for improving public perceptions of forestry within the landscape unit, based on research findings on visible stewardship.⁸¹ It is believed that development in the forestry sector can occur while managing for visual quality associated with scenic areas, important recreational areas, rivers and streams and important natural features. This is addressed with the following two measures:

- 9-2.1 Compliance with visual quality objectives
- 9-2.2 Visible stewardship outside established VQO areas

Measure 9-2.1 Compliance with Visual Quality Objectives

Target (Variance):

Measure:

9-2.1 Compliance with existing Visual Quality Objectives (VQO's) or other visual management approaches established by the BC Ministry of Forests and Range for the area 0 non-compliance or non-conformance

⁸⁰ Shindler et al., 2002; Sheppard, 2001a; Sheppard 2001b

⁸¹ Sheppard, S.R.J. 2001. Guidance for crystal ball gazers: developing a code of ethics for landscape visualization. *Landscape and Urban Planning*, 54:183-199. Elsevier Science B.V

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What is this measure and why is it important?

This measure addresses maintaining the scenic values inherent in the DFA through visual quality management. Some of the important areas identified for visual quality management are the major rivers, as well as the more popular backcountry recreational areas. Management for visual quality is linked to the economic diversity (6-1), recreation opportunities (9-1) and unique or significant places (9-3) of the DFA.

Visual quality is the extent to which the aesthetic or scenic value of a landscape is maintained or altered compared to the pre-existing or natural condition.

Visual Quality Objectives (VQO) reflect desired levels of visual quality based on the physical characteristics and social concern for the areas. VQO's have been established by the Ministry of Forests and Range and the information is maintained by the Ministry of Sustainable Forest Resources. The five categories of VQO's are:

1. Preservation – Management activities are limited to maintenance of minimal facilities that enhance natural wildland values. Changes are not discernible or visible.
2. Retention – Management activities or alternations are not visually apparent. Changes may be discernable but not clearly visible.
3. Partial Retention – Management activities or alterations remain visually subordinate to the characteristic landscape. Changes generally match the landscape character and do not cause an obvious intrusion.
4. Modification – Management activities or alterations can visually dominate the original characteristic landscape but appear natural. Alterations must borrow from natural line and form to such an extent as on such a scale that they are comparable to natural occurrences. Changes blend with existing dominant lines, shapes and forms.
5. Maximum Modification – Activities are dominant and out of scale, but appear natural in the background.

Tourist facilities are essentially a part of an area's economy. Crown forested land areas near the facility can be used for recreation purposes. Mapping the visual landscape adjacent to tourist facilities can help managers determine locally appropriate management strategies.

This measure requires that future management activities follow the VQO's set for those areas. The protection and maintenance of visual quality in specific areas is an important aspect to sustainable forest management as this measure contributes to the overall landscape condition and social acceptance of industrial forestry.

How are targets established?

Due to the fact that visuals are important for the area and the fact that VQO's are legal requirements, the *FOREST* established the target of 0 non-compliance with zero variability.

Current Condition and Practices:

Canfor/BCTS has proposed results or strategies in its FSP to manage for visual quality objectives (VQO) established by the district manager defined on March 14, 2003 for the Rocky Mountain Forest District. Similarly, the FSP specifies results or strategies for scenic areas identified by the Kootenay Boundary Higher Level Plan. Canfor's/BCTS' environmental management system (EMS) tracks conformance and

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compliance to strategies or results specified in legislation or Canfor/BCTS commitments. Canfor/BCTS will be reviewing its current process and procedures in 2006 to ensure compliance with this measure.

All scenarios begin with the following disturbance levels by visual quality objective.⁸²

Table 38: Disturbance Levels by VQO

Visual Quality Objective	CFLB Area in TSA (ha)	Percent CFLB not Visually Greened Up
Preservation	382	0%
Retention	3,119	22%
Partial Retention	38,122	14%
Modification	13,665	9%
All VQO's	55,288	13%

Legal Requirements:

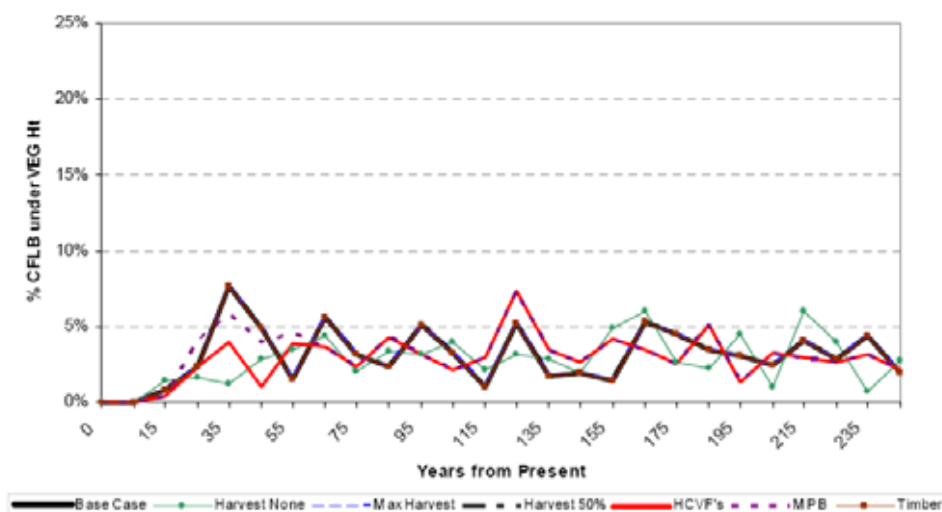
Licensees are responsible for establishing a result or strategy under the Forest and Range Practices Act for Visual Quality Objectives and under the Kootenay Boundary Higher Level Plan Scenic Areas. The VQO areas are established inside and outside the KBHLP scenic areas. (*FRPA section 181, Forest Practices Code Operational and Site Planning Regulation Section 36.1 and 37*)

Forecasting and Probable Trends of Measures:

Preservation VQO's:

The small area (382 ha) covered by preservation VQOs initially has 0% below visual green-up ages and then stabilizes between 2-5% in the long term for all runs. There is little difference between the Harvest None scenario and the other scenarios because of the small area and tight constraints on harvesting. When the constraint is removed in the Timber Focus scenario, no increase is seen relative to the base case. This likely occurs because the constraint is not binding in this small area.

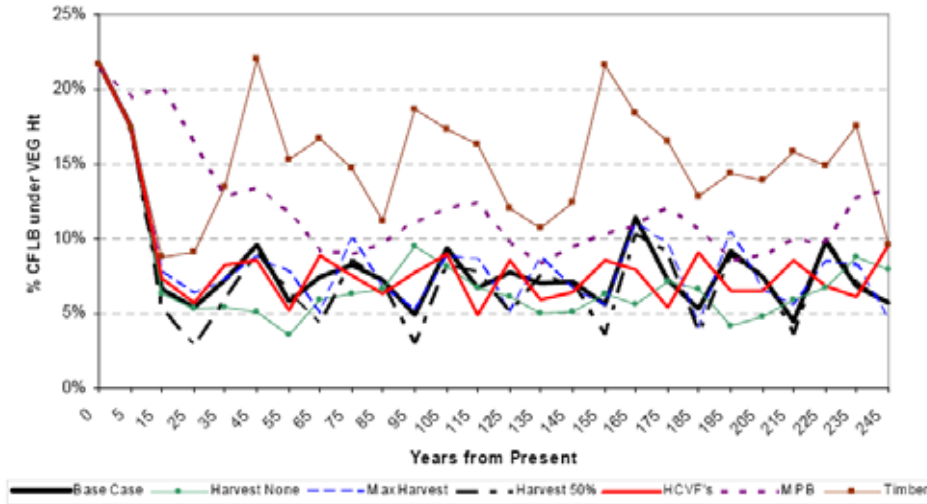
Table 39: Projection of % area under VEG ht for Preservation VQO's on TSA CFLB



⁸² 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.

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Table 40: Projection of % area under VEG ht for Retention VQO's on TSA CFLB

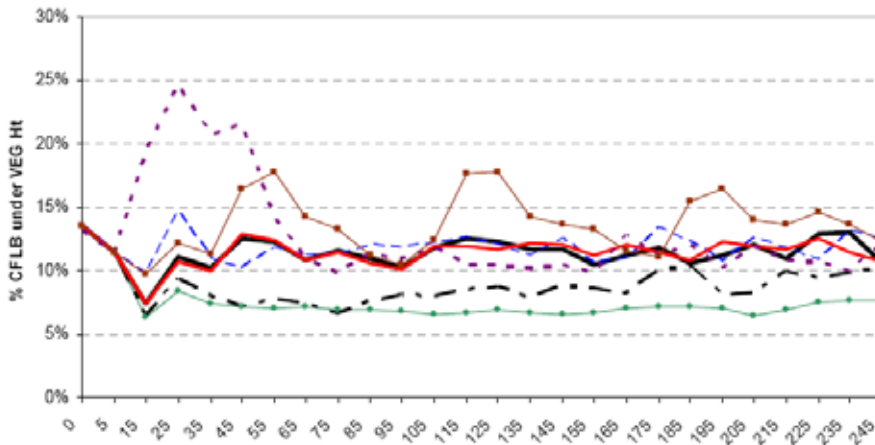


Disturbance in the areas covered by retention VQO's (3119 ha) is currently above maximum limits (22% of the area is below visual greenup ages). The forecast for all scenarios except the MPB and Timber Focus scenarios show this disturbance level being reduced over time to between 5 and 10%. The timber focused scenario has the visual constraints removed and therefore allows higher levels of disturbance. The MPB scenario puts additional pressure on VQO's because of stand mortality/salvage harvesting and lower average harvest ages post MPB epidemic.

Partial Retention VQO's:

The area in partial retention VQO's (38,122 ha) represents the vast majority of area managed for visuals. Disturbance levels in this area under natural processes (No Harvest scenario) fall in the 7-8% range in the long term, while the Timber Focus scenario (constraints turned off) shows disturbances in the 12-18% range. The other scenarios, fall in between these level and are likely at or close to defined maximums in the model (10-25% depending on VAC and viewing distance). In the short term, the MPB scenario can be seen to significantly increase disturbance levels.

Table 41: Projection of % area under VEG ht for Partial Retention VQO's on TSA CFLB

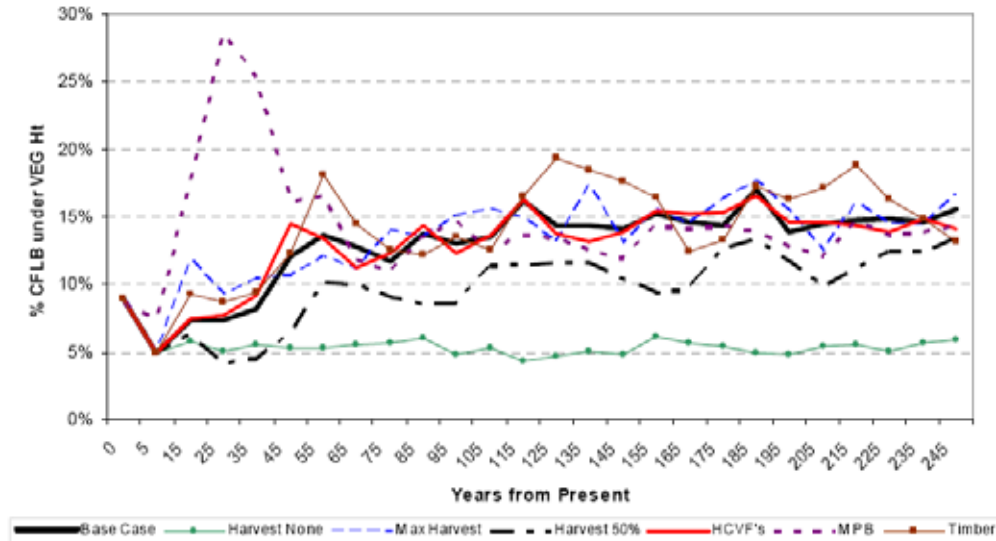


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Modification VQO's:

The area in modification VQO's (13,662 ha) represents the other main area managed for visuals. Disturbance levels in this area under natural processes (No Harvest scenario) fall in the 5% range in the long term, while the Timber Focus scenario (constraints turned off) shows disturbances in the 12-19% range. Again, the short term shows significant increase in the MPB scenario because of the stand killed in the epidemic.

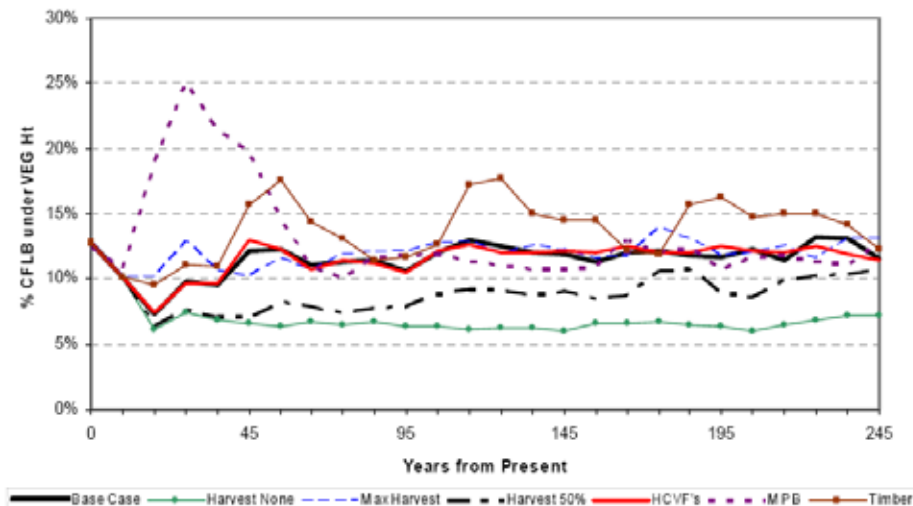
Table 42: Projection of % area under VEG ht for Modification VQO's on TSA CFLB



All VQO's:

Disturbance levels for all VQO polygons are show below in Figure 21 and are very similar to the partial retention VQO results because of their large area. A clear trend can be seen where the amount of harvest in a scenario results in increased disturbance within the visually sensitive landscape. But even with no harvest occurring, natural processes maintain 6-7% of the VQO polygons in stands that have not visually greened up.

Table 43: Projection of % area under VEG ht for All VQO's on TSA CFLB



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Monitoring and Reporting:

The data required to monitor this measure are the number of hectares harvested by Canfor or BCTS conforming to established VQO's. Collection of the data will occur during inspection of all harvesting and road building operations. The FMS will provide verification that site plans and the area treated on the ground match through a field based exercise or pre and post photo assessment or 3D visualization (if available). Inspections are an integral part of both Canfor's FMS and BCTS' EMS.

The frequency of monitoring is dependent on operations. The analysis and reporting of the results will be every three to five years as defined in the monitoring plan. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The most recent analysis of the data will be contained within the SFMP Annual Report.

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

Measure 9-2.2 Visible Stewardship outside Established VQO Areas

Measure:

9-2.2 In areas outside established VQOs but in community viewsheds or major travel corridors to recreation use areas, demonstration of visible stewardship (i.e. explanatory signage, high standards of clean-up along roadsides, landscape design procedures, and modified harvesting practices)

Target (Variance):

Demonstration of appropriate practices to manage localized visuals. Documentation of mechanism.

What is this measure and why is it important?

There are forested landscapes in the DFA that receive high amounts of public viewing but are outside of established VQOs. These areas are places that the PAG, with guidance from Canfor and BCTS, deem it advisable to demonstrate visible stewardship through a variety of practices. These practices would be site specific. This measure provides for the demonstration of public acceptability.

Figure 42: Valley view Photo



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How are targets established?

The target was agreed to by *FOREST* to ensure that areas outside of VQO areas are protected and maintained for visuals specified in those areas.

Current Condition and Practices

In addition to the VQO established in the Rocky Mountain Forest District, VQOs are associated with high use recreation lakes found in the Dunbar/Templeton and Steamboat Landscape units. The VQOs established within the Cartwright Lakes Total Resource Plan will be managed according to the strategies outlined in the FSP for each VQO class. Similarly, despite the lack of established VQO's, visuals are managed along high use recreational areas and trails to maintain the recreation objectives. Examples include the Kootenay River corridor, and numerous recreation trail 'buffering'. Mechanisms will be developed in 2006 to demonstrate that appropriate practices manage for localized visual resources.

Legal Requirements:

Licenses are responsible for establishing a result or strategy under the Forest and Range Practices Act for Visual Quality Objectives and under the Kootenay Boundary Higher Level Plan Scenic Areas. The VQO areas are established inside and outside the KBHLP scenic areas. (*FRPA section 181, Forest Practices Code Operational and Site Planning Regulation Section 36.1 and 37*)

Forecasting and Probable Trends of Measures:

Forecasting of this measure is that Canfor and BCTS will strive to be manage for localized visual concerns. Modelling is not applicable to this measure as it is a process measure.

Monitoring and Reporting:

The data required to monitor this measure will be the total amount of area harvested compliant with VQOs at harvest time in relation to the amount of area that was deemed non-compliant. Collection of the data can occur during inspection of all harvesting and road building operations while verifying that site plans and the area treated on the ground match. Inspections are an integral part of Canfor's FMS.

The frequency of monitoring is dependent on operations. Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. The analysis and reporting of the results will be every three to five years as described in the monitoring plan. The most recent analysis of the data will be contained within the SFMP Annual Report.

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

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Indicator	9-3. Forest management conserves unique or significant places and features of social, cultural, spiritual importance (including protected areas) at the landscape and site level
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The conservation of unique features is often carried out for social and not just ecological reasons. The intent of this indicator is to capture social values that reflect social, cultural or spiritual needs and an important legacy of historical or traditional uses, heritage values and local knowledge. This indicator is meant to address both aboriginal and non-aboriginal cultural values in the landscape. Research is establishing the importance of these sense-of place values⁸³ in community resilience, property values, and tourism, although they are often hard to capture or express without ethnographic methods⁸⁴.

This indicator measures how well unique or significant places and features are identified and protected for Aboriginal and non-Aboriginal users of the DFA. Local people, landscape/cultural professionals and forest managers can identify social, cultural and spiritual features and places. These locations represent the sense of place and other important social and historical values of the communities and users in the area. This is addressed with the following measure:

9-3.1 Management of sites or features of unique social, cultural or spiritual value

Measure 9-3.1 Management – Unique Sites or Features

Measure:

9-3.1 Existing unique sites, features and protected areas and their associated objectives, will be managed according to their associated management strategies during primary forest activities in the area

Target (Variance):

0 non-conformance or non-compliance with management strategies

What is this measure and why is it important?

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

How are targets established?

The target suggested by *FOREST* was for 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.

Current Condition and Practices:

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 Forest Development Plans/Forest Stewardship Plans. Management strategies/practices are outlined within these plans. Additional strategies will be described within the SFMP (Annual harvest levels are based on an apportionment of the Annual Allowable for the Invermere TSA. BCTS staff, contractors, and agreement holders operate within BCTS operating areas through out the Defined Forest Area. At this time annual timber harvesting is directed primarily by the Invermere Forest Health Strategy to manage and salvage mountain pine beetle impacted timber and periodically fire killed timber. Operational Plans outline harvest opportunities, forest health assessments, inventory information (age and height class, piece size, volume), resource values,

⁸³ 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

⁸⁴ Lewis, J.L. 2000. Ancient Values, New Technology: Emerging Methods for Integrating Cultural Values in Forest Management. Unpublished Masters Thesis (M.Sc.), Faculty of Forestry, University of British Columbia, Vancouver.

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access to the resource, and operational feasibility. Site Plans are developed for blocks and roads to ensure compliance with current legislation, our Forest Stewardship Plan (FSP), Safety program and Sustainable Forest Management Plan (SFMP).

The BCTS FSP for the Rocky Mountain Forest District was approved September 15, 2006 for a five year term. The FSP is comprised of several sections addressing management of Kootenay Boundary Higher Level Plan objectives, FRPA resource values such as; Timber, Water, Fisheries, Riparian Management, Wildlife, Recreation, Range, Biological Diversity, Cultural Heritage Resources, Visual Resource Management, and Soil Productivity.

Harvest block summary tables are included in the Operational Plan. These tables cross-reference blocks shown on the Operational Plan maps and describes Block/Road location, area, timber harvest volume, landscape values, stage of development, and other information. To support plans for road construction and harvesting there may be assessments of resource values such as Seral Stage Distribution, Biodiversity, Habitat Distribution, or Hydrology.

Operational Plans are referred to stakeholders and First Nations to ensure all possible information is collected and issues or concerns including those which fall outside the legislative requirements are addressed.

Following the Operational Plan review and comment process roads are constructed either under contract or in conjunction with the sale of timber under a Timber Sale License. Timber Sales Licenses are competitively awarded to BCTS registrants who are responsible for all activities; road construction, maintenance and harvesting operations. BCTS with the help of contractors undertake the post harvest obligations for silviculture and ensure the block achieves the objective of a free growing stand as quickly as possible.

A FSP amendment may be considered at any time, to address any deficiencies or changes that may be required to address new legislation, changes in Land Use Plans, and where current plans are not meeting the resource objectives.. When amendments to the FSP are required, amendments will follow legislated requirements for content, and review and comment. Major amendments to the plan will be referred to interested parties for review and comment prior to submitting an amendment of the FSP to the District Manager.

The BCTS Environmental Management System (EMS) will be used to track compliance with our FSP and the requirements of this SFMP. It is anticipated that some subtle changes to the EMS may be required to track commitments under a SFMP. When instances of non-conformance are discovered in a Operational Plan or the SFMP, they are dealt with on a site-specific basis, with the initialization of a corrective action plan to remedy the issue.

7.2 Implementation – Sustainability Strategies and Appendix 1.8: HCVF Strategies), where applicable.

Legal Requirements:

No harvesting or road building is permitted within designated protected areas under legislation.

Forecasting and Probable Trends of Measures:

Forecasting of this measure is that a description will be developed for each unique site, feature and protected areas. This is a process measure and modelling is not applicable.

Monitoring and Reporting:

The data required to monitor this measure a recorded number of non-compliances. The frequency of monitoring will be annually. Records to satisfy this measure will be stored within the respective Canfor

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and BCTS offices, as per their document control procedures. The most recent analysis of the data will be contained within the SFMP Annual Report.

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

Indicator	9-4. Worker and community safety is maintained within acceptable levels
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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.

BC Timber Sales is managed independently from the Field Services division of the Ministry of Forests and Range and has a unique role with the implementation of the government's forestry revitalization plan. BC Timber Sales develops and sells publicly owned timber to establish market price and optimize the net revenue to the Crown. On the basis of highest qualified bid, BCTS sells blocks of timber across the province to a variety of customers (market loggers, sawmill operators, and timber processors and re-manufacturers). Through private sector contractors and its staff, BCTS completes forest planning, timber cruising, layout, and silviculture activities.

Customers who wish to bid on sales advertised by BCTS, must be registered in the program and in good standing (BC Timber Sales Regulation – Forest Act). This process creates a system where successful bidders are independent from BCTS when compared to contractors working for a major licensee such as Canfor.

The BCTS EMS system requires that Emergency Response Plans be completed for all contracts and harvest operations for BC Timber Sales. Contractors are also required to be in good standing with WCB requirements and must demonstrate this good standing prior to obtaining contract work with BC Timber Sales. BCTS does not monitor forest related safety incidences, rather contractors must demonstrate they have the systems in place to deal with emergencies or other safety issues. They are not required to report this to BC Timber Sales.

BC Timber Sales does monitor safety related incidents for BC Timber Sales staff. However, Indicator 9-4 is not applicable to BCTS.

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. This is addressed with the following measures:

9-4.1 Worker safety program

Measure 9-4.1 Written Safety Policies – Implemented & Effective

Measure:

9-4.1 Worker safety program for employees and contractors implemented periodically reviewed and improved (Canfor)

Target (Variance):

1 safety program in place

What is this measure and why is it important?

Written safety program ensure workers have proper training and guidance prior to commencing work.

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How are targets established?

The target agreed to by the *FOREST* will be compliance with a safety program as evidenced through safety audits. Safety audits reveal whether safety programs are required, if existing safety programs are being implemented and if the safety programs are effective. The results of Canfor's annual Safety Audit will be used to determine Canfor's compliance with the measure.

Current Condition and Practices

Canfor currently has woodlands and sawmill safety programs that are internal to the company. Radium has recently been certified under a 3rd party audit program through SafeWork BC. The safety program consists of Standard Operating Procedures for all woodlands operations and Emergency Preparedness and Response Plans and Procedures. 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.

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.

BCTS currently has a safety program which covers only its employees. Licensees and contractors are considered independent contractors and each have individual safety programs based on the activities they are implementing.

Legal Requirements:

All contractors are required to be registered with WCB and adhere to the WCB regulations.

Forecasting and Probable Trends of Measures:

Forecasting of this measure is that Canfor will have a written safety program. This is a process measure and modelling is not applicable.

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.

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.

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

Indicator	9-5. Water resources will be sustained by maintaining water quality and quantity for domestic and community watersheds that are licensed for human consumption.
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Indicator 9-5 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 stream crossings. Canfor/BCTS takes water quality and

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quantity into account through environmental instructions mandated in their Environmental Management System (EMS).

This is addressed with the following three measures:

- 9-5.1 Complete watershed assessments
- 9-5.2 Consistent with riparian management strategies
- 9-5.3 Stream crossing established and maintained

Measure 9-5.1 Watershed Assessment

Measure:

9-5.1 Hydrological assessments are completed and regularly updated by a Qualified Registered Professional (QRP) in consumptive use watersheds

Target (Variance):

Operational plans follow the recommendations in the Hydrological Assessment and if indicated, Channel Assessments and/or Drainage Plans are completed by a QRP

What is this measure and why is it important?

Water quality and quantity for human consumption are critical in Community and Domestic Watersheds. For this reason when operations are being planned in areas within a consumptive use watershed it is a requirement for a hydrological assessment to be completed by a Qualified Registered Professional. This measure ensures that the operational plans that occur in consumptive use watershed follow all recommendations from those assessments.

How are targets established?

The target was agreed to by the *FOREST*.

Current Condition and Practices:

Canfor has two community watersheds within the DFA, Forester Creek and Pinnacle/Luxor Creek. BCTS has five community watersheds: Able, Sophy, Tatley, Madias, Taynton. 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 Pinnicale) is 8.7%⁸⁵.

⁸⁵ 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.

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Legal Requirements:

FRPA

Forecasting and Probable Trends of Measures:

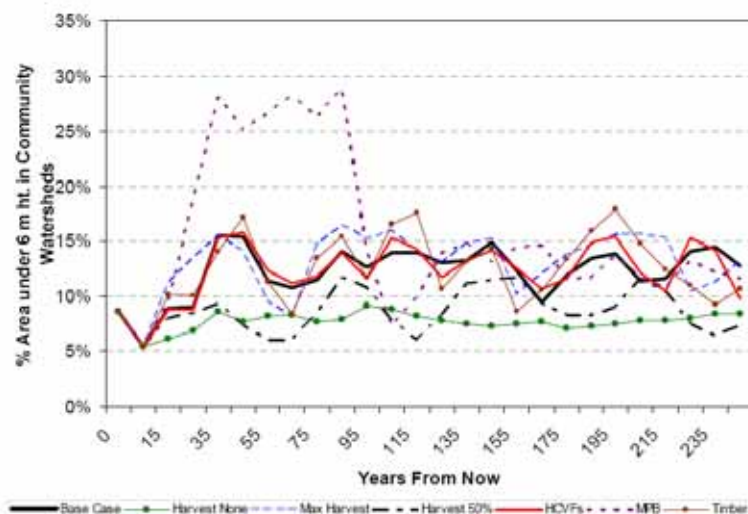
Forecasting of this measure is that the hydrological assessments that have been completed will be regularly updated by a Qualified Registered Professional (QRP).

Modelling is not applicable to this measure as it is a process measure.

Figure 43 provides a projection of the % CFLB area under 6m in height for community watersheds in each scenario over time. This measure was used in TSR3 because of modeling limitations and is used again here for consistency and because the late inclusion of this indicator did not allow more sophisticated approaches. Future analysis should likely include a measure such as Equivalent Clearcut Area calculations.

All scenarios where harvesting takes place can be seen to increase the amount of disturbance in CWS's over time. The No Harvest scenario shows the least disturbance over time in the CWS (7-8%), while the Timber Focus scenario shows the highest disturbance over the long term (peaks of up to 17%). Because of the large scale mortality that occurs early in the MPB scenario, it has very large impacts on disturbance levels in the short to mid term that last for approximately 60 yrs. None of the scenarios approached the 30% limit that was imposed in the model, although there are likely sub-basins with the watersheds that experience higher impact levels than the average values shown here.

Figure 43: Projection of % CFLB area under 6m in height for CWS's within the DFA



Monitoring and Reporting:

The data required to monitor this measure is the number of operational plans that follow the recommendations in the Hydrological Assessment. In addition if indicated, a Channel Assessments and/or Drainage Plans are completed by a QRP. Collection of this data, as well as monitoring and reporting will occur as per the monitoring plan.

Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report.

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

Measure 9-5.2 Consistent with Riparian Management Strategies

Measure:

9-5.2 Percent of primary forest activities consistent with riparian management strategies for reserve and management zones specified in a FSP

Target (Variance):

0 non-compliance or non-conformances with site plan and Forest Stewardship Plan riparian management strategies

What is this measure and why is it important?

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. 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?

The target was agreed to by the *FOREST*. It was also noted that riparian reserve and management zones and machine free zones are established adjacent to riparian features as defined for the stream class as defined by legislation.

Current Condition and Practices:

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 clear cut to full reserve based on a blowdown risk assessment of the Riparian Reserve Zone. Beetle infested pine trees only are removed from riparian reserve zones. Five meter machine free zones are established along all water features.

The location, classification and RRZ requirements (where applicable) of water bodies will be included in site plans and/or on operational maps used for timber harvesting, road construction and silviculture activities. Field foresters will identify site-specific requirements for the protection of reserve zones, and management practices will be included in site plans. Pre-works completed prior to harvesting, road construction or silviculture activities will review RRZ size, location and any site specific protection measures prescribed.

Canfor/BCTS environmental management system (EMS) tracks conformance and compliance to strategies or results specified in legislation or Canfor/Canfor commitments. Canfor/Canfor will be reviewing its current process and procedures in 2006 to ensure compliance with this measure.

Figure 44: Riparian Feature – Middle fork



Legal Requirements:

FRPA

Forecasting and Probable Trends of Measures:

Forecasting of this measure is that primary forest activities undertaken in riparian areas will be in compliance with the strategies specified in a FSP. Modelling is not applicable to this measure as it is a process measure.

Monitoring and Reporting:

The data required to monitor this measure is the recorded number of non-conformance or non-compliance with FSP Riparian strategy requirements. Collection of this data, as well as monitoring and reporting will occur as per the documented requirements. Collection of this data, as well as monitoring and reporting will occur as per the FSP strategy requirements.

Inspections will be completed following harvesting, road construction and silviculture activities by operations supervisors, and any transgressions into the Riparian Reserve Zone (RRZ) will be noted and tracked. Non-compliance issues will be reported promptly to the appropriate government officials. SFMP Annual Reports will summarize the number of compliance issues identified, specifically addressing any incidents involving RRZs.

Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, as per their document control procedures. At a minimum, the reporting of this information will be contained within the SFMP Annual Report.

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

Measure 9-5.3 Stream Crossings

Measure:

9-5.3 Stream crossings are established and maintained according to the requirements for each stream class

Target (Variance):

0 non-compliance or non-conformances with road permits, site plans and Forest Stewardship Plan riparian management strategies

What is this measure and why is it important?

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 measure 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?

The target was agreed to by the *FOREST*.

Current Condition and Practices:

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/BCTS environmental management system (EMS) tracks conformance and compliance to strategies or results specified in legislation or Canfor/BCTS commitments. Canfor/BCTS will be reviewing its current process and procedures in 2006 to ensure compliance with this measure.

Legal Requirements:

FRPA, Fisheries Act

Forecasting and Probable Trends of Measures:

This measure will not be forecast and modelling is not applicable to this measure as it is a process measure.

Monitoring and Reporting:

The data required to monitor this measure is the recorded number of non-conformance or non-compliance with FSP Riparian strategy requirements. Canfor will inspect all 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 and reported in the SFMP Annual Report.

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Records to satisfy this measure will be stored within the respective Canfor and BCTS offices, 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 placed in the information management system will be identified in Appendix 1.6: Responsibility Action Matrix.

6.0 Tactical Level Planning

This section describes the aspects of SFM Planning that occur at the tactical planning level for the DFA, as outlined in the SFM Framework document. The objective of the tactical level is to establish a detailed forest management strategy or scenario that is sustainable for a range of forestry related values. This level localizes planning to meet the broad goals developed in the strategic planning level.

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, multi-criteria analysis (MCA), 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.

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 Development Plans (FDP), Forest Stewardship Plans (FSP), and internal site plans are currently used for this purpose in the DFA. The measures and targets detailed in Section 5.0 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/BCTS;
- implementing the MCA and assessing sustainability values;
- forecasting out current conditions under alternative scenarios; and
- assessing the outcome against sustainability targets to develop a preferred scenario in an adaptive management framework.

6.1 Assessment of Current Conditions

The 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 and measures through indicator mapping⁸⁶;

The following provides an assessment of the current conditions for the Radium DFA. The information outlined within this section, influences the MCA process, the forecasting and obviously the final determination of sustainability at this point in time – the preferred scenario.

⁸⁶ Indicator Mapping has not been initiated for the Radium DFA at the time of the writing of this SFM Plan

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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. Within the SFM Framework, 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 the signatories of this SFM Plan.

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 measures and its impact on forest management practices. It also allows for evaluation of the role of natural disturbance in non-timber harvesting areas where licensees have no control over how natural disturbance may affect various measures.

Natural disturbance is modelled in three ways: 1) as a volume reduction based on non-recoverable losses in the TSA (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.⁸⁷ 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 report⁸⁸. 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. At this point in time, this database is not being utilized in Radium.

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.⁸⁹ The following summarizes the current situation for the Radium DFA with regards to agents such as fire, insects, and disease.

⁸⁷ Forsite, Interior Reforestation, Ecologic Research. 2006. Sustainable Forest Management Plan Scenario Forecasting. Version 1.1. February 24, 2006. Prepared for Canfor – Radium and BCTS.

⁸⁸ Forest Ecosystem Solutions Ltd, 2003. Development of a Natural Disturbance Strategy for Sustainable Forest Management.

⁸⁹ Invermere TSA Forest Health Strategy 2006. Ministry of Forests, Rocky Mountain District.

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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.

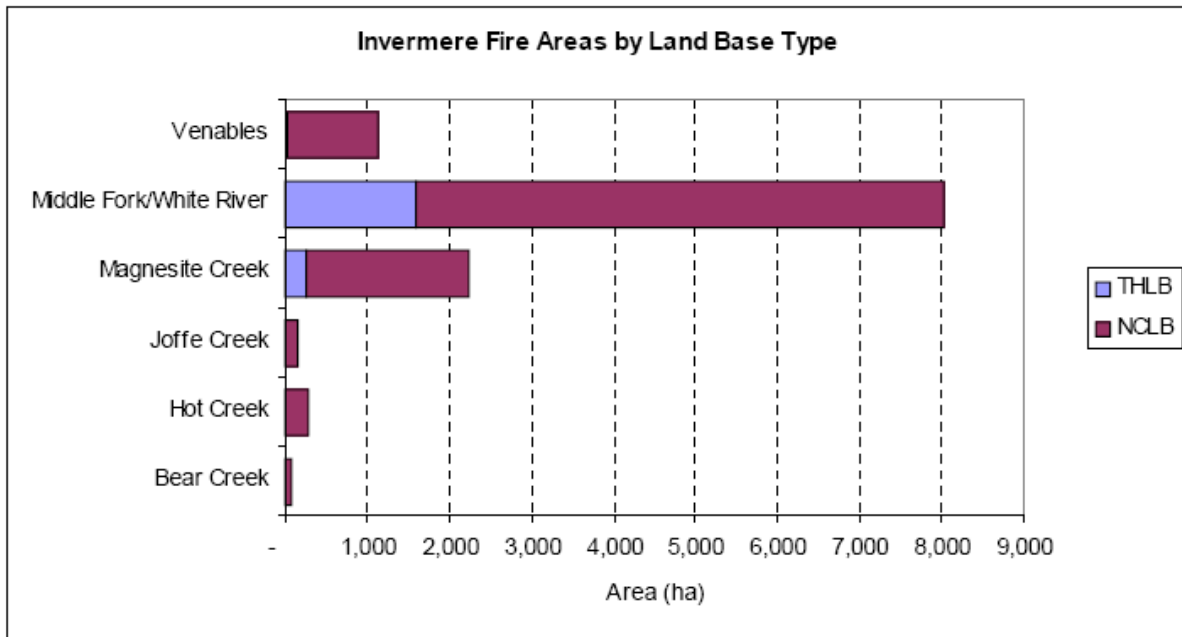
The fires of 2003 impacted considerable area of the CFLB in the Invermere TSA and has resulted in a significant salvage effort in 2003/04. Table 44 and Figure 45 below provide details on the area and volume impacted. Within the THLB, a total of 1,895 ha were included in the mapped fire boundaries.

Table 44: 2003 Fire Area and Volume Summary

FIRE	Forest District		THLB	
	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
Venebles	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 45: 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 MOF&R between 1999 and 2005 detected bark beetles, defoliators, needle casts, abiotic damage and impacts from feeding by mammals. Mountain pine beetle

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has been the most significant impact over the last five years (Table 45). 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 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.

Table 45: 1999 – 2005 Invermere TSA Aerial Overview Survey Results

Type of impact: 1=quality, 2=growth reduction, 3=young tree mortality, 4=mature tree mortality

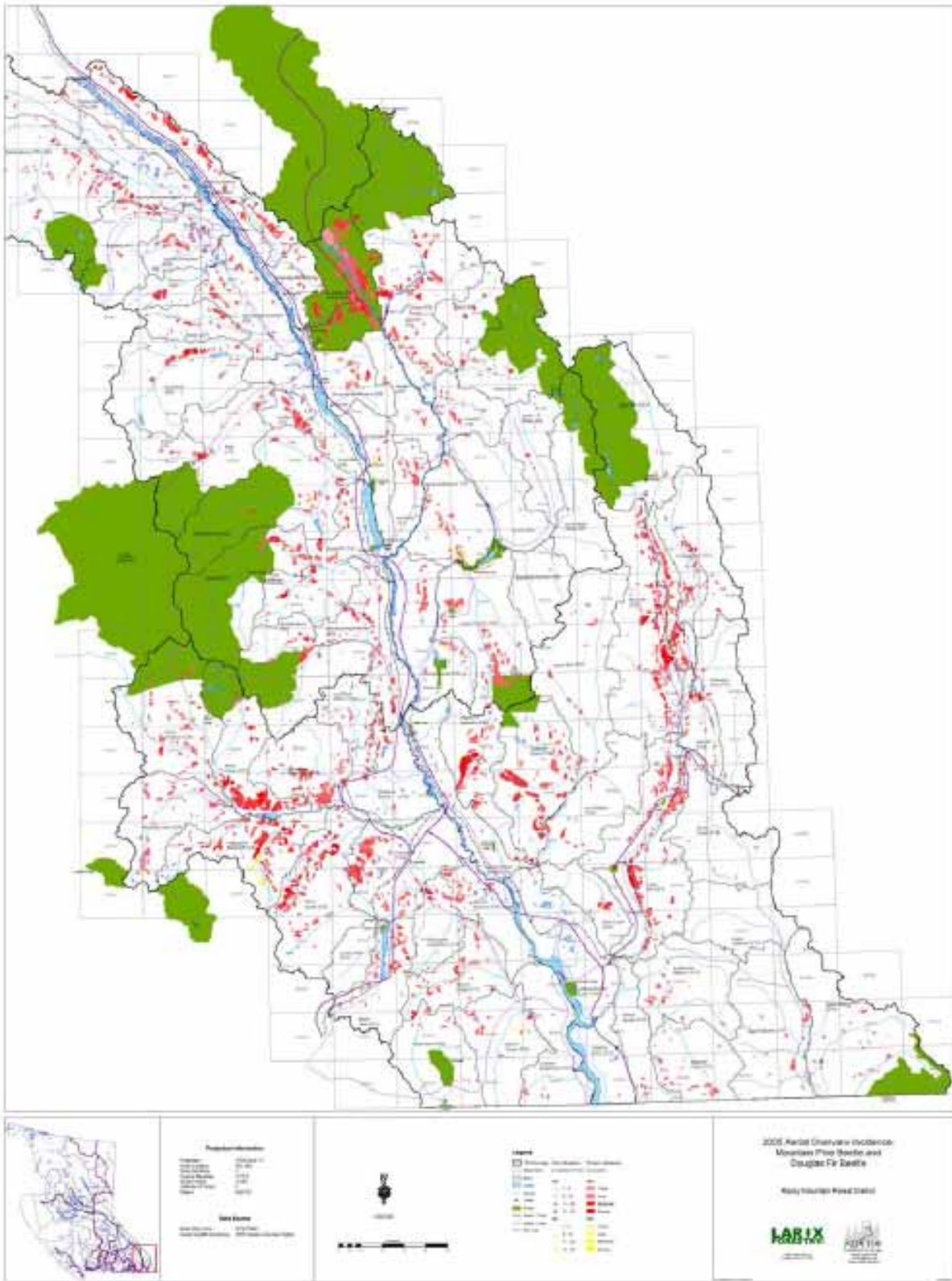
Forest Health Factor	Hectares Affected 2005	Cumulative Hectares Affected '99-05	Type of Impact	% of THLB stands led by host species
Mountain pine beetle	22,100	36,470	4	41
Douglas-fir beetle	836	7,769	4	29
Western balsam bark beetle	10,000	14,621	4	4
Spruce Bark Beetle	662	1,164	4	13
Pine needle cast	0	5,094	2,3	41
Western false hemlock looper	0	2,500	2,3	29
Larch needle cast	0	2,200	2,3	7
Burned*	0	746*	1,3,4	100

Source: Invermere TSA Forest Health Strategy 2006. Ministry of Forests, Rocky Mountain District.

Figure 46 provides spatial aerial overview survey results of forest health factor incidence for the Rocky Mountain Forest District.

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Figure 46: Rocky Mountain Forest District 2005 Aerial Survey Map



Source: Invermere TSA Forest Health Strategy 2006. Ministry of Forests, Rocky Mountain District.

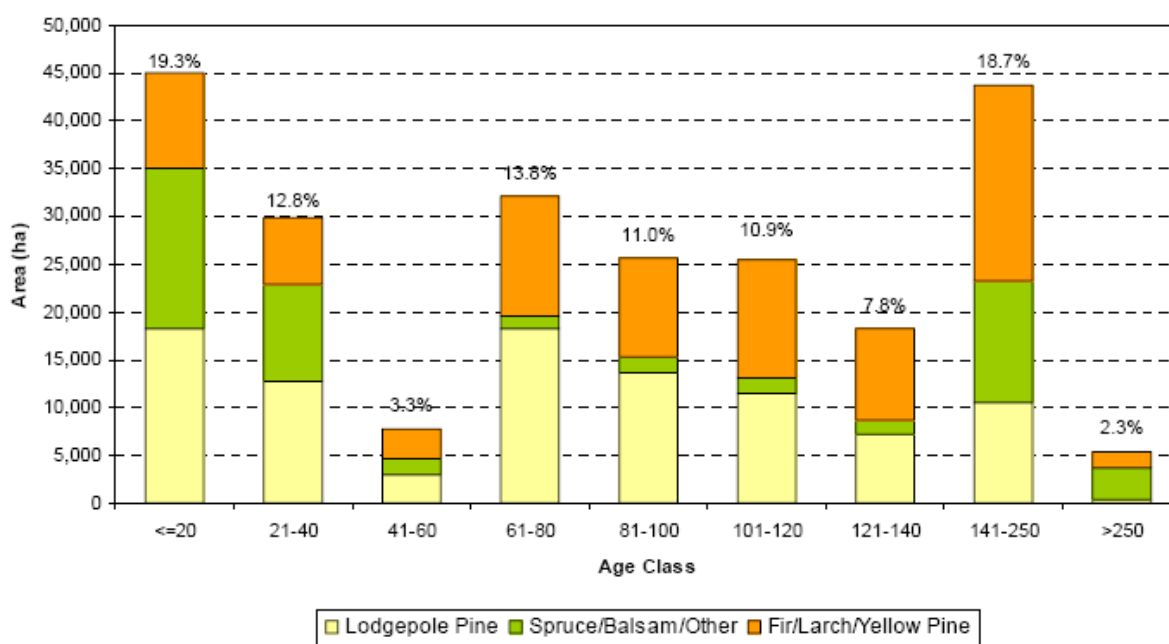
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The interior of British Columbia is being severely impacted by the mountain pine beetle infestation which is now encroaching on the Invermere TSA. Tracking of the beetle infestation shows an exponential increase in infested area within the Invermere 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 metres⁹⁰.

MOF District staff has stated⁹¹ 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 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 47, 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 47: 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 2003/04 beetle survey data show that populations are expanding quickly and could cause significant mortality if they are not held in check by either management practices or 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.

⁹⁰ Invermere Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination. Effective November 1, 2005.

⁹¹ Invermere Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination. Effective November 1, 2005.

Diseases

As stated in the 2006 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)⁹².

Armillaria root disease was not detected from the aerial overview flights and the amount/extent has not been reported in the 2006 Invermere Forest Health Strategy. It is currently dealt with on a site by site basis by Canfor and BCTS following locally accepted guidelines and practices.

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 and BCTS in the DFA are presented in Appendix 1.3: Practices Analysis. The current management practices are used to form a baseline management scenario. This scenario is compared against alternative scenarios to test strategies and to determine if the baseline is meeting the targets set out in Section 5.0. Linking current practices to the measures of each indicator 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 measures was used to hypothetically assess how differing management strategies may impact certain measures 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 measures. The inputs for modelling come from the measures 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."⁹³

⁹² Invermere TSA Forest Health Strategy 2006. Ministry of Forests, Rocky Mountain District.

⁹³ CSA Z809-02 Sustainable Forest Management: Requirements and Guidance, December 2002

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 SFM Framework assumes that the entire land base (whether managed or unmanaged) contributes to meeting ecological, economic and social goals of sustainability. Where possible, indicators/measures will be spatially mapped demonstrating current levels of resources as represented by the indicators/measures. The land base is delineated into THLB and NHLB (Appendix 1.1: Maps) 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. When it is determined that it is required, the results will be incorporated into the SFM Plan at that time. Once indicators have been mapped, their linkage to current practices will be reviewed and summarized. An analysis of how well current practices are helping in achieving targets for the THLB will be summarized and reported out in the SFMP Annual Report.

6.2 Multi-Criteria Analysis – Assessment of Sustainability

A Multi Criteria Analysis (MCA) can be undertaken to solicit input from stakeholders, the public and technical specialists, for input into the development of scenarios. Section 6.3 Design of Sustainability Scenarios describes the development of scenarios and their use. MCAs can also be undertaken as an assessment of how appropriate the current management strategies are to meet the targets identified for the indicators/measures of sustainability. A formal MCA process can consist of both technical and public components. It 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 an operational plan is developed and/or modified for the DFA, highlighting any required changes as a result of strategies described in the SFM Plan.

Canfor – Radium has submitted and received approval in March 2006 for their FSP. BCTS is submitting their FSP in June 2006. The strategies outlined in the FSP will be 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. An MCA provides input into the development of alternative scenarios.

For this iteration of the SFM Plan, the MCA that was undertaken focused on both soliciting input into the development of scenarios as well as assessing the suitability of the forecasted results. A questionnaire was used to determine *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.

6.2.1 Technical MCA

The technical MCA requires that the most up-to-date data for each of the measures and for the management practices be used. 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.

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For the purposes of this SFM Plan, the technical analysis has administered by Canfor and BCTS, as well as by contractors and subcontractors hired for specific FIA projects.

6.2.2 Public MCA

The public MCA for this SFM Plan asked stakeholders to identify what they felt were the most important criteria 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 different stakeholder priorities. This process can lead to increased stakeholder inclusion and support in resource management decisions.⁹⁴

Alternative management scenarios may be required if the initial baseline forecast shows that key indicators are not being met under current operational practices. If the alternative scenarios and innovative design still do not lead to sustainability across the indicators, trade-offs may have to be considered. Input from the public on their tolerance for trade-offs of indicators would be solicited in addition to the MCA. Ultimately, the decision makers for a management unit take the input from the MCA and the Trade-off Analysis (ToA), if applicable, as part of the decision making process. Understanding the public's priorities and their tolerance for risk and the use of input from technical specialists can assist managers in refining targets, practices and/or the overall management scenario.

The 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 48 – Figure 51) summarize the findings of the MCA process for *FOREST*. 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. The sample size (i.e. the number of responses) was 9 of 12 *FOREST* members.

⁹⁴ 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

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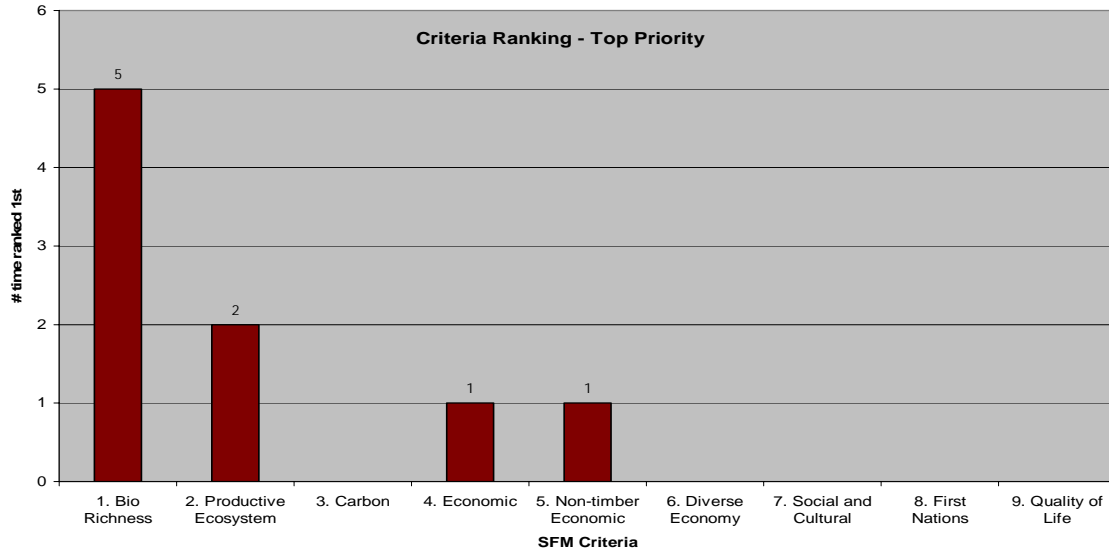


Figure 48: Criteria Ranking Top Priority

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.

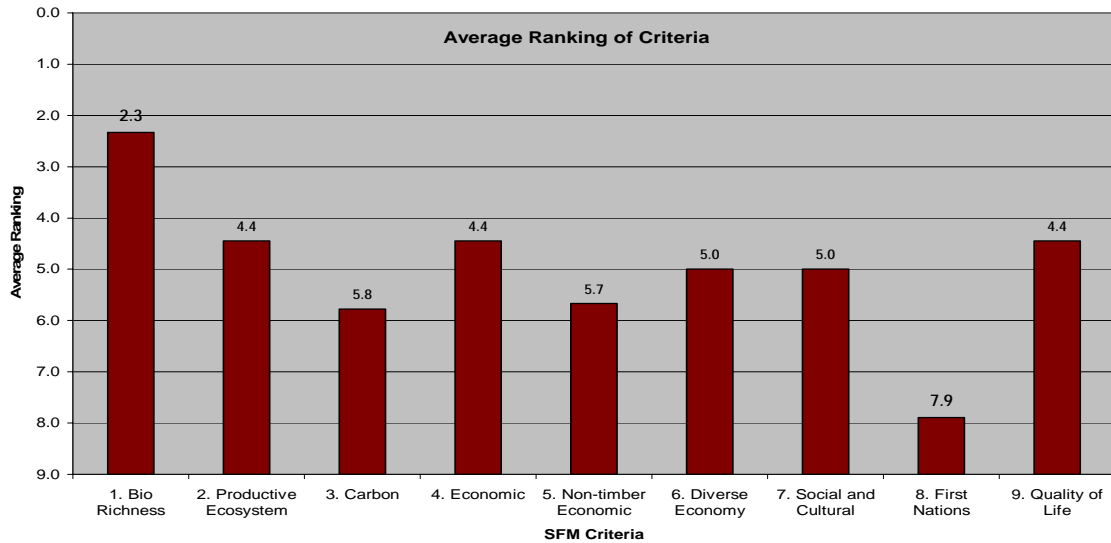


Figure 49: Average Ranking of Criteria

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.

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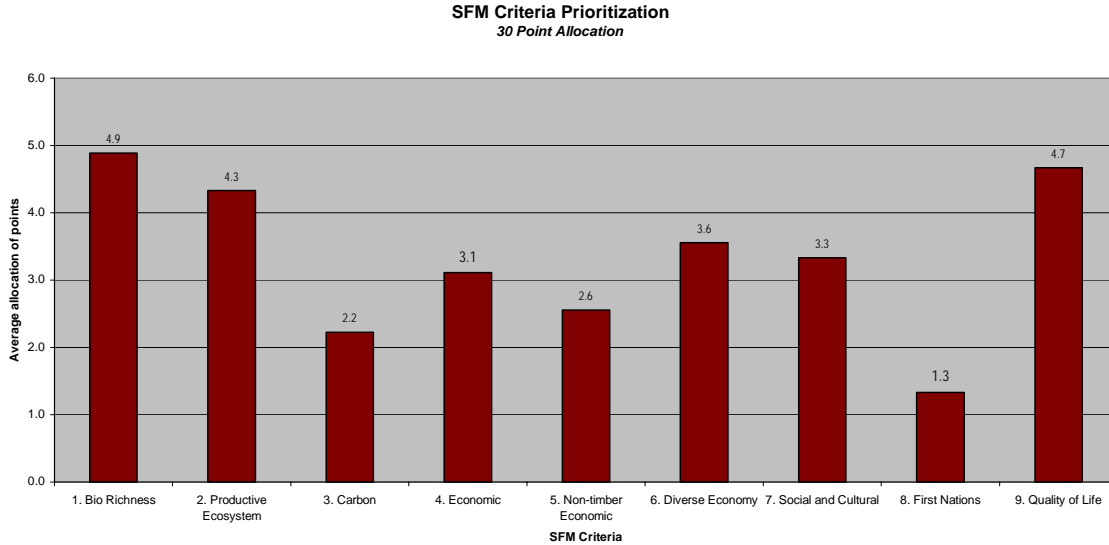


Figure 50: SFM Criteria Prioritization

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.

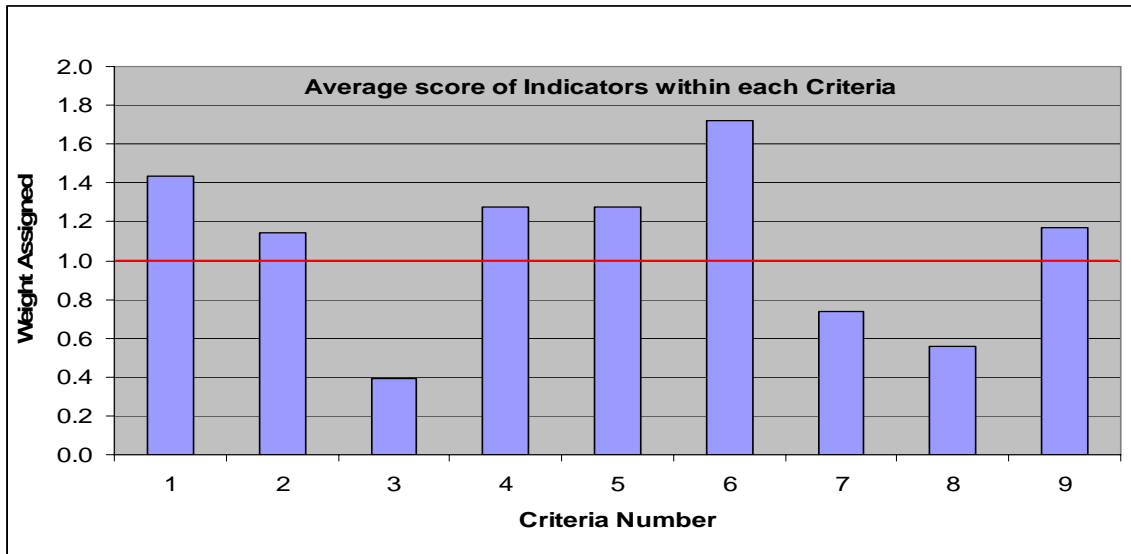


Figure 51: Average score of the indicators within each Criterion.

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

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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.

MCA Summary

The results above show that the Biological Richness criterion stood out amongst all the other criteria as a priority. The Economic and Quality of Life criteria 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 criteria are important to some degree.

6.2.3 Public Survey Results

The purpose of the Sustainable Forest Management 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. 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.

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.

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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.

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 measures. The process of evaluating a scenario involves examining forecasts for each modelable measure'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 measures through time and space. Forecasting is an explicit statement of the expected future condition of an indicator/measure. 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/measures to sustainability targets using current practices over time in order to assess the level of risk for each indicator.

Local level indicators and measures have been reviewed by *FOREST*, as well as by technical experts for their suitability and credibility for measuring and forecasting. As described in Section 5.0 of this SFM Plan, a forecasting strategy specific for each measure has been described ranging from no forecasting for some process measures to full modelling for others. Results for measures that were forecasted are found within the measures write-ups within Section 5.0.

The modelling for the Radium DFA was completed 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.⁹⁵ Forecasted measures are listed below in Table 46.

⁹⁵ Forsite, Interior Reforestation, & Ecological Research. Sustainable Forest Management Plan Scenario Forecasting. Version 1.1 – February 24, 2006. Prepared for Canfor – Radium Woodlands & BCTS.

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Table 46: Summary of Modeled Measure

Static Indicators	Dynamic Indicators
• Habitat types in the THLB and NHLB	• Harvest Levels <ul style="list-style-type: none"> • Timber supply sustainability • Direct/Indirect employment and income levels • 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
• Site productivity (Site index)	• Biodiversity <ul style="list-style-type: none"> • Shrubs, snags, coarse woody debris, hardwoods)
• % of cutblocks converted to permanent access.	
• Regeneration delay period, species, timelines	• % natural regeneration occurring over time
• Free growing	• Status of visually sensitive areas (% disturbed)
• 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 measures and the interaction of measures)
- Current management practices and assumptions
- MCA questionnaire
- Canfor and BCTS
- Consultant (specializing in analysis and forecasting)

Although the preferred scenario described in Section 6.4 meets initial targets for sustainability, other scenarios were tested to confirm assumptions and to highlight areas that could be improved. The development of alternative scenarios has included the influence of natural disturbance, where appropriate for both the NHLB and the THLB.

The scenarios listed below describe quantitative outputs utilizing modelable measures. The preferred scenario takes into account the projected forecast for these measures, as well as measures that are not modelled spatially and the measures that will be developed as described in Section 5.0 and summarized in the Appendix 1.4: Data / Knowledge Gaps Matrix.

The scenarios that were developed and presented to the *FOREST* 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

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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 than 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 m³/yr (58% increase over current AAC)

Pl volume salvaged = 9.3 million m³

Pl volume left unsalvaged = 1.5 million m³

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The results were reviewed with *FOREST*. The Radium DFA Forecasting report⁹⁶ contains the presentation made to *FOREST* and goes into more detail for each of the measures modelled. As well, this report contains a comparison of each of the scenarios and the quantitative or qualitative impact on each measure.

A comparison of each scenarios long-term implications relative to the Base Case (current condition) is provided in Table 47.

Table 47: Long Term Implications Summary

Scenario	Economics	Social	Ecological						
	(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.

⁹⁶ Forsite, Interior Reforestation, & Ecological Research. Sustainable Forest Management Plan Scenario Forecasting. Version 1.1 – February 24, 2006. Prepared for Canfor – Radium Woodlands & BCTS.

- 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 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 to be reflective of this mix and endeavors to accomplish this through the development of the 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 the Adaptive Management Section (8.0) 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 measures, this means using current or newly defined management strategies for operations (as defined in Section Annual harvest levels are based on an apportionment of the Annual Allowable for the Invermere TSA. BCTS staff, contractors, and agreement holders operate within BCTS operating areas through out the Defined Forest Area. At this time annual timber harvesting is directed primarily by the Invermere Forest Health Strategy to manage and salvage mountain pine beetle impacted timber and periodically fire killed timber. Operational Plans outline harvest opportunities, forest health assessments, inventory information (age and height class, piece size, volume), resource values, access to the resource, and operational feasibility. Site Plans are developed for blocks and roads to ensure compliance with current legislation, our Forest Stewardship Plan (FSP), Safety program and Sustainable Forest Management Plan (SFMP).

The BCTS FSP for the Rocky Mountain Forest District was approved September 15 , 2006 for a five year term. The FSP is comprised of several sections addressing management of Kootenay Boundary Higher Level Plan objectives, FRPA resource values such as; Timber, Water, Fisheries, Riparian Management, Wildlife, Recreation, Range, Biological Diversity, Cultural Heritage Resources, Visual Resource Management, and Soil Productivity.

Harvest block summary tables are included in the Operational Plan. These tables cross-reference blocks shown on the Operational Plan maps and describes Block/Road location, area, timber harvest volume, landscape values, stage of development, and other information. To support plans for road construction and harvesting there may be assessments of resource values such as Seral Stage Distribution, Biodiversity, Habitat Distribution, or Hydrology.

Operational Plans are referred to stakeholders and First Nations to ensure all possible information is collected and issues or concerns including those which fall outside the legislative requirements are addressed.

Following the Operational Plan review and comment process roads are constructed either under contract or in conjunction with the sale of timber under a Timber Sale License. Timber Sales Licenses are competitively awarded to BCTS registrants who are responsible for all activities; road construction,

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maintenance and harvesting operations. BCTS with the help of contractors undertake the post harvest obligations for silviculture and ensure the block achieves the objective of a free growing stand as quickly as possible.

A FSP amendment may be considered at any time, to address any deficiencies or changes that may be required to address new legislation, changes in Land Use Plans, and where current plans are not meeting the resource objectives.. When amendments to the FSP are required, amendments will follow legislated requirements for content, and review and comment. Major amendments to the plan will be referred to interested parties for review and comment prior to submitting an amendment of the FSP to the District Manager.

The BCTS Environmental Management System (EMS) will be used to track compliance with our FSP and the requirements of this SFMP. It is anticipated that some subtle changes to the EMS may be required to track commitments under a SFMP. When instances of non-conformance are discovered in a Operational Plan or the SFMP, they are dealt with on a site-specific basis, with the initialization of a corrective action plan to remedy the issue.

7.2 Implementation – Sustainability Strategies).

7.1 Operating Plans/Schedules

Operational 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 Development Plan (FDP) is used to identify candidate areas for the annual scheduling of forest management activities (harvesting, silviculture and road building) that are planned to occur in the DFA. Although it is termed an annual operating plan, it typically covers a 5-year planning horizon, and is updated regularly. The annual operational plan may be amended throughout the year due to unforeseen circumstances such as weather, forest health issues (salvage from insect or fire) and economic factors.

The Forest Stewardship Plan (FSP) of the Forest & Range Practices Act (FRPA) will soon replace all currently approved FDPs. The FSP reflects requirements of the Higher Level Plan and is where the legislative requirements are articulated. 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 FDPs or FSPs can be viewed at the Canfor Radium and the BCTS respective offices.

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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. 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 First Nations.

BCTS FSP Summary

Annual harvest levels are based on an apportionment of the Annual Allowable for the Invermere TSA. BCTS staff, contractors, and agreement holders operate within BCTS operating areas through out the Defined Forest Area. At this time annual timber harvesting is directed primarily by the Invermere Forest Health Strategy to manage and salvage mountain pine beetle impacted timber and periodically fire killed timber. Operational Plans outline harvest opportunities, forest health assessments, inventory information (age and height class, piece size, volume), resource values, access to the resource, and operational feasibility. Site Plans are developed for blocks and roads to ensure compliance with current legislation, our Forest Stewardship Plan (FSP), Safety program and Sustainable Forest Management Plan (SFMP).

The BCTS FSP for the Rocky Mountain Forest District was approved September 15 , 2006 for a five year term. The FSP is comprised of several sections addressing management of Kootenay Boundary Higher Level Plan objectives, FRPA resource values such as; Timber, Water, Fisheries, Riparian Management,

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Wildlife, Recreation, Range, Biological Diversity, Cultural Heritage Resources, Visual Resource Management, and Soil Productivity.

Harvest block summary tables are included in the Operational Plan. These tables cross-reference blocks shown on the Operational Plan maps and describes Block/Road location, area, timber harvest volume, landscape values, stage of development, and other information. To support plans for road construction and harvesting there may be assessments of resource values such as Seral Stage Distribution, Biodiversity, Habitat Distribution, or Hydrology.

Operational Plans are referred to stakeholders and First Nations to ensure all possible information is collected and issues or concerns including those which fall outside the legislative requirements are addressed.

Following the Operational Plan review and comment process roads are constructed either under contract or in conjunction with the sale of timber under a Timber Sale License. Timber Sales Licenses are competitively awarded to BCTS registrants who are responsible for all activities; road construction, maintenance and harvesting operations. BCTS with the help of contractors undertake the post harvest obligations for silviculture and ensure the block achieves the objective of a free growing stand as quickly as possible.

A FSP amendment may be considered at any time, to address any deficiencies or changes that may be required to address new legislation, changes in Land Use Plans, and where current plans are not meeting the resource objectives.. When amendments to the FSP are required, amendments will follow legislated requirements for content, and review and comment. Major amendments to the plan will be referred to interested parties for review and comment prior to submitting an amendment of the FSP to the District Manager.

The BCTS Environmental Management System (EMS) will be used to track compliance with our FSP and the requirements of this SFMP. It is anticipated that some subtle changes to the EMS may be required to track commitments under a SFMP. When instances of non-conformance are discovered in a Operational Plan or the SFMP, they are dealt with on a site-specific basis, with the initialization of a corrective action plan to remedy the issue.

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. Priority of development was given to those strategies that address Section 4.1 Key Issues.

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 – specifically the MCA, 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:

- Habitat Representation
- Wildlife Tree Retention
- Coarse Woody Debris
- Riparian Area
- Hardwood Tree
- Protected Areas
- Land Base Productivity
- Reforestation
- First Nations
- Recreation
- Visual Quality
- Consumptive Use Streams

The following sustainability strategies have been identified as those to be developed:

- Natural Disturbance
- Mountain Pine Beetle
- Stream Crossing

The SFM Participants acknowledge the need for more sustainability strategies to be developed and have provided a list that will be addressed in a timely manner. See the Appendix 1.4: Data / Knowledge Gaps Matrix for the current schedule of development.

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 1.7: 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 1.7: 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 1.7: 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 1.7: 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 1.8: 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.

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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 1.7: Habitat Element Supporting Tables) 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 overriding 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). This will enable trends in the CWD volume at the coarse scale to be examined in the near future.

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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 2000 ha represented in the East Kootenays (Appendix 1.7: Habitat Element Supporting Tables),
- 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,
 - o no clear cutting of the RMZ, and
 - o harvest the RMZ to a maximum of 30% removal of basal area, focusing on retention of windfirm trees, and
 - o fall and yard away from RRZ unless a safety hazard dictates otherwise.
 - ii. a moderate blowdown risk occurs,
 - o clearcut 0% to 50% of the RMZ, and
 - o 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
 - o fall and yard away from RRZ unless a safety hazard dictates otherwise.
 - iii. a low blowdown risk occurs,
 - o clearcut 0% to 100% of the RMZ, and
 - o if retaining trees in the RMZ, focus any retention on windfirm trees, and
 - o 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

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- 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

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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

Hardwood 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.

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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 an operational Forest Stewardship Plan and subsequent site 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 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/BCTS 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 plans will ensure that site 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 an operational FSP or site 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 site plans, legislation, and EMS programs. Once operations are complete a final inspection is performed to evaluate consistency with operational plans. Any management strategies identified in operational plans for protected areas are monitored concurrently with other activities.

Existing inspection checklists, EMS procedures, and internal audits will continue to ensure site plans and other operational plans are implemented to achieve prescribed management strategies. If these methods are proving ineffective in achieving desired results, 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 or are being identified for Canfor and BCTS operating areas in the Invermere TSA. Once candidate HCVF's are finalized, management strategies will be developed and implemented for each HCVF. Currently management strategies for Canfor are under development. Once the strategies are finalized, they will be appended to this SFM PLAN and described for the specific 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 1.8: 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 be 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 for proposed cutblocks classified as "Potentially Unstable" if skid trail construction is planned.

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 site 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 site plans and other operational 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 and BCTS 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/BCTS 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 a site 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 site 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 Ministry of Forests and Range through the RESULTS program.

Establishing free growing dates and standards for each harvested stand is a legal requirement. They will be recorded and maintained in a database, such as GENUS. 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 Ministry of Forests and Range for the cutblock to revert to the Crown's responsibility.

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First Nations Strategy

The First Nations strategy is intended to formalize processes already in place for management of archaeological resources and address broader cultural heritage resources related to First Nations traditional uses.

A list of all First Nations 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 First Nations, 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 site 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 conditionsproviding 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 measures 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 site 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 site plans and other operational 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 a site 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 stream 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 site 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 site plans and other operational 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 Annual harvest levels are based on an apportionment of the Annual Allowable for the Invermere TSA. BCTS staff, contractors, and agreement holders operate within BCTS operating areas through out the Defined Forest Area. At this time annual timber harvesting is directed primarily by the Invermere Forest Health Strategy to manage and salvage mountain pine beetle impacted timber and periodically fire killed timber. Operational Plans outline harvest opportunities, forest health assessments, inventory information (age and height class, piece size, volume), resource values, access to the resource, and operational feasibility. Site Plans are developed for blocks and roads to ensure compliance with current legislation, our Forest Stewardship Plan (FSP), Safety program and Sustainable Forest Management Plan (SFMP).

The BCTS FSP for the Rocky Mountain Forest District was approved September 15 , 2006 for a five year term. The FSP is comprised of several sections addressing management of Kootenay Boundary Higher Level Plan objectives, FRPA resource values such as; Timber, Water, Fisheries, Riparian Management, Wildlife, Recreation, Range, Biological Diversity, Cultural Heritage Resources, Visual Resource Management, and Soil Productivity.

Harvest block summary tables are included in the Operational Plan. These tables cross-reference blocks shown on the Operational Plan maps and describes Block/Road location, area, timber harvest volume, landscape values, stage of development, and other information. To support plans for road construction and harvesting there may be assessments of resource values such as Seral Stage Distribution, Biodiversity, Habitat Distribution, or Hydrology.

Operational Plans are referred to stakeholders and First Nations to ensure all possible information is collected and issues or concerns including those which fall outside the legislative requirements are addressed.

Following the Operational Plan review and comment process roads are constructed either under contract or in conjunction with the sale of timber under a Timber Sale License. Timber Sales Licenses are competitively awarded to BCTS registrants who are responsible for all activities; road construction, maintenance and harvesting operations. BCTS with the help of contractors undertake the post harvest obligations for silviculture and ensure the block achieves the objective of a free growing stand as quickly as possible.

A FSP amendment may be considered at any time, to address any deficiencies or changes that may be required to address new legislation, changes in Land Use Plans, and where current plans are not meeting the resource objectives.. When amendments to the FSP are required, amendments will follow legislated requirements for content, and review and comment. Major amendments to the plan will be referred to interested parties for review and comment prior to submitting an amendment of the FSP to the District Manager.

The BCTS Environmental Management System (EMS) will be used to track compliance with our FSP and the requirements of this SFMP. It is anticipated that some subtle changes to the EMS may be required to track commitments under a SFMP. When instances of non-conformance are discovered in a Operational Plan or the SFMP, they are dealt with on a site-specific basis, with the initialization of a corrective action plan to remedy the issue.

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.

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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 measure has taken place, practices can be re-evaluated to determine what/if any changes are required. Current practices are identified in the appropriate FDP or approved FSP but have been summarized in Appendix 1.3: Practices Analysis for both Canfor and for BCTS. Further details on practices and operating procedures can be viewed at the Canfor Radium and the BCTS respective offices.

7.4 Training

Canfor and BCTS provide 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 Forestry Principles (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 and BCTS' respective FMS/EMS.

8.0 Adaptive Management

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. operating 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 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
- Reporting
- Adjustment/Adaptation

The following sections will detail how the steps will work together to instigate 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 Framework. A variety of information needs to be warehoused, in easily accessible formats including, scientific background data and reports, resource inventory data, forecasting results, key uncertainties,

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risks, implementation reports and monitoring/evaluation outcomes. Canfor and BCTS planning and operations staff and, in some cases, personnel from several levels of government and stakeholders, need access to the system to input and extract information. A cooperative, multi-user information management system (IMS) supports the shared learning and resultant knowledge approach of adaptive management, and the hierarchical structure of the Framework.

The development of new data and the amalgamation of existing data into the SFM hierarchical planning framework and operational implementation requires considerable time and effort. To assist with strategic level data requirements Canfor and BCTS are 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 and BCTS have 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,
- SFM related reports and the SFM Plan are housed within the Canfor Woodlands offices,
- Canfor currently uses Phoenix software to capture and track roads, harvesting and silviculture activities; the Woodlands Information System (WIS) for harvest volume,
- BCTS currently uses RESULTS to capture and track silviculture; FTAS for harvest volumes, roads and harvesting activities,
- Excel spreadsheets are used by staff to track other activities, and
- FDP/FSP are developed using ArcView.

Canfor is currently undergoing a change to a coordinated system under the Genus software. BCTS is also currently moving to a fully implemented Genus system. Once these respective systems are fully operational, Canfor and BCTS representatives may meet to standardize reports, develop a protocol for information management data exchange and to develop a plan to involve other government agencies.

Current baseline data sources include the following for most measures:

- TSR3 data package
- Terrain Stability
- Forest Cover/Vegetation Resources Inventory (VRI)
- In-house baseline data from Canfor and BCTS
- 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)

Both Canfor and BCTS 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 measures and to check performance against an expected outcome for that measure. Monitoring allows for observation of changes over time and space. A monitoring and evaluation process is necessary to ensure that management plans and activities

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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 measure. There are essentially two types of measures: process and performance. Process measures describe a process, not an outcome. For process measures neither trend nor effectiveness monitoring is relevant. These measures are not so much monitored as reported out within the SFMP Annual Report.

For performance measures (i.e. non-process measures), status and trend monitoring plans have been, or are being, developed. Status monitoring provides managers and *FOREST* with a snapshot of how the measure is currently doing. These measurements over time provide managers and *FOREST* with the trend of the measure. Trend analysis can be used to assess how well forest practices are helping in meeting targets. Monitoring data for non-process measures 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 from the SFM Framework:

- (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 measure is included as part of the detailed discussion for the indicators and measures in Section 5.0 and is summarized in Appendix 1.9: Monitoring Matrix. For the purposes of this SFM Plan, the current status for each measure will be the starting point for trend monitoring and the basis from which analysis will take place in subsequent SFMP Annual Reports and updates to the SFM Plan.

The position/person responsible for the monitoring plan for each measure is identified in Appendix 1.6: Responsibility Action Matrix.

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 measure. Details of measures analysis will be discussed as the monitoring plans are refined. Results of analysis of each measure 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 measure 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 Strategic Planning Forester and BCTS Area Forester
- 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 and BCTS 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 and BCTS will address these through the following process:

- Canfor Strategic Planning Forester and BCTS Area Forester will be responsible for identifying and investigating non-conformance;
- Canfor Strategic Planning Forester and BCTS Area Forester take action to mitigate any impacts caused; and
- Initiating, completing and documenting corrective and preventive action and expected results.

Any corrective or preventive action taken to eliminate the causes of actual and potential non-conformances shall be appropriate to the magnitude of the problem and commensurate with the impact encountered.

8.4.1 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 measures 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 and BCTS 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. For the first year of the SFM Plan, the management review is summarized within Appendix 2.4: Results of Management Review:

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, both Canfor and BCTS have developed 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 System⁹⁷ (FMS) provides a platform on which to build the sustainable forest management elements required to meet the CSA SFM standard.

BCTS has established an EMS and BCTS – Kootenay Business Area is currently seeking ISO 14001 certification.

Both Canfor's FMS and BCTS' EMS 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.

⁹⁷ 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.

1. Radium Defined Forest Area
2. Radium: THLB/NHLB
3. Biogeoclimatic Zones
4. Canfor Radium Input Covers: Landscape Units
5. Canfor Radium Input Covers: Protected Area Strategies
6. Invermere TSA Visual Quality Objectives
7. DFA & TSA Listing of Applicable Maps

Appendix 1.2: Inventory & Stakeholder Analysis

This appendix contains the Inventory & Stakeholder Analysis completed for the DFA. Names and personal information of the stakeholder analysis have not been included in the appendix to ensure privacy. All information is maintained by Canfor.

1. Inventory and Stakeholder Analysis Report
2. Inventory and Information Data

Appendix 1.3: Practices Analysis

This appendix provides the resulting Practices Matrix for the DFA.

1. Practices Matrix Canfor
2. Practices Matrix BCTS

Appendix 1.4: Data / Knowledge Gaps Matrix

This appendix is a summary table listing the knowledge/information gaps (beyond data gaps) to support the Criteria & Indicators for the DFA. The comprehensive list will include issues identified by HLP, AAC Determination, LBIR, Type I/II, DFAM, etc.

Appendix 1.5: 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, measures, targets, and the current condition of the measure.

1. Ecological C&I Matrix – April 2006
2. Economic C&I Matrix – April 2006
3. Social C&I Matrix – April 2006
4. Updated C&I Matrices – December 2007

Appendix 1.6: Responsibility Action Matrix

This appendix provides the responsibility matrix for achieving or moving towards targets for each measure. 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 1.7: Habitat Element Supporting Tables

This appendix contains tables that provide supporting data for the various habitat elements (i.e. Measure 1-2.1).

Appendix 1.8: HCVF Strategies

This appendix contains the strategies specifically written to support HCVF areas.

Appendix 1.9: Monitoring Matrix

This appendix contains the monitoring matrix for each measure.

Appendix 1.10: 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 Z809-02) 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. C&I Comparison Matrix
2. CSA SFM Framework Comparison Memo Jan 14, 2004
3. CSA SFM Framework Comparison Memo May 5, 2004
4. PWC Interpretation Questions Oct. 1, 2004
5. SFM Plan vs. CSA Requirements Cross Reference Matrix

Appendix 2.2: Signatory Roles & Responsibilities

This appendix provides the details for the roles and responsibilities for those participating (developing, implementing, maintaining) in the SFM Plan as well as the CSA application. The primary documentation for this appendix is FMS information on Roles & Responsibilities.

1. Canfor – FMS Annex D(1) – Mandatory Environmental Duties with SFM
2. BCTS – Table 008-2 Roles & Responsibilities Matrix – March 15, 2005

Appendix 2.3: *FOREST* and First Nations Involvement Process

This appendix provides all the information for the public involvement process. This may include (depending on the public process): terms of reference (TOR), roles & responsibilities; open- houses, focus group meetings, surveys, minutes from meetings, etc.

1. Open House Information
2. *FOREST* meeting summaries
3. *FOREST* Terms of Reference (ToR)
4. Summary of Communication/Consultation of the Radium *FOREST*

Appendix 2.4: Results of Management Review: 2006 – Present

This appendix is a summary of the management reviews for Canfor and for BCTS from 2006 through to the current year.

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: Cross Reference Matrices

This appendix contains a number of matrices comparing CIMT to other initiatives: i.e. LRMP, FRPA, etc (beyond CSA).

1. Radium C&I vs. FRPA Matrix

Appendix 3.2: Glossary & Acronym List

This appendix contains a glossary for the SFM Plan. This glossary was generated from the *FOREST* process.

1. Glossary & Acronym List – Current

Appendix 3.3: References & Citations

This appendix contains a listing of citations made throughout the SFM Plan.

Appendix 3.4: Record of Revisions

This appendix contains the recording of changes to this SFM Plan.