

Sustainable Forest Management Plan Canfor Kootenay Operations Version 5.0 December 2017



Canadian Forest Products Ltd.
Kootenay Operations



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

Acknowledgements

We wish to thank all members, past and present, of the Public Advisory Group (PAG) for their contributions and dedication to sustainable forest management in the Kootenay Region.

We also gratefully acknowledge the contributions from Indigenous Peoples, ENGOs and members of the public who provided input into the development of this plan, as well as the Annual Reports. In addition, we would like to thank Kootenay Forest Management Group staff who provided timely and thought-provoking additions to many sections.

The biodiversity and wildlife sections of this plan (Criterion 1) were written by Kari Stuart-Smith, PhD., RPBio, Forest Scientist for Canfor, with the assistance of Stephanie Keightley, BSc. In addition, they provided expertise into the Climate Change, soils and water quality sections.

Ecosystem Resilience sections, including silviculture, regeneration, invasive plant species and climate change were written by Kori Vernier, RPF.

Ian Johnson, RPF wrote the sections on forest productivity, soils, water quantity and quality, as well as socio-economic sections such as, overlapping tenure holders and non-timber forest benefits.

In addition to leading this SFM Plan, Grant Neville, RPF wrote the balance of the socio-economic sections. These included but are not limited to: First Nation and stakeholder involvement/information sharing, local employment, local procurement, contribution to the communities and safety.

Signature Page

The following have committed to implement and maintain on a continuous improvement basis.



Authorized Signatory

Date: Dec 29/17

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Executive Summary

Since the early 2000's forest tenure holders ("licensees") operating in the East Kootenay have worked with members of the public, local stakeholders, Indigenous representatives and Government Agencies to develop and implement a Sustainable Forest Management Plan (SFM Plan) for the Defined Forest Area (DFA). This SFM Plan addresses the increased size of the DFA, changes in forest condition, public, stakeholder, and Indigenous Peoples input and local community values.

Public participation, performance objectives, management systems, review of actions, monitoring of effectiveness, and continual improvement are cornerstone to the success of SFM. Through the public participation and expert advice, performance objectives were developed for the DFA to reflect local and regional interests. Compliance with existing forest policies, laws and regulations are the baseline requirements of the SFM Plan. This edition of the SFM Plan includes updated references to the applicable laws and regulations, as well as an updated suite of Criteria, Elements, Values, Objectives, Indicators and Targets that address the current environmental, economic and social conditions within the DFA. Both the Canadian Standards Association (CSA) Sustainable Forest Management Requirements and Guidance (CSA Z809-16) and Forest Stewardship Council (FSC) Certification (FSC-BC Oct. 2005) guide this SFM Plan. This SFM Plan localizes the implementation and monitoring of the criteria and indicators for both Standards.

The SFM Plan is a dynamic and evolving document that is to be reviewed and revised on a regular basis (approximately every 5 years). Canfor is committed to the monitoring of the indicators set out in the SFM Plan. On an annual basis Canfor prepares an Annual Report in reference to the targets established for the indicators in the SFM plan. Annual Reports are made available for review and to provide input. This process provides Canfor, the public, and Indigenous Peoples with an opportunity to bring forward new information and to provide input concerning new or changing public, stakeholder, and Indigenous Peoples values and interests that can be incorporated into future updates of the SFM Plan, both at the DFA and Timber Supply Area (TSA) level.

This SFM Plan has been written appropriate to the scale and intensity of operations, is available to the public and is kept current.

Canfor Environmental Policies

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

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

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

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

[Canfor Policies](#)

Figure 1: Canfor's Environmental Policy



The image shows a document titled "ENVIRONMENT POLICY" with the Canfor logo in the top right corner. The background of the top section is a photograph of a dense forest. Below the title, a red banner contains the text: "WE ARE COMMITTED TO RESPONSIBLE STEWARDSHIP OF THE ENVIRONMENT THROUGHOUT OUR OPERATIONS." A horizontal line follows. The section "WE WILL:" is followed by a bulleted list of nine commitments. At the bottom, there are two signatures: Don Kayne, President and Chief Executive Officer, and Michael Korenberg, Chairman. The date "JUNE 2016" is printed to the left of the signatures. The footer consists of two grey boxes: "CANADIAN FOREST PRODUCTS LTD. and affiliated companies" and "CANFOR.COM".

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.

JUNE 2016

 **DON KAYNE**
President and Chief Executive Officer

 **MICHAEL KORENBERG**
Chairman

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Sustainable Forest Management Commitments

Figure 2: Canfor's Sustainable Forest Management Commitments



SUSTAINABLE FOREST MANAGEMENT

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

ACCOUNTABILITY

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

ADAPTIVE MANAGEMENT

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

SCIENCE

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

MULTIPLE VALUE MANAGEMENT

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

HEALTH AND SAFETY

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

ABORIGINAL PEOPLES

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

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SUSTAINABLE FOREST MANAGEMENT COMMITMENTS



OPPORTUNITIES FOR PARTICIPATION

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

SCALE

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

TIMBER RESOURCE

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

FOREST LAND BASE

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

JUNE 2016

A handwritten signature in black ink, appearing to read "Don Kayne".

DON KAYNE
President and Chief Executive Officer

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1.0 Introduction

1.1 Background to Sustainable Forest Management

Canfor is committed to Sustainable Forest Management (SFM) and has provided and communicated these commitments publicly. The policies found in the Preamble of this document provide the SFM commitments for Canfor.

Founded on long-term commitments to concurrent, balanced, multi-value sustainability and continual improvement through adaptive management, the Sustainable Forest Management Plan (SFMP or SFM Plan) uses criteria and indicators (C&I) as guideposts for transparent forest management decisions and actions.

The overall objective of the SFM Plan has been to demonstrate to government and industry managers, area residents, stakeholders, local Indigenous Peoples and customers of forest resources that it is possible to implement sustainable forest management at the management unit level (i.e. DFA). The successful achievement of SFM is intended to occur through the on-going refinement and development, implementation and maintenance of this SFM Plan. This SFM Plan translates the strategic goals to operational reality on the ground. This SFM Plan localizes the implementation and monitoring of the criteria and indicators.

Additionally, third party certification continues to be an important factor in the marketability and competitiveness of forest products. Market campaign pressures have lead many forest product customers to develop procurement policies that guide suppliers in terms of acceptable practices. Certification of forest practices assures buyers that the wood products meet the requirements considered critical for SFM.

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

1.2 Scope of SFM Plan

The scope of this SFM Plan is operations on all public lands Canfor manages within the East Kootenay.

Both the Canadian Standards Association (CSA) Sustainable Forest Management Requirements and Guidance (CSA Z809-16) and Forest Stewardship Council (FSC) Certification (FSC-BC Oct. 2005) guide the development and implementation of this SFM Plan. Both standards require public participation processes, performance measures and targets establishment, monitoring the effectiveness, and adaptive management.

This SFM Plan has been written appropriate to the scale and intensity of operations, is available to the public and is kept current. This SFM Plan and supporting documents shall provide:

- Management objectives;
- Description of the forest based on inventories;
- Description of tree silvics and silvicultural systems;
- Level of allowable harvest and rationale;
- Description of harvesting and regeneration systems and techniques;
- Growth and yield information;
- Maps identifying land tenure and timber operating areas;
- Provisions for the protection of fish, wildlife and other non-timber values; and
- Provisions for the development and expansion of local socio-economic benefits.

1.3 Purpose of an SFM Plan

The purpose of this SFM Plan for the Defined Forest Area (DFA) is to provide a planning document that localizes and operationalizes SFM. The SFM Plan provides the “on-the-ground” implementation of locally developed indicators through the implementation of the associated management strategies and operational approaches outlined. These indicators address a range of social, ecological and economic values for the DFA. It is updated annually through the SFMP Annual Report and wholly revised approximately every 5 years, or as may be necessary to remain consistent and/or compliant with;

- 1) significant aspects of the applicable forest certification standard,
- 2) public, stakeholder and Indigenous Peoples values, interests and/or treaty rights, and
- 3) provincial forestry laws, legislation and/or regulatory requirements.

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

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

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

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

The following describes the sections of the SFM Plan:

- Preamble provides the SFM commitments and policies for Canfor.
- Section 1.0 provides the background and purpose of this plan.
- Section 2.0 describes the SFM Planning process, including plan development, implementation, structure and responsibilities of those involved, as well as other resource management initiatives.
- Section 3.0 provides the background information about the DFA, including description of the DFA – geographically, biologically, and socio-economically.
- Section 4.0 covers the foundation for sustainable forest management in the DFA. The foundation of SFM Planning includes identifying or understanding the key issues, inventories, and the range of natural variability within the DFA.
- Section 5.0 describes the sustainability goals for the DFA through locally defined Criteria and Indicators (C&I) – ecological, economical and social. This is Strategic Level Planning.
- Section 6.0 provides the translation of the sustainability goals from the Strategic Level to Tactical Level Planning. This section integrates the Government’s determination of the long-term annual allowable cut with the legal requirements under Canfor’s FSP, as well as provides the Sustainability Strategies for a range of forestry related values. This is Tactical Level Planning.
- Section 7.0 provides the translation of the sustainability goals to operations through the implementation of operational level plans, strategies, practices and training. This is Operational Level Planning.
- Section 8.0 describes continual improvement inherent in Adaptive Management. It describes the information management systems, monitoring, analysis, reporting and adaptation to planning and or practices.
- Appendices provide additional DFA specific content to support the SFM Plan.

2.0 SFM Planning Process

Section 2.0 describes the SFM Planning process via:

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

2.1 Plan Development, Implementation & Maintenance

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

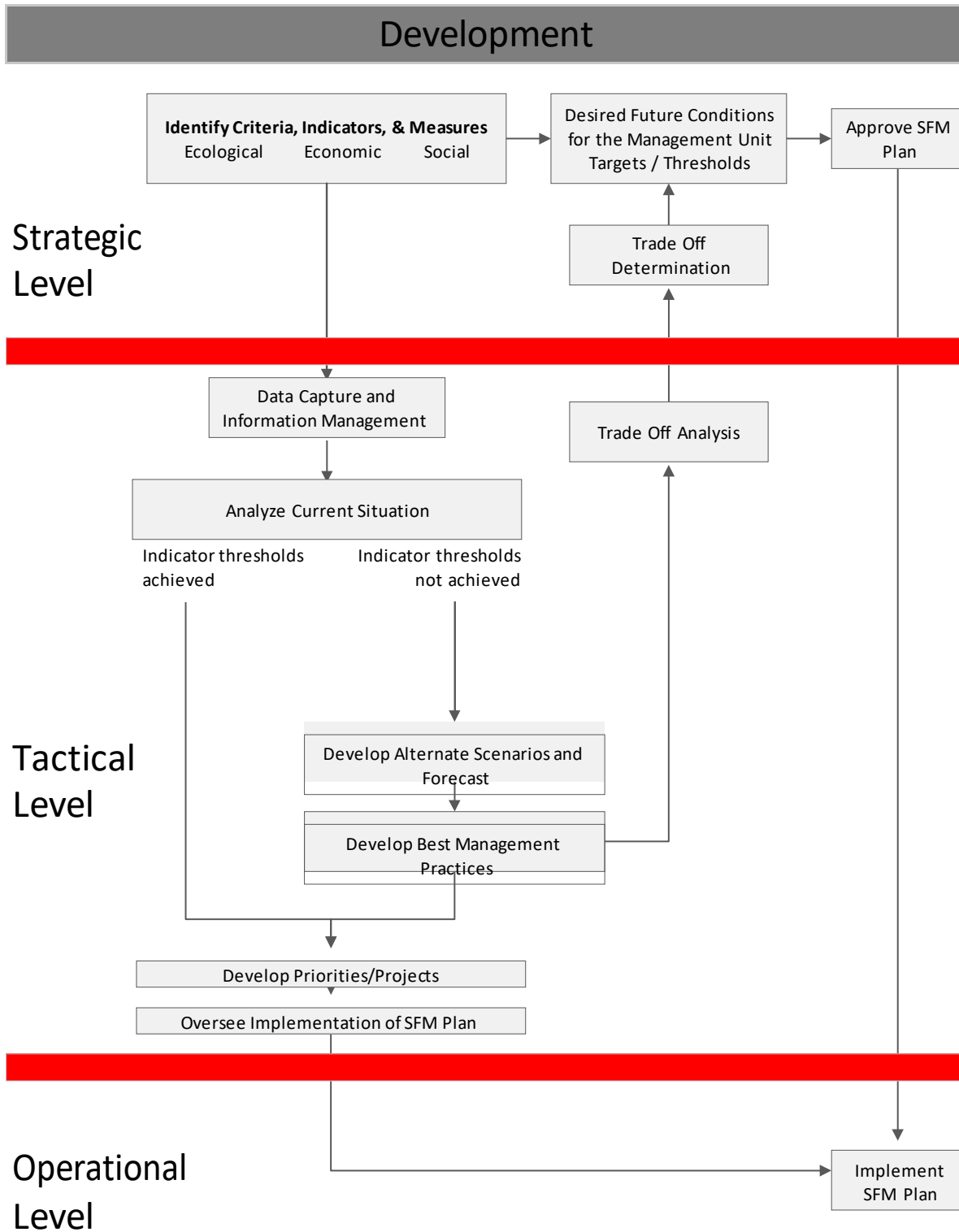
This following text briefly outlines the flow of activities shown in Figure 3. The descriptions refer to the main steps that occurred at each hierarchical level of the planning process but do not necessarily represent the specific sequence of events. Although many of the individual components and activities flow from one to the next, the process is not entirely linear and some hierarchical planning activities occur at similar times.

A Sustainable Forest Management Plan that meets locally defined performance requirements is the outcome of the **Strategic Level** of planning. The SFM Plan directs tactical and operational plans and practices within the DFA. The critical step at this planning level was to localize the core set of Values, Objectives, Indicators, Targets and Strategies. The desired future conditions for indicators were determined through the articulation of targets. Both of these steps were accomplished through a combination of expert technical and stakeholder input. The strategic level is detailed within Section 5.1 Criteria, Elements, Indicators, Targets.

In the **Tactical Level** of planning, analysis focused on expected areas of operations over the next 20 years, which is a planning horizon that resource managers are familiar with through previous harvesting planning approaches. At this level of planning, data is analysed for longer time periods to ensure that practices are still within sustainable thresholds and moving towards the desired future forest condition (i.e. targets). Section 6.0 Tactical Level provides the details on this planning level.

At the **Operational Level**, site- and treatment- specific planning, such as site plans, incorporate the strategies and practices needed to achieve the preferred future state while remaining consistent with legislative and corporate requirements. Section 7.0 Operational Level provides the details on this planning level.

Figure 3: SFM Plan Development Flowchart



SFM Plan Implementation & Maintenance

Once operational level plans are in place, the development phase of the SFM Plan is completed and resource managers begin implementing operational activities and collecting monitoring data according to the plan (Figure 4). 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 (FSP) through the implementation of current or revised Standard Work Procedures (SWP) and/or Sustainability Strategies. 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 stakeholders, which is crucial for maintaining stakeholder 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 analysed 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 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.

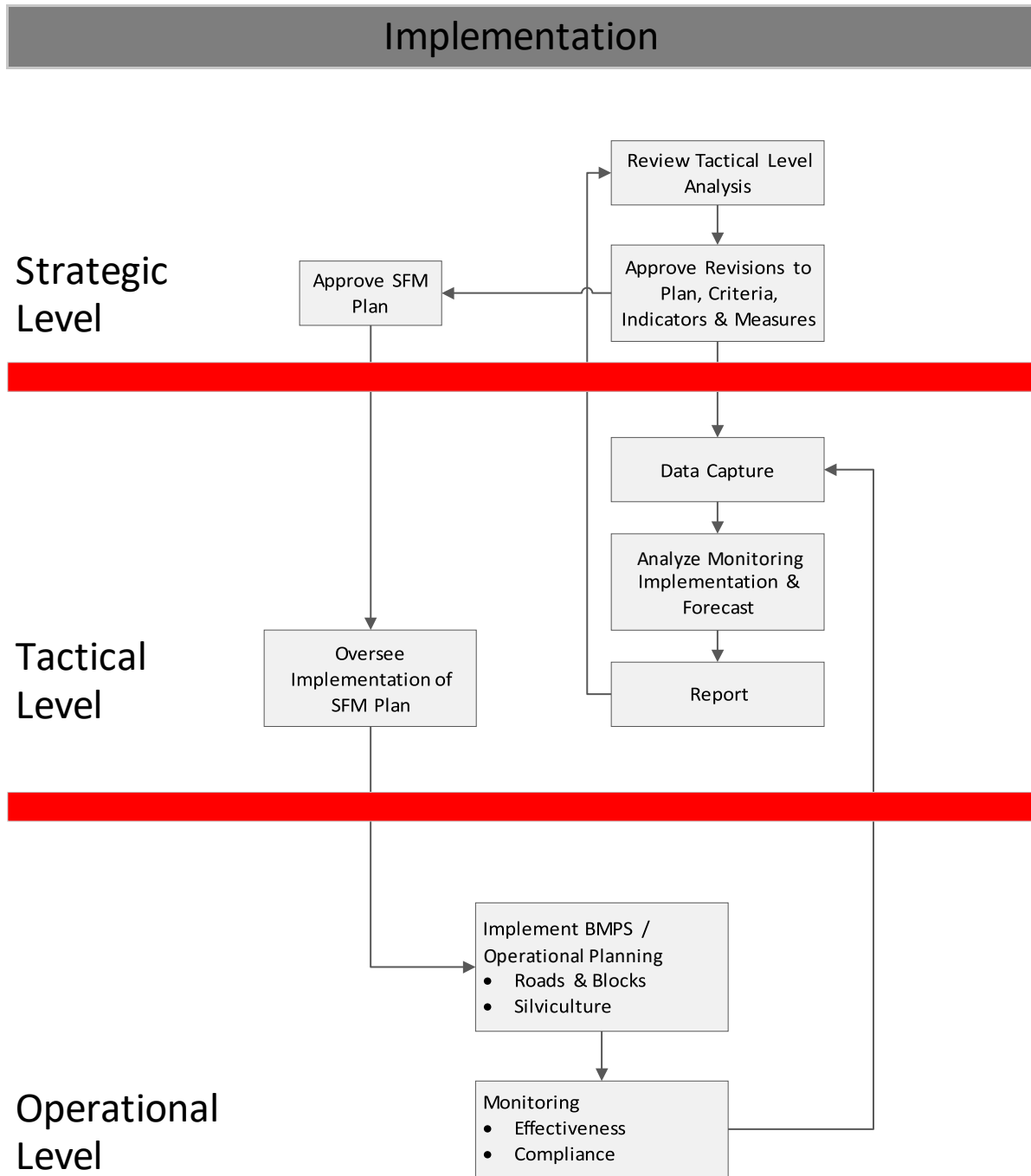
The **Strategic Level** completes the continual improvement loop by providing Canfor the opportunity to examine their performance against all of the SFM requirements, both individually and collectively and making appropriate changes, if required or recommended. The following steps are completed:

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

Both the SFM Plan and the SFMP Annual Report are publicly available¹. The 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.

¹ SFM Plan and associated documents are available on the Canfor Website

Figure 4: SFM Plan Implementation Flowchart



2.2 Structure and Responsibility

The organizational structure for input into the development and maintenance of the SFM Plan consists of representatives from Canfor, as well as rights holders, interested and/or directly affected parties (as described in the rest of Section 2.2). The three main groups are a technical working group, a public advisory group (PAG), which includes BCTS representatives, and input from Indigenous Peoples and stakeholders.

The technical working group consists of representatives from Canfor, as well as qualified experts/consultants. This group is responsible for the development, implementation and maintenance of the SFM Plan.

Participation from Indigenous Peoples, rights holders and directly affected parties 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 SFM Plan. Valuable input is a result of informed, inclusive and fair consultative processes with local people who are directly affected by, or who have an interest in, resource management in the DFA.

A variety of public participation approaches have been employed on the DFA during the development and implementation of the SFMP.

2.2.1 Canfor Involvement

Canfor is committed to the development, implementation and maintenance of this SFM Plan within the DFA.

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

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

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 SFM Plan.

In order to implement the SFM Plan, it is important that roles and responsibilities are identified. Specific Roles and Responsibilities for each indicator are outlined in the Responsibility Action Matrix (RAM) found on Appendix 3.

Further, the following table outlines the general duties for each of the three main groups for Canfor: Senior Managers; SFM Representatives; and operational staff. These roles and responsibilities are in addition to those identified within the companies Forest Management System (FMS).

Table 1: Canfor – DFA Roles & Responsibilities

Canfor Senior Management
<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
Canfor SFM Representatives
<ul style="list-style-type: none"> • Coordinate the development, implementation and maintenance of effective public participation processes with Indigenous Peoples and stakeholders, including the 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 meaningful opportunities for directly affected or interested parties to participate in forest management planning • Track internal and external communication concerning SFM • Develop, implement and maintain the SFM Plan – including participation in the development of local Criteria, Indicators & 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
Canfor Operational Staff
<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 Canfor’s structure, authority and roles and responsibilities, can be found within the Forest Management System (FMS).

2.2.2 Public Involvement

Canfor previously and currently adheres to the legislative review and comment process for stakeholder input. Canfor is in the process of facilitating a more thorough and meaningful process with the stakeholders of the local area (i.e. Indigenous Peoples, rights holders and directly affected parties). This stakeholder involvement process will provide input, evaluation and feedback into the SFM Plan and therefore, into SFM for the DFA; for details, see the Participation Strategy.

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

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Canfor has engaged, and will continue to engage the participation of directly affected and interested parties in the planning process for the DFA. The Stakeholder Analysis, completed in 2004, was 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). The first PAG established in April 2005, was specific for the Radium DFA. The structure of the PAG is outlined and updated as needed in the PAG Terms of Reference (TOR). 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 (refer to Appendix 6). The TOR also outlines the schedule for the development and maintenance of the SFM Plan, including the involvement schedule and communications. The documentation on the establishment, assembly and running of meetings, as well as the TOR can be reviewed at the Canfor office.

For privacy reasons, peoples' contact information are not provided, however, Table 2 below provides the interests groups that were invited to participate on the PAG. Some of those (people/groups) invited chose not to be involved in the process at this time. The groups with active representation are indicated by an asterisk (*) in the table below. The groups indicated by (#) began the process but have not continued to attend meetings. These latter groups received information generated from the PAG until it was collectively decided at meeting #10 to stop sending information. They were informed however, that if they would like to join again or receive information, they could contact the group facilitator.

Table 2: Interest Groups Invited on PAG

Local Government	Indigenous Communities
East Kootenay Regional District* Radium Town Council* District of Invermere	Shuswap Band Ktunaxa Nation Council (KNC) including: ?Akisq'nuk Band St. Mary's Band Lower Kootenay Band Tobacco Plains Band
Tenure holders	Government
Woodlot* Christmas trees# Commercial Recreation* Trappers* Guide Outfitter* Ranchers# Prospectors	Provincial (Ministries) Indigenous Relations and Reconciliation Agriculture Energy and Mines Environment Forests, Lands and Natural Resource Operations BC Timber Sale* 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 &/or Edgewater

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

During the 2015 review and revision of this SFM Plan Canfor took multiple steps to engage Indigenous Peoples, rights holders and/or interested parties. These include:

1. Extensive review and discussion within the PAG.
2. Public posting of the draft SFMP on the Canfor website.
3. Notification letters to Indigenous Peoples, rights holder and directly affected parties.
4. Meetings with and presentations to Indigenous Peoples, rights holder and directly affected parties, both as groups and on an individual basis.
5. Outreach to a random sample of rights holders to solicit feedback on the effectiveness of outreach.

Input into the plan and Canfor’s response and, where applicable, any changes made to the plan are documented in within the PAG Meeting Minutes and documents.

2.2.3 Indigenous Peoples Involvement

Indigenous Peoples hold a unique position in Canada and as such, have a legally protected right to participate in the development and review of resource management strategies or plans in areas they assert to be traditional territories. This includes Crown lands outside areas where treaties apply. Canfor recognizes all Indigenous Peoples and treaty rights, and will facilitate the involvement of Indigenous Peoples in the SFM Plan.

Indigenous Peoples participation is a part of the overall public involvement process, as much as possible. The Ktunaxa Nation has traditional areas that overlap the DFA. The initial draft plan was reviewed with the Ktunaxa’s Land and Resources Agency (KLRA) in May 2015. The presentation included an overview of sustainable forest management. The draft was sent to the Ktunaxa in advance of public release. The SFMP notification was sent to all Bands in the KNC, the Shuswap Indian Band (SIB), Neskonlith Indian Band (NIB) and the Adams Lake Band (ALIB) in June of 2014. Follow up meetings were held with the SIB, ALIB and NIB to describe the plan and its contents. Neither the ALIB nor NIB had concerns regarding the content within the plan. The SIB provided no comments following an information sharing session to describe the SFMP plan purpose and contents.

The Ktunaxa did not have the capacity to respond or provide meaningful input into the development of the SFM Plan by the July 7th date. They have reviewed the plan internally and sent it to a consulting forester for review. Finalization of the SFM plan was postponed to provide additional time for the Ktunaxa to provide comments. KNC provided comments in September 2015. KNC and Canfor further discussed and appropriate comments were accommodated within this final SFMP (2016).

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

Table 3: Indigenous Communities and Councils in DFA

Ktunaxa Nation Council (KNC) including: <ul style="list-style-type: none"> • ?Akisq’ nuk First Nation • A’qam Band • Lower Kootenay Indian Band • Tobacco Plains Indian Band 	Shuswap Indian Band
	Adams Lake Indian Band
	Neskonlith Indian Band

2.2.4 Other Tenure Holders Involvement

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

Generally, other Licensees are responsible for the construction and maintenance of roads and stream crossings necessary to access their 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.

There are several smaller tenure holders within the DFA. These tenures include Indigenous Peoples forest tenures including replaceable and non-replaceable licenses, replaceable tenures held by other licensees and licenses focused on mountain pine beetle salvage. The other licence holder are responsible for all harvesting, road building and silviculture activities for their areas. Canfor has signed operating agreements with some Indigenous Bands to co-manage their licenses and some of these licenses fall within the DFA.

Canfor does not have the right to direct or control other Licensees, tenure holders and/or their respective employees. As well, Canfor will not be responsible for other tenure holder activities in the DFA under this SFM Plan. However, these other tenure holders have been invited to be involved in the SFM process via the PAG. In addition, Canfor will communicate their SFM commitments to all known tenure holders in relationship to this SFM Plan through the appropriate indicators and strategies within this SFM Plan.

2.3 SFM Plan Links to Other Strategic Initiatives

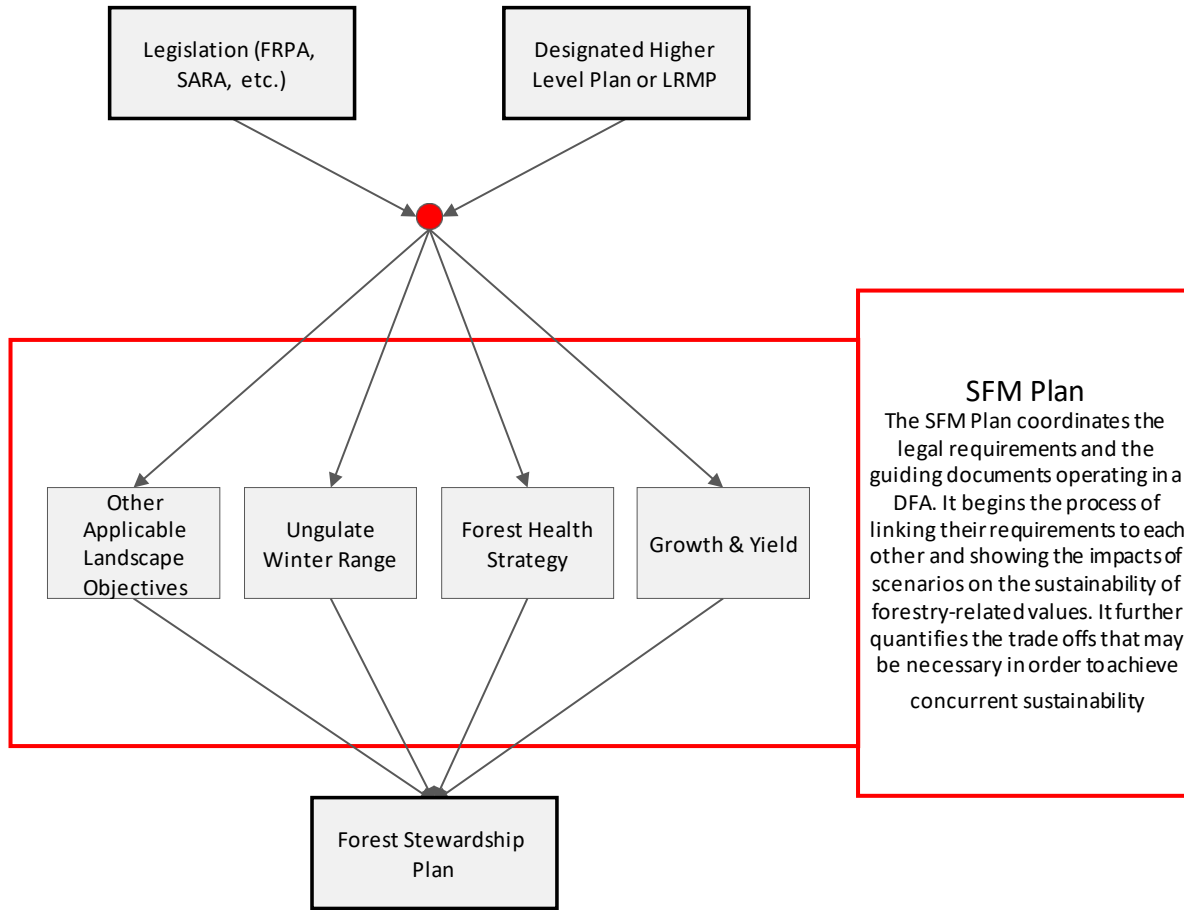
There are a number of policy, market and professional forest management drivers that are currently underway in BC. Few of these initiatives have been developed in context of each other or are linked within a larger planning environment, nor do they propose operational tools to address many of the strategic-level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

This SFM Plan describes the SFM system for the DFA. The SFM Plan is a comprehensive planning document that integrates provincial legislative requirements, as well as many previously implemented forestry or land use initiatives. Applicable legislation and the most influential initiatives are described below, providing a listing and description of the linkages to the SFM Plan. Table 4 provides information on how the SFM Plan addresses the listed initiative.

2.3.1 Strategic Forest Management Initiatives

Figure 5 depicts the intent and purpose of the SFM Plan in terms of addressing the current range of other decision-making processes relevant to forest management in British Columbia, i.e. legislation, policy and guidelines.

Figure 5: SFM Plan Linkage to Strategic Initiatives



Source: P. Jeakins, 2004

Table 4 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 were considered during the development, implementation, and maintenance of this SFM Plan.

Table 4: SFM Plan Links to Other Forest Management Initiatives

Forest Management or Sustainability Initiative	Linkage to SFM Plan
<i>Forest and Range Practices Act (FRPA)</i>	<p><i>FRPA</i> provides forest managers with a “results-based” legal structure upon which to develop and deliver forest management.</p> <p>The SFM Plan is also “results-based”. The SFM Plan provides the signatories the context to develop, implement and report on achievement of objectives either those set by government or proposed changes to set objectives. At a minimum, the SFM Plan must meet or exceed the requirements of <i>FRPA</i>. However, the documentation for the SFM Plan may provide the rationales for any proposed changes to any objectives identified in <i>FRPA</i>.</p>

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Forest Management or Sustainability Initiative	Linkage to SFM Plan
Higher Level Plan	<p>Community-based processes (such as the Commission on Resources and Environment (CORE) process in the Kootenay-Boundary Region 1993-1994) 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>
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 BC Chief Forester with information to make any necessary adjustments to the allowable annual cuts for the next five years, following the determination. <p>The SFM Plan currently addresses the first and second objectives. Once the SFM Plan is fully implemented, it is anticipated that elements of the TSR may be included in parts of the SFM Plan.</p>
<p>ISO 14001 Forest Management System (FMS)</p> <p>ISO 14001:2004 Certified</p> <p>Issued Nov. 18, 1999</p>	<p>ISO 14001 provides organizations with the elements of an effective environmental management system (EMS)². This system was developed in a manner that is easily integrated with other management systems. The FMS provides the management system framework required for the CSA Z809-02 Standard. Compliance with all regulatory requirements is described within the FMS.</p> <p>The FMS provides the foundation for the management system of the SFM Plan. The primary linkage between the FMS and SFM Plan will be in the areas of roles & responsibilities, tracking, monitoring, corrective actions, internal/external audits and reporting of performance, as well as regulatory compliance.</p>
Canadian Standards Association (CSA)	<p>The CSA Z809-08 Standard outlines the use of CCFM SFM criteria and CSA SFM elements. It requires public involvement in the process of setting locally appropriate values, objectives, indicators and targets. This SFM Plan is the document that supports the SFM Requirements of CSA Z809-08 Standards.</p>
Forest Stewardship Council (FSC)	<p>FSC-BC Standard outlines the requirements for 256 indicators for the 10 Principles within the 2005 Accredited Version. This SFM Plan is the document that supports the SFM Plan Requirements of Principle 7 – Management Plan.</p>

² ISO 14001 EMS of Canfor is called the Forest Management System (FMS)

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Forest Management or Sustainability Initiative	Linkage to SFM Plan
Land Based Investment Strategy (LBIS)	<p>LBIS provides funding to forest sector associations, researchers, tenure holders, manufacturers, and government agencies to: support sustainable forest management practices; improve the public forest asset base and promote greater returns from the utilization of public timber.</p> <p>LBIS (previously Forest Investment Account (FIA)) funding has been the financial support for many of the projects for testing SFM concepts including the original SFM Plan (circa 2004). More recently the funds are used for timber supply mitigation.</p>

2.3.2 Strategic Plans, Policies & Supporting Documents

In addition to the SFM Policies applicable to the DFA, addressing strategic policies/plans developed through other initiatives and legislation is essential for a complete understanding of SFM applicable to the DFA. These external, yet related documents are categorized into Strategic Plans/Policies (Table 5) or Supporting Documents (Table 6) and are listed below. Some of these requirements are in addition to being compliant with legislative and regulatory requirements established by federal, provincial or local levels of authority. The following contains a list of all DFA applicable strategic plans and/or policies.

Table 5: 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.
Timber Supply Review – AAC Determination & Supporting Documents: Invermere TSA (Nov. 1, 2005)* Cranbrook TSA (Nov. 1, 2005)* Kootenay Lake TSA (Aug. 12, 2010)	<p>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.</p> <p>TSR Data Package Submissions and Analysis Report (current) provide the inventory base and analysis rigor to assess SFM within the SFM Plan tactical planning section.</p> <p>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.</p>
Forest Stewardship Plan (FSP) Canfor Radium FSP #17– March 2006 Canfor Kootenay – November 2006	FSPs link government objectives to practices on the ground through various results and strategies. Under the <i>FRPA</i> 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 is the responsibility of the individual licensee to ensure that SFM principles are upheld through implementation of this and other operational plans. Canfor’s approved FSPs are currently being revised and amalgamated into one FSP for the Kootenay DFA. Under the approved FSP Canfor’s site level plans will be developed and implemented to reflect SFM requirements.

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Strategic Plan / Policy	Linkages to SFM Plan
Forest Health Strategy	<p>Applicable Forest Health strategies identify the known forest health factors in the applicable 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.).</p> <p>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 SFM 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).</p>
Silviculture Strategy (Type I) Invermere, Cranbrook, and Kootenay Lake TSA	<p>The Type I Silviculture Strategies identify 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.</p>
FIA – Land Based Investment Rationale (LBIR),	<p>The LBIR identifies land-based resource management issues and projects based on biological needs and local forest management priorities through collaboration between government, licensees and key stakeholders. This initiative is to provide managers information required to support informed resource management investment decisions. Funding from this program has been the financial support to many of the solutions and/or testing of SFM thinking, as well as the original SFM Plan.</p>
Provincial Strategic Data – GeoBC (GeoBC - Home Page)	<p>GeoBC creates and manages geospatial information and products all natural resource sector (NRS) agencies. Areas directly tied to SFMP functions:</p> <ol style="list-style-type: none"> 1. Standard set of base spatial data (e.g. roads, hydrology, terrain, etc.), 2. Provincial Crown land registries (2) – information repositories of Provincial rights and obligations.

* At the time of the writing of this SFM Plan, TSR4 process and determination was underway. The AAC Determination is expected to be made by Winter 2016. Changes to this SFM Plan and/or components will be completed as needed.

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

Table 6: SFM Plan – Supporting Documents/Systems

Supporting Document(s), Date	Linkages to SFM PLAN
Canfor Forest Stewardship Plan (FSP)³, 2006	The FSP is a plan that is required under <i>FRPA</i> . It provides “results” and “strategies” for forest practices – many of which are aligned with the SFM Criteria & Indicators.
Canfor Woodlands, FMS	The FMS is an important component describing Canfor’s overall standard operating procedures for environmental management and linkages to sustainable forest management.
PAG documents (i.e. TOR, minutes from meetings, etc.).	Provides details on the public involvement process in the development and maintenance of the SFMP. Available at Canfor Radium Woodlands office.
Relationship Protocol and Engagement and Benefits Agreement	Agreements signed between the Ktunaxa Nation Council and Canfor. Outlines each parties interests and the relationship between them.

2.4 Canfor’s SFM Plan – Local Level

The first step in developing the SFM Plan for the DFA was to clearly state senior management’s SFM Commitments. The SFM Commitments⁴ provide the foundation and guidance to Canfor.

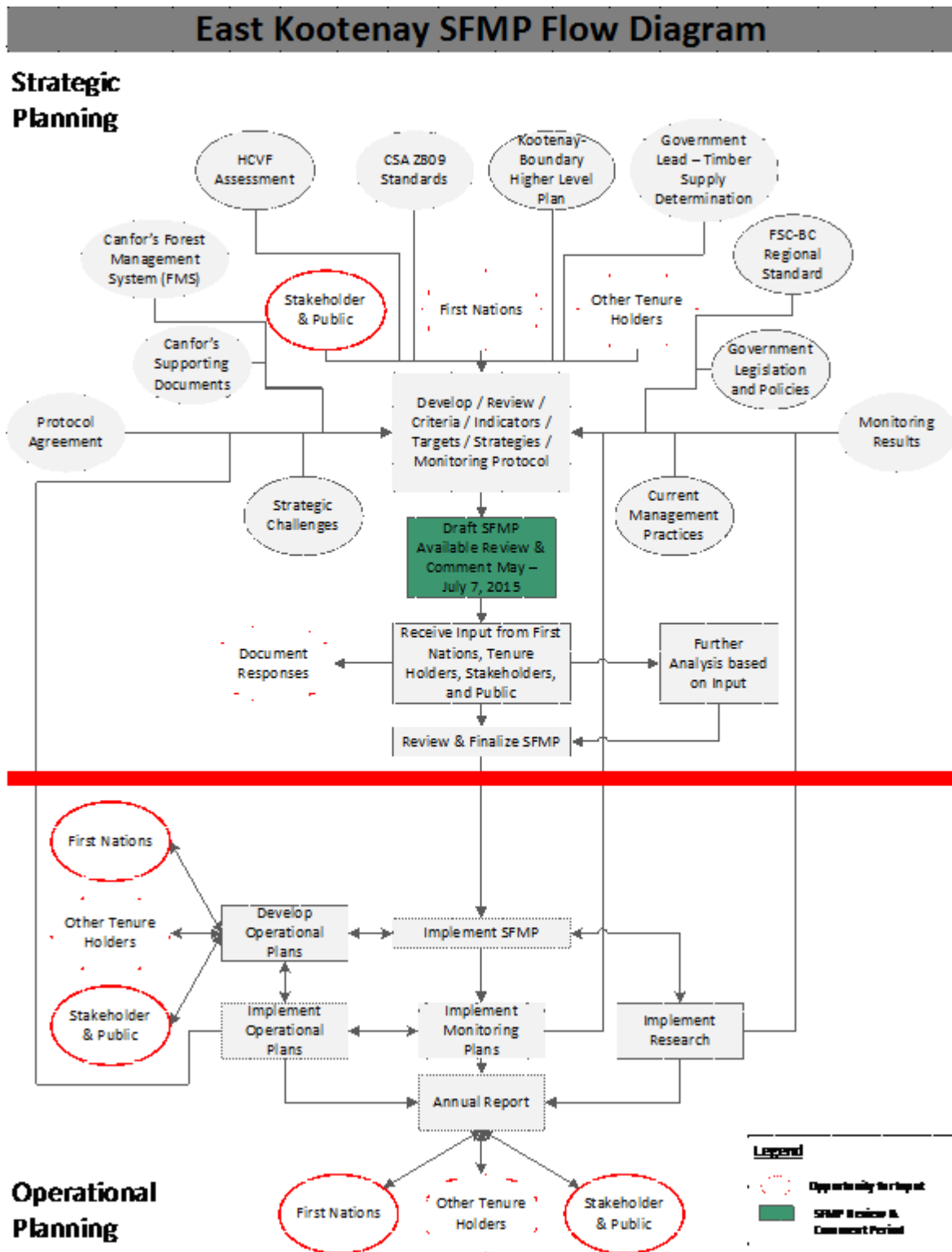
Following the tenets set out in the SFM Commitments, a number of key activities were undertaken to establish the foundation for a formal planning process. The activities included:

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

³ 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 may be in place for up to ten 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.

⁴ SFM Policies for Canfor are found within the Preamble to this SFM Plan

Figure 6: Canfor's SFMP Planning Flow Diagram



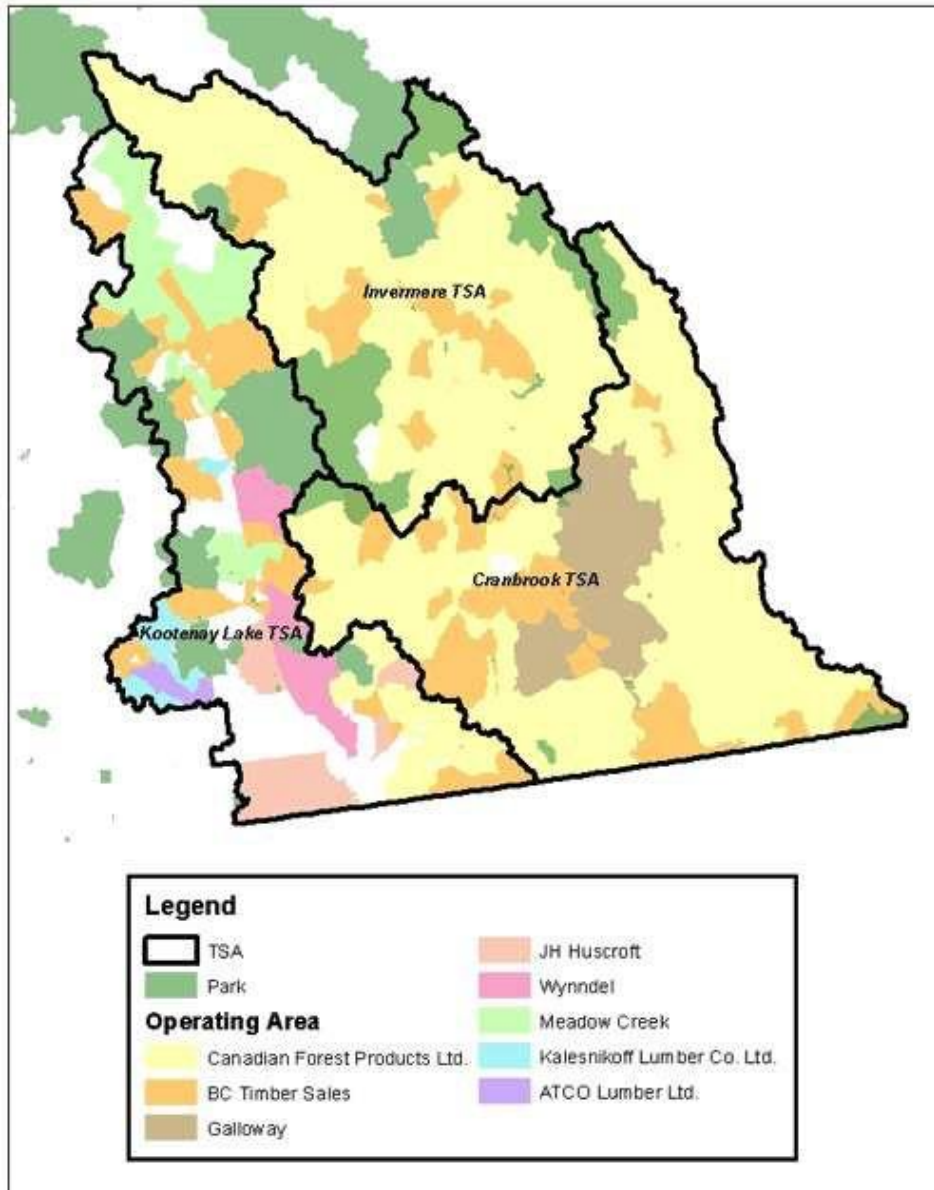
3.0 Background to the SFM Plan

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.

3.1 Geographical Description

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 and 1.48 million hectares in the Cranbrook TSA. Canfor also has operations in the Kootenay Lakes Forest District. The district contains approximately 1.24 million hectares within the Kootenay Lake TSA.

Figure 7: Canfor– Kootenay Operations Map



Canfor Kootenay Operations SFM Plan

The DFA of this SFM Plan includes Canfor’s public land in the BC Ministry Forests Lands and Natural Resource Operations (FLNRO) Kootenay/Boundary Region – Rocky Mountain Forest District (Table 7).

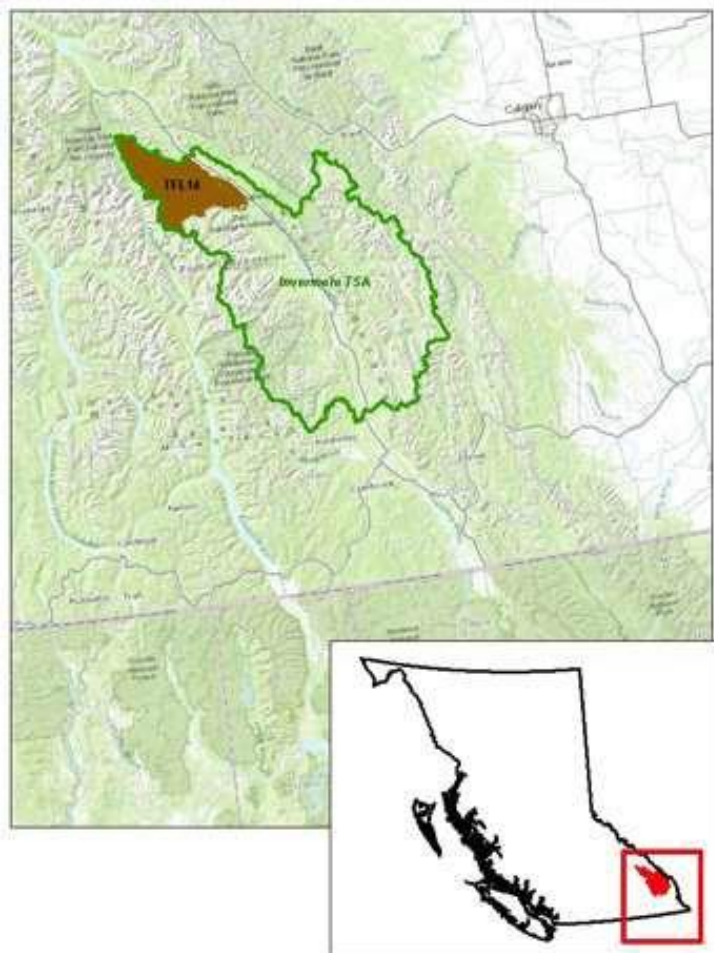
Table 7: Canfor FMG Operations

Licence Management Unit Name		Tenure Type ⁵	CFLB	THLB	Certification
TFL 14	TFL 14	Area-based	72,378	52,822	FSC
Invermere	FL A18979	Volume-based	554,650	233,873	CSA
Invermere	FL A18978	Volume-based			FSC
Cranbrook	FL A19040	Volume-based	760,590	416,196	FSC
Kootenay Lake	FL A20212	Volume-based	613,299	257,850	FSC

Tree Farm Licence 14 (TFL 14)

TFL 14 lies in the northern part of the Rocky Mountain Forest District in the Southern Interior Region of British Columbia (Figure 8). This management unit is bounded to the southeast by the Invermere Timber Supply Area (TSA), to the southwest by the Kootenay Lake TSA, and to the north by the Golden TSA.

Figure 8: TFL 14 Area Map



⁵ Forest tenure (either area-based or volume-based) issued by the government of British Columbia. It grants Canfor the right to harvest Crown timber each year, during the term of the Licence, from areas of Crown land within specified boundaries, which are specified in cutting permits and road permits.

Canfor Kootenay Operations SFM Plan

Table 8 provides a landbase summary of TFL 14. As well, the land base net down summary is provided in Table 9. A coarse map illustrating the locations of the CFLB and THLB is shown below (Figure 9).

Table 8: TFL 14 Landbase Summary

TFL 14 Land Base	Area (ha)
Total Land Base	161,210
Total Productive Landbase – Crown Forested Land Base (CFLB) – approx. 45%	72,378
Non-Productive (non-forest, swamp, alpine area, glaciers, lakes, snowfields, rock, existing roads and trails) – approx. 55%	88,832
Timber Harvesting Land Base (THLB) – approx. 33% of landbase	52,822

Source: Timber Supply Analysis, Management Plan No. 9 – Information Package, April 25, 2007

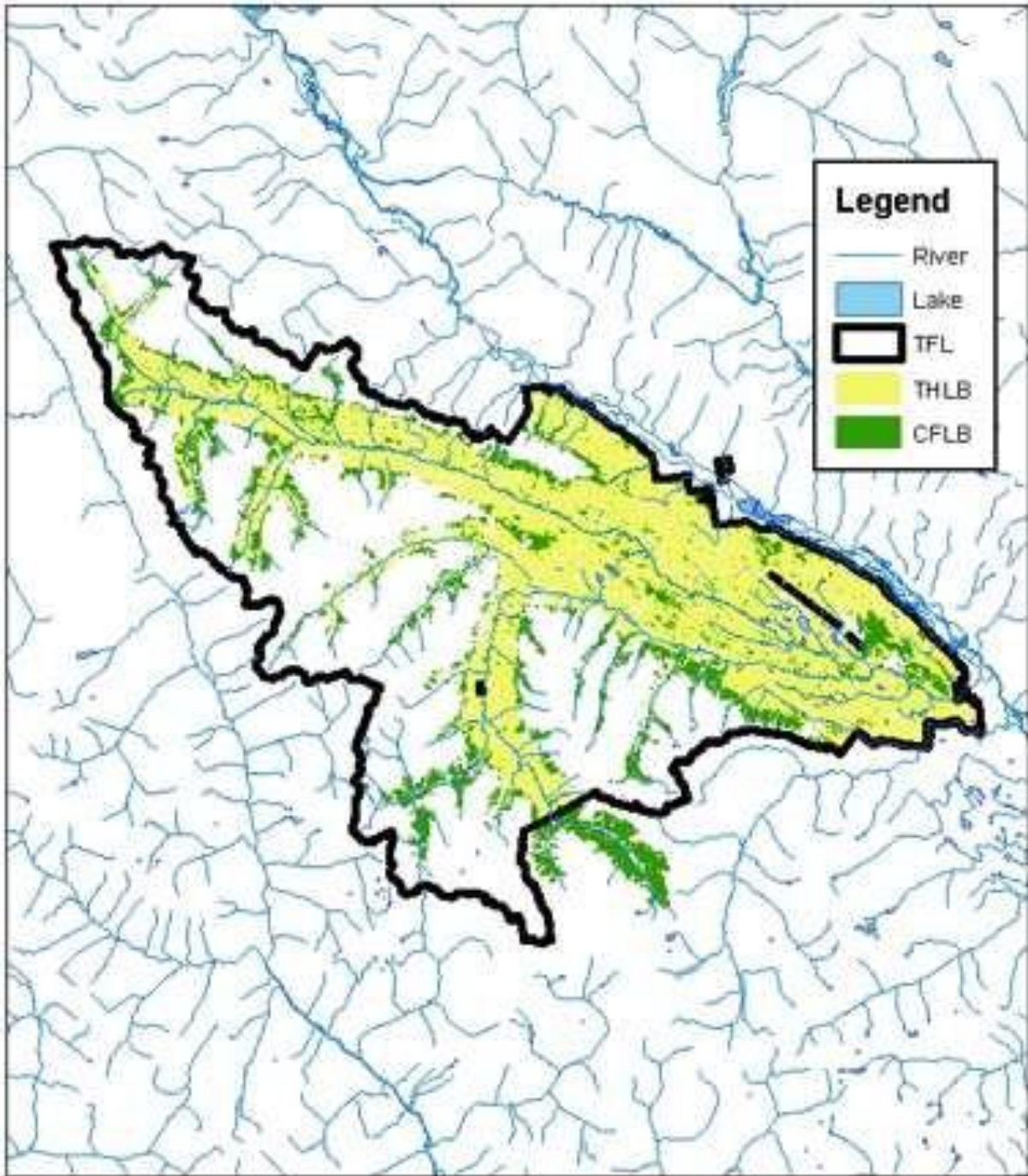
TFL 14 encompasses four Landscape Units, a landscape unit being the principle unit for long-term planning of resource management activities and biodiversity conservation. The four landscape units are the Twelve Mile Landscape Unit (I38); the Lower Spillimacheen Landscape Unit (I35); the Upper Spillimacheen Landscape Unit (I37); and the Bobbie Burns Landscape Unit (I34).

Table 9: TFL 14 Landbase Area Netdown Summary

	Area (ha) Schedule A	Area (ha) Schedule B	Area (ha) Bugaboo Park (*)	Area (ha) Total	Net merch volume ⁺ Schedule A	Net merch volume ⁺ Schedule B	Net merch volume ⁺ Total
Total land base	138	150172	10900	161210	18	13212	13230
Reductions							
Water	0	1414	69	1483	0	0	0
Non-forest, non-productive forest	19	77266	8110	85395	0	0	0
Non-commercial brush	0	177	53	230	0	0	0
Roads, trails, landings	3	1715	7	1724	0	232	232
Total productive land base (*)	115	69,601	2,662	72,378	18	12,980	12,998
Reductions							
Bugaboo Park - LU I34 (**)	0	0	2662	2662	0	0	0
Inoperable	0	9859	0	9859	0	2040	2040
Unstable terrain	0	1069	0	1069	0	274	274
Environmentally sensitive	0	413	0	413	0	60	60
Non-merchantable	50	1863	0	1913	0	82	82
Riparian Reserves	1	1842	0	1843	0	465	465
Wild life tree patches	0	1764	0	1764	0	543	543
Block reserves							
PSP reserves	0	33	0	33	0	7	7
Total Reductions	51	16844	2662	19556	0	3471	3471
Current Timber Harvesting Land Base	65	52,757	0	52,822	18	9,509	9,527
Future WTPs	1	580	0	581			
Future roads and trails	1	997	0	998			
Net long-term Timber Harvesting Land Base	63	51,190	0	51,253			

Source: Timber Supply Analysis, Management Plan No. 9 – Information Package, April 25, 2007

Figure 9: TFL 14 – Land Base Classification Map



Invermere TSA

The Invermere TSA (Figure 10) is within the Southern Interior Forest Region – Rocky Mountain Forest District and is administered out of the district office in Cranbrook. 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 10: Invermere Timber Supply Area Map

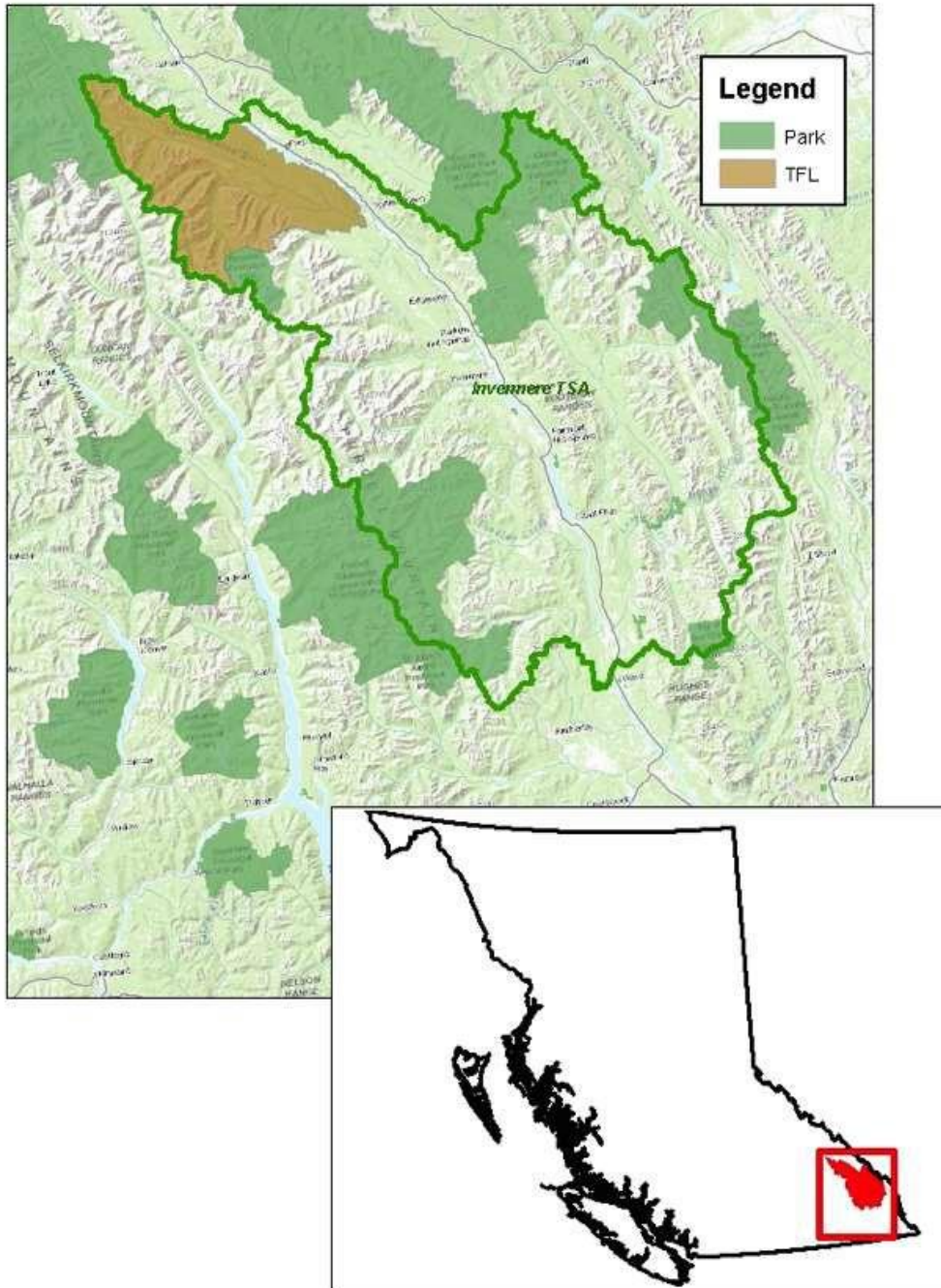


Table 10 below provides a landbase summary for the TSA. As well, the land base net down summary is provided in Table 11. A coarse map illustrating the locations of the CFLB and THLB is shown below (Figure 11).

Canfor Kootenay Operations SFM Plan

Table 10: Invermere TSA Landbase Summary

Invermere Land Base	Area (ha)
Total Land Base	1,153,073
Crown Ownership	1,062,775
Total Productive Landbase – Crown Forested Land Base (CFLB) ⁶ – approx. 48%	554,650
Non-Productive ⁷ &/or not Managed by the Crown ⁸ – approx. 52%	598,423
Timber Harvesting Land Base (THLB) ^{9,10}	233,873

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

Table 11: Landbase Area Netdown Summary¹¹

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%	8,196		
Other Future Reductions:				
FMER Open Range		1,585		
Future roads, trails and landings		11,016		
Long-term Timber Harvesting Land Base (ha)		213,097		

* 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.

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 i.e. rock, ice, alpine, etc

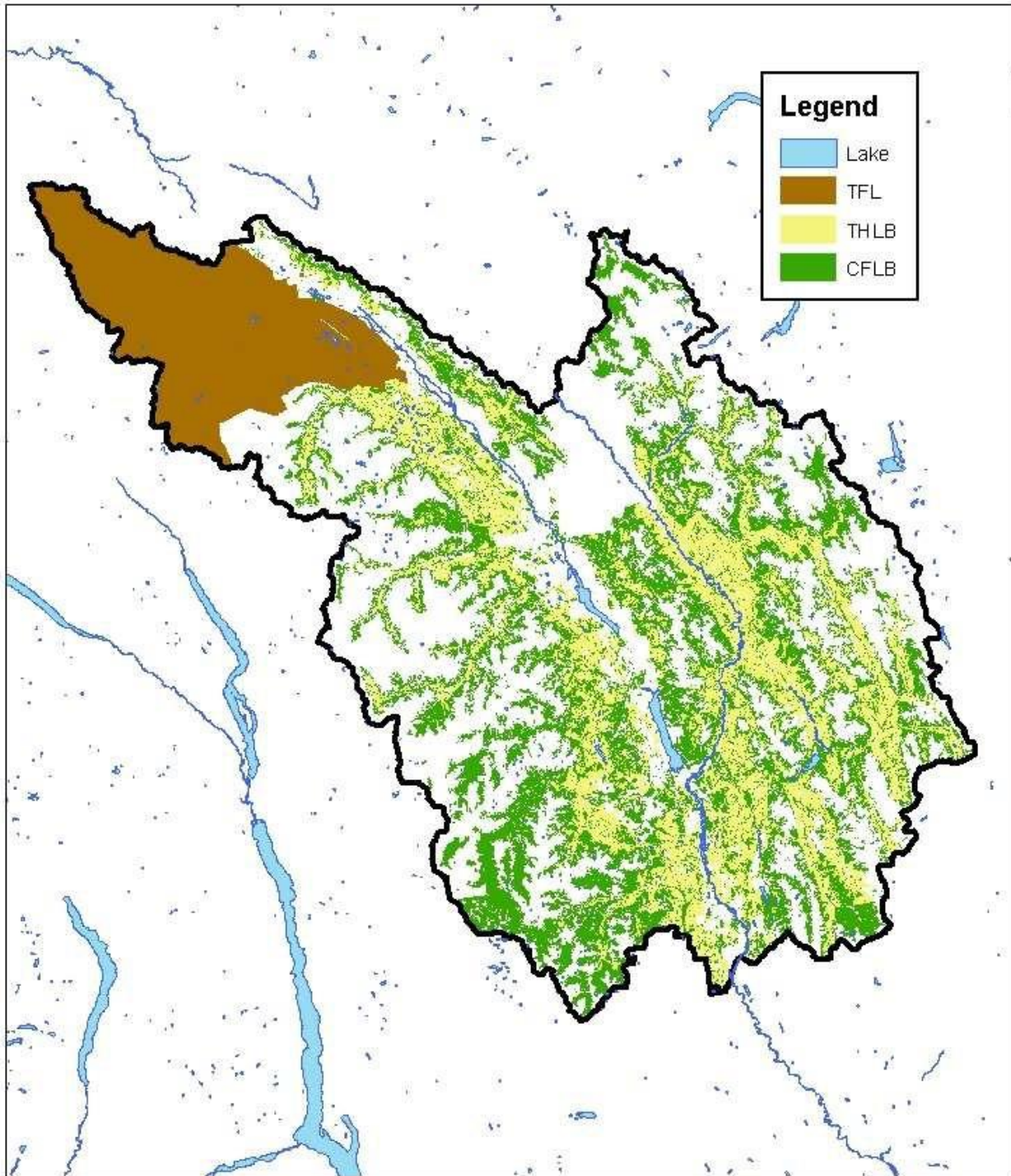
⁸ Private, Indigenous Peoples, Woodlots

⁹ 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.

¹⁰ Within the CFLB, only about 42% is considered economically and biologically available for timber harvesting (20% of the total TSA).

¹¹ Data Source: Invermere TSA Timber Supply Review 3 Analysis Report V3.0, May 12, 2004

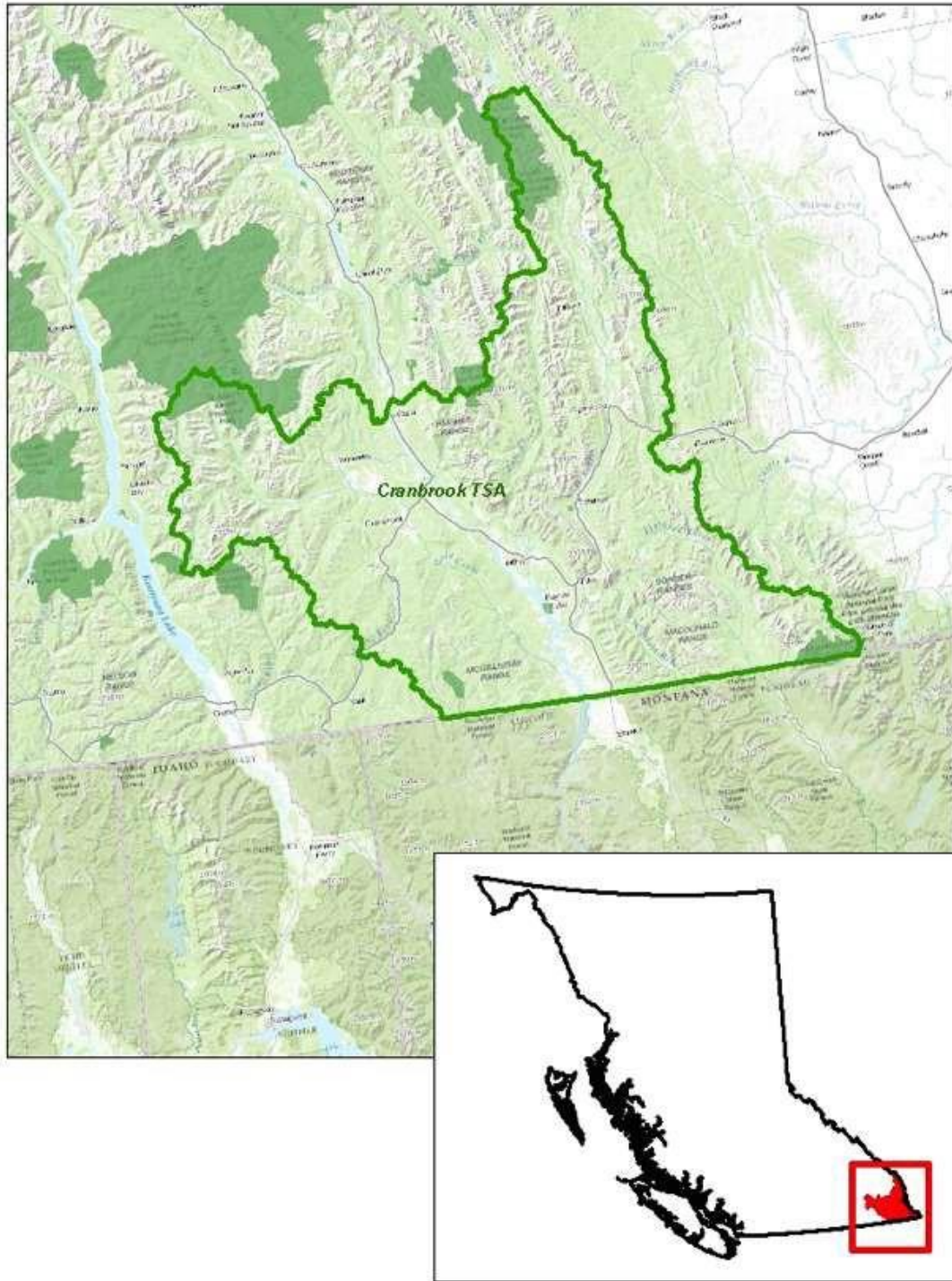
Figure 11: Invermere TSA – Land Base Classification Map



Cranbrook TSA

The Cranbrook TSA (Figure 12) is within the Southern Interior Forest Region – Rocky Mountain Forest District and is administered out of the district office in Cranbrook. The Cranbrook TSA is bounded by Alberta to the east, the USA to the south, and the Kootenay Lake and Invermere TSA to the west and north, respectively.

Figure 12: Cranbrook Timber Supply Area Map



Canfor Kootenay Operations SFM Plan

Table 12 provides a landbase summary of the TSA. As well, the land base net down summary is provided in Table 13. A coarse map illustrating the locations of the CFLB and THLB is shown below (Figure 13).

Table 12: Cranbrook TSA Landbase Summary

Cranbrook Land Base	Area (ha)
Total Land Base	1,484,302
Crown Ownership	1,244,351
Total Productive Landbase – Crown Forested Land Base (CFLB) ¹² – approx. 51%	760,590
Non-Productive ¹³ &/or not Managed by the Crown ¹⁴ – approx. 49%	723,712
Timber Harvesting Land Base (THLB) ^{15,16}	416,196

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

Table 13: Cranbrook TSA Landbase Area Netdown Summary¹⁷

Factor	Total area (ha)	Effective Area (ha)*	% of Total Area	% of Crown forest
Total Area (old Cranbrook Forest District)	1,484,302	1,484,302	100	
Less:				
Private, Federal, Dominion and First Nation reserves	225,556	225,556	15.2%	
Woodlots, X-mas tree permits, Misc Leases	14,394	14,394	1.0%	
Total TSA Area	1,244,351	1,244,351		
Non-forest / Non-productive forest	495,333	451,926	30.4%	
Non-Commercial Brush	3,884	3,474	0.2%	
Backlog NSR (non-productive stands)	643	525	0.0%	
Unclassified existing roads, trails and landings	28,052	27,836	1.9%	
Total Crown Forested Land Base** (CFLB)		760,590	51.2%	100%
Less:	In CFLB:			
Parks and Reserves	22,389	22,389	1.5%	2.9%
Inoperable/Inaccessible	256,408	238,714	16.1%	31.4%
Operable/Inaccessible (Slope > 70%)	9,724	257	0.0%	0.0%
Unstable Terrain	17,175	5,871	0.4%	0.8%
Environmentally Sensitive Areas (excluding Es – areas with extremely fragile or unstable soils)	60,937	7,341	0.5%	1.0%
Non-Merchantable	30,717	11,390	0.8%	1.5%
Low Sites	59,689	11,582	0.8%	1.5%
Problem Forest Types	163,852	17,856	1.2%	2.3%
Riparian Management Areas	42,567	26,740	1.8%	3.5%
Existing Wildlife Tree Patches	2,897	2,254	0.2%	0.3%
Timber Harvesting Land Base –THLB (ha)		416,196	28.0%	54.7%
Volume Reductions:				
Identified Wildlife Management Strategy	0%	0		
Future Wildlife Tree Patches and Inblock Retn (%)	2.7%	11,237		
Other Future Reductions:				
FMER Open Range		19,382		
Future roads, trails and landings		19,997		
Long-term Timber Harvesting Land Base (ha)		365,580		

* 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.

¹² 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

¹³ i.e. rock, ice, alpine, etc

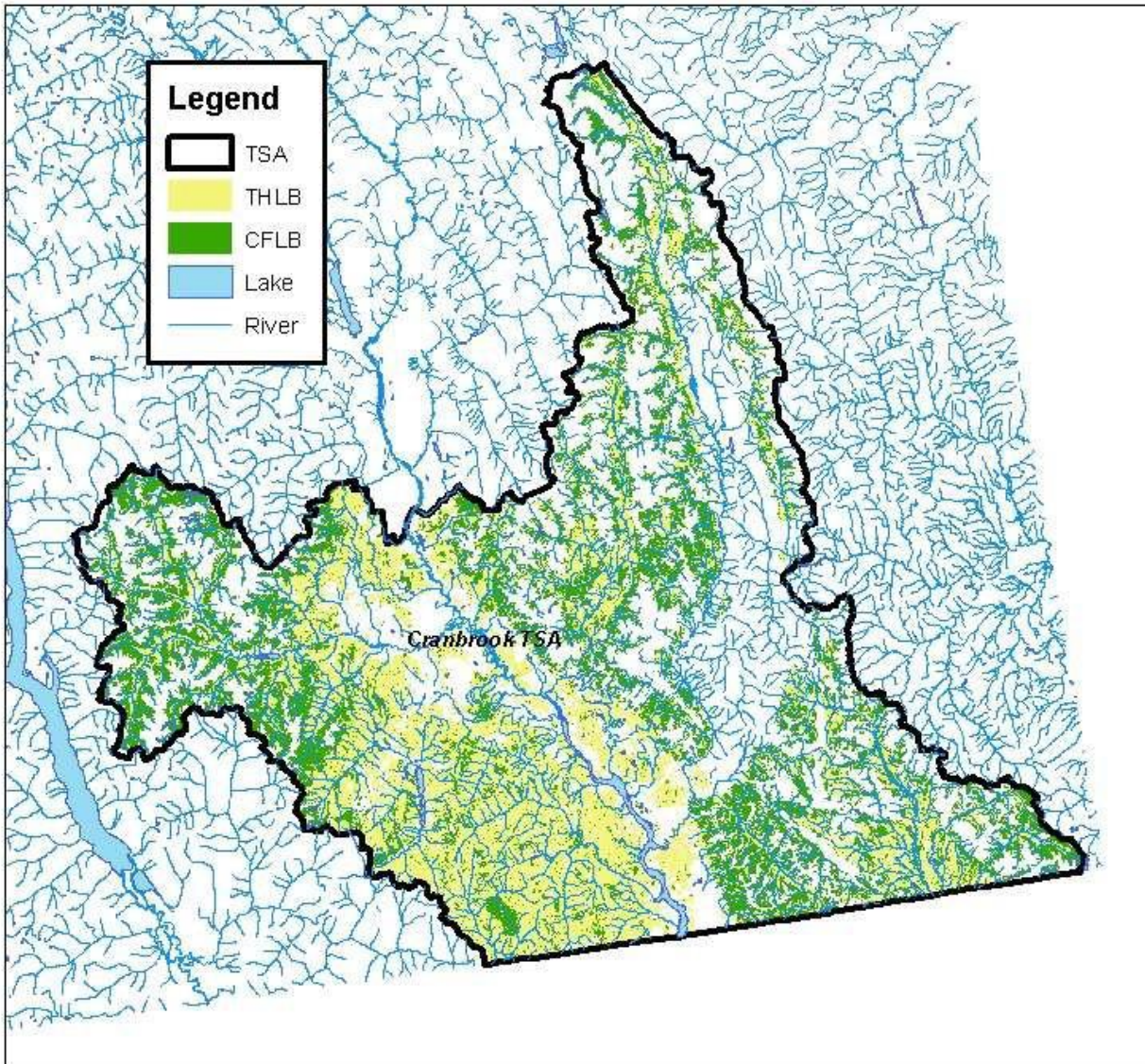
¹⁴ Private, Indigenous Peoples, Woodlots

¹⁵ 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.

¹⁶ Within the CFLB, only about 55% is considered available for timber harvesting (33% of the total TSA).

¹⁷ Data Source: Cranbrook TSA Timber Supply Review 3 Analysis Report V3.0, May 11, 2004

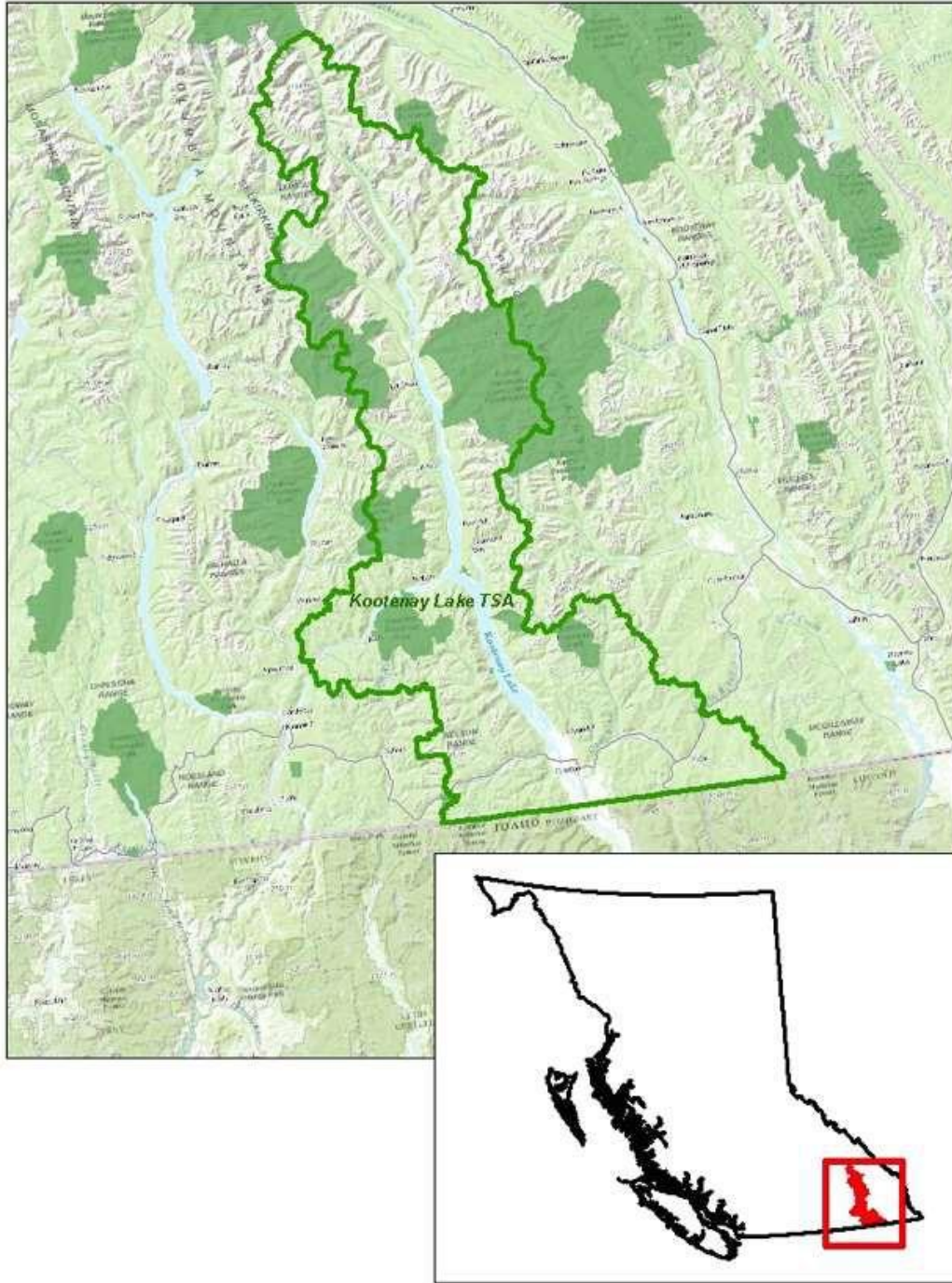
Figure 13: Cranbrook TSA – Landbase Classification Map



Kootenay Lake TSA

The Kootenay Lake TSA (Figure 14) is within the Southern Interior Forest Region – Kootenay Lake Forest District and is administered out of the district office just east of Nelson. The TSA is centred around Kootenay Lake, and runs in a long strip from the U.S. border in the south to Glacier National Park in the north. It is bounded by the Arrow Lake TSA on the west and by the Invermere and Cranbrook TSAs to the east.

Figure 14: Kootenay Lake Timber Supply Area Map



Canfor Kootenay Operations SFM Plan

Table 14 provides a landbase summary of the TSA. As well, the land base net down summary is provided in Table 15. A coarse map illustrating the locations of the CFLB and THLB is shown below (Figure 15).

Table 14: Kootenay Lake TSA Landbase Summary

Kootenay Lake Land Base	Area (ha)
Total Land Base	1,240,843
Total Productive Landbase – Crown Forested Land Base (CFLB) – approx. 46%	569,620
Timber Harvesting Land Base (THLB) ¹⁸ – approx. 35% of TSA landbase	199,282

Source: Kootenay Lake TSA Technical Summary of Timber Supply Analysis, September, 2009

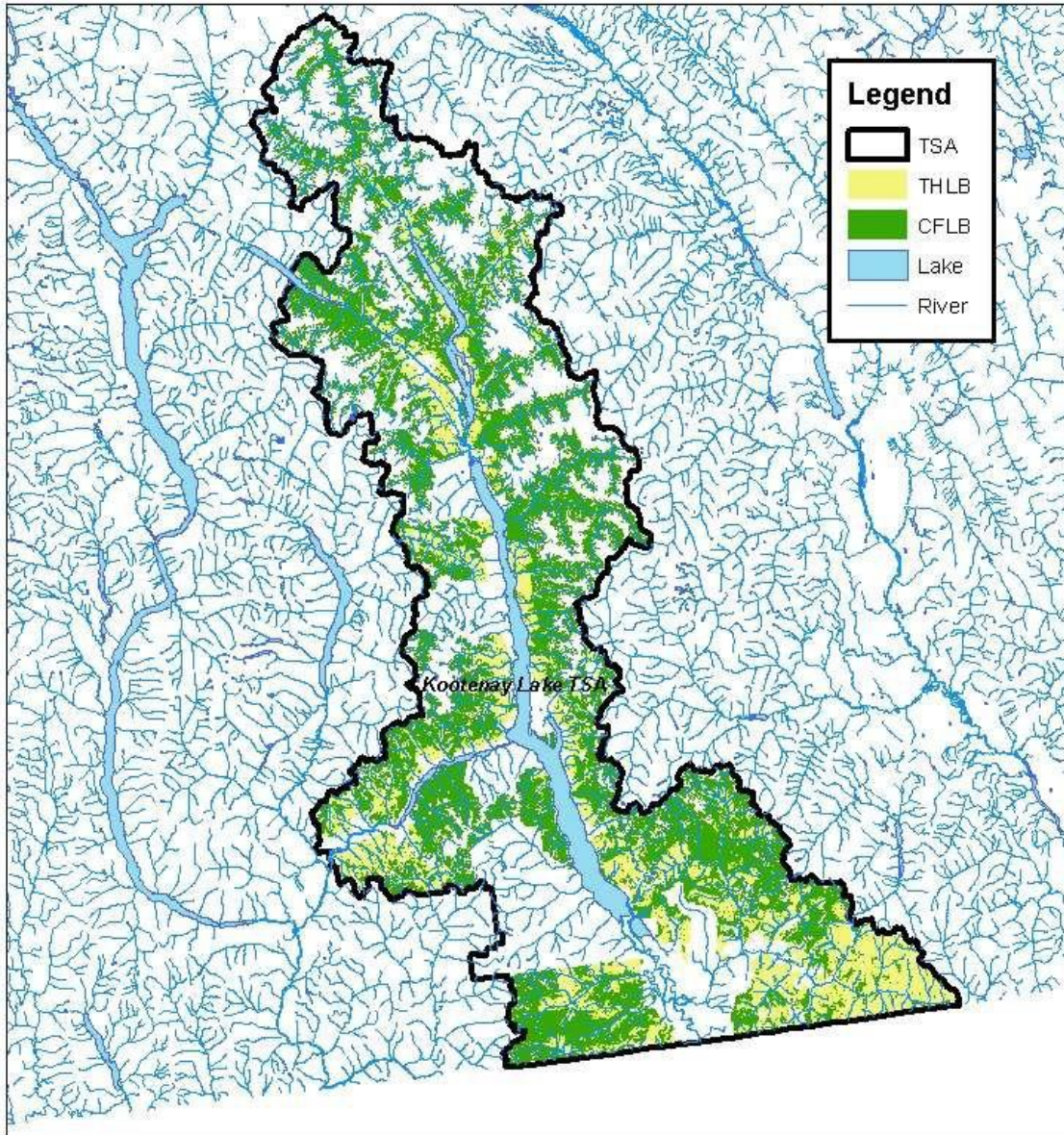
Table 15: Kootenay Lake TSA Landbase Area Netdown Summary¹⁹

Land classification	Data package reference section	Area (ha)		Sequential netdown to determine THLB (ha) ⁴
		Total	CFLB	
Total area		1,240,843		1,240,843
Non-forest / non-productive	3.1.5	535,311		-535,311
Not administered by the province of BC ¹	3.1.1 & 3.1.2	119,866		-77,611
Not administered by the MFR for timber supply ²	3.1.3 & 3.1.4 & 3.1.9	86,891		-58,301
Crown forested land base		569,620	569,620	569,620
Park ³	3.4.4	219,014	96,682	-95,291
Old growth management areas	3.4.12	264,535	112,521	-63,895
Inoperable areas	3.2.1	708,417	232,284	-126,418
Uneconomic areas	3.2.2	41,052	7,979	-1,715
Low timber productivity	3.2.3	88,520	34,423	-6,844
Problem forest types	3.2.3	76,795	49,177	-14,034
Caribou	3.4.11	217,185	109,159	-35,210
Sensitive terrain areas	3.4.1	101,561	52,203	-15,637
Riparian areas	3.4.3	50,111	22,358	-8,537
Existing roads and trails	3.1.6	7,001	3,813	-2,541
Railways and transmission lines	3.1.8	1,909	364	-216
Current timber harvesting land base				199,282

¹⁸ 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.

¹⁹ Data Source: Kootenay Lake TSA Technical Summary of Timber Supply Analysis, September, 2009

Figure 15: Kootenay Lake TSA – Landbase Classification Map



3.2 Biophysical Description

The DFA includes a wide variety of ecosystems from low elevation grasslands in the valley bottoms to rugged mountains with rocky peaks and alpine areas. Straddling two mountain ranges, the Purcell Mountains to the west and the Rocky Mountains to the east, the DFA is split down the middle by the Rocky Mountain Trench, a broad, flat valley running north-south with two major rivers and numerous 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.

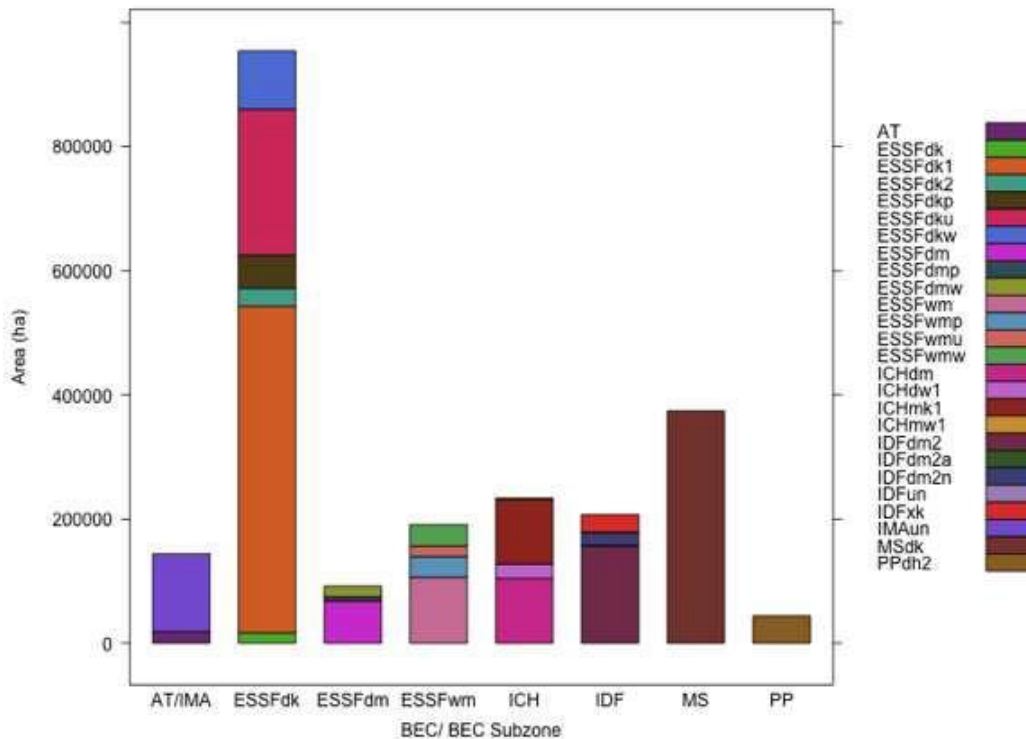
Biogeoclimatic Ecosystem Classification (BEC) & Forest Types

The DFA contains six main biogeoclimatic (BEC) zones (relative area in the DFA – Figure 16). These zones reflect differences in terrain, climate and the species of trees that are present. Listed from high to low elevation, these are:

- Alpine Tundra (AT) / Interior Mountain-Heather Alpine (IMA)
- Engelmann Spruce-Subalpine Fir (ESSF)
- Montane Spruce (MS)
- Interior Cedar-Hemlock (ICH)
- Interior Douglas-Fir (IDF)
- Ponderosa Pine (PP)

Each of these zones is divided further into subzones, indicated with lower case letter codes, and variants, indicated with numbers. Detailed information on British Columbia’s biogeoclimatic system and how it works can be found here: [BECweb](#) A detailed description of each of the BEC zones in the DFA, including photos, climate, natural disturbances, tree species, and characteristics of wildfire that occurs within it, can be found in Section 4.3 The Range of Natural Variability.

Figure 16: Relative area of each of the BEC variants in BEC version 6.0, in the DFA



Parks

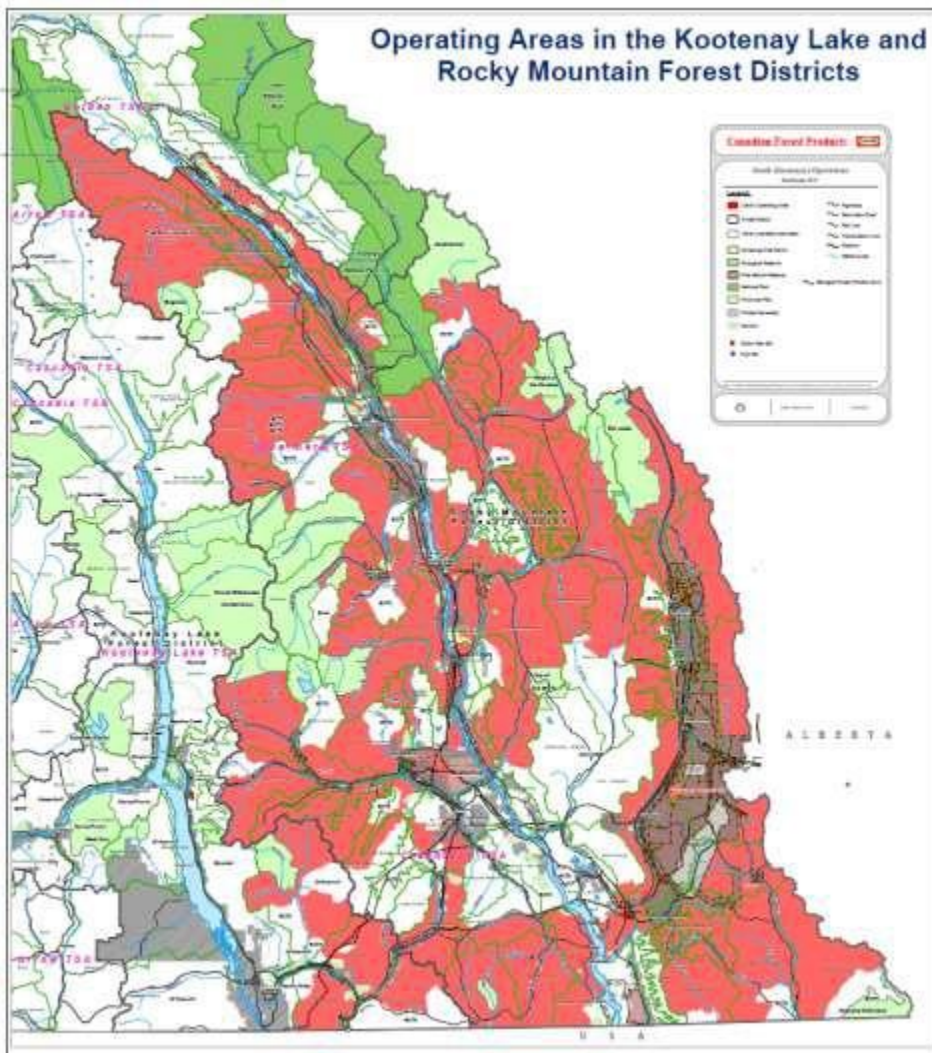
TFL 14 is bordered by three protected areas: Glacier National Park (established 1886) to the north western side; the Columbia Wetlands Wildlife Management Area (established 1996) to the eastern side; and the Bugaboo Alpine Recreation Area (established 1969 and expanded in 1994) to the south side.

There are 232,340 hectares of parks and reserves in the Invermere TSA. That area includes one national park (Kootenay) and eleven provincial parks ranging in size from very large to very small; 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.

The Cranbrook TSA offers many and varied opportunities for recreation and tourism, due to its lakes, parks and spectacular mountains. The area is well travelled, as Highway 3 and 93 are major access routes to Alberta and the national and provincial parks in the Canadian Rockies. Within the Cranbrook TSA, there are the Akamina-Kishinena, Elk Lakes, and Gilnockie Provincial Parks as well as numerous smaller parks and recreation areas and portions of the Purcell Wilderness Conservancy, Height of the Rockies Provincial Park, and Top of the World Provincial Park.

The portion of the Kootenay Lake TSA within and bordering the DFA contains the western half of the Purcell Wilderness Conservancy.

Figure 17: National and Provincial Parks and Wilderness Areas in and Adjacent to the DFA



Wildlife & Fish

Canfor's DFA lies in the East Kootenay region, which is renowned for its density and diversity of wild ungulate and large predator populations. This wealth of wildlife is made possible by the great variety of habitat types available in the area, including some of the highest ranked ungulate winter range for elk, deer, and bighorn sheep in the province of British Columbia. Ungulate species present in the DFA include elk, mule deer, whitetail deer, moose, Rocky Mountain bighorn sheep, mountain goat, and caribou. Carnivores present include cougar, wolf, coyote, black bear, grizzly bear, otter, fisher, marten, skunk, weasel, badger, wolverine, bobcat, lynx, mink, and fox. In total, 64 species of mammals reside within the East Kootenay region.

The East Kootenay also supports a high diversity of breeding and migratory bird species. Approximately 174 species of birds are known to breed within the DFA, and many more species migrate through, stopping on the numerous lakes and wetlands, particularly the Columbia Wetlands.

Eight species of amphibians, six reptiles, and 18 species of fish (including introduced species) also inhabit the area. The DFA contains many important lakes, creeks and rivers from a sport fishery perspective, and many lakes are stocked.

Finally, there are also diverse communities of terrestrial and aquatic mollusks, butterflies, dragonflies and damselflies, and other invertebrates.

As of September 2015, there were 86 species at risk in the East Kootenay and likely occurring within the DFA (Table 16). Species at Risk is defined here as being listed as Endangered, Threatened, or Special Concern by the Canadian government under the *Species at Risk Act (SARA)*, recommended for listing on SARA by COSEWIC (Committee for the Status of Endangered Wildlife in Canada), or on the Red (Endangered or Threatened) or Blue (Vulnerable) list by the BC Conservation Data Centre. The actual species and notes about them are given in Table 17.

Table 16: Number of Listed Species in the DFA

Species Group	Number of Species at Risk
Fish	6
Amphibians and Reptiles	7
Birds	18
Mammals	14
Invertebrates	33
Trees	2
Plants	6
TOTAL	86

Table 17: Listed Species that Breed within the DFA

Species	Conservation Status ^a (SARA; BC CDC)	Present in East Kootenay and Location
Fish		
White Sturgeon – Kootenay River Population	Endangered; Red-listed in BC	In Kootenay River mainstem, including Kooconusa
Burbot	Lower Kootenay population is red-listed; Upper Kootenay is yellow-listed (secure)	Lower Kootenai River population occurs from Kootenai Falls, Montana, downstream through Idaho to Kootenay Lake, BC. Currently, only one tributary stream is known to support spawning (Goat River, BC).
Westslope Cutthroat Trout, <i>lewisi</i> subspecies	Special Concern; Blue-listed in BC	Confirmed-Widespread
Bull Trout	Not at Risk (Pacific population); Blue-listed	Confirmed-Widespread
Rocky Mountain Sculpin, <i>Cottus</i> species	Special Concern; Blue	Flathead drainage
Kokanee	Not listed or assessed, but a species of regional importance	Confirmed, Kooconusa and Kootenay and tribs for spawning
Amphibians and Reptiles		
Coeur d'Alene Salamander	Special Concern; Yellow-listed	Confirmed at 3 locations in the EK
Western Toad	Special Concern; Blue-listed, rare (IUCN)	Confirmed-Widespread, possibly declining
Rocky Mountain Tailed Frog	Endangered (SARA), Recommended for Threatened (COSEWIC); Red-listed	Confirmed in 2 watersheds (Yahk, Flathead)
Northern Leopard Frog	Endangered; Red	Was extirpated; reintroduced to Bumpers Flats and the Columbia Wetlands (also Duck Lake, out of study area)
Painted Turtle Intermountain Rocky Mountain Population	Special Concern; Blue-listed	Confirmed in many small lakes in the trench
Western Skink	Special Concern; Blue-listed	Only confirmed sighting near Moyie Prov. Park, some sightings in KLD
Northern Rubber Boa	Special Concern; Yellow-listed	Confirmed
Birds		
Prairie Falcon	Not at Risk; Red-listed	Confirmed sightings in breeding season
Peregrine Falcon, <i>anatum</i> ssp.	Special Concern; Red-listed	Confirmed breeding sites in EK
Broad-winged Hawk	Not assessed; Blue-listed	One confirmed breeding record in one year (TFL 14)
Swainson's Hawk	Not assessed; Red-listed	Occasional nesting records near AB border
Long billed Curlew	Special Concern; Blue-listed	Confirmed breeding from several locations
Short-eared Owl	Special Concern; Blue-listed	Sighting at Bumpers Flats. Could not be confirmed during systematic surveys in 2003.
Western Screech Owl, <i>macfarlani</i> subspecies	Endangered (recommended threatened in 2012); Red-listed	Confirmed – systematic surveys
Flammulated Owl	Special Concern; Blue-listed	Confirmed – systematic surveys
Common Nighthawk	Threatened; Yellow-listed	Confirmed from public sightings – no

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Species	Conservation Status ^a (SARA; BC CDC)	Present in East Kootenay and Location
		systematic surveys.
Lewis's Woodpecker	Threatened; blue-listed	Confirmed - systematic surveys
Olive-sided Flycatcher	Threatened; Blue-listed, rare (IUCN)	Confirmed; widespread
Barn Swallow	Recommended for Threatened; Blue-listed	Confirmed; low elevation grasslands
Bank Swallow	Recommended for Threatened; Blue-listed	Confirmed; nests in natural stream banks, hoodoos, some steep road cuts.
Williamson's Sapsucker	Endangered; blue-listed	Confirmed; roughly 50 nest sites found in the East Kootenay to date
American Bittern	Not assessed; Blue-listed	Confirmed. All areas with > 1-2 pairs are within Wildlife Management Areas.
Great Blue Heron, <i>herodias</i> subspecies	Not assessed; Blue-listed	Confirmed
Black Swift	Recommended for Endangered (COSEWIC 2015); Blue-listed	Known from various valley bottom areas (eBird) and areas with canyons (Kootenay National Park)
Bobolink	Recommended for threatened; Blue-listed	A few known breeding locations in fields
Mammals		
Northern Myotis	Endangered; Blue-listed	Distribution uncertain. Could be widespread or just a few locations
Little Brown Myotis	Endangered; Blue-listed	Confirmed, fairly widespread
Townsend's Big-eared Bat	Not assessed, Blue-listed	One known roost in study area in buildings on private land
American Badger	Endangered; Red-listed	Confirmed
Caribou Southern Mountain Population (S. Purcells, C. Selkirks)	Threatened (recommended Endangered by COSEWIC 2014; Red-listed)	Confirmed
Grizzly Bear	Recommended Special Concern; Blue-listed	Confirmed
Wolverine	Recommended Special Concern; Blue-listed	Confirmed
Fisher	Not assessed; Blue	Extirpated then re-introduced. Occasional sightings and trapping, mainly along Gold Cr.
Least Chipmunk, <i>Oreocetes</i> subspecies	Not assessed; Blue	Confirmed
Least Chipmunk, <i>Selkirki</i> subspecies	Not assessed; Red,	Confirmed – Paradise Mine
Red-tailed Chipmunk, <i>ruficaudus</i> subspecies	Not assessed; Red. Also endemic species to BC.	Confirmed on east side of Flathead valley from US border north to Middle Pass
Southern red-backed vole, <i>galei</i> subspecies	Not assessed, Blue; Taxon questioned (G5TNRQ)	Confirmed, unknown locations, based on unknown studies. Sub-species designation nont-confirmed.
Mountain Goats	Not assessed; Blue-listed. BC has high responsibility for this species globally.	Confirmed
Bighorn Sheep	Not assessed; Blue-listed	Confirmed

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Species	Conservation Status ^a (SARA; BC CDC)	Present in East Kootenay and Location
<i>Invertebrates (only those SARA listed, COSEWIC assessed, or BC Red-listed are given here by species)</i>		
Gillette's Checkerspot	Not assessed; Red-listed	Confirmed
Monarch	Special Concern (SARA), Blue	Confirmed but very rare
Vivid Dancer	Recommended for Special Concern; Blue-listed	Confirmed
Pygmy Slug and Sheathed Slug	Both red listed, both to be assessed by COSEWIC in April, 2016	Both confirmed
Magnum Mantleslug	Recommended for Special Concern; Blue	Confirmed
Other red and blue listed butterflies, dragonflies damselflies, slugs and snails (see Canfor species dbase)	Not assessed; Red or Blue	Listing usually based on one or very few sightings at restricted locations (e.g., Bummer's Flats, alpine, hot springs)
<i>Plants</i>		
Whitebark Pine	Endangered; Blue-listed	Confirmed
Limber Pine	Recommended as Endangered (COSEWIC 2012); Red-listed	Confirmed
Spalding's Campion	Endangered; Red	Confirmed
Smooth Goosefoot	Threatened, Red	Confirmed
Giant Helleborine	Special Concern, Blue	Confirm
Alkaline wing-nerved moss	Threatened; Red	Confirmed
Gastony's Cliff-brake	Not assessed, Blue,	Confirmed
Southern maiden-hair fern	Endangered, Red	Confirmed

Recreation

The DFA offers many and varied opportunities for backcountry and wilderness recreational experiences. Recreation and tourist-orientated business enterprises continue to grow within the area. Commercial heli-skiing, heli-hiking, and ski touring operations as well as guiding and trapping activities are on-going within the licence area. Fishing, hunting, hiking, snow-mobiling, camping, and touring are other activities that occur.

Visual Management

Visual management is an important consideration on the slopes that are visible from communities, public use areas and travel corridors. The main travel corridors are Highways 93, 95, 3, and 3A. These corridors have been designated as a "known" scenic area. The communities of Golden, Parson, Harrogate, Spillimacheen, Brisco, Edgewater, Radium, Invermere, Fairmont Hot Springs, Canal Flats, Skookumchuk, Wasa, Cranbrook, Kimberley, Marysville, Moyie, Elko, Fernie, Sparwood and Elkford are the primary major community viewpoints affecting the planning areas.

Areas proposed for harvesting that are visible from communities, recreation lakes and recreation sites are managed using landscape management principles to minimise visual impacts. Visual quality objectives are established for various planning areas and are incorporated in the planning process.

3.3 Socio-Economic Description

Communities & Populations

The DFA is entirely within the Ktunaxa Nation traditional territory. The Ktunaxa Nation Council (KNC)²⁰, on behalf of the Ktunaxa Nation, has entered into the BC Treaty process. They 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.

Figure 18 shows their territory and the BC portion that was filed with the British Columbia Treaty Commission during the Statement of Intent portion of negotiations.

Figure 18: Traditional Territory of the Ktunaxa Nation



Archaeological evidence suggests the Ktunaxa have inhabited the East Kootenay region since the last glaciation over 10,000 years ago. The KNC represents the four Band communities of Tobacco Plains (TPIB) near Grassmere, Aq'am (SMIB) near Cranbrook, Lower Kootenay Band (LKIB) near Creston, and ?Akisq' nuk First Nation (AFN – formerly Columbia Lake Indian Band) near Windermere.

²⁰ Formerly the Ktunaxa Kinbasket Tribal Council (KKTC)

The Shuswap Band (previously represented by KNC) and is part of the Secwepemc Nation and has interests within the Invermere TSA. The Secwepemc (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. Recently, both the Neskonlith and Adams Lake Indian Bands have asserted traditional territory claims in the northern portion of the Invermere TSA. The Bands are also part of the Secwepemc Nation.

In 1884, reserves for two Bands were established at St. Mary's and Tobacco Plains. In addition, Isidore's Ranch, Indian Reservation 4 was established near Mayook. These continue to exist as Ktunaxa communities with a combined population of approximately 400. Non-status Ktunaxa, as well as other status and non-status Indigenous Peoples such as Cree, Sioux, and Peigan, are also residents in the Cranbrook TSA. The total Indigenous population within the TSA is estimated to be about 1100.

Both Traditional Use mapping and Archaeology Overview Assessment mapping have been completed in the DFA and are being used to help protect cultural resources. Culturally important High Conservation Value Forests (CCVF) were identified in a collaborative process with Ktunaxa Nation members for the Lower Kootenay, Tobacco Plains, A'qam and Akisqnuq Bands' areas. The CCVF's were identified for Canfor's operating areas but did not include the TFL or Radium license areas. Identification of CCVF's for those areas will commence in 2015/16. In addition, a number of Archaeological Impact Assessments have been completed to identify sites of archaeological significance and develop strategies to protect them.

TFL 14 is the northern portion of the DFA. There are no communities within TFL 14; however, there are several rural communities such as Parson, Harrogate, Spillimacheen, Brisco, and Edgewater that are dispersed along the Highway 95 corridor adjacent to TFL 14. Populations vary from 41 (Spillimacheen) to 369 (Edgewater). The nearest larger population centre is Golden (3,780).

The Invermere TSA has a relatively small population of about 8,490²¹, dispersed amongst several settlements, such as Canal Flats (736), Radium Hot Springs (766), and Regional District of East Kootenay Areas F and G, and Invermere including Wilmer and Athalmer (2,993). 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. This area is a popular tourist destination, Invermere's population soars to 40,000 during the summer.

The Cranbrook TSA is the south portion of the DFA. The City of Cranbrook (19,785) is the regional service centre. In addition to Cranbrook, there are four other incorporated municipalities included in this TSA: Kimberley, Fernie, Sparwood, and Elkford. There are some small-unincorporated communities and a number of rural residences that are dispersed throughout the TSA. Cranbrook, plus the surrounding Regional Districts B & C and Indian Reserves results in a population of 26,183²².

Almost one half of the population of the Kootenay Lake TSA lives in the three largest centres of Nelson, Creston and Kaslo. The TSA includes many other smaller communities both incorporated and unincorporated. Smaller communities include Yahk, Wyndell, Lardeau, Meadow Creek and Argenta.

Community Dependence

Forestry, mining, ranching, and tourism form the main basis of employment and economic activity for the small communities. Like many small rural communities dependent on natural resources in BC, communities in the DFA have experienced a significant downturn in economic activity in recent years.

The Labour Force in 2011²³ for the East Kootenay, includes 1,570 people work in natural resources, agriculture and related production, with an additional 690 in manufacturing and utilities. The Labour

²¹ <http://www.cbrdi.ca/communities/columbia-valley/invermere-3/>

²² <http://www.cbrdi.ca/communities/cranbrook/>

²³ Source: Statistics Canada, National Household Survey 2011

Force by Industry in 2014²⁴ for the East Kootenay includes 7,400 in forestry, fishing, mining, quarrying, oil & gas, with an additional 4,800 in manufacturing. The median hourly wage for forestry, fishing, mining, quarrying, oil & gas was reported as \$33.27 and \$27 for manufacturing.

The employment base for DFA, and the mills it supplies, includes people living in the communities of Golden, Parson, Radium, Invermere, Canal Flats, Kimberley, Cranbrook, Creston, Elko, Fernie and numerous communities in the Columbia Valley. It is recognized that the volume harvested from the DFA provides a significant contribution to the employment in the local area.

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.

Local Business

Tourism, the public sector, forestry, mining, mineral exploration and ranching operations form the main basis for employment and economic activity for communities within the DFA. Recreation and tourist-orientated business enterprises continue to grow and provide a significant contribution to the economic diversity in the area.

The Columbia Valley is a popular tourist destination, Invermere's population soars to 40,000 during the summer where activities include boating, fishing, hiking, camping, hunting, river rafting, zip lining and bungee jumping. There are more golf courses per capita in this valley than anywhere else in the Kootenay Rockies. Winter attractions include snowmobiling, snowshoeing, downhill and heli skiing, and snowboarding. A further attraction to the Columbia Valley includes a relaxing soak in the local mineral pools located to both the north and the south of the District of Invermere.

Cranbrook is a railway town, a mill town, a commercial centre, and an island in a sea of golf courses. Cranbrook has the College of the Rockies, an airport, government offices, shopping malls, a modern theatre and a lively arts community, a professional hockey team, and a remarkable museum that captures the experience of the golden age of rail travel in Canada. The opening of the St Eugene Mission Resort in 2001, the Casino of the Rockies, and the expansion of the Fernie ski resort will see an expansion of the tourism sector in the southern portion of the DFA.

Businesses in the DFA service visitors' needs, including outdoor recreation facilities, tours and attractions, retail and service businesses, food and beverage facilities, and accommodations.

Economic Profile

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

In the Kootenay area Canfor operates dimension lumbermills in Radium Hot Springs²⁵ and Elko²⁶. These mills produce dimension lumber, mainly for the domestic American market, but also make Chinese grade lumber which is approximately 25% of the output. The mill sells residual chips and hog fuel to Paper

²⁴ Source: Statistics Canada, Labour Force Survey, Custom Data

²⁵ Canfor acquired the Radium operations from Slocan Forest Products in early 2004.

²⁶ Canfor acquired TFL 14, Canal Flats, Elko and Cranbrook operations from Tembec in March 2012. Canal Flats mill was shut-down indefinitely – November 2015.

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Excellence's Skookumchuk Pulpmill and sells other sawmill by-products such as sawdust, planer shavings and hog fuel to other manufactures.

Canfor is the largest forest industry employers in the DFA. Canfor has rights to substantial AAC in two of the three TSA's in which it operates. The volume harvested in the DFA provides a significant contribution to employment in the local area. The employment base for the DFA, and the mills it supplies, includes people living in the communities of the DFA.

While employment levels have been declining in many manufacturing industries including the forest industry, there remains a very direct relationship between direct and indirect employment and annual harvest levels. Direct forest sector and non-forest sector employment levels are predicted using TSR3 multipliers (person years per 1000 m³ harvested) as derived from Statistic Canada.²⁷ The harvest levels figures do not include purchase volumes, which vary based on mill consumption requirements, which will contribute additional employment in both forest operations and manufacturing.

Table 18: Canfor DFA – Employment #'s

Invermere TSA and TFL 14	
Direct employment	0.545 PY's/'000m ³
Indirect employment	0.20 PY's/'000m ³
Cranbrook and Kootenay Lake TSA's	
Direct employment	0.69 PY's/'000m ³
Indirect employment	0.26 PY's/'000m ³

Based on the last 5 years harvest levels within the Kootenay DFA (excluding the Radium Licence), the calculated 5-year average employment PY's is 989 persons.

Table 19: Kootenay DFA Employment Numbers (2010 – 2014)

All remaining licenses administered by Canfor FSC DFA - Volume harvested					
Year	2010	2011	2012	2013	2014
AAC m³	1,021,686	1,025,925	1,025,925	1,020,051	1,020,051
Cumulative AAC m³	1,021,686	2,047,611	3,073,536	4,093,587	5,113,638
Annual harvest m³	983,928	1,171,524	1,185,876	1,238,985	921,122
% of AAC	96.30%	114.19%	115.59%	121.46%	90.30%
Cumulative	983,928	2,155,452	3,341,328	4,580,313	5,501,435
% of cumulative AAC	96.30%	105.27%	108.71%	111.89%	107.58%
Average per year over five years	1,100,287				
Cranbrook & Kootenay Lake TSA Direct + indirect employment per 1000 m³	0.95				
Invermere TSA & TFL 14 Direct + indirect employment per 1000 m³	0.745				
TFL and A18978 total 5 year harvest	1,702,561				
Cranbrook & KL TSA – total 5 year licenses harvest	3,798,874				
Person Year Target	875				
Person Year Calculated Invermere TSA and TFL	267				
Person Year Calculated Cranbrook and KL TSA	722				
Total Person Years Calculated	989				

²⁷ Employment multipliers were not available in TFL 14's determination therefore the same figures were used for the Invermere TSA.

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Based on the last five years harvest levels within the Radium license (A18979), the calculated 5-year average employment PY's is 149 persons. It should be noted that due to Canfor Radium's shutdown in 2009-2011, these numbers are not reflective of normal operations for that license.

Table 20: Employment Numbers (2010-2014) – Radium Forest Licence

FL A18979 Volume harvested					
Year	2010	2011	2012	2013	2014
AAC m ³	221,005	221,005	221,005	221,005	221,005
Cumulative AAC m ³	221,005	442,010	663,015	884,020	1,105,025
Annual harvest m ³	3,246	0	96,356	428,222	473,677
% of AAC	1.47%	0.00%	43.60%	193.76%	214.33%
Cumulative	3,246	3,246	99,602	527,824	1,001,501
% of cumulative AAC	1.47%	0.73%	15.02%	59.71%	90.63%
Average per year over five years	200,300				
Direct + indirect employment per 1000 m ³	0.745				
Person Year Target	165				
Person Year Calculated	149				

Forestry Tenures

The scope of this planning document however is limited to the Kootenay portion of Canfor BC operations and is divided into the following licenses, and applicable AAC:

Table 21: Canfor FMG Operations – AAC

Licence Management Unit Name		Tenure Type ²⁸	AAC m ³	Effective Date
TFL 14	TFL 14	Area-based	180,000	April 7, 2008
Invermere	FL A18979	Volume-based	221,005	November 1, 2005
Invermere	FL A18978	Volume-based	220,668	November 1, 2005
Cranbrook	FL A19040	Volume-based	477,652	November 1, 2005
Kootenay Lake	FL A20212	Volume-based	99,081	August 12, 2010

Non Forestry Tenures & Interests

In addition to Canfor, there are currently: woodlot licenses; Christmas Tree Permit; Guide Outfitter tenures; Range tenures; and Trapper tenures. Within the DFA there are Community Watersheds and extensive domestic and irrigation watersheds.

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

There is an active mining, rock quarries, and prospecting activity that has generated an abundance of mineral claims throughout the planning area.

There are many interests groups in the area that include such groups as the Nature Conservancy of Canada (NCC), 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.

²⁸ Forest tenure (either area-based or volume-based) issued by the government of British Columbia. It grants Canfor the right to harvest Crown timber each year, during the term of the Licence, from areas of Crown land within specified boundaries, which are specified in cutting permits and road permits.

4.0 Establishing the Foundation for SFM Planning

This section provides the foundation for sustainable forest management planning: primarily the collation and assessment of information required as the groundwork for the SFM Plan. This includes the identification and analysis of the inventories and assessments, the key issues, and the range of natural variability, that directly influence the management of the DFA.

4.1 Inventory and Assessments

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.

In addition, Canfor has completed a number of assessments that provide the foundation for SFM. These assessments include, but are not limited to: Ecosystem Representation, Protected Areas, HCVF, Riparian, Patch Size, Stand and Landscape Level Retention, Species of Management Concern (including SAR), Soil, Road Density, etc.

Canfor collates or assembles the required data and assesses the quality and appropriateness of the data, inventory, assessment or results. Canfor conducts periodic re-analysis of this data, as required or needed and updates applicable portions of the management plan.

4.2 Key Issues

A number of key forest management issues for the DFA have been identified and collated from legislative requirements (i.e. FRPA), other land use initiatives, processes and/or stakeholder input. The initiatives and processes from which key issues have been collected are identified and listed in 2.3.2 Strategic Plans, Policies & Supporting Documents.

Identification and organization of these key issues is critical for developing and maintaining the SFM Plan. It provides the foundation for setting local criteria and indicators, as well as possibly providing solutions to these issues through strategies. These key forest management issues will be addressed within the SFM Plan through the implementation of strategies and monitoring of indicators.

A listing and scope of the key issues for the DFA, as well as documentation on the significance of this issue to SFM Planning and SFM Strategy, is provided below. This is not a comprehensive list of issues but a summary of the key issues unique to the DFA and is reflected in the issues and concerns identified by the public during a Multi-criteria Analysis exercise completed in 2005/2006 for the Radium License, but included residents within the Invermere TSA. Other key issues may be related to new or changing ecological and/or socio-economic conditions of the DFA, or provided by stakeholders input from within or outside of the local public process.

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Table 22: Key Issues within the DFA

Issue	Scope of issue	Significance to Planning	SFM Strategy
Safety	Maintain company wide Operational Health & Safety	Potential to impact well being of workers and community	Forest Management System (FMS)
Mountain Pine Beetle	TSA wide and beyond. Prioritizes harvests. Affects biodiversity	Potential to impact most, if not all, criteria and indicators	Range of Natural Variability Description
HLP Order: Biodiversity & Old Growth Management	Rocky Mountain Forest District as defined by the higher-level plan	Require biodiversity strategy arising from the KB-HLPO	Coarse Woody Debris Distribution of Forest Type Ecosystem Representation Green Tree and Snag Retention High Conservation Value Forest
Fire Maintained Ecosystems	TSA wide and beyond. Affects biodiversity strategies	Potential to impact most, if not all, criteria and indicators	High Value Snag Retention
Identified Wildlife Species			Interior Forest Habitat Invasive Plant Species Old and Mature Forest Identification and Recruitment Patch Size Distribution Protected Reserves Riparian Management Seral and Structural Stages Relative to RNV Sites of Biological Significance Species of Management Concern Wildlife Tree Patch Retention
Loss of Productive Landbase	TSA wide and beyond	Potential to impact the size of the productive landbase	Detrimental Soil Disturbance Invasive Plant Species Land Conversion Landslide Permanent Access Structures Silviculture
Riparian Habitat	TSA wide and beyond. Affects biodiversity strategies	Potential to impact most, if not all, criteria and indicators	Riparian Management Stream Crossing Sedimentation Control
Domestic and Community Watersheds	TSA wide and beyond. Affects biodiversity strategies		Sensitive Watershed Stream Crossing Sedimentation Control
Competing Integrated Resource Values	TSA wide and beyond. Prioritizes harvests. Affects wildlife habitat, visual quality, biological diversity, etc.		In addition to previously listed strategies: Indigenous Peoples Non-Timber Forest Benefits Overlapping Tenures
Economics	Providing economic benefits at a local level		Employee & Forest Worker Training Fibre Flow Non-Timber Forest Benefits Overlapping Tenures Procurement of Local Goods & Services

4.3 The Range of Natural Variability



Forested ecosystems experience many types of natural disturbances including wildfire, insect infestations, windthrow, flooding, grazing, and, in some places, volcanic eruptions. These disturbances are highly variable in their timing, location, and severity. For example, wildfires can range from very severe fires in which all the trees are killed throughout entire watersheds, to low intensity fires which kill only the underbrush over a few hectares. Over time, as forests regrow and different disturbances occur and overlap one another, a mosaic of patches of different ages and structures is created across the landscape.

There is strong evidence natural disturbances are fundamental to the structure and function of forest ecosystems (Attiwill 1994), and that native species have adapted to disturbance regimes (e.g., Bunnell 1995). Characteristics of ecosystems where natural disturbance has been removed provide evidence of this.

For example, the exclusion of low-intensity, surface fires from the ponderosa pine (*Pinus ponderosa*) forests of western interior North America has drastically altered forest ecosystem structure and function, such that catastrophic wildfire and insect outbreaks now threaten the ecosystem and many endemic

wildlife species (Fule et al. 1997).

Based on the increasing awareness of the importance of disturbance in ecosystems, the concept of natural variability emerged as a paradigm for ecosystem management in western North America in the 1990's (Morgan et al 1994, Cissel et al. 1994, Swanson et al. 1993). The historic range of variability refers to variability in the composition, structure, and dynamics of ecosystems before European settlement (Swanson et al. 1993). The concept relies on two ideas: that past conditions and processes provide context and guidance for management of ecological systems today, and that disturbance-driven spatial and temporal variability is a vital attribute of nearly all ecological systems (Landres et al. 1999). The natural disturbance approach rests on the premise that native species have persisted through or adapted to the disturbance events of recent millennia (Bunnell 1995, Swanson et al. 1993, Hunter 1993). Thus, the more that managed ecosystems resemble those created through natural disturbance, the greater the likelihood that native species and ecological processes will be maintained (Swanson et al. 1993).

The use of the natural variability concept is not an attempt to return landscapes to wilderness states or return them to a single, pre-existing condition, but rather, to meet ecological objectives by incorporating variability and bringing landscapes within their natural range (Swanson et al. 1993). Recognizing that we have incomplete knowledge of species and functions within ecosystems to manage on a species-by-species basis, the natural variability approach assumes that maintaining the patterns and processes of natural disturbance, and thus a range of habitat types similar to historic distributions, will provide for viable populations of most species. Thus, it is often referred to as a "coarse-filter" strategy (Hunter 1990).

In practice, there are many limitations to applying the range of natural variability to forest management. Managers may not want to target natural variability as a management objective, because it does not account for the influences humans have had on their environment (post-European settlement), nor all the values that humans want to produce from their environment (Morgan et al. 1994). For example, natural wildfires were not concerned with providing a sustainable flow of timber to local sawmills, or providing constantly clear, high quality drinking water.



Further, determining the range of natural variability is often hampered by a lack of historical data and difficulties in interpreting the historical record, and selecting the appropriate time period as a reference can be challenging (Wimberly et al. 2000, Cissel et al. 1998, Morgan et al. 1994). Returning ecosystems to within their range of natural variability can be difficult where human activities have drastically altered ecosystems, or where disturbances were infrequent and catastrophic (Swanson et al. 1993). Critics have charged that changes in ecosystems due to exotic species, climate change, and human constructs with no natural analogue such as roads make returning to natural variability impossible or inappropriate (Swanson et al. 1993). A disturbance regime emulating natural variability may interact with these changes in current or future ecosystem condition to trigger ecosystem responses far outside the range of natural conditions (Swanson et al. 1993). Finally, components of natural disturbance regimes, such as very large (> 100,000 ha) wildfires, may be viewed as unacceptable by many segments of society (Cissel et al. 1998, Hunter 1993).

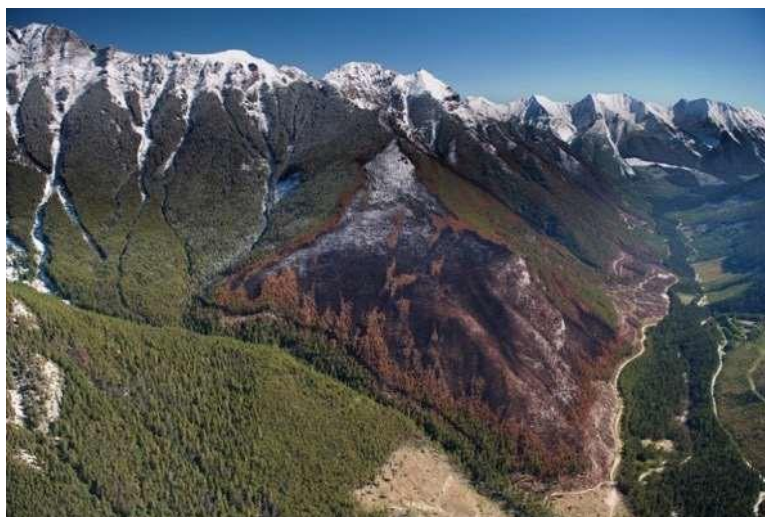
Despite these limitations, the natural disturbance approach provides an alternative to other approaches to forest management such as the sustained yield model traditionally followed by foresters, or the reserve, corridor and matrix concept often advocated by conservation biologists (Noss and Cooperrider 1994). In the United States, the implementation of ecosystem management by natural resource agencies relies heavily on the concept of natural range of variability (Kaufmann et al. 1994) or reference variability (Manley et al. 1995) in defining sustainable target conditions for managed lands. Examples of its diverse application range from the planned flooding of the Colorado River from Glen Canyon dam (Patten et al. 2001), the development of recovery plans for freshwater habitats of anadromous salmonids (Reeves et al. 1995), to the development of landscape plans for forest management (Cissel et al. 1998, 1999).

Further, the natural disturbance approach provides an ecological baseline against which to evaluate ecosystem change associated with current conditions and future alternatives (Morgan et al. 1994, Kaufmann et al. 1994, Swanson et al. 1993). The risks and probabilities of changes in ecosystems are likely to be related to the magnitude and direction of departures from the historical range of variability (Morgan et al. 1994). In cumulative effects assessments, this is often how it is being used currently.

The Range of Natural Variability in the East Kootenay

Key to implementing the natural disturbance approach is a strong understanding of the natural, or historic, disturbance regimes. Following is a description of the Range of Natural Variability (RNV) for each biogeoclimatic subzone occurring within the DFA. Tables providing a summary of the scientific papers upon which the summaries are based are in Appendix 1 (Tables 1 & 2). A more detailed discussion of disturbance regimes in the East Kootenay can be found in Utzig (2003). The summary of the literature on historical variability of natural disturbances in British Columbia by Wong et al. (2003) was very helpful in the preparation of this RNV description, as was the summary of wildfire and insect disturbances in the Invermere TSA by Gray et al. (2003).

The time period chosen to evaluate RNV is very important, as this influences the disturbance return interval, which is one of the key characteristics of disturbance regimes. Here, the natural disturbance regime is interpreted as that occurring during the current climatic regime (approximately last 2000 years), but prior to the onset of Euro-American settlement circa 1850. It includes activities such as lighting fires by Indigenous Peoples. Prior to 1850, no appreciable European settlement activities, outside of Catholic missionary work beginning in 1846,



had taken place in the Rocky Mountain Trench (Scott and Hanic 1979). Note that this time period does include some climatic changes, such as the little ice age in the 1700-1800's. Climate change may greatly affect the implications of using disturbance regimes to design future forest ecosystems. This is discussed further in Indicator 30 – Climate Change Adaptation.

Some Words of Caution....

The purpose of summary tables at the end of each BEC section is to provide a general picture of the range of return intervals, disturbance sizes and residual (live tree) percentages from the reported literature for that particular BEC subzone and variants. Canfor cautions against drawing strong conclusions from these numbers as values reported in the source documents are usually specific to a certain location, sample size, size of study area, time period, and method. Further information on methods, assumptions and data manipulations are available in the reports listed in the tables in the appendices and in the references at the end of this section.

Why can it be misleading to combine studies that estimate fire return intervals from fire scars?

There is no standard approach to selecting study sites:

Selection of plots in mixed-severity fire regime studies are often biased towards older stands. Younger, even aged stands that were initiated after a stand replacing fire may be overlooked in favor of older stands, so that the fire record will go further back in time. These studies may underestimate the occurrence of stand replacing and overestimate the occurrence of low-severity fires for an area (Cochrane 2007).

Studies that have selection criteria for their sites, such as ease of access, aspect, or elevation cannot be applied over a broader area as these criteria will bias the return interval estimates (Cochrane 2007). Return intervals are generally thought to be shorter for warm aspects and longer for higher elevations.

Fire return intervals are area dependent (Wong et al. 2003). For example, within an entire watershed it can be expected that a fire of any size or severity will occur fairly frequently, while the probability that a fire will occur in a specific stand within that watershed is much lower. A study might look at 8 sites within that watershed and determine the mean fire interval to be 24 years across the sites, but when all 8 sites are pooled (treated as one big site) the fire return interval may only be 2 years. This is because not all fires are the size of a watershed; each site within the watershed will experience its own set of fires.

Why do many studies here report intervals from mixed-severity fire regimes, and why is this important?

Lower severity fires have been found to occur in conjunction with stand replacing fires in many forests in the DFA, creating a mixed severity fire regime. This differs from previous assumptions that wildfires are exclusively stand-replacing (Marcoux et al. 2013). Assuming wildfires are exclusively stand-replacing when they are in fact mixed severity can result in inaccurate estimates of range of variability in age distributions. To quote Gray and Daniels 2004:

“Evidence from studies by Frost (1998) and Beatty and Taylor (2001) indicate that mixed fire regime types are more prevalent than previously thought, especially in coniferous forests. As fire moves across the landscape its behavior and effects can change dramatically due to variability in stand structure, fuels, topography, and changing weather elements. This can result in highly variable tree mortality and survival patterns within a fires’ boundary (Brown 2000).”

What do the terms fire return interval and fire cycle mean?

The time it takes to burn an area equivalent to the landscape under study (in this time, fires may burn some areas more than once and others not at all) is known as the fire cycle. This measure is always independent of the size of the study area and is typically used in studies that estimate the frequency of high-severity fires from age structure across a landscape.

The fire return interval (FRI, also known as Fire Interval (FI), Fire-Free Interval (FFI)) is the number of years between two successive fire events in a given area. The FRI can be reported in different ways:

Mean Fire Return Interval (MFRI): The arithmetic average (mean) of all fire intervals in a given area over a given time period is referred to as the mean fire return interval (MFRI), mean fire frequency interval (MFFI) or mean fire interval (MFI). MFRI is typically used for studies based on charcoal deposition in lake sediments or for studies of stand-maintaining and mixed-severity regimes based on fire scars. This metric is the one that has commonly been used to characterize fire regimes and is based on an underlying assumption, not necessarily correct, that fire return intervals are distributed normally. MFRI is sometimes defined as the average expected time between fires at a given point in the landscape (mean point interval), but is more commonly used to describe the expected average time between fires occurring anywhere in the study area. MFRI thus often depends on the size of the study area and is therefore difficult to transfer to areas of a different size, unless the distribution of fire sizes is known (Baker and Ehle 2001).

Weibull median interval (WMI): A measure of central tendency of the Weibull distribution in which half of the fire intervals in the modelled frequency distribution are longer than WMI and half are shorter than WMI. The WMI is also referred to as the Weibull median fire frequency interval (WMFFI), or the Weibull median probability interval (WMPI). Grissino-Mayer (1995) suggests that the WMPI is a more accurate metric for characterizing fire regimes when fire frequency distributions are skewed (the distribution curve is not normal (bell-shaped), but has one tail longer than the other).

The MFRI is the statistic reported in the summary tables in this section.

Summary of the Range of Natural Variability by BEC

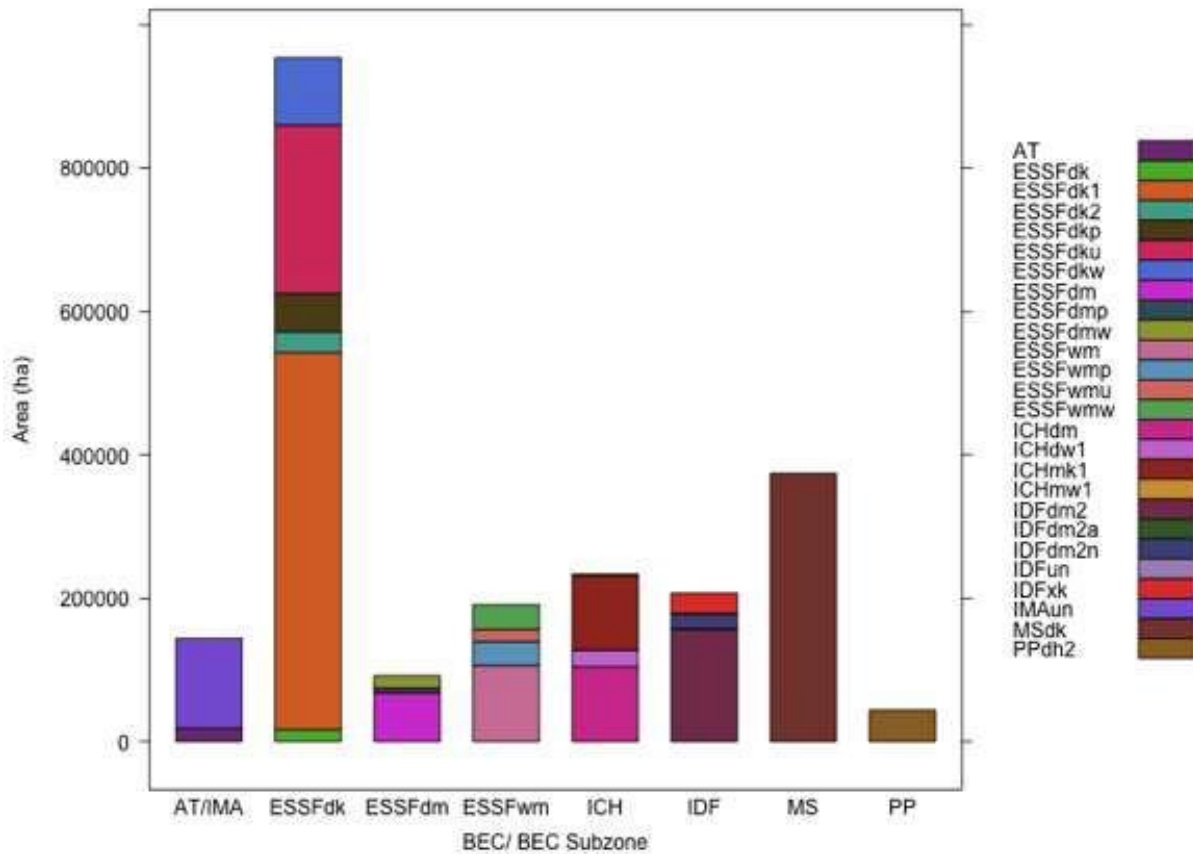
Canfor's operating area in the East Kootenay Region is comprised of six main biogeoclimatic (BEC) zones. Listed from high to low elevation, these are:

- Alpine Tundra (AT) / Interior Mountain-Heather Alpine (IMA)
- Engelmann Spruce-Subalpine Fir (ESSF)
- Montane Spruce (MS)
- Interior Cedar-Hemlock (ICH)
- Interior Douglas-Fir (IDF)
- Ponderosa Pine (PP)

Each of these zones is divided further into subzones, indicated with lower case letter codes, and variants, indicated with numbers. For example, the ESSFdk1 is the dry cool subzone, variant 1 (Elk), of the ESSF. Detailed information on British Columbia's biogeoclimatic system and how it works can be found on: [BECweb](#)

The relative area of each of the BEC variants (version 6.0) found in the DFA is shown in Figure 19. The large amount of area in the ESSF, particularly the dry cool subzone, relative to that in the other variants can be clearly seen.

Figure 19: Relative area of each of the BEC variants in BEC version 6.0, in the DFA



Interior Mountain-Heather Alpine



The Interior Mountain-heather Alpine (IMA) zone (previously the Alpine Tundra zone) occurs in high mountain areas, with a lower elevation boundary of around 2100 m, coinciding with the treeline. This zone has an extremely harsh climate, with extensive wind and snow and very short frost-free periods. The interactions of wind, snow and topography result in a mosaic of grasslands, dwarf-shrublands (alpine heaths), and patches of bare soil or rock, with scattered individual trees or islands of trees (krummholtz) occurring in sheltered spots. No timber harvest occurs in this zone.

Natural disturbances in this zone include fire, avalanches, rockslides, snowcreep, wind and frost damage, defoliating insects (i.e. western hemlock looper and spruce budworm), and grazing from ungulates. White pine blister rust, an introduced fungal disease that affects white pines, also occurs. This disease is one of the key factors linked to the decline of whitebark pine over much of its range in North America.

Although extensive work has been done on plant dynamics in the IMA zone, little is known of the spatial and temporal attributes of natural disturbances here, and there are no quantitative estimates of return intervals, patch sizes, or other variables. Fires in the subalpine are thought to be infrequent (100-300 yr. +), severe, and driven by extreme weather events, but it is unclear if this applies to the IMA as well as the subalpine. Tree regeneration after fire appears to be largely unpredictable and only partially correlated with time-since-disturbance or climate; rather, positive interactions among neighbouring plants (facilitation) are thought to be particularly important for successional dynamics. Fire is generally considered to be a positive influence on the persistence of tree species such as whitebark pine, as well as the diversity of krummholtz and heath communities.

Engelmann Spruce-Subalpine Fir (ESSF)



The ESSF zone spans a gradient of continuous tree cover at lower elevations to patchy clumps of trees at higher elevations. It generally occurs above the MS or ICH zones and below the IMA zones, from elevations of roughly 1500-1650 m to 2100 m. The climate is cold and moist with long, cold winters with moderate to heavy snowfall. Engelmann spruce and subalpine-fir dominate older stands in this zone, while lodgepole pine dominant young seral stands that establish following high severity wildfire (Campbell and Antos 2003). Whitebark pine occurs at higher elevations, while Douglas-fir and western larch are often found at the lower elevations. Western white pine and western hemlock may also occur at lower elevations within this zone, while broadleaf trees are rare.

Insect disturbances that can affect trees in this zone include bark beetles, two-year-cycle budworm, and western hemlock looper. Mountain pine beetle have impacted both lodgepole and whitebark pine in warmer ESSF regions bordering MS, ICH or IDF zones. There are no quantitative estimates on the frequency and severity of insect infestations in the DFA although attacks appear to be cyclic. Gray et al. (2003) report that two-year cycle spruce budworm defoliated subalpine fir and Engelmann spruce along the Kootenay River in alternate years from 1942-1952, from 1964-69 and in 1972, and that populations expanded in the White River drainage in 1972, 1978 and 1979.

Other biotic disturbances in this zone include decay fungi, root rot (*Tomentosus* root disease), and blister rust. White pine blister rust affects whitebark pine trees, and has caused extensive mortality in the southern Rockies (Stuart-Smith 1998).

Abiotic disturbances in the ESSF subzones in the East Kootenay include wildfire, windthrow, avalanches, rockslides, snowpress, and debris flows and flooding in riparian areas. Wildfires are considered to be relatively infrequent and tend to be stand-replacing, since both spruce and subalpine-fir have thin bark making them highly susceptible to mortality from fire (Wong et al. 2003). However, recent research suggests that stands in the ESSF located on south aspects adjacent to IDF and MS zones, and stands in the

ESSFdm near Cranbrook experienced a range of fire severities in the past, from severe stand-replacing fires, with few surviving patches of scattered trees (sometimes only small trees), to low-intensity burns which most canopy trees survived (Gray et al. 2002, Campbell and Antos 2003, Greene 2011). It is unknown how widespread mixed-severity fire regimes are in the East Kootenay ESSF variants, although it is likely more common than previously assumed.

In areas where fire suppression has been effective, the proportion of ‘old’ forests is thought to have increased compared to historic conditions, which has led to a more homogenous forest cover (Smith and Fischer 1997, see modelling results in Davis 2007).

Table 23: Summary of available data on range of natural variability for ESSF subzones in Canfor’s DFA²⁹

BEC variant	Disturbance type	Variable	Mean	25-75% percentile of data	Range (min-max)	Comments
ESSFdk/ dm1/ dm2	Stand replacing fire	Fire return interval (yrs)	131.6	110 – 138	60 – 220	5 studies, model derived
	Mixed severity fire	Fire return interval (yrs)	27.7	-	-	1 study, field based
	Mountain pine beetle	Mean return interval (yrs)	30-40	-	-	1 study, field based
ESSFdk/ MSdk	Stand replacing/ mixed severity	Disturbance size (ha)	483.3	-	-	1 study, field based
		Residual (live) Tree Percentage	18.6	16 – 21.3	13.3 – 24.0	2 studies, field based
ESSFwm	Stand replacing fire	Fire return interval (yrs)	153	-	-	1 study, model derived

Montane Spruce (MS)

The Montane Spruce dry cool variants (MSdk1, MSdk2) occupy the mid elevation valley bottoms, slopes, and plateaus above the IDF and below the ESSF. The lower elevation boundary varies from approximately 1150 m on north-facing slopes to 1050 m on south-facing slopes or higher on some south facing slopes adjacent to IDF zones in the Rocky Mountain Trench (Gray et al. 2002). The upper elevation boundary varies from about 1550 m on north-facing slopes to 1650 m on south-facing ones. The MSdk has a cool continental climate with moderate snowfall. Extensive stands of similar-aged lodgepole pine arising from wildfire are common; other dominant tree species include Douglas-fir, western larch, hybrid white spruce, and subalpine fir. Trembling aspen and paper birch are present (with aspen much more common than birch), along with limited black cottonwood in some riparian areas.

The main natural disturbances in this subzone are wildfire and bark beetles, primarily mountain pine beetle and spruce bark beetle. These two disturbance types are not independent, but may interact, with beetle epidemics acting as a catalyst to severe stand-replacing wildfire by providing high levels of surface fuel. Recent research supports a mixed-severity fire regime for at least parts of the MSdk subzone (Cochrane 2002, Gray et al. 2002, Gray and Daniels 2005, Daniels et al. 2007, Marcoux et al. 2013), replacing the previously held belief that wildfires were solely severe and stand-replacing in this subzone (Wong et al. 2003). Daniels et al. (2007) suggest that the mean fire return interval be reduced from the Biodiversity Guidebook disturbance interval of 150 years to 45 years and the range of natural variation broadened to be from <5 to 125 years.

²⁹ A more complete description of the studies summarized here is found in Appendix 1 – Tables 1 & 2.



Photo: Gerry George

Aspect also influences the disturbance regime; dry (south) aspects can exhibit a wider variety of structural attributes independent of age, compared to wet (north) aspects, where stands develop large trees and snags with increasing age in a relatively predictable manner (Holt 2001). The former supports a strong influence of mixed severity disturbances, while the latter suggests few post-establishment disturbances.

Other abiotic disturbances include windthrow, avalanche and snowpress. Riparian areas may experience flooding and debris flows, in particular in the alluvial and semi-alluvial reaches of valley bottoms. In some areas, avalanche run-out zones intersect the MSdk, and provide important spring forage for ungulates and bears. Biotic disturbances include other spruce budworm, fungal pathogens, and dwarf mistletoes (which cause diffuse mortality). There is less ungulate winter range in the MS zone compared to the IDF and PP, and as a result, grazing is a less influential disturbance agent.

Information on historical disturbance regimes for insect infestations is lacking. Data on the frequency and extent of mountain pine beetle outbreaks and other insect pathogens are available in the form of annual overview flight maps, but have not been analyzed for the MS. Analysis has been done for some timber supply areas in BC, which report periods between outbreak peaks ranging from 13-60 years, and individual epidemics extending over 6-8 years (Wood and Unger 1996, in Wong et al. 2003). Table 24 provides a summary of historical accounts of spruce beetle infestations in the Invermere and northern Cranbrook TSAs.

Table 24: Summary of mountain pine beetle and spruce beetle infestations in the Invermere and northern Cranbrook TSAs, from Gray et al. 2003

Species	Year	Location	Description
Spruce beetle	1968	Elk River West	Infestations of spruce beetle
	1981 - 1984	Height of the Rockies Wilderness area	Spot infestations of spruce beetle
	1982, 1988	Kootenay River headwaters	Small infestations

Table 25: Summary of available data on the natural disturbances for MS subzones in the DFA³⁰

BEC variant	Disturbance type	Variable	Mean	25-75% percentile of data	Range (min-max)	Comments
MSdk	Stand replacing fire	Fire return interval (yrs)	79.5	-	51 – 108	2 studies, model derived
	Mixed severity fire	Fire return interval (yrs)	30.6	22.0 – 40.0	10.3 – 46.2	5 studies, field based
	Mountain pine beetle	Mean return interval (yrs)	30 – 40	-	-	1 study, field based
ESSFdk MSdk	Stand replacing fire	Fire return interval (yrs)	95	-	-	1 study, model derived
		Disturbance size (ha)	483.3	-	-	1 study, field based
	Stand replacing/ mixed severity fire	Residual (live) Tree Percentage	18.6	16 – 21.3	13.3 – 24.0	2 studies, field based

Interior Cedar Hemlock (ICH)

The Interior Cedar Hemlock zone is found below the ESSF zone at low to middle elevations (approximately 800-1500 m). It is somewhat wetter than the MS zone, and has a greater diversity of tree species. Dominant tree species include Douglas-fir, western larch, hybrid white spruce, lodgepole pine, western red cedar, and subalpine fir. Aspen and birch are present, and cottonwood may be found in riparian areas.

Disturbance regimes in the ICH are considered complex, and probably included low severity wildfires, mixed severity wildfires, and stand-replacing wildfires that overlap through time. Other abiotic disturbances include windthrow, snowpress, and hydraulic disturbances in riparian areas in the form of flooding and debris flows. Root rot is also an influential disturbance, and helps to maintain a patchy, dynamic seral mixture of broadleaf species and conifers. In addition, bark beetles (mountain pine, Douglas-fir, spruce), defoliators (western spruce budworm, western hemlock looper), needle diseases, and dwarf mistletoe are important biotic disturbances.

Table 26: Summary of available data on range of natural variability for ICH subzones in DFA³¹

BEC variant	Disturbance type	Variable	Mean	25-75% percentile of data	Range (min-max)	Comments
ICHmk1/mw2/dw	Stand replacing fire	Fire return interval (yrs)	110.7	97.5 – 127.0	64 – 161	4 studies, model derived
ICHmk1/dw	Mixed severity fire	Fire return interval (yrs)	25.9	24.4 – 31.0	11.1 - 38	4 studies, field based

³⁰ A more complete description of the studies summarized here is found in Appendix 1 – Tables 1 & 2.

³¹ A more complete description of the studies summarized here is found in Appendix 1 – Tables 1 & 2.

Interior Douglas-Fir (IDF)

Within the DFA, the dominant IDF variant is the dry mild Kootenay variant (IDFdm2). The IDFdm2 variant occurs primarily in the Rocky Mountain Trench, from 800 – 1200 m, although fingers extend up some of the larger valleys (e.g., Findlay Creek and upper Kootenay River). The climate is continental with a long, warm, and dry growing season, and limited snowfall in winter. Dominant tree species are Douglas-fir, western larch and ponderosa pine, but lodgepole pine also occurs on some sites. Aspen and birch are present, along with black cottonwood in riparian areas. Topography strongly influences local moisture regimes and the spread of disturbances, leading to structurally complex forest landscapes of multi-aged patches with ill-defined stand boundaries.



Wildfires are an influential disturbance agent in this zone. Historically, the IDFdm2 was characterized by low and mixed severity fire regimes (Baker et al. 2007, Heyerdahl et al. 2007, 2012), with frequent underburns occurring in drier portions of the IDF zone (mean of 17.9 for stand replacing fires (Table 28)). Low-severity fires maintained open stands of larger diameter Douglas-fir, western larch, and ponderosa pine trees, interspersed with pockets of higher density, smaller diameter stems. Infrequent, high-severity fires occasionally kill overstory (tall, old) trees, and result in regeneration of even-aged stands (Heyerdahl et al. 2012).

Fire boundaries in the East Kootenay IDF are difficult to determine and consequently, no studies are available on patch size, distribution of fire remnants, or retained trees. Estimates for the IDF in other parts of BC reported fires ranging from ~3 ha to <400 ha (Wong et al. 2003, Heyerdahl et al. 2001, Lertzman et al. 2001), with topography constraining fire size.

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Insect defoliators (e.g., western spruce budworm, Douglas-fir tussock moth), bark beetles, and root rot (*Armillaria*, laminated) are other important disturbance agents. There has been limited analysis on the size and distribution of insect epidemics, although data are collected by government ministries. Over different periods of time it's possible that the area affected by these disturbance agents can exceed that disturbed by wildfire (Parminter 1998). There are no studies on spruce budworm from the DFA, but Campbell et al. (2006) looked at their dynamics from 1700 – 2000 in the IDF area near Kamloops and identified 30, 43 and 70 year cycles, with outbreaks coinciding with early spring seasons characterized by low precipitation levels during winter months and normal spring condition. Table 27 and Table 28 summarize impacts of Mountain Pine beetle and Douglas-fir infestations in the Invermere TSA.

Table 27: Summary of mountain pine beetle and Douglas-fir beetle infestations in the Invermere TSA, from Gray et al. 2003

Species	Year	Location	Description
Mountain pine beetle	1929 – 1941	Kootenay National Park	First recorded outbreaks of mountain pine beetle in the area (MSdk)
	1949 – 1956	Invermere	Infestations common
	1967 – 1969	Canal Flats, Invermere, Brisco, Edgewater	Small spot infestations
	1973	North Whiteswan Lake	Patches of infestation (MSdk), annual expansion after
	1975	West side Columbia River	Mountain pine beetle disperse to west side of Columbia
	1979 – 1996	Invermere TSA	Infestations occurring annually
	1999 -2002	Parsons, Brisco, Kootenay River/ Kootenay National Park junction NE of Invermere	Populations detected
	2002	West side of Columbia River	Population declines noted
Douglas-fir beetle	1953 – 1955	East side of Windermere Lake	First recorded observation and infestation of Douglas-fir beetle
	1965 – 1968	Throughout Radium TSA	Pockets of mortality detected
	1973, 1978	Near Radium	Patchy infestation
	1988 – 1989	Invermere TSA	Scattered spot infestations
	1999	east of Canal Flats, North of Invermere	Population increases, numerous infestations
	2000	Radium area	3700 ha of Douglas-fir beetle infested stands, likely due to extremely dry conditions from 1998
	2001 – 2002	Radium area	Population declines

Grazing on grasses and shrubs by native ungulates (elk, deer, bighorn sheep) can be severe, as the majority of ungulate winter range is found in this zone. Localized impacts occur on grasses and shrubs in riparian areas, particularly around wetlands in the trench where cattle graze. 'Homesteader elk' that remain on winter ranges year round are having heavy impacts on some ranges (e.g., Skookumchuck Prairie).

Other biotic disturbances include dwarf mistletoe, stem rusts and needle casts. Abiotic disturbances include drought, and minor, occasional windthrow; as trees are well anchored by deep roots and fine textured soils that when dry, are firm and compact. Riparian areas may experience flooding, debris flows and bank undercutting.

Table 28: Summary of available data on range of natural variability for IDF subzones in DFA³²

BEC variant	Disturbance type	Variable	Mean	25-75% percentile of data	Range (min-max)	Comments
IDFdk/dm	Stand replacing fire	Fire return interval (yrs)	111	-	-	1 study, model derived,
	Mixed severity fire	Fire return interval (yrs)	17.9	12.8 – 20.4	7.7 – 32	8 studies, field based
IDFdk	Mountain pine beetle	Mean return interval (yrs)	30 – 40	-	-	1 study, field based
IDFdk4	Mountain Pine beetle	Residual (live) Tree Percentage	17 - 30% canopy, 80 – 100% sub canopy	-	-	1 study, field based
	Spruce budworm	Cycle	30	-	-	1 study, field based

Ponderosa Pine (PP)

The dry hot Ponderosa Pine Kootenay variant (PPdh2) is the driest and warmest forested variant in the Invermere and Cranbrook TSAs, with very little snow in winter. Dominant tree species include ponderosa pine, Douglas-fir, and aspen, with black cottonwood and hybrid white spruce in wetter areas.



³² A more complete description of the studies summarized here is found in Appendix 1 – Tables 1 & 2.

Historically, the PPdh2 was characterized by low-severity fire regimes that were likely influenced by local topography and physiography, and displayed a wide range of characteristics (Gray et al. 2003). Intentional fires set by the Ktunaxa people are thought to have played a role in maintaining the open woodland characteristic of PP forests (Mah 2000). One tree was found near Tobacco Plains with 39 fire scars on it (Daniels, pers. comm.). The role of higher-severity fires in PP forests is unclear and the subject of considerable debate (Wong et al. 2003).

Other disturbance agents include windthrow, drought, mountain pine beetle, Douglas-fir beetle, Douglas-fir tussock moth, root rot (*Armillaria*, *tomentosus*, *Phellinus*), dwarf mistletoe, stem rusts and needle casts. Heavy grazing occurs, historically by native ungulates, primarily elk and deer, and currently by ungulates and cattle.

There are no studies examining fire return intervals specific to the PPdh2 variant, however, there are estimates for fire return intervals for other PP variants found in BC. Though not identical to the PPdh2 variant found in the East Kootenay, other PP variants share very similar characteristics, and Fire Return Interval estimates would be similar to PPdh2 FRIs. Table 29 provides return interval estimates for other PP variants within BC.

Table 29: Summary of available data on range of natural variability for PP subzones in DFA³³

BEC variant	Disturbance type	Variable	Mean	25-75% percentile of data	Range (min-max)	Comments
PPxh1	Low severity fires	Fire return interval (yrs)	16	-	-	1 study, field based
PPxh2/ IDFxh2	Low severity fire	Fire return interval (yrs)	16	-	-	1 study, field based
PPdh	Stand replacing/ mixed severity	Disturbance size (ha)	378	-	-	1 study, field based
		Residual (live) Tree Percentage	10.8	-	-	1 study, field based

³³ A more complete description of the studies summarized here is found in Appendix 1 – Tables 1 & 2.

5.0 Strategic Level

The strategic level for SFM establishes broad management objectives or sustainability criteria over as large an area as possible over a long time frame (from 100 to 300 years). At this level, the overall strategy for the DFA is defined.

The Canadian Council of Forest Ministers (CCFM) Criteria and Indicators (C&I) and the Forest Stewardship Council FSC-BC Standards guided the development of the SFM Criteria and Indicators that were used as a starting point for the original SFM Plan (2004). This SFMP (2016) aligns with CSA Z809-08 standard, Canfor core indicators and FSC-BC October 2005. Even though the numbering structure of the C&I follow the CSA Standard, many of the locally developed Indicators address the specific requirements of the FSC-BC 2005.

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

5.1 Criteria, Elements, Indicators, Targets

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

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

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

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

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

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

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

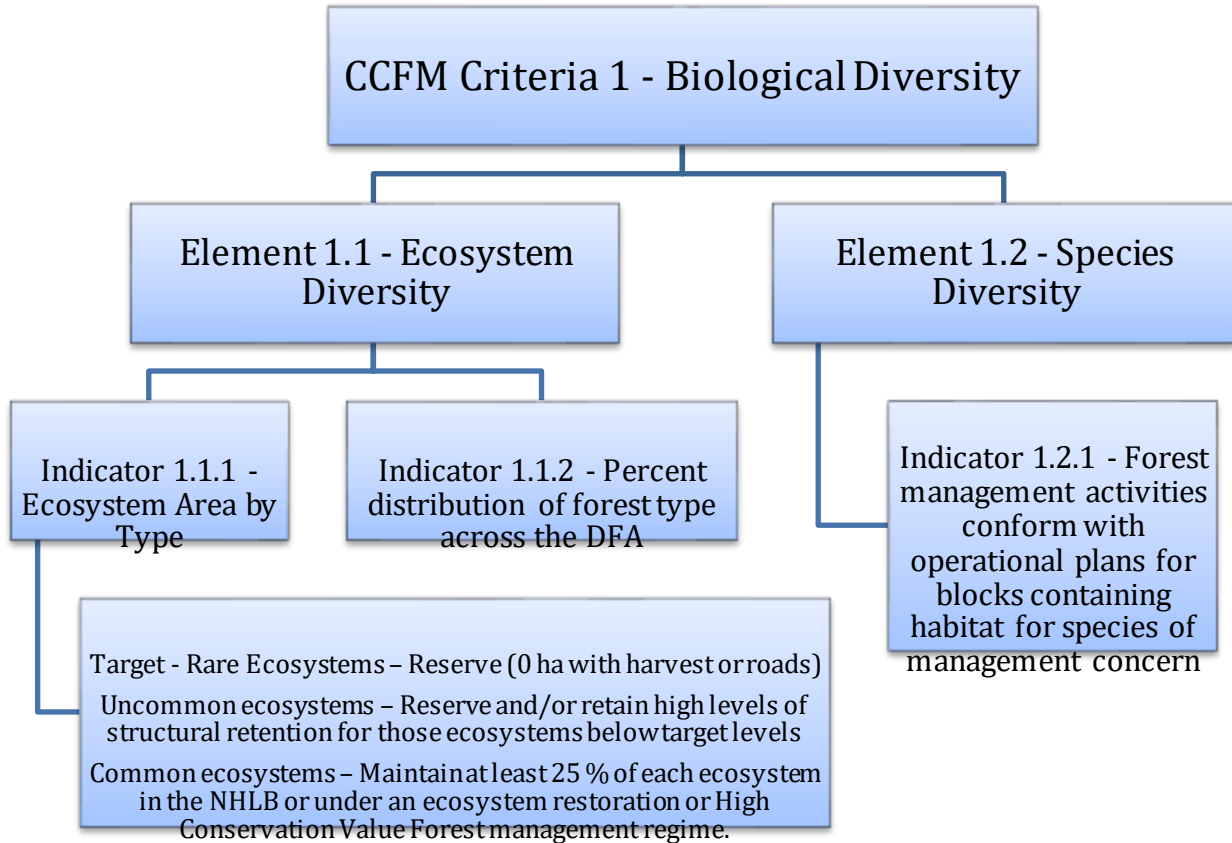
Targets are specific short-term (one or two year) commitments to achieve identified indicators. Targets provide a clear specific statement of expected results, usually stated as some level of achievement of the associated indicator.

Strategy is a coordinated set of actions designed to meet established targets.

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 were developed. 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 DFA as determined by the public input process.

Figure 20 below provides a schematic sample of the hierarchy of criteria, element, indicators and targets.

Figure 20: Criteria, Element, Indicators, and Targets Hierarchy



A summary listing of locally important Criteria, Elements, and Indicators for the Ecological (Table 30), Economic and Social (Table 31) Values are provided below.

Table 30: Kootenay DFA Criteria, Element & Indicators – Ecological Values

C1. Biological Diversity
1.1 Ecosystem Diversity
1 – Ecosystem Representation 2 – Protected Reserves 3 – Patch Size Distribution by Natural Disturbance Type 4 – Distribution of Forest Type 5 – Old and Mature Forest Retention 6 – Seral and Structural Stages Relative to RNV 7 – Interior Forest Habitat 8 – Green Tree and Snag Retention 9 – Landscape Unit Wildlife Tree Patch Retention 10 – High Value Snags 11 – Riparian Management
1.2 & 1.3 Species & Genetic Diversity
12 – Species of Management Concern – Habitat Protection 13 – Species of Management Concern – Habitat Suitability 14 – Tree Seed 15 – Natural Regeneration 16 – Mix of Species Planted 17 – Managing for Species Diversity during Tree Thinning
1.4 Protected Areas & Sites
2 – Protected Reserves 18 – Sites of Biological Significance 19 – High Conservation Value Forests 47 – Level of Management &/or Protection – Indigenous Peoples Culturally Important Sites, Practices & Activities
C2. Ecosystem Condition & Productivity
2.1 Forest Ecosystem Condition and Productivity
20 – Reforestation Success 16 – Mix of Species Planted 21 – Invasive Plant Species 22 – Permanent Access Structures 23 – Landslides 24 – Land Conversion 25 – Volume Harvested Vs. Allocated
C3. Soil & Water
3.1 Soil Quality & Quantity
26 – Detrimental Soil Disturbance 27 – Coarse Woody Debris
3.2 Water Quality & Quantity
28 – Sensitive Watersheds 29 – Stream Crossing Sedimentation Control
C4. Role of Global Ecological Cycles
4.1 Carbon Uptake and Storage
5 – Retention of Existing Old Forest 20 – Reforestation Success 14 – Tree Seed 30 – Climate Change Adaptation
4.2 Forest Land Conversion
22 – Permanent Access Structures 24 – Land Conversion

Table 31: Kootenay DFA Criteria, Element & Indicators – Economic & Social Values

C5. Economic & Social Benefits	
5.1 Timber & Non-Timber Benefits	
25 – Volume Harvested Vs. Allocated	
31 – Primary And By-Products	
32 – Non-Timber Benefits	
33 – Overlapping Tenures	
5.2 Communities & Sustainability	
34 – Investment In Local Communities – Local Procurement	
35 – Investment In Local Communities – Sponsorships, Donations and Scholarships	
36 – Environmental & Safety Training	
37 – Direct & Indirect Employment	
C6. Society’s Responsibility	
6.1 Fair & Effective Decision-Making	
38 – PAG Satisfaction	
39 – Educational Opportunities – Information/Training	
40 – SFM Monitoring Report Public	
41 – Third Party Verification	
6.2 Safety	
42 – Certified Safety Program	
C7. Indigenous Relations	
7.1 Indigenous Peoples & Treaty Rights	
43 – Indigenous Peoples Awareness Training	
44 – Indigenous Peoples Understanding of the Plans	
7.2 Indigenous Peoples Forest Values, Knowledge & Uses	
45 – Level of Indigenous Peoples Participation in the Forest Economy	
46 – Evidence of Understanding and Use of Indigenous Peoples Knowledge	
47 – Level of Management &/or Protection – Indigenous Peoples Culturally Important Sites, Practices & Activities	

Criterion 1 – Biological Diversity

The overall intent of Criterion 1 is to maintain productive, well-distributed populations of species, both known and unknown, within a defined management area. This Criterion consists of four Elements:

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

The indicators within this Criterion are based on a multi-filter approach to sustaining biological richness in forested landscapes. The first two indicators, Ecological Representation and Protected Reserves (1 and 2) are ‘coarse-filter’ approaches to maintaining even poorly understood species and ecosystem functions, by ensuring that all distinct habitat types are represented in some form of reserves on the landscape. The following habitat elements and landscape structure indicators (2, 3, 4, 5, 6, 7, 8, 9, 10, 11) are considered components of a ‘medium-filter’ approach, based on the principle of managing forest and landscape structures that are both important as habitat and are impacted by forestry practices. The species level indicators (4) which provide a ‘fine-filter’ approach that manages for specific species whose habitat needs may not be covered by the coarse or medium filter approaches. These indicators also include monitoring response of species to changes in habitat structure and pattern. Monitoring the population trends of certain species is a means of assessing the effectiveness of the coarse and medium level indicators. Finally, indicators of genetic diversity within the forest ensure that the genetic pool is being maintained.

Criterion 1 is strongly linked to Criterion 2 (Ecosystem Condition and Productivity) and Criterion 5 (Economic and Social Benefits). Criterion 1 also is linked to social values. For example, old growth forests are an indicator under Criterion 1 for habitat elements, as well as under Criterion 6 to address sites of spiritual importance.

Element 1.1 – Ecosystem Diversity

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

The following indicator statements have been identified for this Element:

- 1 Representation of ecosystem groups across the DFA
- 2 Percent of area in protected reserves, by BEC variant and management unit, within the DFA
- 3 Patch size distribution by Natural Disturbance Type (NDT), within Ecosections
- 4 Percent distribution of forest type across the DFA
- 5 Amounts of old and mature stands by landscape unit and BEC variant
- 6 Area of old, mature and early seral stands, by ecosystem (BEC subzone) grouping, for current and future time periods relative to the Range of Natural Variability
- 7 Median patch size of Old Growth and Mature Management Areas, by NDT and ecosection
- 8 Density (stems/ha) of dominant and co-dominant green trees and snags (standing dead trees) on each cutblock or cutblock area (gross block area)
- 9 Percent of Wildlife Tree Patches retained across the DFA, by Landscape Unit and BEC variant
- 10 High Value Snags
- 11 Riparian Management

Indicator 1 – Ecosystem Representation

Indicator Statement	Target (Variance)
Representation of ecosystem groups across the DFA	<ul style="list-style-type: none"> - Rare Ecosystems – Reserve (0 ha with harvest or roads) - Uncommon ecosystems – Reserve and/or retain high levels of structural retention for those ecosystems below target levels - Common ecosystems – Maintain at least 25% of each ecosystem in the NHLB or under an ecosystem restoration or High Conservation Value Forest management regime.

What is this indicator and why is it important?

This indicator represents a ‘coarse-filter’ approach to maintaining biological diversity. Its intent is to sustain little known species and poorly understood ecological functions by representing a portion of each ecosystem type in an unmanaged state (i.e., with no logging, road-building, or other industrial or urban/rural development). Unmanaged areas play a key role in maintaining biodiversity for many reasons, including the following (Huggard 2004):

- 1) They contribute to the maintenance of the thousands of species that are too poorly known to manage on an individual basis,
- 2) They act as a safeguard against uncertainty in maintaining species in the managed landbase, providing a precautionary buffer against management errors made in the timber-harvesting portion of the land base,
- 3) They provide areas for natural disturbances and ecological processes to occur that may be critical to many species, but that occur at reduced rates in managed stands,
- 4) They provide an ecological baseline or benchmark against which the effects of management can be compared.

Maintaining representation of a full range of ecosystem types in an unmanaged state is a widely accepted strategy to conserve biodiversity in both protected areas and landscapes managed for forestry (e.g., Margules and Pressey 2000, Lindenmayer and Franklin 2002, Huggard 2004 and references therein).

In the East Kootenay, nearly half of the forested land is currently unavailable for harvesting and potentially able to contribute to ecological representation (Wells et al. 2004). These areas include parks, old growth management areas, steep slopes, environmentally sensitive areas, and riparian reserve zones.

In order to understand this indicator, it is important to understand how it is calculated. An ecosystem representation analysis consists of three main steps: 1) defining ecosystem types across the land base, 2) defining the unmanaged portion of the land base (in this case, the Non-harvestable Land Base, or NHLB), and 3) determining the proportion of each ecosystem type that occurs in the NHLB. The sections below explain each of these steps.

Defining study area and ecosystem types

In the East Kootenay, the study area was defined as the ‘East Kootenay Conservation Program’ (EKCP) area, and includes both crown and private land in the Rocky Mountain Forest District, plus TFL 14 and a portion of the Golden TSA (Figure 21). This area includes all of the DFA, with the exception of the portion in the Kootenay Lake TSA, but also includes areas outside the DFA such as operating areas currently managed by BCTS or Galloway. In total, the EKCP area was 3,018,368 ha.

Ecosystem types should be defined at an ecologically relevant scale that can be mapped and is useful to management (i.e. not too small or broad, discrete boundaries). 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). Under this system there are four groupings, listed in order of broadest to finest scale:

- zones – represent major forest types
- subzones – describe different climate regimes within zones
- variants – encompass different elevational gradients and geographic variation within subzones
- site series – distinguish soil moisture and nutrient regimes within variants

For this analysis ecosystem types were defined by grouping together site series based on similarities in plant species (Wells et al. 2004). Predictive Ecosystem Mapping (PEM) was used to map the resulting ecosystem types. Only forested ecosystems were considered, and not wetlands, grasslands, alpine, or urban areas. There were 24 core ecosystem groups defined within the EKCP area, and 11 upper ESSF or ‘West-Kootenay’ groups which were either high elevation ESSF groups or groups shared between the East and West Kootenay.

Rare and uncommon ecosystem groups were also defined by the proportion of the study area that each group occupied. Rare groups were defined as those occupying less than 0.1% of the EKCP area (corresponding to < 2000 ha). Uncommon groups were defined as those with < 0.5% area in the EKCP (2000-9000 ha). Of the 24 ecosystem groups in the EKCP, nine were categorized as “rare”, and seven were categorized as uncommon.

Defining the Non-Harvestable Land Base (NHLB)

Unmanaged land was considered to be any land that met the definition of the Non-Harvestable Land Base (NHLB) in Timber Supply Analysis III. The NHLB consists of land that is not legally allowed to be harvested, or cannot be harvested due to logistical or economic constraints. This included:

- Provincial parks
- Wildlife habitat areas with reserve requirements
- Very steep, rocky, or inaccessible sites (above the operability line)
- Environmentally sensitive areas (e.g., unstable terrain)
- Riparian reserve zones
- Whitebark pine leading stands
- Stands with low productivity
- Deciduous leading stands
- Old growth and mature management areas
- Wildlife tree patches

In addition to the above areas, conservation properties were included in the definition of the NHLB. These are lands owned and/or managed for conservation objectives by groups such as the Nature Conservancy of Canada and The Nature Trust of British Columbia.

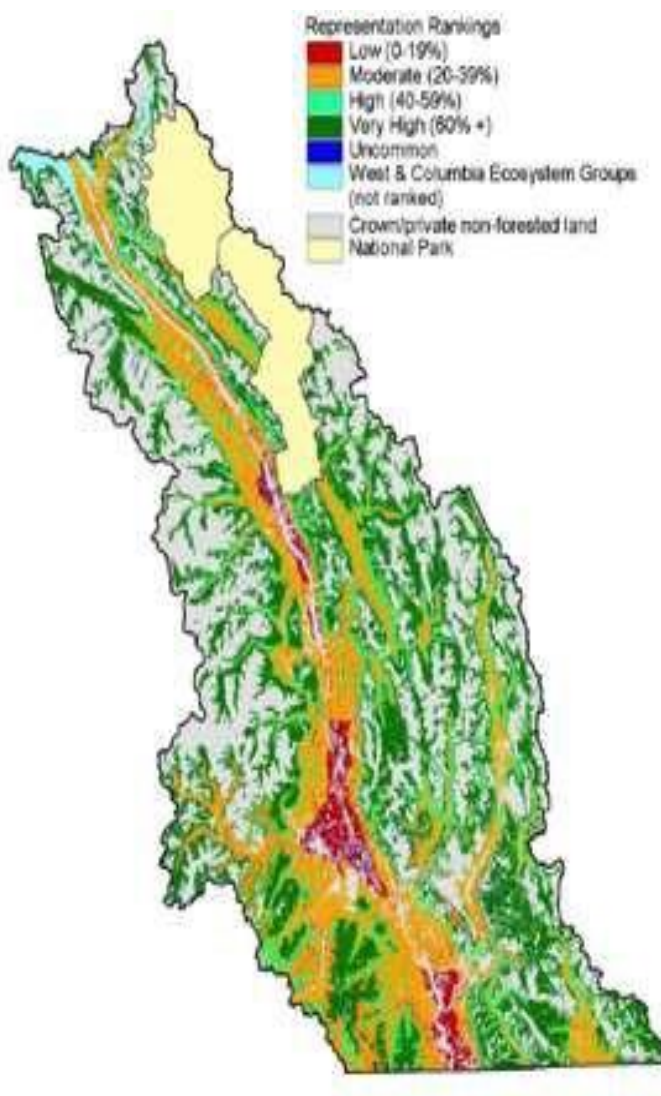
In summary, of the 1,787,957 ha of productive crown and private forest land in the EKCP, nearly half, 45.6% (820,833 ha), was classified as NHLB, and unavailable for harvest.

Determining Representation

Once ecosystem types have been described and mapped and the NHLB has been defined, a Geographic Information System (GIS) can be used to determine the percent, or representation, of each ecosystem type that occurs in the NHLB. In the EKCP, representation ranged from 15% to 97% (Wells et al. 2004). Ecosystem types with the lowest percent of their area in the NHLB, and thus considered to be most at risk, were those in the valley bottoms in the Ponderosa Pine and Interior Douglas-fir BEC zones (Figure 21; ecosystems most at risk shown in red). These ecosystems are those that are most desirable for human

settlement, agriculture and ranching, and have the greatest amount of private land. They have also been impacted the most from human activities, from towns and roads to recreational activities to fire suppression.

Figure 21: Representation within the East Kootenay Conservation Program Study Area



How are targets established?

Since the main objective of ecosystem representation is to maintain species and processes that little or nothing is known about, it is impossible to know precisely how much area is required to achieve this objective. Recommendations range widely, from the 12% in the 1987 Brundtland Commission Report to the 50% recently called for by some conservation scientists (Noss et al 2012). Noss and Cooperider (1994) concluded that in most regions, 25% to 75% (or an average 50%) of an area needs protection to maintain biodiversity and ecological processes. The actual percent depends on many factors, including how the land outside the protected areas is being managed and the impacts to it.

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 targets for this indicator are based on the results and recommendations of Wells et al. (2004) and Wells (2007). The recommendations are based on two main principles:

- Rare or uncommon ecosystem groups are potentially more vulnerable and thus deserve a higher level of protection than more common ecosystem groups, and,
- A minimum area of each common ecosystem should be protected in unmanaged areas.

Targets & Current Condition

Rare Ecosystems

Rare ecosystems are considered especially vulnerable due to their small area. For the nine rare groups in the East Kootenay it was considered reasonable to set a target of 100% representation in the NHLB, i.e. no harvest or road-building is to occur within them, so any portion of them within the THLB is effectively removed. The rare ecosystems are listed in Table 32, and their targets and associated areas in Table 33. ***The majority of these ecosystems are already in the inoperable portion of the land base or would be expected to be placed in riparian or other reserves should they be encountered during cutblock layout.***

Table 32: Rare Ecosystem Groups (< 0.1% and < 2000 ha in EKCP)

Eco-system Group #	Ecosystem Group Name	Site Series within the Ecosystem Group	Climax Community Description
2	Submesic-mesic IDFun	IDFun-DP	Cool mossy aspects dominated by Fd
5	Mesic IDFun2	IDFun2-FH	Mid-slope Fd & At with rich herb understory.
9	Subhygric IDFun2	IDFun2-SD	Level to Lower slope. Sx & Fd with red-osier dogwood.
14	Hygric PPdh2 (fluvial mid-bench riparian)	PPdh2 04	Open Ac & Sx (Fd) with snowberry, bluegrasses and common silverweed.
15	Hygric IDF (fluvial mid-bench riparian)	IDF dm2 07 IDF dm2 XB	Open Sx with water birch, horsetails, sarsaparilla, sedges, red-osier dogwood and trailing raspberry.
16	Hygric IDFun (fluvial mid-bench riparian)	IDFun-CD	Open Ac & Sx with red-osier dogwood
19	Subhygric MS	MSdk 07 IDFdm2A-SB	Level slope position with organic soils. Open Sx with sedges, sitka alder, scrub birch and sphagnum
24	Subhygric ESSFdm2	ESSFdm2/FS	Warm aspects and upper slope positions. Dominated by very open Englemann spruce stands with willow, scrub birch, and sphagnum. Similar to the ESSFdk 07.
30	Hygric ESSFdm 1 (fluvial riparian)	ESSFdm 1-FH	Se & Bl with false azalea, horsetail, Canby's lovage and arrow-leaved groundsel.

Table 33: Targets and associated areas for rare ecosystem groups across the EKCP and DFA area

Ecosystem Group	Area in EKCP (ha)*	Area in Canfor DFA (ha)**	NHLB Target (%)	Percentage in NHLB across EKCP (%)	Variance from Target (%)	Additional area to be added to NHLB to meet targets (ha), as of 2004	
						EKCP	Canfor DFA
2	949	921	100	24	(76)	721	700
5	370	370	100	37	(63)	233	233
9	32	32	100	30	(70)	22	22
14	1,645	527	100	26	(74)	1,217	390
15	821	577	100	35	(65)	534	375
16	368	331	100	35	(65)	239	215
19	1,542	977	100	74	(26)	401	254
24	1,750	520	100	76	(24)	420	125
30	53	30	100	71	(29)	15	9
TOTAL						3502	2323

* As calculated from data from the 2004 Invermere TSA Update Run (Invermere PEM, TSR III) in Wells et al. 2004.

** Estimated the 2014 Canfor DFA under the 2004 Invermere TSA Update Run, using the ratio between the total area in each ecosystem group in the EKCP between the original PEM run and the 2004 Invermere Update Run, and the area known to be in the Canfor DFA in the original PEM run. Actual data is not available for the 2014 Canfor DFA for the 2004 Invermere TSA Update Run.

Uncommon Ecosystems

Uncommon ecosystems were defined as those greater than 0.1% but < 0.5% (2000-9000 ha) in the EKCP study area (Table 34). For this group, the NHLB target is dependent on their area, based on a sigmoid relationship (Wells 2007). This scale is somewhat arbitrary, but reflects the assumption that an ecosystem becomes potentially more vulnerable with decreasing abundance on the landscape.

Targets for these ecosystems are shown in Table 35, and range from 0 to over 3000 ha. Until a new NHLB for TSR IV has been completed (expected 2015), and the precise target for the Canfor DFA can be determined, the strategy for uncommon ecosystems will be to reserve all or a portion of them from logging or road-building and to retain high levels of structural retention (> 50 stems per ha) on the remainder of them (see the Ecosystem Representation SWP for details). The exception will be Group 8, which requires ecosystem restoration to provide for its species and ecological processes. This ecosystem will be managed under an Ecosystem Management Regime (see definition under Common Ecosystems below).

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Table 34: Uncommon Ecosystem Groups (< 0.5% or 9000 ha but > 2000 ha in EKCP)

Ecosystem Group # & Name		Site Series in Ecosystem Group	Climax Community Description
8	Subhygric PPdh2	PPdh2 03	Level to depressions. Py, At & Fd with roses, bluegrasses and pinegrass.
10	Subhygric ICH mk1	ICH mk1 06	Lower to level slope. Cw, Sx and Bl with oak fern, lady fern, foam-flower, queen's cup, five-leaved bramble and Sitka alder.
13	Subhygric-hygric ICH	ICHdm-XA	Lower to level position. Hw, Cw, Bl & Sx with black huckleberry and oak fern (sometimes lady fern and devil's club)
17	Hygric ICH (fluvial mid-bench riparian)	ICH mk1 07 ICH dm-SD	Open Sx & Bl with horsetail, lady fern, bluejoint, arrow-leaved groundsel, cow parsnip, mountain alder and clasping twisted stalk
18	Hygric MS (fluvial mid-bench riparian)	MSdk 06 IDFdm2a-SH	Level, mid-bench riparian with Sx, horsetail, bunchberry, dogwood, black twinberry
29	Subhygric ESSFwm	ESSFwm 04	Lower to level position. Bl & Se with false azalea, black huckleberry, Sitka alder, oak fern, foam-flower, queen's cup, five-leaved bramble, lady fern, feathermoss and common leafy liverwort.
35	Subhygric upper ESSF (Se, Bl)	ESSFdku-FH ESSFdmu1-FH ESSFwmu-WE ESSFdmu2-WE	Very open Se & Bl with a abundant horsetail.

Table 35: Targets for uncommon ecosystem groups across the EKCP area

Eco-system Group	Area in EKCP (ha)*	Est. area in Canfor DFA (ha)**	NHLB Target (%)	Actual Percentage in NHLB (%)	Variance from Target (%)	Additional area (ha) to be added to NHLB or have high levels of structural retention to meet targets, as of 2004.	
						EKCP	Canfor DFA
8	4,402	2,005	90	18	(72)	3169	1804
10	6,702	3,959	50	38	(12)	804	475
13	4,667	3,427	86	41	(45)	2100	1542
17	6,526	3,572	53	56	3	0	0
18	8,813	6,135	31	52	21	0	0
29	2,444	1,752	99	62	(37)	904	648
35	3,611	2,705	83	93	10	0	0
					TOTAL	6977	2665 (not including Group 8)

* As calculated from data from the 2004 Invermere TSA Update Run (Invermere PEM, TSR III) in Wells et al. 2004.

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** Estimated the 2014 Canfor DFA under the 2004 Invermere TSA Update Run, using the ratio between the total area in each ecosystem group in the EKCP between the original PEM run and the 2004 Invermere Update Run, and the area known to be in the Canfor DFA in the original PEM run. Actual data is not available for the 2014 Canfor DFA for the 2004 Invermere TSA Update Run.

Common Ecosystems

These ecosystem groups were defined as those with > 0.5% of their area in the EKCP. For these 18 groups, the target is to maintain at least 25% of their area in the NHLB, under an ecosystem restoration management regime, or under a High Conservation Value Forest regime. Only three common ecosystem groups have representation < 25% (Table 36).

Targets for these ecosystems are shown in Table 37. An ecosystem restoration management regime is defined as one in which the ecosystems is classified as Open Range or Open Forest under the Ungulate Winter Range Orders for the Cranbrook and Invermere TSAs, and is planned for prescribed burning to restore historical ecological conditions and processes. A High Conservation Value Forest (HCVF) regime is defined as one in which the area has been identified as an HCVF and is being managed in accordance with the management strategies outlined for that HCVF.

Table 36: Common ecosystems with < 25% of their area in the NHLB

Ecosystem Group	Ecosystem Name	Site Series in Ecosystem Group	Climax Community Description
1	Subxeric-submesic IDF/PP	PPdh2 01 IDFdm2 03 IDFun-DJ	Open Fd & Py with saskatoon, bunch grasses, kinnikinnick, yarrow & arrow-leaved balsamroot.
3	Circum-mesic IDF/ICH/MS	ICHmk1 03 ICHmk1 04 ICHdm-FB IDFdm2 01 IDFdm2 04 IDFdm2A-LP MSdk 04	Fd and Pl with Sx understory. Pinegrass, soopolalie, birch-leaved spirea, Oregon grape, Saskatoon. Most common ecosystem in the East Kootenay.
4	Circum-mesic ICH dw/dm	ICH dw-XA (01a) ICH dw-XB (01b) ICH dm-FH	Midslope. Hw, Fd, Cw & Lw with falsebox, black huckleberry, prince's pine, queen's cup & twin-flower.

Table 37: Targets for common ecosystem groups with < 25% in NHLB

Ecosystem Group	Area (ha) in EKCP*	Area in Canfor DFA (ha)**	NHLB Target (%)	Percentage in NHLB (%)	Variance from Target (%)	Additional area (ha) to be added to NHLB, harvested under Ecosystem Management or HCVF mgmt. regime to meet targets, as of 2004	
						EKCP	Canfor DFA
1	62,166	40,975	25	15	(10)	6217	4098
3	262,214	151,056	25	23	(2)	5244	3021
4	45,691	36,513	25	23	(2)	913	730

*As calculated from data from the 2004 Invermere TSA Update Run (Invermere PEM, TSR III) in Wells et al. 2004.

** Estimated the 2014 Canfor DFA under the 2004 Invermere TSA Update Run, using the ratio between the total area in each ecosystem group in the EKCP between the original PEM run and the 2004 Invermere Update Run, and the area known to be in the Canfor DFA in the original PEM run. Actual data is not available for the 2014 Canfor DFA for the 2004 Invermere TSA Update Run.

Strategy

There is an Ecosystem Representation Strategy associated with this indicator, as well as an Ecosystem Representation Standard Work Procedure.

Forecasting and Probable Trends of the Indicator

By implementing the Ecosystem Representation Strategy and Standard Work Procedure (SWP) associated with this indicator, by 2024 the representation of rare ecosystems is forecast to increase to 100% in the DFA, and the representation of uncommon ecosystems and common ecosystems with < 25% representation is forecast to reach their respective targets. Protecting a proportion of each ecosystem type in the DFA is expected to contribute towards maintaining the diversity and abundance of species, both known and unknown.

Monitoring and Reporting

Two scales of monitoring will be undertaken.

Each year, the WIM group will conduct an analysis to determine the area of rare and uncommon ecosystems with targets > 0 contained within the net harvested area of cutblocks and within road rights-of-way. If rare or uncommon groups have been harvested, a root cause analysis will be undertaken by the Forest Scientist and Permitting Foresters and the reasons why determined. Modifications will be made to the SWP if necessary, in order to prevent future occurrences.

To determine if the percentage of common and uncommon ecosystems in the NHLB is improving over time, the representation analysis will be re-run every time a new TSR is completed (and a new NHLB determined). Since the area of these ecosystems is large, their representation is not expected to change very quickly through time. This work needs to be undertaken by a contractor, and the Forest Scientist will arrange it.

Although ecosystems are theoretically static, the results of an ecosystem representation analysis can change over time with the changes in the definition of ecosystem groups, the availability of new ecosystem mapping or new forest harvesting landbase definitions (e.g., a new TSR). Thus, the ecological representation analysis will be re-done whenever ecosystem groups are re-defined, a new version of BEC variant and site series mapping is accepted for management, or significant changes in the land base definition occur.

Indicator 2 – Protected Reserves

Indicator Statement	Target (Variance)
Percent of area in protected reserves, by BEC variant and management unit, within the DFA	12 – 24%

What is this indicator and why is it important?

This indicator is a coarse-filter indicator similar to Indicator 1 – Ecosystem Representation, but at a larger ecological scale. The rationale behind the two indicators is the same; to sustain little known species and poorly understood ecological functions by keeping a portion of each ecosystem type in an unmanaged state (i.e., with no logging, road-building, or other industrial or urban/rural development). The main difference between them is in terms of scale: the Protected Reserves indicator defines ecosystems in terms of broader BEC variants, while Ecosystem Representation defines them more finely as groupings of similar site series. For example, the Protected Reserves indicator has one target for the entire MSdk variant, while the Ecosystem Representation indicator divides the MSdk into moist, mesic, and dry ecosystem groups, each with their own target.

How are targets established?

Targets are set for each BEC variant within the DFA on a sliding scale from 12-24% by considering the percentage of established protected areas within that BEC variant, such as legally established parks, wildlife management areas, and conservation properties owned by groups such as the Nature Conservancy of Canada and the Nature Trust (Table 38). The assumption is that the less protected area exists outside the DFA, the greater the requirement for protected areas inside the DFA. For example, when the total protected area outside of a management unit is less than 4% for a BEC variant, ecosection, or BEC variant/ ecosection, the minimum percentage of protected area within the management unit for each BEC variant is 24%.

The range of the sliding scale was established by the FSC-BC standard (2005). As per the discussion in the Ecosystem Representation section, it is impossible to know precisely ‘how much is enough’ when it comes to protected area targets, and the amount will vary depending on the objectives of the protected area, the characteristics and management regime of the surrounding landscape, etc. Since the FSC-BC Standard is considered precautionary management, Canfor is also considering the targets within that standard precautionary.

Table 38: Management Unit Requirements for Protected Areas (Reserves)

Context Outside of Management Unit	Management Unit Requirements
Percentage of Protected Areas by BEC variant, Ecosection or BEC variant/ Ecosection	Minimum Reserves by BEC variant (%)
> 20%	12
16.1 – 20%	15
12.1 – 16%	18
8.1 – 12%	20
4 – 8%	22
< 4%	24

*Relative to the percentage of protected areas outside the Management Unit (from FSC-BC 2005).

Current Condition

The specific targets for each management unit are shown in Table 39 – Table 42, together with the surpluses and deficits relative to targets at the time the analysis was done. The methodology for calculating targets differs slightly among units, because calculations for the units were completed at different times, the BEC mapping and boundaries of the DFA changed through time, and the thinking behind how best to approach this indicator also evolved through time. However, differences are minor and all methods are consistent with the FSC-BC Standard (2005). The Ministry of Forests, Lands, and Natural Resource operations has been revising the BEC variants in the East Kootenay for a number of years. Once these changes have been finalized and the new BEC variants are accepted for management, a new Protected Areas analysis will be run for the entire DFA in the East Kootenay.

In each management unit, deficits relative to targets are primarily found within the lowest elevation BEC variants; the PPdh2 and IDFdm2. In these ecosystems, restoration, rather than protection, is often required in order to maintain native species and ecological processes. This is because of the change in fire regimes since European settlement, and the resultant increase in tree ingrowth and encroachment onto grasslands and open forests (See Section 4.3 The Range of Natural Variability for more detail). Thus, a key strategy for meeting protected area targets in these variants is the application of ecosystem restoration logging (following the Best Management Practices for Ecosystem Restoration), followed by prescribed burning, rather than setting areas aside as protected reserves. Since there are many HCVMs in these BECs that have ecosystem restoration as their management strategy, the deficits were examined relative to HCVM amounts.

Small deficits were also present in the ICHmk1 and ICHmw1 in TFL14, and in the MSdk2 and ICHmk4 in the Radium license (A18979). The strategy to address these deficits is to designate reserves in them up to target levels. This was done for the deficit of protected reserves in the ICHmw1 and ICHmk1 variants in TFL14 in 2007 and for the Radium licence in July 2016.

Table 39: Management Unit Reserve Requirements: Deficits / Surpluses – A189878

								HCVF Consideration	
BEC Variant	CFLB (ha)	Reserves outside MU		Reserves Inside MU		MU Requirement	Deficit or Surplus	Rsys Incl HCVF Areas	Deficit or Surplus
		ha	%	ha	%				
AT un	299	152	51%	147	100%	12%	88%	100%	88%
ESSFdk 1	104,427	22,506	22%	48,185	59%	12%	47%	61%	49%
ESSFdku	28,351	8,362	29%	19,005	95%	12%	83%	96%	84%
ICH mk 1	14,474	-	0%	3,834	26%	24%	2%	28%	4%
IDF dm 2	28,029	810	3%	4,242	16%	24%	-8%	29%	5%
IDF xk	1,248	149	12%	713	65%	20%	45%	82%	62%
MS dk	59,890	7,092	12%	18,275	35%	20%	15%	37%	17%
PP dh 2	4,914	-	0%	361	7%	24%	-17%	31%	7%
Totals	241,632	39,070	16%	94,762	47%	15%	32%	51%	36%

Note: Variants with less than 100 ha were lumped with the variant most similar to it.

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Table 40: Management Unit Reserve Requirements: Deficits / Surpluses – Kootenay Lake and Cranbrook TSAs

Biogeoclimatic Variant	Total Forested Area (ha)	Minimum Reserve Requirement (%)	Minimum Reserve Requirement (ha)	Reserve Area (ha)	Deficit or Surplus (%)	Deficit or Surplus (ha)	HCVF Consideration	
							Reserves incl. HCVF areas	Deficit or Surplus (ha)
ESSFdk 1	125,913	24%	30,219	62,672	26%	32,453	91,480	61,261
ESSFdk 2	34,345	12%	4,121	24,420	59%	20,299	28,242	24,121
ESSFdkp	129	12%	15	129	88%	113	6,591	6,576
ESSFdkw	23,222	12%	2,787	21,698	81%	18,911	36,457	33,671
ESSFdm	56,995	22%	12,539	35,507	40%	22,968	35,589	23,050
ESSFdmp	2,060	20%	412	2,060	80%	1,648	2,060	1,648
ESSFdmw	13,392	22%	2,946	13,213	77%	10,267	13,214	10,267
ESSFwm	31,570	12%	3,788	26,556	72%	22,767	27,108	23,320
ESSFwmp	281	12%	34	281	88%	248	809	775
ESSFwmw	11,454	15%	1,718	11,330	84%	9,612	11,848	10,130
ICH dm	95,483	24%	22,916	33,037	11%	10,121	35,226	12,310
ICH dw 1	16,019	24%	3,845	5,335	9%	1,491	5,976	2,132
ICH mk 4	26,001	24%	6,240	10,096	15%	3,856	13,767	7,527
IDF dm 2	37,425	24%	8,982	4,689	-11%	-4,293	20,666	11,684
IDF un	41	22%	9	10	1%	0	21	11
MS dk 1	93,602	24%	22,465	28,402	6%	5,937	49,682	27,217
MS dk 2	16,542	24%	3,970	7,000	18%	3,030	8,827	4,857
PP dh 2	16,185	22%	3,561	1,894	-10%	-1,667	7,961	4,401

Table 41: Management Unit Reserve Requirements: Deficits / Surpluses – TFL14

BEC Variant	CFLB (ha)	Reserves outside MU		Reserves Inside MU		MU Requirement	Deficit or Surplus	HCVF Consideration	
		ha	%	ha	%			Rsvs incl. HCVF Areas	Deficit or Surplus
AT	507	504	99%	3	100%	12%	88%	100%	88%
ESSFdk	16,566	2,221	13%	4,891	34%	18%	16%	41%	23%
ESSFdku	996	0	0%	973	98%	24%	74%	98%	74%
ESSFwm	19,360	0	0%	9,772	50%	24%	26%	55%	31%
ESSFwmu	2,134	-	0%	2,073	97%	24%	73%	97%	73%
ICH mk 1	2,536	-	0%	591	23%	24%	-1%	28%	4%
ICH mw 1	1,851	-	0%	315	17%	24%	-7%	17%	-7%
IDF dm 2	11,255	-	0%	2,791	25%	24%	1%	43%	19%
MS dk	19,263	-	0%	5,141	27%	24%	3%	30%	6%
Totals	74,468	2,726	4%	26,550	37%	24%	13%	44%	20%

Note: Variants with less than 100 ha were lumped with the variant most similar to it.

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Table 42: Management Unit Reserve Requirements: Deficits / Surpluses – A189879

Ecosection	Biogeoclimatic Variant	CFLB Area (ha)	Minimum Reserve Requirement (%)	Minimum Reserve Requirement (ha)	Reserve Area (ha)	Deficit or Surplus (ha)
Eastern Purcell Mountains	ESSFdk 2	20,241	15%	3,036	14,906	11,870
	ESSFdkp	284	15%	43	284	242
	ESSFdkw	6,616	15%	992	6,278	5,286
	ESSFwm	1,634	15%	245	1,056	811
	ESSFwmp	6	15%	1	6	5
	ESSFwmw	378	15%	57	346	289
	ICH mk 4	1,063	15%	159	678	518
	IDF dm 2	461	15%	69	172	103
	MS dk 2	11,539	15%	1,731	4,512	2,781
Southern Park Ranges	ESSFdk 2	43,610	12%	5,233	31,862	26,629
	ESSFdkp	243	12%	29	243	214
	ESSFdkw	13,409	12%	1,609	13,182	11,573
	ICH mk 4	19,391	12%	2,327	9,148	6,821
	IDF dk 5	6	12%	1	4	4
	IDF dm 2	918	12%	110	603	492
	MS dk 2	41,220	12%	4,946	11,530	6,584
Upper Columbia Valley	ESSFdk 2	121	20%	24	121	97
	ICH mk 4	4,295	20%	859	1,802	943
	IDF dk 5	2,964	20%	593	901	308
	IDF dm 2	13,858	20%	2,772	2,726	(46)
	IDF xk	805	20%	161	256	95
	MS dk 2	13,509	20%	2,702	2,666	(36)
Totals		196,570		27,699	103,281	75,582

Strategy

There is a Protected Reserves Strategy associated with this indicator, but no Standard Work Procedure, since there are no components that need to be implemented on a regular basis at the operational level.

Forecasting and Probable Trends of the Indicator

By implementing the Protected Reserves Strategy, it is forecast that BEC variants that already meet targets will continue to do so, and that BEC variants below targets will be met by July 2016. Protecting a proportion of each BEC variant in the DFA is projected to contribute towards maintaining the diversity and abundance of species, both known and unknown.

Monitoring and Reporting

Baseline reporting will consist of analyses showing the amount of protected reserves within each BEC variant relative to the target for that variant at the first time that analysis was completed. Since the analysis is done at a large scale, results will not change significantly over short time periods. Current condition analyses will be conducted every 10 years or within 2 years of any significant changes to protected reserves within the DFA or within the variants. New baseline analysis will be conducted within 2 years of the legal adoption of new mapping of BEC variants.

On an annual basis, the amount of harvesting and road-building outside the operability line for all variants with less than 1000 ha surplus area will be reported. This is necessary because the land outside the operability line is included in the definition of protected reserves within the DFA.

Indicator 3 – Patch Size Distribution

Indicator Statement	Target (Variance)
Patch size distribution by Natural Disturbance Type (NDT), within Ecosections	Trend towards patch size distribution targets as defined in the Biodiversity Guidebook (Table 21), by Natural Disturbance Type (NDT) within Ecosections, over the mid-term (20-50 yrs)

What is this indicator and why is it important?

In an ecosystem, an area that is relatively homogenous can be referred to as a patch. For example, in forests, a patch can be defined as a contiguous area of the same seral stage, e.g. areas of young forest, or of old forest. Within forests, natural disturbances such as wildfire and insect infestations maintain a mosaic of different sized patches across the landscape. This heterogeneity promotes biodiversity by providing a variety of environments for species to inhabit. Some species are strongly affected by edge effects and will not live in small patches (which have a large proportion of their area composed of habitat near the edge of the patch), while others thrive on edges and prefer small patches. Species that prefer older forest habitat are particularly sensitive to patch size and often prefer larger patches, making size management and/or tracking especially important for older forest. For this reason, Indicator 7 – Interior Forest Habitat was developed.

In general, species that live in large patches are more sensitive to habitat change than species that live in small patches, thus, it is important to ensure that large patches are retained and created in addition to small ones. Managing for a range of patch sizes is recommended by ecologists to maintain provide potential habitat for the diversity of species in the area (Lindenmayer et al. 2006, Bunnell et al. 2007).

This indicator provides the basis for working towards a patch size distribution that resembles what is considered to occur naturally in the East Kootenay, based on the current best available information. To generate the patch size distributions used in this indicator, the East Kootenay operating area was split up into distinct ecological units (ecosections), and forest patches within each ecosection were grouped by Natural Disturbance Type (NDT). Explanations of ecosections and NDTs are provided below.

Natural Disturbance Types

Five NDTs are recognized as occurring in British Columbia for the purpose of setting biodiversity objectives. They are:

- NDT1 – Ecosystems with rare stand-initiating events
- NDT2 – Ecosystems with infrequent stand-initiating events
- NDT3 – Ecosystems with frequent stand-initiating events
- NDT4 – Ecosystems with frequent stand-maintaining fires
- NDT5 – Alpine Tundra and Subalpine Parkland ecosystems

These different disturbance types characterize areas with different natural disturbance regimes. For example, stand-initiating disturbances largely terminate the existing forest stand and initiate secondary succession in order to produce a new stand. Examples include severe wildfires, windstorms and, to a lesser extent, insects and landslides. Much of the forest in the main valleys of Canfor’s DFA is classified as NDT3, e.g., the White River, Upper Elk River, Flathead River, etc. Stand-maintaining disturbances include low intensity ground fires that historically occurred in the valley bottom of the Rocky Mountain Trench.

More information on NDTs can be found in the Biodiversity Guidebook:

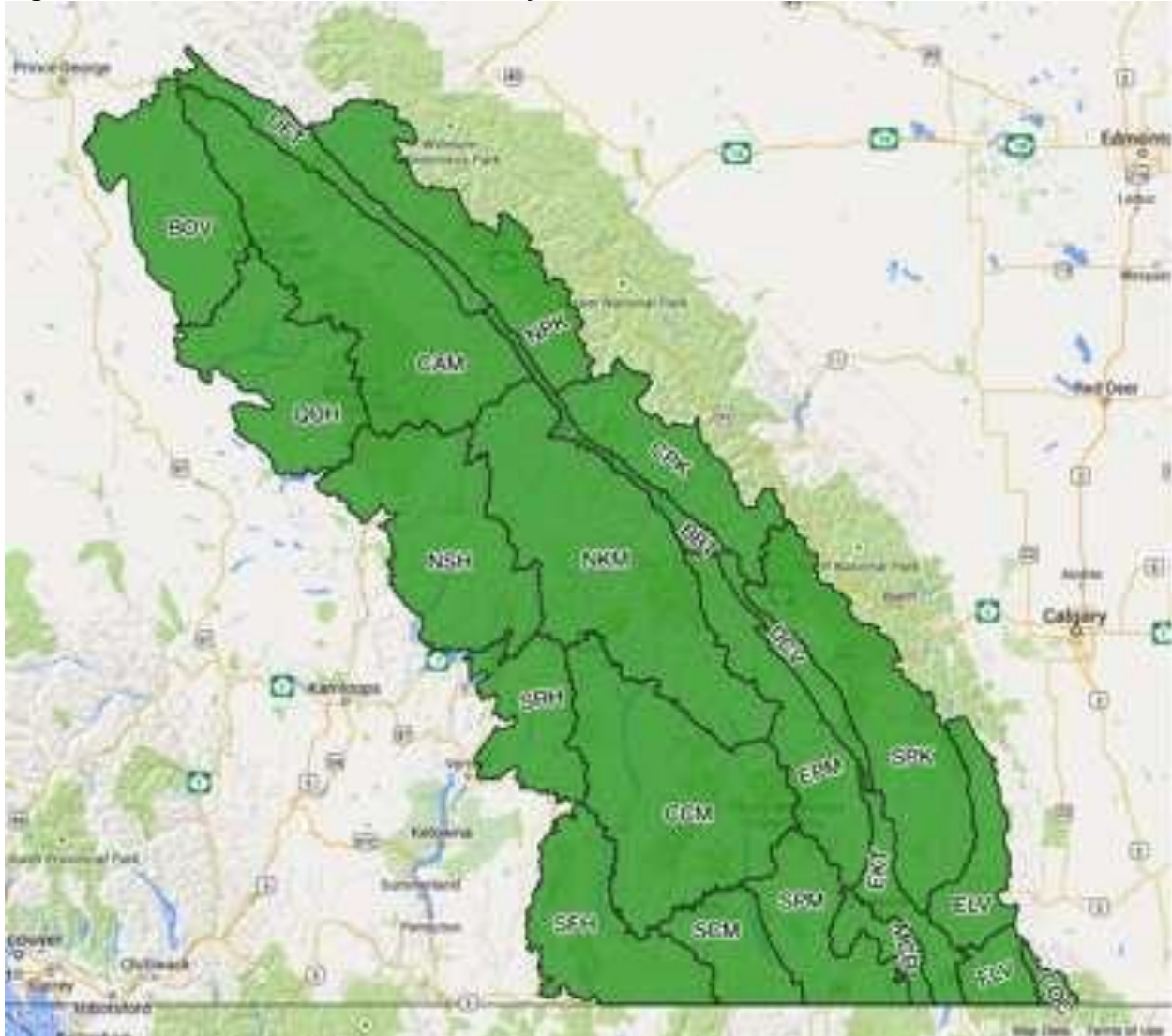
[Establishing Landscape Unit Biodiversity Objectives](#)

Canfor’s DFA in the East Kootenay contains NDT2, 3, 4, and 5, but not NDT1 (this NDT occurs largely in coastal areas or in inland rainforests).

Ecosections

Ecosections are ecological areas with minor physiographic and macroclimatic variation, defined at the sub-regional level by the Ministry of the Environment. Ecosections cover hundreds of thousands of hectares each. A map of the Ecosections in the East Kootenay Region is shown in Figure 22. Slight modifications of the ecosections boundaries were made in some cases to make the boundaries match Landscape Unit boundaries, for details, ecosection descriptions and explanations of the three-letter code names (Table 63).

Figure 22: Ecosections of the East Kootenay



How are targets established?

As with other ecological indicators, like old and mature forest, there are several different ways to set targets for patch size distribution:

- ***Determine the range of variability in the size of patches that was been present under historic disturbance regimes, and set the target to be within this range or some measure of it (e.g., the mean or median).***

This method assumes that the closer forestry practices can maintain the patterns and process associated with natural disturbances like wildfire, the greater degree to which biodiversity will be maintained.

The difficulty with this method lies in obtaining an accurate measure of the range of natural variability, and then dealing with the fact that natural variability can be very high and varies with the time period chosen to measure it within. For example, in one 10-yr period the fires may all be <100 ha, but in the next 10-yr. period there may be several fires over 10,000 ha in size. There is little actual data suggesting what the historic patch size distribution was in the East Kootenay region. A study on the Invermere TSA suggests that the patch size distribution in 1950 in the MS and ESSF zones combined was 28% in patches of 0-50 ha, 12% in 50-100 ha, 28% in 100-500, and 32% in patches > 500 ha (Morgan 1999). This demonstrates that a diversity of patch sizes existed prior to the advent of industrial logging, some of which were very large. However, it does not provide the historic range of variation in patch size since only one year was analyzed.

- ***Determine the patch size distributions required by various species in order to maintain their populations, and use this amount as a target.***

This is a challenging method, because of the large number of species, each with differing habitat requirements. Even if one tried to select the species with the most stringent patch size requirements, determining the species to measure and the size of patches they require is very difficult. Further, applying this patch size over the entire landscape would result in a loss of landscape and likely species diversity. There are no meaningful cut-offs for patch size classes in the scientific literature, and categories are likely species dependent (Bunnell 2003).

- ***Use targets set by government or other bodies.***

An example is the patch size distributions outlined in the Biodiversity Guidebook (BC Ministry of Forests and Environment 1995). These targets are loosely based on natural disturbance patterns, but they incorporate social and economic factors as well as biological ones.

Due to the difficulty and uncertainty associated with methods one and two, Canfor has chosen a modified version of method three (the modifications discussed below). Choosing method three fits with the recommendation of Bunnell et al. (2003), who suggested that the targets in the Biodiversity Guidebook may suffice until better information is available.

Modifications to Method Three for Setting Targets

- 1) First, Canfor only applied patch size targets to very early seral stands – defined as those between 0 and 19 years, including logged and fire-origin stands – rather than to early seral – defined by the Biodiversity Guidebook as those between 0 and 40 years. Very early seral was differentiated from early seral because of the large difference in structural stage and biodiversity between 0-19 yr stands and 20-40 yr stands.

Stands aged 0-19 yrs. typically fall into the herb and shrub/seedling structural stages, with some reaching the pole-sapling stage by about 15 yrs. (later on poor sites). Biodiversity is generally relatively high, due to the abundance and diversity in shrubs and herbaceous vegetation, which results in high diversity and abundance of other species such as songbirds. In contrast, between

20-40 yrs., a stand is typically a dense young forest with trees 3-6 m tall. At this age the shrub component is falling out due to canopy closure and shading from the trees, and the stand has been declared free-growing. Biodiversity in 20-40 yrs stands is often lower than in stands 0-19 yrs. due to the lower abundance and diversity of shrubs and herbs (Stuart-Smith 2002). Thus, it was felt that separation of these two age classes was warranted based on their ecological differences.

- 2) The scale of analysis was changed to Natural Disturbance Type (NDT) within ecosections, rather than within landscape units. The scale of analysis was changed from landscape unit to ecosection for two main reasons:



- ***Landscape Units are too small to be ecologically meaningful for patch size distribution.***

In fire history studies, landscape pattern statistics are usually generated for very large landscapes (100,000 ha or greater). However, landscape units (LUs) in the East Kootenay vary from roughly 20,000 - 70,000 ha. Since there may be up to four NDTs within a given LU, when the LUs are broken down by NDT, the size of each shrinks significantly to often less than 10,000. It is impossible for an entire patch size distribution to be met within a small area at any given time, particularly for NDTs in which fires were very large. For example, a fire of 15,000 ha could leave all of one NDT in an LU in one very large patch. In the East Kootenay, fire history data indicates that wildfires ranged in size from very small to extremely large, including fires covering tens of thousands of hectares. Thus, applying natural disturbance patch sizes to NDTs within LUs is too small to be ecologically meaningful.

- ***Using LUs results in patch size being a moving target.***

At present, harvested cutblocks are the predominant contributors to very early seral patches. The denominator for calculating patch distribution percentages is the sum of the area of all very early seral patches, which increases as more cutblocks are harvested and decreases as these cutblocks age past 20 years. Changes can be large in small LUs with few existing cutblocks, to which a

larger number of new blocks are being added. This makes patch size a moving target, and very difficult to plan for through time. Using a larger unit like ecosection results in less change in the denominator each time new cutblocks are added or old ones are removed, making the target more stable.

- 3) The differentiation between NDTs with and without Douglas-fir (Fd) was dropped. This is because, in the Biodiversity Guidebook, the two predominant BEC zones in Canfor's DFA, the MS and the ESSF, were split into different categories because the MS contains large amounts of Fd and the ESSF contains lesser amounts. Each category had different patch size distribution targets. Yet, fire history studies in the East Kootenay have shown that wildfires often cross between the MS and ESSF (e.g., Stuart-Smith and Hendry 1999). Thus, splitting these two BECs would artificially split many patches into two. Further, it would reduce the size of the scale of the analysis, similar to using landscape units rather than ecosections. Thus, it was decided just to use NDT, rather than splitting BECs on the basis of Fd present or restricted.
- 4) Targets were added for the categories that were missing them. In the Biodiversity Guidebook, the targets for NDT2 and 'NDT3 with Fd present' have no patch size distribution specified for patches > 250 ha. Similarly, the category 'NDT3 without Fd present' has no targets for patches over 1000 ha. Yet, fire history studies show that wildfires in these disturbance types frequently burned areas larger than 1000 ha, so patches in these size classes did occur. The targets for NDT3 were a combination of the targets from the NDT3 with Fd throughout and Fd restricted or absent.

The target patch size distributions for very early seral patches within the NDTs that occur within the DFA are shown in Table 43.

Table 43: Target Patch Size Distributions for the NDTs in Canfor's DFA

NDT2		NDT3		NDT4	
Patch Size (ha)	Target Percentage Range	Patch Size (ha)	Target Percentage Range	Patch Size (ha)	Target Percentage Range
< 40	30-40	< 40	15-25	< 40	30-40
40-80	30-40	40-250	20-40	40-80	30-40
80-250	20-40	250-1000	30-50	80-250	20-30
250+	0 - 5	1000+	10-20	250+	5-15

Current Condition

The variance of the current patch size distribution from target distributions for each ecosection in the DFA is shown in Table 44. Trends are not always very clear because of the high variability among ecosections, but it is apparent that:

- In NDT2, there are too many very small patches (< 40) and not enough patches between 40- 80 ha. Very large patches are within target.
- In NDT3, there are either too many patches < 40 and 40-250, or these size of patches are within targets. There are typically too few patches in the larger size classes of 250-1000 and > 1000.
- In NDT4, the dominant pattern is too few patches in the 40-80 size class and a trend towards too many in the larger size classes.

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Table 44: Variance of Current Patch Size Distributions from Target Distributions for Ecosections in the DFA

Ecosection		Size class (ha)			
#	Name	Amount Relative to Target ¹			
NDT2					
		<40	40-80	80-250	250+
10	Upper Columbia Valley – TFL14	Low	Low	High	Within
12	Eastern Purcell Mountains – TFL14	V. High	V. Low	V. Low	Within
16	Southern Purcell Mountains – Cranbrook	High	V. Low	Within	Within

Ecosection		Size class (ha)			
#	Name	Amount Relative to Target ¹			
NDT3					
		< 40	40-250	250-1000	1000+
1	Flathead Valley/ Crown of Continent	High	Within	V. Low	High
2	Mid-Elk Valley	High	Within	V. Low	V. High
3	Upper Elk Valley	Within	High	Within	V. Low
4	Southern Park Ranges – South	High	Within	Low	V. Low
5	Southern Park Ranges – Central	Within	Within	V. Low	High
6	Southern Park Ranges – North	High	Within	Low	Low
7	East Kootenay Trench – South	V. High	Within	V. Low	V. Low
8	East Kootenay Trench – North	Within	Within	Within	Within
9	MacGillivray Range	Within	Within	V. Low	High
10	Upper Columbia Valley – TFL14	Within	Within	Low	Within
12	Eastern Purcell Mountains – TFL14	High	V. High	V. Low	V. Low
13	Eastern Purcell Mountains – North	V. High	Within	V. Low	V. Low
14	Eastern Purcell Mountains – Central	Within	High	Low	V. Low
15	Eastern Purcell Mountains – South	Within	High	Low	V. Low
16	Southern Purcell Mountains – Cranbrook	High	V. High	V. Low	V. Low
17	South Purcell Mountains – Kootenay Lake	Within	High	Low	V. Low

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Ecosection		Size class (ha)			
#	Name	Amount Relative to Target ¹			
NDT4					
		<40	40-80	80-250	250+
5	Southern Park Ranges – Central	Within	V. Low	V. High	Low
7	East Kootenay Trench – South	Low	V. Low	Within	V. High
8	East Kootenay Trench – North	Low	V. Low	Within	High
9	MacGillivray Range	Within	V. Low	High	High
10	Upper Columbia Valley – TFL14	High	V. Low	High	Within
14	Eastern Purcell Mountains – Central	High	High	V. Low	Low
15	Eastern Purcell Mountains – South	Low	V. Low	High	High

¹ V. low: $\geq 10\%$ below target, Low: $< 10\%$ below target, within: within target, High: $< 20\%$ above target, V. high: $\geq 20\%$ above target. The different cut-offs between low and high were because of the unequal possibility of going below the target versus going above the target.

Strategy

There is a Patch Size Distribution Strategy associated with this indicator, but not a Standard Work Procedure.

Forecasting and Probable Trends of the Indicator

By implementing the Patch Size Distribution Strategy, it is forecasted that patch size distributions will trend towards targets over the mid-term (20-50 years). This length of time should allow for the impacts of natural factors that are out of Canfor's control, such as large wildfires and severe insect infestations.

Monitoring and Reporting

Patch size distributions for very early seral patches will be calculated every 5 years and trends through time determined for each NDT within each Ecosection. Patch size distributions will be re-calculated for specific Ecosections at shorter intervals if a major natural disturbance event occurs that is thought to likely impact the patch size distributions.

Indicator 4 – Distribution of Forest Type

Indicator Statement	Target (Variance)
Percent distribution of forest type across the DFA	No significant decline (> 10% of the total amount) in broadleaf or mixedwood types by BEC zone, over a 10-year period

What is this indicator and why is it important?

This indicator is one of the core set of indicators for Canfor’s Conservation Framework developed by Dr. Fred Bunnell and his team at the University of British Columbia. It provides high-level overview information on the relative area in the DFA covered by forests in broad classes, defined primarily by whether the trees are coniferous or deciduous/broadleaf, and by the broad age class of the stand.

The coniferous/broadleaf distinction is the most important component of this indicator, not only because Canfor harvests coniferous trees, but because broadleaf and broadleaf/coniferous mixed stands generally support higher biodiversity than pure conifer stands. For example, compared to conifer trees, broadleaf trees:

- Provide habitat for more canopy-dwelling insects, and thus insectivorous birds and mammals that feed on them,
- Support a greater diversity of fungal and lichen species,
- Produce snags and CWD earlier because they are shorter-lived and faster-decaying
- Support a higher diversity of forest floor invertebrates and their predators (e.g., shrews and amphibians), because broadleaf litter is much richer in nutrients than conifer needle litter.



In addition to their value for biodiversity, broadleaf stands also contribute to maintaining forest health. Many of the bird species that use aspen trees for nesting (e.g., Hairy, Downy, Three-toed, Black-backed woodpeckers) or foraging (e.g., Black-capped chickadee) are also voracious consumers of forest pests (Machmer and Steeger 1995). For example, an individual three-toed woodpecker can

consume thousands of spruce beetle larvae a day. Foliage gleaning birds such as chickadees have been recorded as causing as much as 95% mortality in pest populations (Martin and Eadie 2002). There is also evidence that the broadleaf in stands contributes to slowing the incidence and rate of spread of tree diseases such as root rot (*Armillaria spp.*, *Phellinus weirii*, Comeau 1995). The presence of broadleaf

trees in a stand may also enhance the growth of conifers in that stand by reducing the vigour of competing shrubs, fixing nitrogen, and increasing rates of decomposition, thus increasing the availability of nutrients (Simard 1995). Thus, they can contribute to long-term sustainability and productivity over several rotations.

Further, Bunnell et al. (2007, 2009) has demonstrated strong associations between various vertebrate species in the DFA and the broad forest types in this indicator. Thus, changes in the amounts of these forest types can serve as an index to the abundance of these vertebrate species. Thus, this indicator is a critical component of the Canfor's Species Accounting System. This is further discussed in 1.2.1 Species of Management Concern indicator.

These broad forest types are defined by Bunnell (2007) as follows:

- Conifer stands: at least 75% of the trees are conifer,
- Broadleaf stands: at least 75% of trees are broadleaf,
- Mixedwood stands: neither hardwoods nor conifers attain 75%
- Recent Disturbance: 0 to 10, and 11 to 30 years old; too early in succession to classify confidently as mixedwood, hardwood, or conifer leading.
- Non-Vegetated upland: less than 5% vegetation cover; includes roadsides, landings, oil and gas developments (excludes lakes, rivers and ponds)
- Non-Forest (Treed) upland or wetland: less than 10% tree cover; includes interior mountain heather (alpine tundra), wetland, and other sparsely trees sites such as non-commercial brush (NCBR). Also includes many recent cutblocks in Canfor's current analysis.
- Water

The forested types are further divided into mid-seral (31-90 years) and late (> 90 years).

Finally, this indicator is important as forest operations can, through harvesting, reforestation, and stand-tending practices, have a significant influence on the composition of forest stands on the landscape through time. Shifts to a landscape with significantly less broadleaf or mixedwood stands would have negative impacts on biodiversity and ecosystem health and resilience.

How are targets established?

Ideally, the target for this indicator would be determined by the range of natural variation in the amount of broadleaf and mixedwood stands that were naturally present on the DFA historically. However, there is no good information on what this was. The earliest estimates of broadleaf and mixedwood stands come from Forest Cover mapping in the 1970s, after considerable harvesting had already occurred on the landbase, and these estimates are considered to be poor.

Thus, for this indicator trends through time will be used rather than a set quantitative target. A decline of more than 10% of the total amount of broadleaf or mixedwood over 10 years will be considered significant, at which point changes to reforestation or stand-tending strategies will be developed (see the Forest Type Strategy for details).

Current Condition

The current (as of December 2015) distribution of forest types across the DFA by major licence, and within the Radium A18979 licence alone are shown in Figure 23 through Figure 27. The area under analysis included the entire landbase in the DFA, excluding private land and woodlots.

It is very clear that all five licences are dominated by conifer stands, and there are small percentages of broadleaf and mixedwood stands.

Figure 23: Broad Forest types across TFL 14

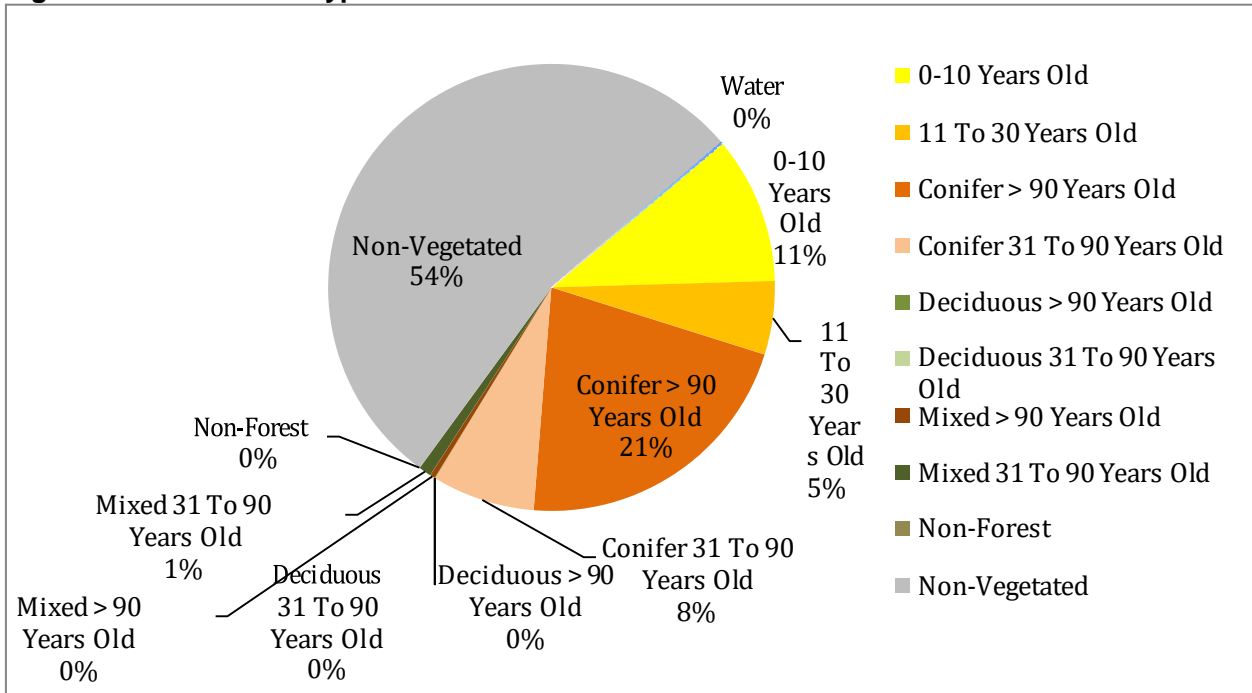


Figure 24: Broad forest types across the Cranbrook Forest Licence A19040

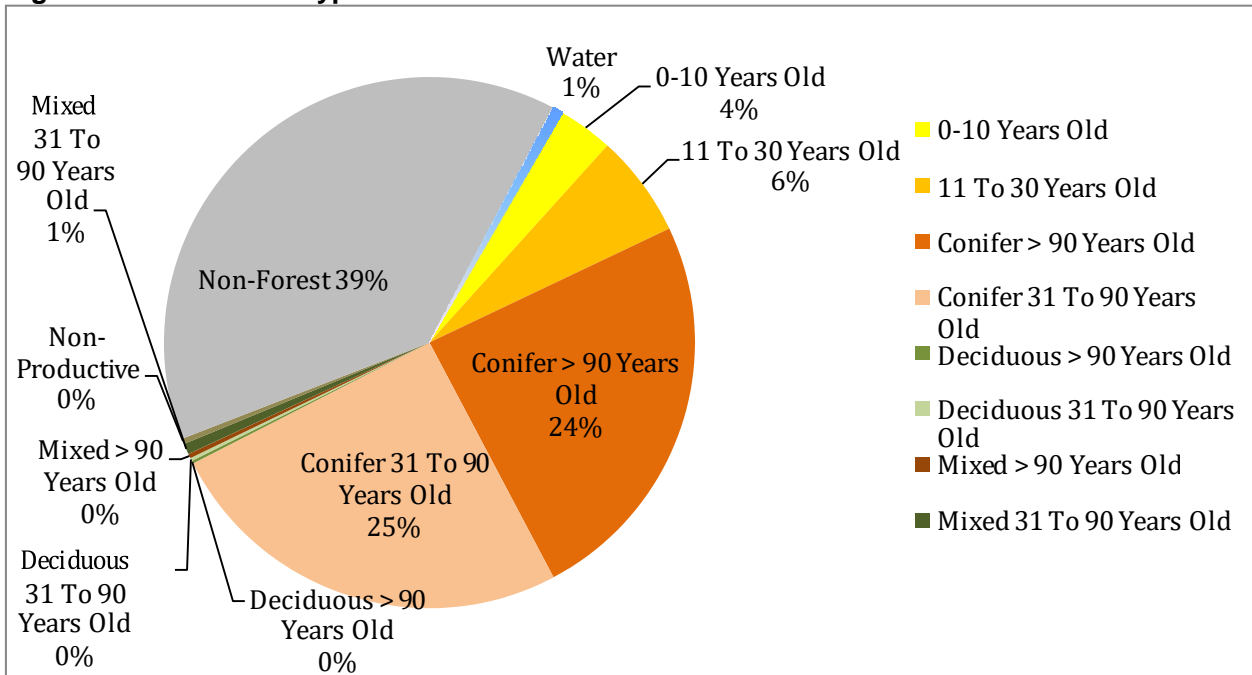


Figure 25: Broad forest types across the Creston Forest Licence A20212

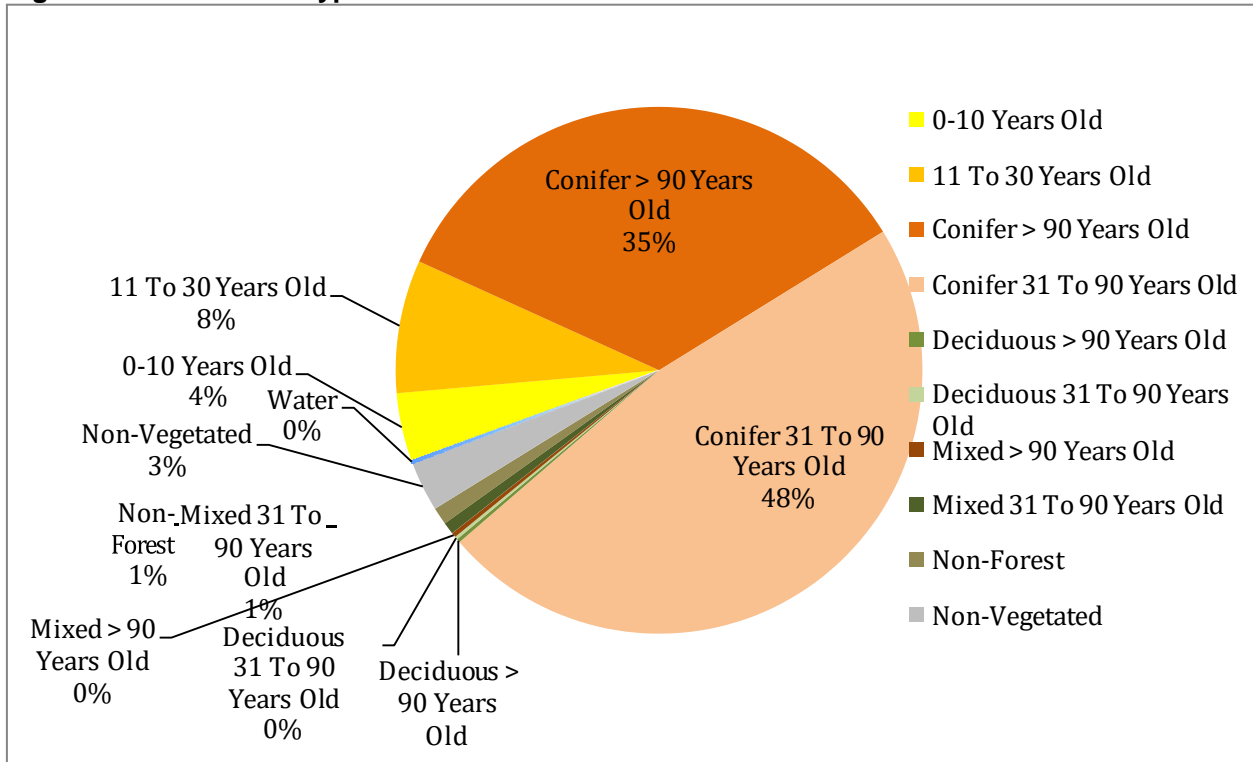


Figure 26: Broad forest types across the Canal Flats Licence A18978

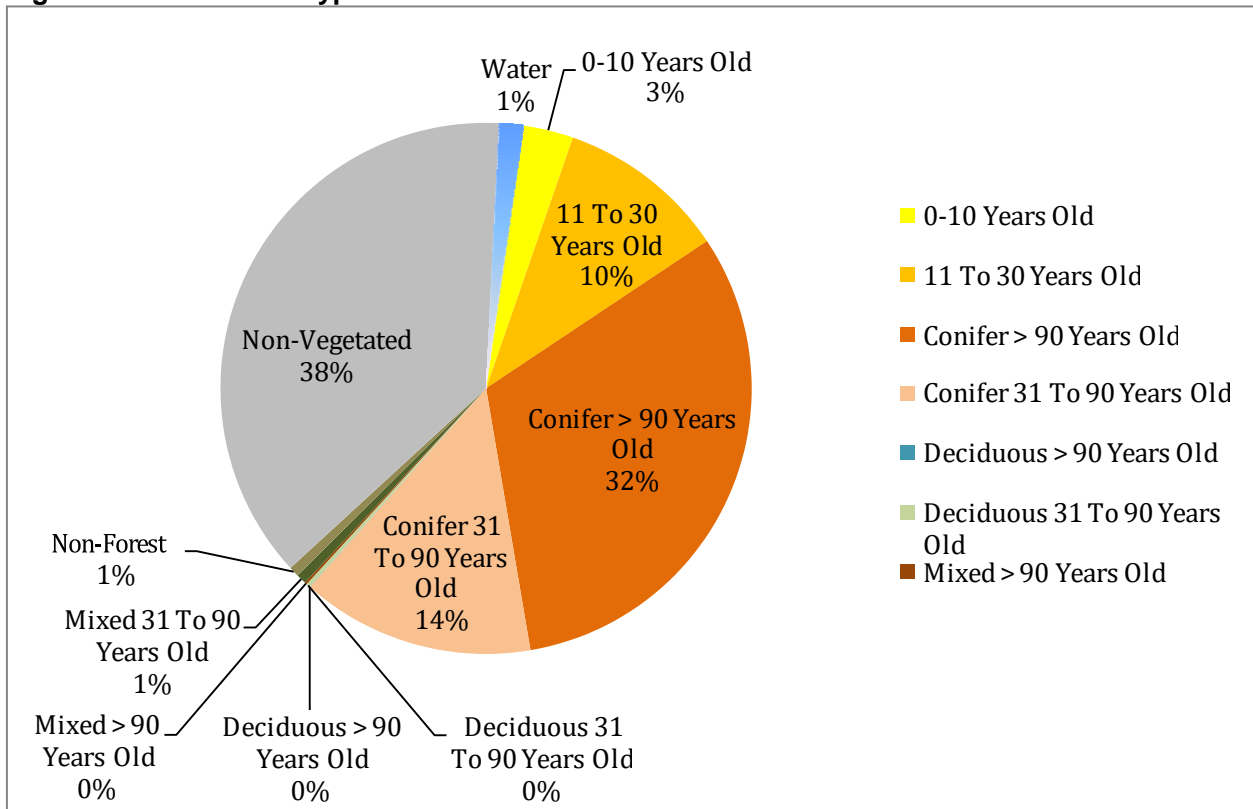
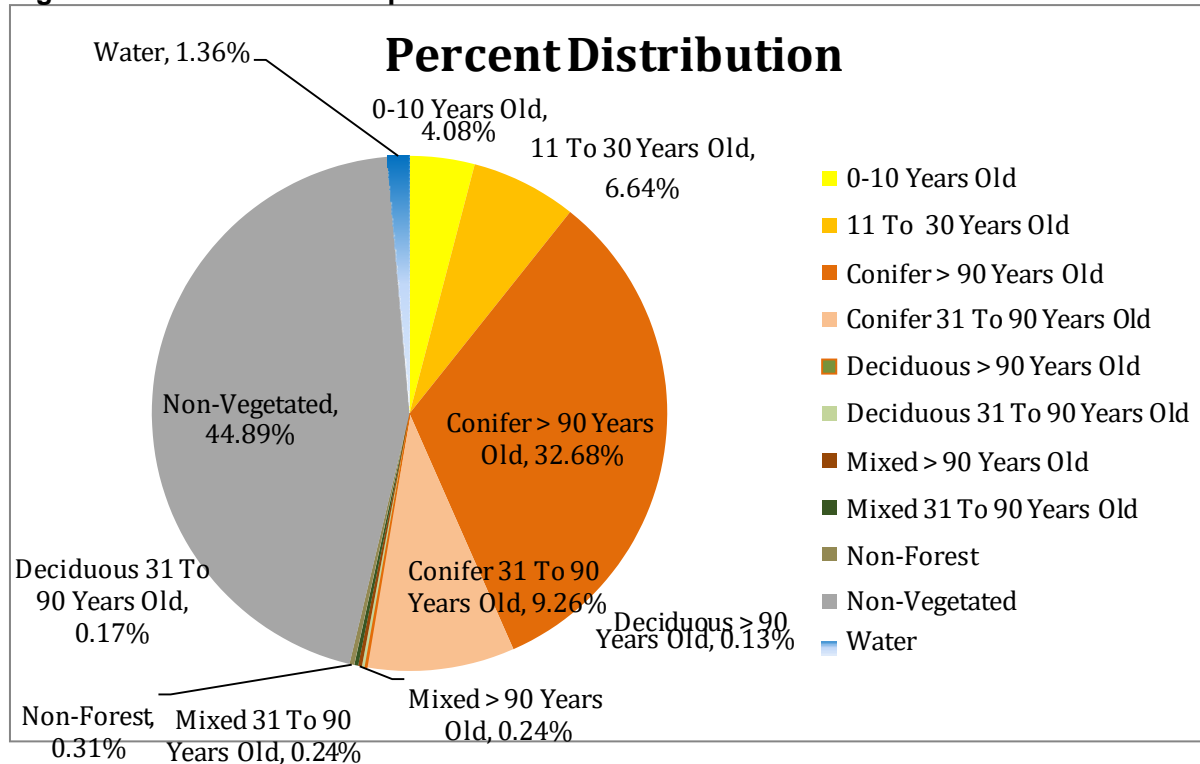


Figure 27: Broad Forest Groups across the Radium Licence A19879



Strategy

There is a Distribution of Forest Type Strategy associated with this indicator, but not a Standard Work Procedure.

Forecasting and Probable Trends of the Indicator

By implementing the Distribution of Forest Type Strategy, it is forecast that mixedwood and broadleaf stands will remain at their current amounts plus/minus 10%. This will provide for the species associated with these forest types, such that their numbers do not decline due to decreases in habitat type.

Monitoring and Reporting

This indicator will be reported out on a 5-year basis, based on calculations done by the WIM team using VRI data updated with RESULTS. WIM has a standardized code for this calculation that they follow (available from the WIM team or GIS Analyst). Reporting on a more frequent basis is not necessary because the indicator will change very slowly due to the large scale of the analysis (licence-wide wide) and the relatively small changes that occur each year in each category. Reports will include the new data for the year in question, in addition to comparisons with previous years, so that trends through time can be determined. Changes in the amount of broadleaf and mixedwood types will be determined on a rolling average basis. If the changes show a decrease of more than 10% by licence, the Forest Scientist, Permitting Foresters, and Silviculture Foresters will review the data and develop a strategy to increase the amount of broadleaf and/or mixedwood stands through time.

Indicator 5 – Old and Mature Forest Retention

Indicator Statement	Target (Variance)
Amounts of old and mature stands by landscape unit and BEC variant	Full compliance with the mature and old targets as defined in the Kootenay Boundary Higher Level Plan and spatial identification of stands to meet these targets (+0.3% of the target)

What is this indicator and why is it important?

Conserving old growth forest is considered to be a key component of strategies to maintain biodiversity in managed forests. Further, the public places high value on old growth, whether for biological, spiritual, aesthetic or other intrinsic values. This indicator provides one measure of the amount of old forest on the landscape; Indicator 1.1.3b provides another. Together, they ensure that old and mature forest is being retained within the DFA.

About one third of vertebrate species present in British Columbia’s forests are associated with old growth stands or old growth habitat elements (Bunnell et al. 1999). Although few of these species are restricted to old growth stands, many reach their highest abundance there (Bunnell et al. 1999). This is generally because the habitat features important to many species (e.g., large live trees, snags, and large pieces of down wood) are generally more frequent in older stands than in younger ones. The microclimate found in older stands is also important for many amphibians, as well as non-vertebrate species such as lichens.

Finally, old growth stands often contain endemic or rare species.



How are targets established?

There are several different ways to set targets for the amount of old forest to be retained:

- 1) Determine the range of variability in the amount of old growth stands that was been present under historic disturbance regimes, and set the target to be within this range or some measure of it (e.g., the mean or median). This method assumes that the closer forestry practices can maintain the patterns and process associated with natural disturbances like wildfire and windthrow, the greater degree to which biodiversity will be maintained. The difficulty with this method often lies in obtaining an accurate measure of the range of natural variability, and then dealing with the fact that natural variability can be very high and varies with the time period chosen to measure it within.
- 2) Determine how much old growth is required by various species in order to maintain their populations, and use this amount as a target. This is a very difficult method, because of the large number of species associated with old growth stands, and their differing habitat requirements. Even if one tried to select the species with the most stringent old growth amount requirements, determining the species to measure and the amount of old growth they require is very difficult.

- 3) To use targets set by government or other bodies. A local example is the legally established targets for old growth set in the Kootenay Boundary Higher Level Plan Order (KBHLPO, 2002). These amounts are negotiated levels that consider social and economic factors as well as biological ones.

Canfor has chosen methods 1 and 3, due to the difficulty associated with method 2. Method 1 is written up in Indicator 1.1.3b; while method 3 is detailed in this Indicator, 1.1.3a.

Old and mature forest targets are defined in the KBHLPO (2002) by BEC variant and landscape unit. Canfor will reserve the amount of forest required by these targets (as per the calculations in the ForSite (2007) reports), and any legal revisions to them.

Each BEC is classified into one of five Natural Disturbance Types (NDT) based on the historic disturbance regime it had. For example, NDT3 in the mid and high elevation mountain valleys is defined as having experienced infrequent, severe (stand-initiating) natural disturbances, while NDT4 in the low elevation Rocky Mountain Trench as having frequent, low-severity (stand-maintaining) disturbances. NDT2 is forests with infrequent, severe events (e.g., wetter areas like the back end of the Spillimacheen River Valley, or around Fernie). Incorporating NDT into the targets was designed to incorporate the concept of how much old forest would have been present naturally under historic disturbance regimes. For further reading see the ‘Biodiversity Guidebook’

Each landscape unit within the DFA has also been assigned a ‘Biodiversity Emphasis Option’, which is low, moderate, or high. Each option is designed to present a different level of natural biodiversity and a different risk of losing elements of that biodiversity. The ‘High’ option is designed to give higher priority to biodiversity conservation but with a higher impact on timber, while ‘Low’ is where social and economic demands are the primary objectives, but biodiversity conservation is also managed for. Many of the units ranked high contain habitat for species-at-risk such as Mountain Caribou or Tailed Frog. Landscape units rated ‘High’ require mature forest to be retained as well as old, to allow for recruitment into older age classes to occur. Some units rated Intermediate and Low also have this requirement.

Within the DFA, Natural Disturbance Types 2, 3, and 4 occur. The targets for these types, by Biodiversity Emphasis Option, are shown in Table 45. The age a forest must be to meet the requirements is 100 years for mature (120 yrs in ESSF) and 140 yrs (in NDT3) or 250 years (all others) for old.

Table 45: Percentage of old and mature plus old forest to be retained, by BEC variant and biodiversity emphasis Option (low, moderate, and high)

NDT	BEC	Mature plus old			Old		
		Low	Moderate	High	Low*	Moderate	High
2	ICH	>15	>31	>46	>3	>9	>13
	ESSF	>14	>28	>42	>3	>9	>13
3	MS	>14	>26	>39	>4.7	>14	>21
	ESSF	>14	>23	>34	>4.7	>14	>21
	ICH	>14	>23	>34	>4.7	>14	>21
4	ICH	>17	>34	>51	>4.3	>13	>19
	IDF	>17	>34	>51	>4.3	>13	>19
	PP	>17	>34	>51	>4.3	>13	>19

* The amount of Old Forest for the Low option has been reduced by 2/3rds in this table. The full target must be achieved by the end of the third rotation (approximately 240 years).

** Taken directly from the Kootenay Boundary Higher Level Plan Order.

In order to meet the targets, calculations were performed to determine how much area within each BEC/LU combination was required to be spatially identified as old and mature forest. Stands were then identified up to target levels through a combination of flights to identify the best old growth stands (conducted by Ministry of Environment and Forestry staff) and GIS models in which rare ecosystems and HCVF areas were prioritized along with the NHLB for old growth placement. Each of the three districts in the Canfor operating area used slightly different methods. The final selection of old and mature management areas (OGMA and MMAs) was made into a GIS layer and made available to Canfor planners in the GIS system, so that these areas could be avoided during forest development planning.

Since there are allowances for harvest within OGMA and MMAs for factors such as forest health and wildfire salvage, and for when the stand does not have the old growth characteristics the digital data suggested it did, an Old Growth and Mature Replacement Strategy was developed. This was to ensure that if any OGMA or MMAs were harvested, that other areas were found to replace them so that target levels were maintained.



Current Condition

The amounts of old and mature forest required by targets, that were spatially identified in 2007 (Forsite), and that are present on the landscape are forthcoming in the Annual Report.

Strategy

There is an Old and Mature Forest Identification and Recruitment Strategy and an Old and Mature Forest Replacement Standard Work Procedure and Form associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Old and Mature Forest Identification and Recruitment Strategy, it is forecasted that the amounts of mature and old forest specified by the KBLUP targets for each BEC/Landscape Unit will continue to be met through time, and any short-term deficits will be made up. The total amounts of mature and old forest on the landscape may be higher than the targets, however.

The amount of Old and Mature forest forecast to be available under the application of the Old and Mature Forest IDS and associated Strategy and SWP was forecast through the runs made with the model described in Indicator 6 – Seral and Structural Stages Relative to the Range of Natural Variability. The tables and figures describing the

amounts of old and mature through time, by BEC zone, can be found in that section.

Monitoring and Reporting

Comparisons of the actual percent of mature and old forest with the KBLUP targets by LU/BEC will occur in conjunction with Timber Supply Reviews or every 5 years, whichever comes first. Results of the comparisons will be presented in the Annual Report in the year they are done.

Indicator 6 – Seral and Structural Stages Relative to the Range of Natural Variability

Indicator Statement	Target (Variance)
Area of old, mature and early seral stands, by ecosystem (BEC subzone) grouping, for current and future time periods relative to the Range of Natural Variability	To be compatible with (either within or moving towards) the Range of Natural Variability



What is this indicator and why is it important?

Conserving old forest is considered to be a key component of strategies to maintain biodiversity in managed forests. Further, the public places high value on old forest for biological, spiritual, aesthetic, and intrinsic values. This indicator provides one measure of the amount and distribution of old forest on the landscape; Indicator 5 – Old and Mature Forest Retention provides another, while Indicator 7 – Interior Forest Habitat addresses the size and interior habitat of old and mature forest patches. Together, all three indicators ensure that old forest (and mature, which recruits to old) is being retained through time in appropriate amounts and distribution within the DFA.

This indicator also includes the early seral stage. This stage of forest development, which includes grassland and shrub-sapling structural stages, supports high biodiversity due to high shrub and ground vegetation cover. In early seral forests arising after natural disturbances like wildfire, high levels of snags and down wood are also often present. In early seral stands, shrubs provide nesting, foraging, and rearing habitat for grouse and many species of songbirds, cover for small mammals and ground-dwelling arthropod communities, and a moist microclimate for sensitive plant species (Bunnell et al. 1999). Many shrubs also provide forage and berries for ungulates and bears in late summer and/or winter. Snags and

down wood provide nesting, roosting, and foraging habitat for birds and mammals, as well as lichens and fungi. Thus, this seral stage is also important to consider from a forest management perspective.

This indicator assesses the extent to which early, mature, and old seral stages are projected to change through time under current management (TSR III). It shows not only increases and decreases through time, but whether these changes put the total area of the seral stage outside amounts seen historically. This is shown by the area of each seral stage relative to the Range of Natural Variability (RNV). Here, the Range of Natural Variability refers to the amount of the seral stage estimated to have been present under historic fire regimes in the East Kootenay (Davis 2009).

Comparing present and projected future ecosystem conditions to RNV represents one type of environmental risk assessment. The assumption is that the more the current ecosystem condition deviates from the historic condition, the greater the risk to that ecosystem and the species associated with it.

How are targets established?

Indicator 5 – Old and Mature Forest Retention outlines different ways in which targets for old forest can be set. This indicator addresses Method 1: setting targets based on RNV: The Range of Natural Variability Model for the East Kootenay.

In order to determine RNV, an extensive modelling project was carried out (Davis 2009). The model incorporated the best available data on the characteristics of historic fire regimes in the East Kootenay, including for each ecosystem the fire return interval, the proportion of high, moderate, and low severity fires, and the mortality curve associated with each fire severity class by tree species. The input data includes that summarizes in the RNV description in this document, that was available at the time.



The model was run for the entire Cranbrook and Invermere TSAs, including the Radium licence. The model did not include TFL 14 or the portions of the DFA within the Kootenay Lake TSA, due to the high cost of bringing data from these areas into the model. However, since the model results are very similar between the Cranbrook and Invermere TSAs, the results are also expected to be similar for the TFL 14 and Canfor's portion of the Kootenay Lake TSA, given that these areas are adjacent to the Cranbrook and Invermere TSAs and the ecosystem types are similar to those in the Cranbrook and Invermere TSAs.

Results of the model are presented in terms of the area burned by age class (seral stage) and ecosystem group across each TSA. Four age classes were chosen (early, mid, mature, and old, as defined in the Biodiversity Guidebook) and eight ecosystem groups were defined: grassland, IDF, MS, dry ICH, wet ICH, dry ESSF, wet ESSF, and parkland forest. The model was also run using structural stages, because these capture ecological information rather than age class alone. Six structural classes were defined: shrub/sapling, small tree, medium tree open or moderate crown closure, medium tree closed crown closure, large tree open or moderate crown closure, and large tree closed crown closure. The definition of these classes is explained in the reports (Davis 2009), and is based on work from the Columbia Basin in the United States.

Because the model was only run for 500 years, which is a relatively short time period to estimate RNV, the full range of variation (minimum to maximum) was selected as the target range. RNV targets are shown in the figures in the Forecasting Section, together with current and projected future condition.

Current Condition, Forecasting and Probable Trends of the Indicator

Current condition was based on the amount of each age (seral) class in 2004. Future harvesting was based on TSR III assumptions, and incorporated retention of old growth and other constraints, as well as short- and long-term retention of overstory within certain types of cutblocks to mimic current practice. Current fire regimes were also incorporated. Trends in the amount of age and structural classes in the Cranbrook and Invermere TSAs over the period from 2004 to 2254 were determined and compared to the range of variability in age and structural classes determined historically from the model.

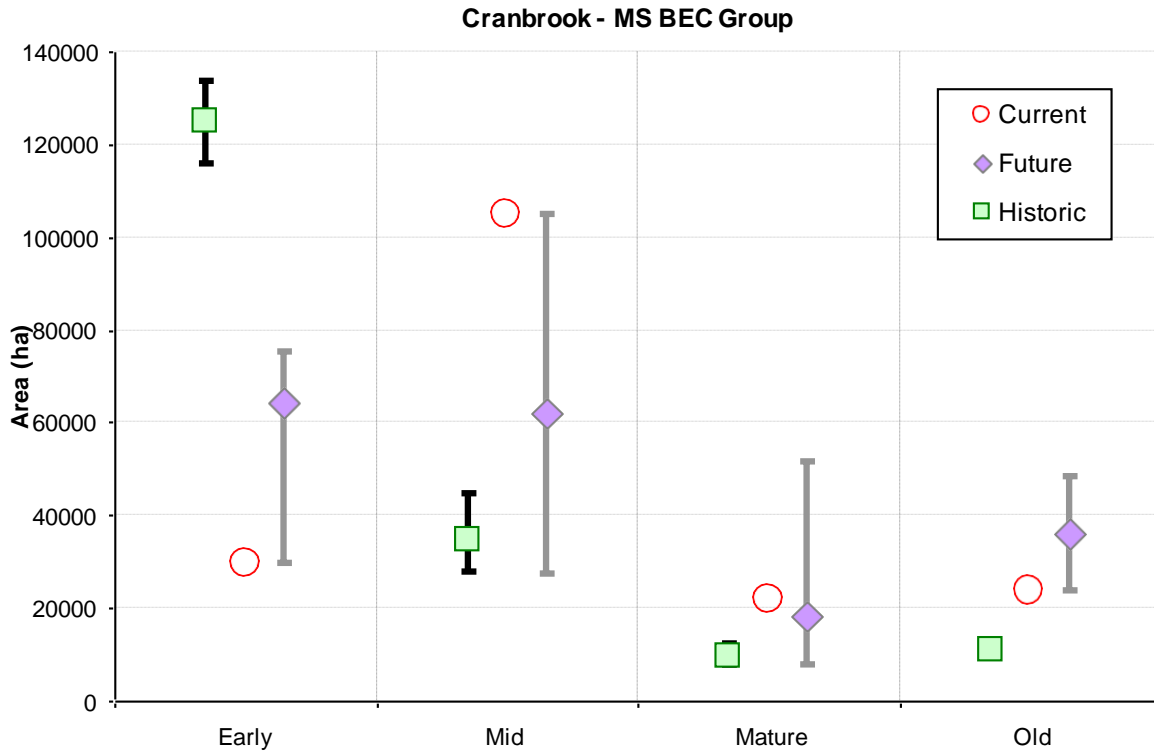
Results of the model showed that:

- For most ecosystem types (BEC groupings), the amount of early seral stands and mature stands are currently below historic amounts, and,
- The amounts of mid- and old seral stands are currently above or similar to historic amounts.
- Under current management, trends in seral stage are toward historic conditions for most ecosystem types and seral stages, except that there is a trend towards more old forests than existed historically.
- However, in most ecosystems, the range of variability in future amounts of early seral does not overlap those seen historically.

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An example is shown below for the MS in the Cranbrook TSA below in Figure 28.

Figure 28: Current estimated historic and future amounts of forest in different seral stages in the Cranbrook TSA in the Montane Spruce BEC grouping zone



* Error bars represent the maximum and minimum around the mean.

Table 46 and Table 47 below summarize the results for current vs. historic conditions (Table 46) and future versus historic conditions (Table 47) for the Cranbrook TSA for each BEC grouping; results for the Invermere TSA were very similar and can be found in Davis (2009).

Table 46: Relative area of age groups found in historic vs. current forests in the Cranbrook TSA.

BEC Group	Early	Mid	Mature	Old
Grassland	--	+		
IDF	--	+		
MS	--	+	--	+
Dry ICH	--	+	--	+
Wet ICH	--	+	--	
Dry ESSF	--	+	--	+
Wet ESSF	--	+	--	
Parkland	--	+	--	+

Key	Description
--	Less area found in forests of today than found in historic forests
	Present forests have a approximately the same area as historic forests.
+	More area found in forests of today than found in historic forests.

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Table 47: Trends in seral stages in future forest compared to historic conditions in the Cranbrook TSA.

	Early	Mid	Mature	Old
Grassland	+		+	
IDF	+	+		
MS	+	+	+	-
Dry ICH	+	+	+	-
Wet ICH	+	+	-	-
Dry ESSF	+	+	+	-
Wet ESSF	+	+		-
Parkland	+	+		

Shading	Description
+	Trend is positive, future forests trend towards historic forests.
	No significant change.
-	Trend is negative, future forests trend a way from historic forests (but for old forest, in the direction of more old forest than historically present)

Since stand structure classes were also run in the model as well as seral stages, the model provides some additional information. One of the key findings was that the shrub/sapling structural stage is currently below historic conditions for all ecosystem groups (Figure 29). Current management is projected to increase amounts sharply over the next 50 years, but not quite to levels seen under historic conditions in most ecosystems. An example of this can be seen in Figure 30 in the Cranbrook IDF ecosystem type.

Figure 29: Current estimated historic and future amounts of the shrub sapling structural stage in the Cranbrook and Invermere TSAs combined

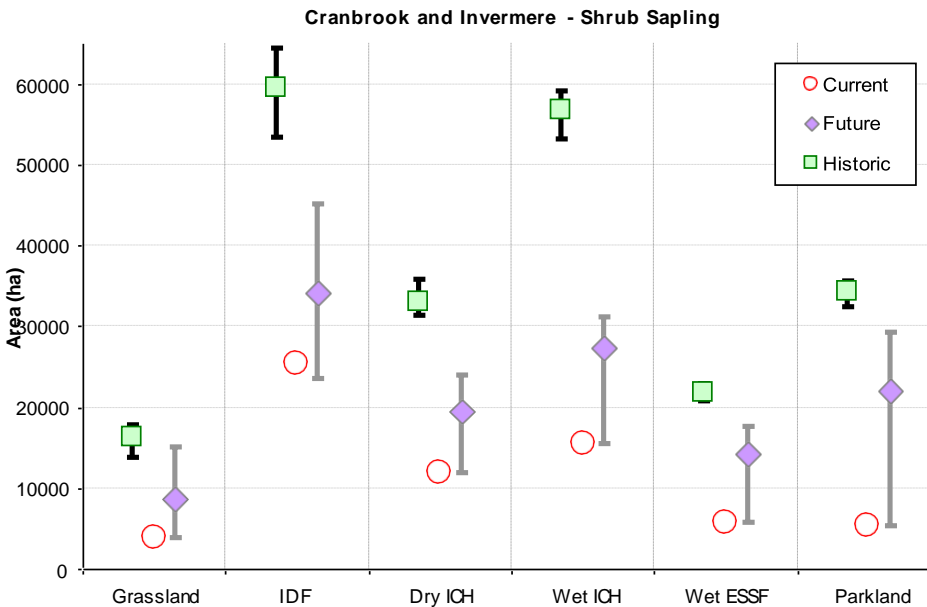
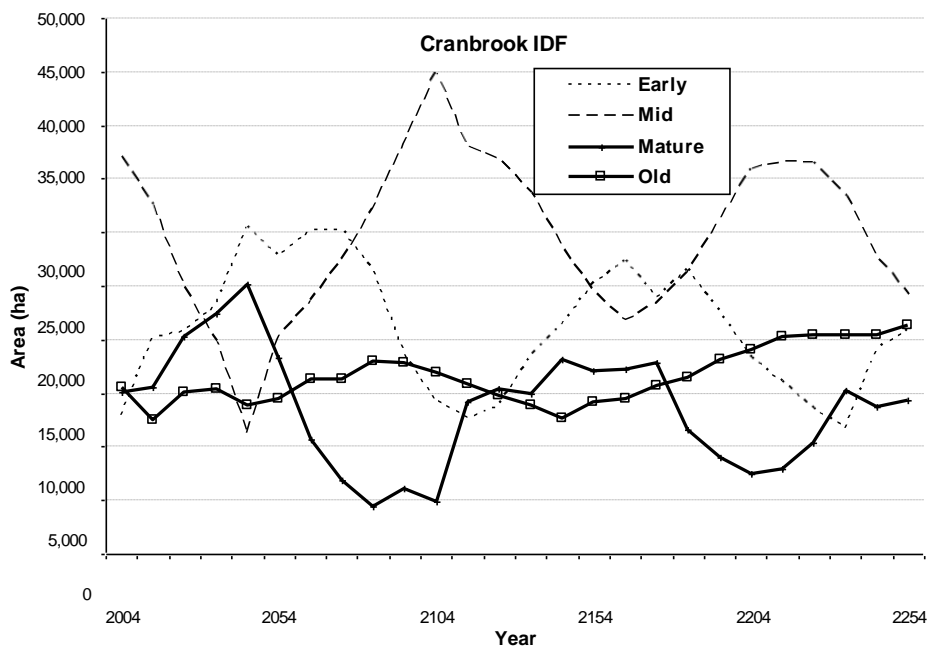


Figure 30: Increase in early seral over the next 250 years in the IDF ecosystem in the Cranbrook TSA



Other findings from the structural class runs were that:

- For the medium and large tree classes, stands with open and moderate crown closure are currently below historic levels, but are projected to increase in the future toward historic conditions.
- Stands with high crown closure are currently above historic levels, but are projected to decrease somewhat in the future.

In summary, all three seral stages in this indicator – early, mature, and old – are outside their range of natural variation in most ecosystem groups. However, under current forest management early and mature forest in most ecosystems is projected to trend towards its historic condition, but old is generally moving further away from its historic condition in that it is projected to be at higher amounts than seen historically.

What is important to note, however, is that the model did not incorporate any effects of climate change, because TSR III did not incorporate changes in fire regimes associated with climate change. Future climate trends are expected to differ from historic and current ones in that fires are projected to increase in frequency and severity as the climate warms and summers become hotter and drier (see Indicator 30 – Climate Change Adaptation for a discussion).

Due to this, a conservative approach to managing old forest is warranted. Amounts of old forest projected through time under this model may not be accurate if the amount of forest burned by wildfire increases dramatically in the future.

Similarly, although current management is predicted to increase the amounts of early seral forest sharply over the next 50 years, the amounts will still not be quite at levels estimated to be present under historic conditions in most ecosystems. However, the predicted effects of climate change suggest that the amount of early seral stands in the East Kootenay will likely increase over the next 25-100 years due to increasing fire frequency and severity and increased insect and disease outbreaks associated with climate change. Regeneration of forests in drier areas may be more difficult due to droughts and high temperatures, which may extend the number of years a site is in an early seral stage.

Thus, the amount of early seral stands could increase substantially above what was projected to occur under historic disturbance conditions in this model.

Strategy

There is a Seral and Structural Stages Relative to the Range of Natural Variability Strategy associated with this indicator, but not a Standard Work Procedure.

Forecasting and Probable Trends of the Indicator

By implementing a Seral and Structural Stages Relative to the Range of Natural Variability Strategy, it is forecasted that Canfor will continue to be able to assess the amounts of early, mid, mature, and old seral stages relative to their amounts under the range of natural variability, and by doing so assess a component of environmental risk. Trends in the various age classes over the next 240 years have already been presented and discussed in the above sections and will not be repeated here.

Monitoring and Reporting

The Davis (2009) simulation model used to estimate the range of historic variability and future trends will be reviewed and re-run every 15 years, or within 5 years of a new Timber Supply Review (TSR) being released with significantly different forest management assumptions than the previous TSR. The model does not need to be run more frequently because of the very large area that is being modelled (10s to 100s of thousands of hectares for each ecosystem type within each TSA), and the long time periods over which the model is being run, which means that the resultant patterns change slowly. As part of the review, the scientific literature on historic variability in the East Kootenay and adjacent areas with similar ecosystems will be reviewed to determine if model parameters need to be changed. In addition, the type of model used may also be changed, to ensure that it remains a valid and rigorous method of modelling, consistent with current practice.

Indicator 7 – Interior Forest Habitat

Indicator Statement	Target (Variance)
Median patch size of Old Growth and Mature Management Areas, by NDT and ecosection	Median patch size is maintained or increases through time

What is this indicator and why is it important?

This indicator was developed to serve as an index of interior forest for old and mature forest management areas (OGMAs and MMAs). Interior forest is defined as the part of a forest that shows no detectable edge effects. Interior forest is important because creating edges in a forest stand, for example by logging or road-building through a forest, changes the forest near the edge in three main ways:

- by physically disturbing the vegetation and soil,
- by increasing the amount of light, wind and moisture that enters the forest,
- by allowing for greater access into the stand by various plant and animal species, pollen, and seeds.

The increased blowdown, productivity, evapotranspiration, and nutrient cycling that generally result from these changes often lead to increases in seedling establishment and sapling density, increases in shrub cover, increases in overall plant growth and mortality, and changes in plant species composition (Harper et al. 2005).



In general, edge effects dissipate as distance from the edge increases, with the bulk of documented ecological effects occurring within two to three tree heights of a stand edge (Kremsater and Bunnell 1999). A reasonable estimate of the biological distance of most edge effects is considered to be 50 m, with a maximum up to 200 m (Huggard and Kremsater 2010).

Individual species respond to edges in variable ways and at variable distances. Shrub-nesting and cavity nesting species generally prefer edges (Bunnell et al. 1999), while species strongly associated with mature

and old forests are often sensitive to edge effects. For example, the northern goshawk, a large forest raptor, prefers mature and old forest for breeding areas in the East Kootenay. Goshawk nests are typically found in the interior of forest stands, and the probability that a breeding area will continue to be used following logging around it is directly related to the size of the reserve encompassing the breeding area; reserves smaller than 25 ha have a very small probability of continued use, while those over 60 ha have the greatest chance of longer-term use (Stuart-Smith et al. 2012).

The sensitivity to edges of species associated with old and mature forests was the reason this indicator deals only with old and mature forest, and not other age classes of forest. For example, other terrestrial forest-dwelling animal and birds resident in the DFA for which interior forest is considered to be an important component of their habitat include Golden-crowned Kinglet, Spruce Grouse, American Marten, Southern Red-backed Vole, Woodland Caribou, and Fisher (Bunnell et al. 2007). These species are also associated with old and mature forest, and are placed into monitoring Group 5 in the Species Accounting System (see Indicator 12 – Species of Management Concern – Habitat Protection).

The decision to go with the size of old (OGMA) and mature management areas (MMA), rather than to measure the amount of interior forest within these polygons was made because the measure is more direct and easier to understand than a measure of edge length or edge:area ratio, particularly for people searching for replacement OGMA areas or when trying to assess if an addition to an OGMA makes a positive change to that OGMA. Further, there are technical issues associated with measuring interior forest directly. Although interior forest can be measured in a GIS environment, spurious results often arise due to issues within the linework (e.g., arbitrary divisions within forest polygons). Further, OGMAs and MMAs are surrounded by many different types and ages of forest, from recent cutblocks to other old and mature stands which were not picked as OGMAs, to roads, wetlands, rock, etc. Some of these edges form what would be termed a biological edge like those discussed above, while others would not. Differentiating among them in a GIS environment is time-consuming and difficult. Consequently, an index of OGMA/MMA size was chosen as being a simpler approach, with the advantage of being more easily translated into a strategy applicable on the ground.

The indicator was presented by natural disturbance type and ecosection to be consistent with Indicator 3 – Patch Size Distribution.

How are targets established?

As with the patch size indicator, there are various ways in which targets could be set for interior forest:

1. Determine the range of variability in the size of interior forest patches that was present under historic disturbance regimes, and set the target to be within this range or some measure of it (e.g., the mean or median).
2. Determine the patch size distributions required by various species in order to maintain their populations, and use this amount as a target.
3. Use targets set by government or other bodies.

As per the more detailed discussion in Indicator 3 – Patch Size Distribution, Method 1 would be very difficult due to the very limited data on patch sizes and shapes from historic disturbances, and the high variability associated with what data exists. Method 2 is challenging because of the large number of species, each with differing habitat requirements. Method 3 in this case does not apply because there are no legal or certification targets for this indicator.

Thus, the target for this indicator was established on first principles: the smaller the size of a patch, the less interior habitat it will have. For example, if edge effects extend 50 m from a forest edge, a square patch of 1 ha or less will have no interior forest habitat. If edge effects extend up to 200 m, a square patch of 16 ha will have no interior forest habitat. Thus, the target was based on the concept that larger patches will have more interior habitat and thus provide more effective habitat for species associated with interior

forest habitat. A specific quantitative target for all ecosections could not be set due to the large amount of variation among the different ecosections. Finally, the median polygon size, rather than the mean, was used to measure changes because it is less affected by skewed values and outliers than the mean, and the data distributions are heavily skewed. The median is simply the 50th percentile of the data; half of the data points lie below this number, and half of them lie above it.

Current Condition

As of December 2014, there were 9,471 OGMA and MMA polygons within NDT3 or NDT4 in the DFA. The majority of polygons are within NDT3 (n = 8444), since NDT4 is only present in a few ecosections. The analysis excluded all polygons less than 1.0 ha, as these were considered most likely to be artefacts of the GIS analysis (linework issues/ slivers of larger polygons) rather than real OGMAs or MMAs. Only NDT3 and NDT4 were considered, as there were only 12 OGMAs within NDT2, which is too small a sample size for analysis, and harvesting very rarely occurs in NDT5 (Alpine tundra and subalpine parkland).

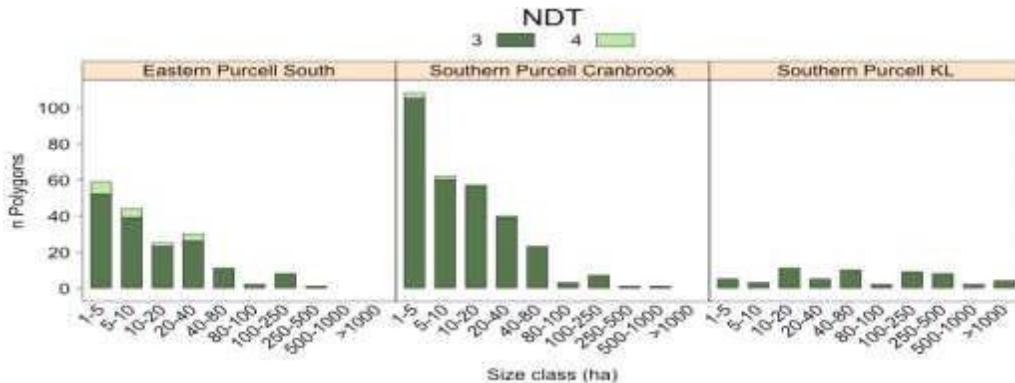
The reason some ecosections have more OGMA/MMAs than others is due to the fact that only some landscape units have legal requirements for MMAs, and thus MMAs are only present within nine of the ecosections. These are:

- Flathead
- Upper Elk
- South Park Central
- South Park North
- EK Trench North
- McGillivray
- Eastern Purcell North
- Eastern Purcell Central
- Southern Purcell Cranbrook

Figure 31, Figure 32 and Figure 33 show the current breakdown of OGMA/MMA size class distributions by ecosection and NDT (see Figure 22 for a map of the locations of the Ecosections in the DFA). The size classes were chosen based on the distribution of the data, which is clearly skewed towards the smallest size class (1-5 ha) in most ecosections. The two exceptions are the Mid Elk and the Southern Purcell Kootenay Lake ecosection, in which there are many larger OGMAs.

Table 48 shows the median polygon size by ecosection and NDT, as well as the number of polygons for each combination.

Figure 31: Size class distribution of OGMAs and MMAs in 2014 for ecosections in the south- eastern portion of the DFA



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Figure 32: Size class distribution of OGMA and MMA in the central and northern portions of the DFA in 2014

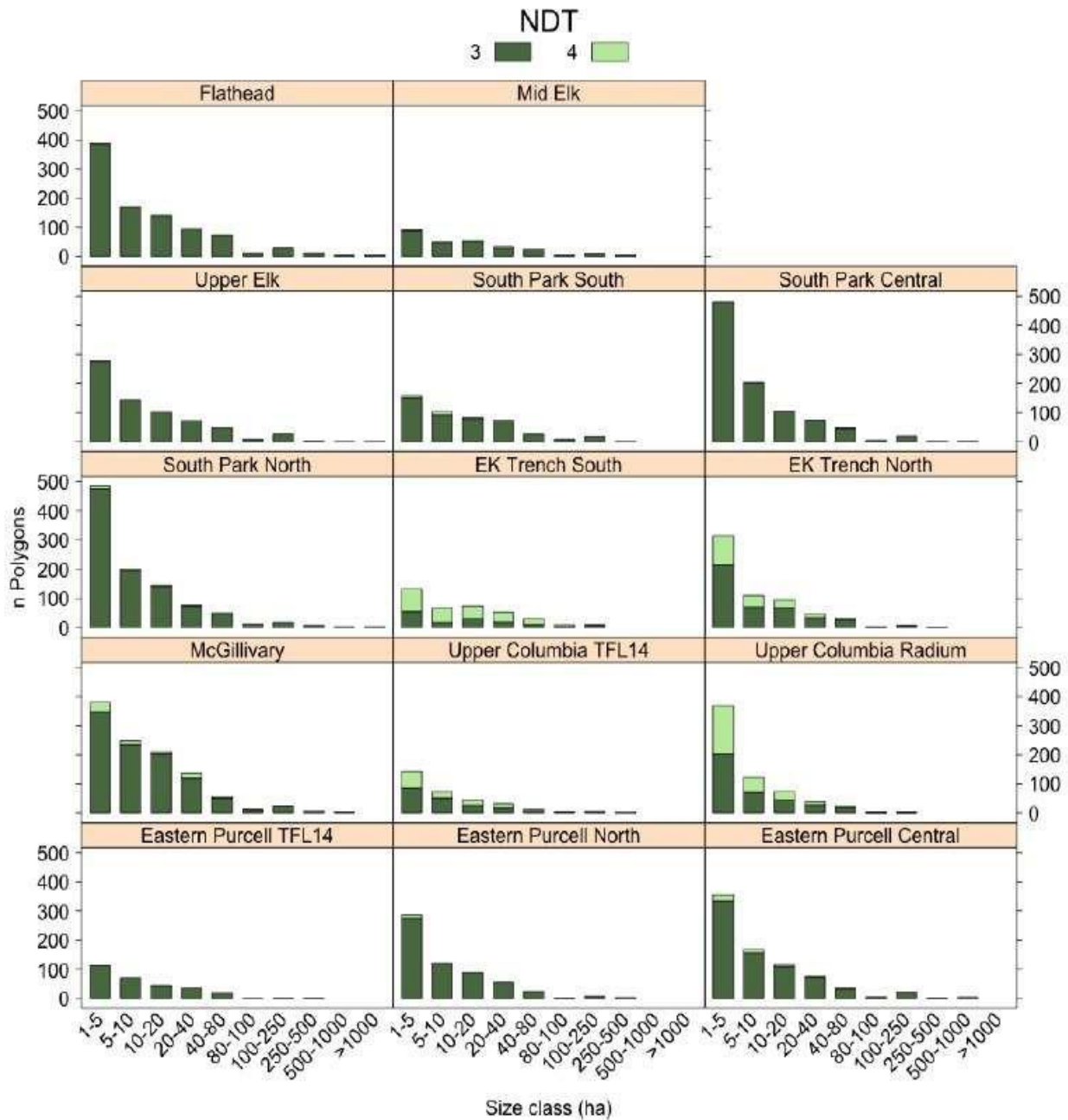


Table 48: Median OGMA/MMA polygon size by ecosection in the DFA

Ecosection	NDT3		NDT4	
	Median size	n polygons	Median size	n polygons
Eastern Purcell Central	5.81	745	6.37	42
Eastern Purcell North	5.27	574	5.53	19
Eastern Purcell South	8.16	162	6.20	18
Eastern Purcell TFL14	6.43	289	-	0
EK Trench North	4.83	417	4.35	188
EK Trench South	8.76	137	8.63	233
Flathead	6.94	918	2.95	3
McGillivray	7.77	1000	5.97	73
Mid Elk	8.97	257	6.95	9
South Park Central	4.74	929	9.95	11
South Park North	5.07	973	5.47	19
South Park South	8.34	448	5.91	23
Southern Purcell Cranbrook	7.66	296	6.06	6
Southern Purcell KL	64.02	59	-	0
Upper Columbia Radium	4.34	365	3.56	264
Upper Columbia TFL14	5.80	193	5.47	118
Upper Elk	6.69	682	3.42	1
Total	6.15	8444	5.30	1027

Strategy

There is an Interior Forest Habitat Strategy associated with this indicator, but not a Standard Work Procedure.

Forecasting and Probable Trends of the Indicator

By implementing the Interior Forest Habitat Strategy, it is forecasted that the distribution of OGMA/MMA size will remain the same or shift to the right towards larger size classes over time. Ideally the distribution would shift towards larger size classes over time, reflecting an increase in the number of larger OGMA/MMAs, but due to the currently high number of OGMA/MMAs in the smaller size classes, shifting the distribution will require a changing the size of a large number of OGMA/MMAs. Further, in many cases obtaining larger OGMA/MMAs is not possible at this time due to existing patterns on the landscape from previous harvesting and fires.

Monitoring and Reporting

The median of the size class distributions of the OGMA/MMAs will be calculated every 5 years by the Forest Scientist, and compared to the medians from previous 5 year intervals to determine if the median is remaining stable or upward or downward trends exist for each ecosection/NDT combination. The polygon sizes are calculated by the WIM team, and details on the methodology used to calculate the polygon sizes are available from the GIS Analyst, Kootenay Region.

Indicator 8 – Green Tree and Snag Retention

Indicator Statement	Target (Variance)
Density (stems/ha) of dominant and co-dominant green trees and snags (standing dead trees) on each cutblock or cutblock area (gross block area)	All blocks or block areas to exceed the densities specified in the table below, by Natural Disturbance Type (NDT) and Biogeoclimatic zone group.

Table 49: Target densities (stems/ha) for Green trees and snags, and snags alone by NDT

	NDT 1		NDT 2		NDT 3		NDT 4	
	ESSF	Other	ESSF	other	ESSF	other	PP	other
Green Trees and Snags together	12	8	15	10	12	8	4	8
Snags Alone (where present)	3	2	4	2.5	3	2	1	2

What is this indicator and why is it important?

This indicator measures the density of live and dead trees retained within the gross area of cutblocks. The gross area of a cutblock refers to its total area, including both the area that is cut and the area in patch reserves like riparian reserves and wildlife tree patches. The retention of live and dead trees within cutblocks is an important component of strategies to maintain biodiversity in managed forests (Franklin et al 1997, Lindenmayer and Franklin 1997, Bunnell et al 1999).



For this indicator, the trees can be either dispersed (scattered), in patches, or in a mixture of both. Dispersed retention provides habitat for many species, structural complexity, and a long-term recruitment source of dead trees and logs to the regenerating stand. Patch retention provides these benefits, as well as the ability to protect unique or high value habitats, including riparian and aquatic habitats if the patch is adjacent to a stream, river, lake, or wetland.

Green Tree and Snag retention includes different types of trees such as: canopy trees, veteran trees, deciduous trees, understory trees, Wildlife Tree Patches, and dead and dying trees (snags), each of which is discussed separately below.

Canopy Trees

Canopy trees are the dominant and co-dominant trees that form the main canopy of the stand. Retaining dispersed canopy trees within harvested stands can provide many ecological benefits including the following (from Stuart-Smith 2002):

- nesting sites for species that will use very open forests,
- foraging sites for species that forage on tree boles or in tree canopies,
- habitat for small species (e.g., invertebrates),
- shade for plants and animals using the cutblock,
- security cover for larger animals using the block,
- dispersal areas for species reluctant to use very open areas for movement,
- snags and down wood recruitment over time,
- retention of live roots below-ground, which can influence soil invertebrates, soil mycorrhizae and nitrogen-fixing bacteria, as well as the physical characteristics of soils,
- seed sources for natural reforestation or to supplement the planted stock.

Research on songbirds and variable retention in the East Kootenay revealed a positive relationship between the density of residual canopy trees and the abundance of songbirds using cutblocks up to approximately 125 stems per ha (Stuart-Smith 2002).

Veteran Trees

Veteran trees are trees that have survived previous disturbances such as wildfire. They tend to be the largest individuals of species with thick bark, like Western Larch, Douglas- fir, and Ponderosa Pine. However, some larger, thin-barked trees like lodgepole pine may survive low-intensity fires in certain situations. Veteran trees are highly valuable to many species; their thick furrowed bark provides habitat for many invertebrates, which are then preyed on by species including brown creepers and various woodpeckers. They usually form high value snags when they die, since they are usually very large and long- standing.

Deciduous (Broadleaf) Trees

Deciduous or broadleaf trees are particularly important to retain in coniferous stands because mixedwood stands generally support a higher diversity of plants, birds, mammals, reptiles, amphibians and insects than do pure conifer stands. The primary deciduous trees in the area are aspen, poplar, and paper birch. Deciduous trees provide:

- habitat for many canopy-dwelling insects, and insectivorous birds and mammals that feed on them,
- habitat for a high diversity of fungal and lichen species,
- snags and CWD earlier in a rotation than do coniferous species, because they are shorter-lived and faster-decaying,



- nutrient-rich litter which supports a higher diversity of small mammals (e.g., shrews), amphibians, and invertebrates
- escape and forage trees for young bears

In addition to their biodiversity values, deciduous stands also contribute to maintaining forest health. Many of the species that rely on deciduous trees for nesting (e.g., many woodpeckers) or foraging (e.g., Black-capped chickadee) are also voracious consumers of forest pests. For example, an individual three-toed woodpecker can consume thousands of spruce beetle larvae a day, and foliage-gleaning birds such as chickadees have been recorded as causing as much as 95% mortality in pest populations (in Machmer and Steeger 1995). There is also evidence that the deciduous component in stands contributes to slowing the incidence and rate of spread of tree diseases such as root rot (Comeau 1995).

Deciduous trees may also enhance the growth of conifers by reducing the vigour of competing shrubs, fixing nitrogen, and increasing rates of decomposition (Comeau 1995). Thus, they help ensure long-term sustainability and productivity over several rotations.

Understory Trees



Understory trees are those trees growing underneath the main canopy of the forest. Often these are shade tolerant species like White Spruce that have the ability to grow slowly under a canopy, and then respond and grow quickly once a canopy gap opens up above them. Among other benefits, these trees provide structural and species diversity to the forest, and provide forage for species like moose, and nesting sites for many species of birds.

Although they do not contribute towards the green tree and snags targets, they are an important part of many site plans and are retained where practicable.

Wildlife Trees Patches

Retaining patches or groups of trees can be more beneficial for many species than retaining single dispersed trees, particularly for species that use old forests (Cooke et al. 2010). Patches of trees can protect specialized habitats such as dens, licks and wallows, wet areas and seeps. They also provide a necessary safety buffer for workers around standing dead trees (snags), as required by WorkSafe BC in British Columbia, so patches are essential in order to protect most snags. On ungulate winter range, patches of trees with large and interlocking crowns provide good snow interception cover, which is important in deep snow winters. Cutblocks with patches of trees retained have been shown to be more similar to old forests than clearcuts in terms of their bird species composition (see references in Stuart- Smith 2002).

The percentage of wildlife tree patches across the landscape is also tracked separately – see Indicator 9 – Landscape Unit Wildlife Tree Patch Retention for details.

Dead and Dying Trees (Snags)

Standing dead and dying trees provide critical habitat for many species of birds, invertebrates, and mammals. For further details, see Indicator 10 – High Value Snags.

Artificial snags (referred to as “stubs”, see photo below) are 3 – 5 m tall stumps created by feller bunchers retained after a cutblock has been harvested. Stubs are usually created from trees that have little economic value (e.g., defects in the lower part of the bole) or are dead or dying trees that are unsafe and must be felled to comply with WorkSafe BC regulations. In addition to increasing the amount of coarse woody debris in a cutblock after they fall, stubs may be used by wildlife as perching or feeding sites, and a few of them provide nesting sites for cavity nesters (provided the stubs are > 20 cm DBH and have wildlife use characteristics, Harris 2001). Stubs are found to be more heavily used for nesting in clearcuts rather than selectively logged sites, possibly the result of a lack of cover for potential predators (weasels and snakes).



How are targets established?

There are several different methods that could be used to establish targets for green tree and snag retention:

- Use the range of natural variability to select target ranges
- Pick set targets based on analysis of species-habitat relationships for particular species
- Use targets from certification or legal standards (e.g., FSC-BC Standard 2005).

We selected the third method, using targets from the FSC-BC Standard (2005), since Canfor must demonstrate that these are being met on an annual basis for every block or group of blocks in the DFA in order to maintain FSC-BC certification. It would be very difficult to use the first method, because of the extremely high variation in the density of green trees and snags left by natural disturbances. Similarly, it would be difficult to use the second method and select a density of green trees that would maintain habitat for all species, because of the differing habitat requirements of the various species.

No matter which method is chosen, what appears to be most important ecologically is the variation in residual tree density among blocks, so that a range of habitats is provided for various species. Essentially, leave different densities of trees, from none to very high.

Under the FSC-BC standard, the targets only apply to cutblocks > 200 m wide. Two or more nearby cutblocks can also be grouped to meet the targets, as long as each individual block is < 100 ha. This allows for some steep blocks to be clearcut when they are cable harvested, for example, in which it is very difficult and expensive to leave single scattered trees.

Current Condition

Over the past six years, all of the blocks in Canfor’s FSC certified areas have met the green tree retention targets Table 50. Not all blocks, however, met the snag retention targets over this time period, unless stubs (man-made snags) were counted. Due to the large no-harvest buffers required around most snags by

WorkSafe BC (1.5 tree lengths in diameter), not all snags can be retained within cutblocks and have the block still make an economic harvest unit. Thus, stubs help fill this gap. The focus is still on retaining the highest value wildlife trees (snags) in safe reserve patches, however.

Table 50: Percentage of planned blocks meeting green tree and snag retention targets from 2009 through 2014 in FSC certified areas

Year	Percent of Blocks meeting Green Tree Retention Targets	Percent of Blocks meeting Snag Retention Targets when Stubs are not included	Percent of Blocks meeting Snag Retention Targets when Stubs are included ¹	Total number of blocks on FSC certified areas
2014	100%	80%	100%	109
2013	100%	75%	100%	132
2012	100%	70%	100%	103/67 ²
2011	100%	75%	n/a	164/129 ²
2010	100%	n/a ³	n/a	137
2009	100%	n/a ³	n/a	65

¹ The total number of approved blocks in FSC certified areas/ the number of approved blocks in FSC certified areas with the target densities of snags present in the pre-harvest stands (used in snag retention calculation).

² Stubs were not consistently prescribed in all site plans in years prior to 2012

³ Snag retention not measured separately from green tree retention in this year

Strategy

There is a Green Tree and Snag Retention Strategy associated with this indicator, the following Standard Work Procedure.

- Green Tree and Snag Retention SWP
- Guidance for Wildlife Tree Patch Location (Appendix A, Green Tree and Snag Retention SWP)
- Green Tree and Snag Retention Form (Appendix B, Green Tree and Snag Retention SWP)

Forecasting and Probable Trends of the Indicator

By implementing the Green Tree and Snag Retention Strategy and SWP, the forecast for this indicator is that Canfor will meet the targets for both green trees and snags in future years across the entire DFA. This forecast is based on results from the past 6 years, which have shown Canfor to have met the targets for green trees in every year over the area in which the strategy was implemented (the FSC certified areas). The targets for snags have not been met, however changes were made in 2012 to implement a high value snag-tracking program, and in 2013 to better record all snags, so that the forecast is to meet the snag target going forward.

Monitoring and Reporting

In February of each year, WIM will summarize Reserve Tracking Form data from cutblocks approved in that calendar year. The Forest Scientist will summarize the data on a block by block basis and present the results in the Annual Report, along with results and trends from previous years. Field checks will take place to determine whether the number of green trees and snags prescribed to be retained were actually retained following harvest. Results from these field checks will be summarized in annual HCVF Effectiveness Monitoring reports.

Indicator 9 – Landscape Unit Wildlife Tree Patch Retention

Indicator Statement	Target (Variance)
Percent of Wildlife Tree Patches retained across the DFA, by Landscape Unit and BEC variant	Varies by BEC/Landscape Unit combination, as specified in the Forest Stewardship Plan

What is this indicator and why is it important?

Wildlife tree retention (WTR) refers to wildlife tree patches, riparian reserves and individual tree retention in partial cut stands that are reserved for at least one rotation, or until the trees in the harvested portion of the cutblock are mature.

This indicator refers to the percentage of wildlife tree retention within a landscape unit, by BEC variant. As such, it is one measure of forest retention at a landscape scale.

WTR is used to provide protection for known wildlife habitat features (including standing dead and dying trees), to provide attributes important to key ecological processes (including coarse woody debris, tree species diversity, and understory vegetation diversity), to protect small, local sites of special biological or cultural significance (i.e. unclassified riparian or wetlands, rock outcrops or rare plants or ecosystems), and/or to provide stand level complexity (vertical and horizontal) to harvest areas under even-aged, short rotation management.



How are targets established?

Wildlife Tree Retention targets were established by government under the Forest Planning and Practices Regulation. The targets include a landscape minimum retention, depending on the amount of the landscape already harvested without WTR, and a spatial distribution requirement (at least one WTR > 0.25 ha per 500 m). The targets vary by BEC variant and landscape unit, and can be found

in the Tables within the Wildlife Tree Retention Analysis Summary Reports produced for the licensees in the Cranbrook, Invermere and Kootenay Lake TSAs by Forsite Consultants Ltd (2006). On average, the target for the Cranbrook TSA is 6%, for the Invermere TSA it is 5.7%, for Kootenay Lake it is 5.5%, and for TFL 14 it is 5.3%.

Current Condition

Forsite Consultants completed the most recent calculations for this indicator in 2006, as part of the preparation for the FSP packages. The results are in numerous tables, too detailed to report here (because they are by BEC and LU, for all LUs in the DFA).

Stand level retention is currently tracked as part of the development of the operational plan. During the development phase, WTP are field located and spatially mapped (i.e. block level). This information is entered into the appropriate information management system at which point it can be analysed and reported at the Landscape Unit level. Since Canfor foresters ensure that the targets are met at a minimum on a Cutting Permit basis for every permit that is developed, the landscape unit targets should be maintained.

Current condition for this indicator is forthcoming and will be presented in the Annual Report.

Strategy

There is a Wildlife Tree Patch Retention (Landscape Unit Level) Strategy and Green Tree and Snag



Retention Strategy associated with this indicator, and the following Standard Work Procedures.

- Green Tree and Snag SWP, Appendix A-Guidance for Wildlife Tree Patch Location SWP,
- High Value Snag Strategy and SWP

Forecasting and Probable Trends of the Indicator

By implementing the Wildlife Tree Patch Retention (Landscape Unit Level) Strategy and the Green Tree and Snag Retention Strategy, it is forecast that the application of the strategies associated with this indicator will result in compliance with the landscape units/BEC variant WTR targets. This includes wildlife tree patches and single trees with habitat attributes that will help to sustain biological and ecological processes in managed forests through time.

This indicator is one of the inputs into TSR. A net THLB impact of 3.5% is assumed for all cutblocks in TSR modelling, rather than a variable

LU/BEC variant target as per this indicator. Application of the strategies associated with this indicator is forecast to result in Canfor remaining in compliance with this net THLB impact.

Monitoring and Reporting

Each year the WIM team will analyse the data for this indicator. Areas harvested during the annual reporting period will be included in the Landscape Unit level calculation for retention, resulting in a report of the (weighted average) percent of area retained at the Landscape Unit level, split by THLB and NHLB. Details on the calculations are available from the GIS Analyst. Results will be reported in the annual Annual Report. Planning, Permitting, and the Forest Scientist will examine the data and a strategy developed to address any deficiencies.

Indicator 10 – High Value Snags



Indicator Statement	Target (Variance)
a) The density (stems/ha) of all identified High Value snags within gross block areas, all BEC subzones combined; b) The average percentage of High Value snags retained outside net harvest areas, by BEC grouping	a) 5% improvement annually in the average b) Minimum 65%

What is this indicator and why is it important?

Standing dead trees (snags) are used by 25-30% of forest-dwelling vertebrates in British Columbia for nesting, denning, and roosting (Bunnell et al. 1999). Snags also provide critical habitat for many invertebrate, lichen, and fungal species (Bunnell et al. 1999). As such, they have been identified as one of the key elements to maintain in forested landscapes in order to conserve biodiversity (Lindenmyer and Franklin 1997).

Canfor, in Kootenay Region, defines High Value (HV) snags as standing dead trees with the following characteristics:

- One of the following species:
 - western larch, Douglas-fir, ponderosa pine, spruce, or western red cedar, > 40 cm dbh and > 5 m tall
 - aspen or cottonwood, > 30 cm dbh and > 5 m tall
- Wildlife Tree Class 2-7 (dead or dying, or with dead top)
- Have evidence of wildlife sign or potential use (nesting cavities, nesting platforms or nests, loose peeling bark, feeding holes, scratch marks, cracks on the bole, etc.)

As a general rule, the larger the diameter and the taller the snag, and the longer it will stand for, and the higher the wildlife value. Case-hardened snags (snags created by wildfire with no bark remaining and a very hard shell) are of lower value unless there are existing cavities in them, since these snags tend to fall down before they develop the characteristics useful for wildlife.

This indicator was developed to assess how well snags important to wildlife and biodiversity are being retained within Canfor's cutblocks in the DFA. It measures:

- 1) The density of all identified High Value (HV) snags within gross block areas in each BEC grouping, and
- 2) The percentage of HV snags that are found in gross block areas before logging that are protected in reserves or left outside block boundaries.



Retaining snags is difficult to do in forestry operations. This is because snags are considered 'danger trees' by WorkSafe BC due to the fact that all or part of them can fall down and crush a worker without warning. This can occur during felling of the snag, or even simply due to machine vibrations from nearby logging equipment or haul trucks. To be safely retained, a snag must be located within a reserve of at least 1.5 times the height of the unsafe portion of the tree. Snags outside these reserves must be felled. As such, priority should be given to retaining HV Snags.

How are targets established?

There are no legal or certification targets for HV snag retention in British Columbia. A synthesis of the extensive research on snag/vertebrate habitat relationships in the Pacific Northwest suggests that, to maintain vertebrate populations, 10-20 snags/ha should be retained across the Crown Forested Land Base (CFLB), and 2-4 snags of this number should be of high value (i.e., large diameter, long-lasting tree

species, Bunnell et al. 1999). However, this information applies to both areas that can be harvested (the THLB) and areas that cannot (NHLB), and so is difficult to use when setting targets for features recorded at the block level, particularly those in which not every feature is recorded, such as the HV Snags.

An analysis of baseline cruise data collected through the FREP program (provided by N. Densmore, 2014) suggests that densities of class 3,4, and 7 snags ≥ 40 cm dbh in BEC variants found within the Rocky Mountain Forest district range from 0.90 – 5.18 stems/ha, depending on forest type (P1 leading, mixed stand, or other). This range is not directly transferable to HV Snag targets, however, since it does not include Wildlife Tree Classes 2, 5, and 6, and does not differentiate between those snags with wildlife sign and those without, as does Canfor's definition.

Thus, for this indicator, the initial target was set following two years of collecting data across the DFA. The first component of the target was set to improve data collection on HV Snags, and is simply a measure of the density of high value snags identified throughout the blocks. Since the BEC subzone distribution of blocks varies among years, there is no subzone associated with this target.

The second component of the target is an average minimum percentage of HV snags to be protected within blocks that have identified HV snags within them, by BEC grouping. Based on data collected to date (See Current Condition) it would seem that a minimum of 65% should be achievable in all groupings (See Table 51 for the groupings).

Current Condition

The current condition for this indicator is based on data from cutblocks harvested between 1 January 2013 and 31 December 2014. This period was selected because it represented two years when the program was being fully implemented over most of the DFA in terms of cutblocks being planned, although it must be recognized that this period includes cutblocks that were planned prior to this period when the snag program was not in place (hence the high number of blocks in which there were no HV snags identified). The number of polygons (blocks) is greater than the official number of reported blocks for this time period because blocks were split into smaller polygons if the block covered more than one BEC variant.

Table 51 lists densities (snags/ha) of protected High Value Snags, total High Value Snags, and the percentage of High Value Snags that were protected for all High Value Snags in the database. All Class 2 trees are considered "protected", regardless of their status in the database, as Class 2 trees are generally not felled, or are stubbed when blocks are harvested.

The two components of the target are shaded in blue. This shows that the first component of the target, total snag density, was $0.0063 \text{ snags/ha} \pm 0.0011$.

The second component of the target ranges from 34.7% in the dry ICH to 83.9% in the ESSF dry variants. The target was met in all groupings except the dry ICH variants.

Table 51: High Value Snag density and percent protected snags by BEC for all blocks harvested between 1 Jan 2013 and 31 Dec 2014

BEC	Mean density (snags/ha) ± Standard Error of mean				% HV Snags protected ²	Mean % snags protected per polygon ³	N		
	Total snags	Protected Snags	Total (only polygons ¹ with snags)	Protected (only polygons with snags)			polygons	polygons with HV snags	HV snags
ESSF dry variants	0.0025±0.0014	0.0018±0.0014	0.0547±0.0260	0.0397±0.0287	83.9	57.14±20.20	156	7	16
ESSF wet variants	0.0000±0.0000	0.0000±0.0000	-	-	-	-	6	0	0
ICH dry variants	0.0196±0.0086	0.0035±0.0025	0.1207±0.0295	0.0213±0.0142	34.7	23.62±16.72	37	6	42
ICH wet variants	0.0018±0.0014	0.0050±0.0024	0.0602±0.0121	0.0550±0.0138	76.6	88.00±9.69	55	5	24
IDF/PP	0.0104±0.0028	0.0035±0.0012	0.0547±0.0107	0.0186±0.0051	61.7	55.32±10.07	111	21	146
MSdk	0.0055±0.0017	0.0028±0.0009	0.0712±0.0181	0.0370±0.0090	81	68.07±8.78	300	23	73
Total	0.0063±0.0011	0.0029±0.0006	0.0676±0.0088	0.0310±0.0052	66.6	59.82±5.70	665	62	301

¹ Polygons are blocks or blocks that have been divided into smaller portions by BEC grouping

² Protected snags are considered HV snags in reserves, Class 2 trees inside and out of reserves and all HV snags identified outside of the gross block area

³ Only in polygons with HV snags identified

Strategy

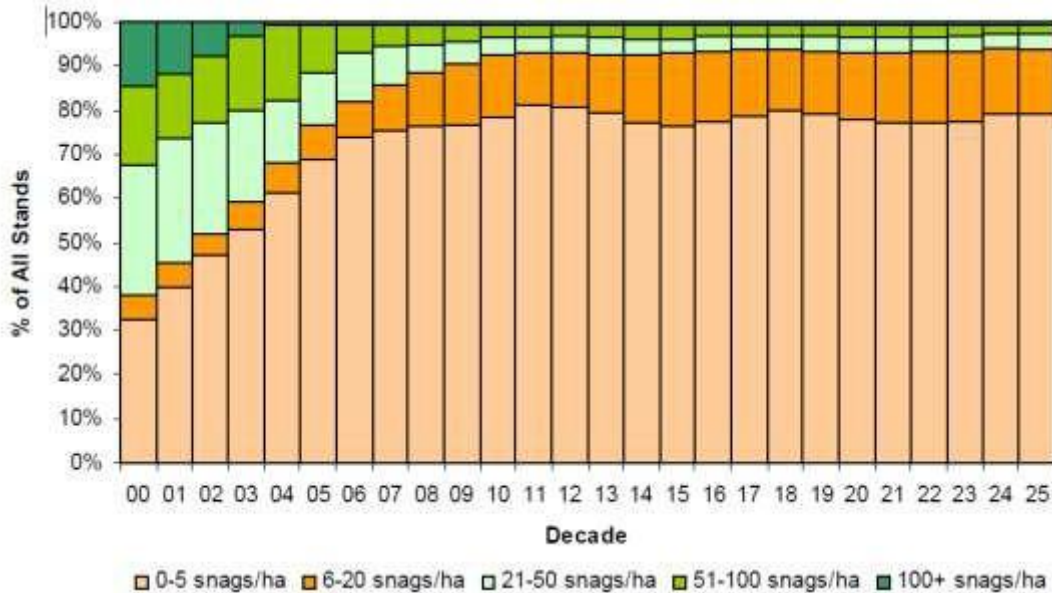
There is a High Value Snag Retention Strategy and Green Tree and Snag Retention Strategy associated with this indicator, and the following Standard Work Procedures.

- Green Tree and Snag SWP,
- Appendix A-Guidance for Wildlife Tree Patch Location SWP,
- High Value Snag SWP

Forecasting and Probable Trends of the Indicator

There are no modelling projections specifically available for the HV Snag density targets and program as defined here. There are, however, modelling projections for the density of snags > 20 cm dbh and > 1.3 m tall, completed for TSR III in the Rocky Mountain District, which are based on detailed stand dynamics data, projections, and fall-down rates in the DFA (Wilson et al. 2004 for details). These projections suggest that, under current management as defined in 2005, snag densities will decline significantly over time on the Timber Harvesting Land Base (THLB) (Figure 33). Although snag densities are projected to increase through time on the Non-Harvesting Land Base (NHLB) as the forest here ages, projections for overall densities on the Crown Forested Land Base (CFLB) are projected to decline.

Figure 33: Projections of snag abundance (>20cm dbh) on the THLB in the Cranbrook and Invermere TSAs



* Projections of snag abundance (>20cm dbh) on the THLB in the Cranbrook and Invermere TSAs under the assumptions of the basecase in TSR III over the 25 decades of the modelling period, from 2005 onward.

The assumptions of the TSR III basecase are not far from current management, with the exception that Canfor did not have specific HV snag targets in 2005. Without a focus on leaving HV snags, retained densities can be very low, since these snags are quite rare on the landscape. Thus, implementation of the High Value Snag Retention Strategy and Green Tree and Snag Retention Strategy associated with this indicator should help alleviate the negative trends seen in this forecast somewhat. However, the reality in British Columbia is that WorkSafe BC regulations make it very difficult to retain snags without reserve patches, and retaining large numbers of reserve patches and creating an economical cutblock are often conflicting objectives.

Monitoring and Reporting

Each year, the Forest Scientist, with assistance from the WIM team, will determine the total HV snag density and the percentage of HV snags in BEC variant groupings for all blocks in which layout has been completed that year, as per Table 51, in order to determine compliance with targets. Results from this will be presented in the Annual Report.

In addition, the Forest Scientist will co-ordinate field surveys on a sample of cutblocks to determine the percentage of HV snags protected and identified, and whether this matches the calculated number from GIS analysis. Results will be presented in annual HCVF Effectiveness Monitoring reports.

Indicator 11 – Riparian Management

Indicator Statement	Target (Variance)
a) Riparian Reserves and Management Zones planned in accordance with Canfor's Integrated Riparian Assessment.	0 non-compliances
b) Within each Riparian Management Unit, the combined Riparian Reserve and Management Zone widths meet the FSC budgets in Table 52, including both <i>FRPA</i> legal minimums on each stream, lake and wetland	0 non-compliances

What is this indicator and why is it important?

Riparian areas occur adjacent to the banks of streams, rivers, lakes and wetlands. These are the zones where terrestrial and aquatic systems connect and interact, and as a result, are highly diverse and productive areas. The width of riparian areas cannot be defined by a set width, but is dependent on the topography and geology in the immediate area. On some large river systems the riparian area may exist on a floodplain up to a kilometre or more from the actual river, while small streams in steep narrow gullies may have virtually no riparian area to speak of.



Riparian areas, because of their high site productivity, often contain some of the largest trees in a valley. Thus they are very attractive areas for forest companies. However, riparian areas are also very rich in biodiversity, they have sensitive soils, and a high potential for negative impacts on both terrestrial and aquatic habitats if not treated properly. Thus, an indicator and management strategies for them are required.

The Ecological Importance of Riparian Areas

Approximately half of the forest-dwelling vertebrates in British Columbia use riparian ecosystems at some point in their lives (Bunnell et al. 1999). While some species are dependent on riparian areas throughout the lives (e.g., beaver, mink, otter, amphibians, some waterfowl), there are many others that use or need riparian habitat at some stage of their life cycle or daily activities. For example, many bat species roost in trees away from water, but forage for insects over water.

The species richness in riparian areas is due both to the complexity and productivity found there (Bunnell et al 1999). The high ready availability of water, moderate temperatures, and high relative humidity encourages rapid growth, large vegetation size, and abundant forage of both plants and water-breeding insects. Large trees produce large snags and large logs, important to species using cavities and down wood, and large tree canopies provide nesting sites and forage for a diversity of birds and insects. Site productivity is linked to a high diversity of species, and many different trees, plants, fungi, and lichens are found in riparian areas. In coniferous forests, riparian areas often contain hardwood trees like aspen, cottonwood, and birch, as well as a high number of shrub species.

Riparian areas also have a strong influence on aquatic habitats. Streamside vegetation contributes to stream channel and bank stability, acts as a filter for sediment, provides shade to regulate stream

temperatures, and provides a continuous source of woody debris, which influences sediment transport rates and channel morphology. The majority of invertebrates that provide food for fish exist in overhanging vegetation and adjacent trees, while leaves and twigs that fall into streams are the primary nutrient source that drives aquatic ecosystems.

Finally, riparian areas also provide ecological connectivity between valley bottoms and high elevations, and from one valley to another. They provide areas for secure movement for large animals like moose and bears as well as small ones like bats and birds.

Canfor's Integrated Riparian Assessment

In 2009, Canfor (and Tembec at the time) completed an Integrated Riparian Assessment for the DFA. This assessment was intended to go beyond the simple linear riparian management currently in legislation to design riparian reserves based on ecological and geological characteristics, and to meet the requirements of the FSC-BC Standard. A team including a hydrologist, a geomorphologist, a riparian ecologist, a fish biologist, two wildlife biologists, and a GIS expert developed it. It contains:

- 1) a detailed review of riparian values in the East Kootenay and their sensitivity to forest management,
- 2) a literature review on the range of natural variability for riparian ecosystems,
- 3) a summary of the geomorphologic characteristics of the 8 major geomorphic regions within the DFA (Figure 34),
- 4) a summary, for each riparian management unit, of how the current amount of riparian reserves compare against the FSC-BC targets,
- 5) detailed riparian summaries and management strategies, by stream, wetland, and lake class, for the 46 riparian management units within the DFA,

Figure 34: Riparian Management Regions within the DFA



Figure 35: Riparian Management Regions within the DFA



The assessment is designed to allow riparian reserves and management zones to be customized to the characteristics of specific watercourses or waterbodies and the ecological values in the areas they are located. It incorporates the concept of natural disturbance by encouraging variable width buffers, that undulate in shape following slope breaks, forest type changes, etc., rather than fixed width reserves.

How are targets established?

The targets for minimum riparian widths are set both under legal acts (FRPA) and FSC-BC Standards. They are both shown in Table 52 for comparison. Based on scientific information, experts developed both sets of targets. Table 52 shows that the *FRPA* buffers are fixed width for every watercourse, while the FSC buffers are set in hectares by kilometre, and can vary in width. *FRPA* requires a 5 m No Machine Zone, while FSC requires a 7-m NMZ. Canfor uses the 7 m NMZ on every watercourse.

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Table 52: Minimum targets for riparian reserve zones and management zones under FRPA and FSC

Definition		FRPA		FSC	
		RRZ (m)	RMZ (m)	Budget Minimums	Equivalent Default Widths (m)
Stream Class					
S1A	>100m in width	0	100	RRZ: 6 ha/km	RRZ: 30
S1B	>20 up to 100m in width	50	20	RMZ: 8 ha/km with 65% BA retention	RMZ: 40 (65% retention)
S2	5-20 m in width	30	20		
S3	1.5 – 5 m in width (fish bearing or community watershed)	20	20	RRZ: 6 ha/km RMZ: 4 ha/km with 65% BA retention	RRZ: 30 RMZ: 20 (65% retention)
S4	<1.5 m in width (fish bearing or community watershed)	0	30		
S5	> 3 m in width (not fish bearing or not in community watershed)	0	30	RRZ: 4 ha/km RMZ: 4 ha/km with 65% BA retention	RRZ: 20m each side RMZ: 20m each side (65% retention)
FSC 5a					
FSC 5b	Above AND non-domestic watershed AND > 500 m upstream of a fish-bearing stream			NDT 1,2,4: RMZ: 3 ha/km with 30% BA retention NDT 3: RMZ: 3 ha/km with 10% BA retention	NDT 1,2,4: RMZ: 15m each side (30% retention) NDT 3: RMZ: 15m each side (10% retention)
S6	≤ 3 m in width (not fish bearing or not in community watershed)	0	20	RRZ: 4 ha/km RMZ: 4 ha/km with 65% BA retention	RRZ: 20 RMZ: 20 (65% retention)
FSC 6a					
FSC 6b	Above AND non-domestic watershed AND > 250 m upstream of a fish-bearing stream			NDT 1,2,4: RMZ: 3 ha/km with 30% BA retention NDT 3: RMZ: 3 ha/km with 10% BA retention	NDT 1,2,4: RMZ: 15 (30% retention) NDT 3: RMZ: 15 (10% retention)
Wetlands					
W1	> 5 ha. in area	10	40	RRZ: 2 ha/km RMZ: 1.5 ha/km with 30% BA retention	RRZ: 20m from edge of wetland RMZ: 15m from edge (30% retention)
W2	1-5 ha. in area in PP or IDF	10	20		
W3	1-5 ha. in area not in PP or IDF	0	30		
W4	0.25-1 ha. in area in PP or IDF	0	30		
W5	2 adjacent wetlands separated by < 60 m and both <5 ha, or separated by < 80 m if one is <5 ha and the other is >5 ha, or separated by 100 m or less if both are >5 ha.	10	40		
Lakes					
L1	> 5 ha. in area	10	<i>varies</i>	RRZ: 1.5 ha/km RMZ: 1.5 ha/km with 30% BA retention	RRZ: 15m from edge of wetland RMZ: 15m from edge (30% retention)
L2	1–5 ha. in area in PP or IDF	10	20		
L3	1-5 ha. in area not in PP or IDF	0	30		
L4	0.25-1 ha.	0	30		

* Canfor's RRZ and RMZ must meet both.

Current Condition

Canfor did not have any Incidents reported on riparian reserves not being planned to meet the Integrated Riparian Assessment process in 2014. However, detailed field data collected on riparian areas in 2014 as part of the HCVF Effectiveness Monitoring Program is still being analysed. Results will be presented in the 2015 Annual Report.

The current condition of Canfor's riparian reserves with respect to the FSC budget is available in the Integrated Riparian Assessments, Volumes 2-9. For each of the 46 Riparian Management Units within the DFA, the required retention amounts for each lake, c, and stream class are calculated, together with the amount of retention currently calculated to be present. Surplus and Deficits are presented by feature class, and for the overall unit.

All of the 46 RMUs have a budget surplus when lakes, wetlands, and streams across the unit were considered as a whole. However, in some units particular feature classes are at or near deficit. This is particularly so for lakes and wetlands which are relatively rare on the landscape and thus have small budgets and small surpluses. In addition, these features tend to be located on valley bottoms where historic logging has taken place, much of it without riparian reserves.

Strategy

There is a Riparian Management Strategy and a Riparian Standard Work Procedure associated with this indicator. As well, there is a mandatory training presentation for permitting foresters, field operations staff and contractors.

Forecasting and Probable Trends of the Indicator

By implementing the Riparian Management Strategy and Riparian SWP, it is forecast that healthy, functional riparian ecosystems with a diversity and abundance of native species will be maintained and/or restored and negative impacts from forest harvesting on aquatic ecosystems will be minimized.

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

Monitoring and Reporting

Inspections of harvested areas will be completed during and following harvesting activities by Canfor, and any issues concerning the Riparian Reserve Zone (RRZ) will be noted and tracked using the Incident Tracking system. The number and type of riparian incidents will be summarized at the end of each year and reported out by the Forest Scientist. Non-compliance issues with respect to FRPA will be reported promptly to the appropriate government officials. These inspections are completed both by the Prime Contractors, Canfor Supervisors as part of their regular duties, as well as Field Operations personnel as part of the HCVF Effectiveness Monitoring program.

Riparian budget calculations relative to the FSC targets will be redone every 10 years, or within 1 year of the targets changing. The spatial scale the targets are calculated at (the riparian assessment unit, which is a number of watersheds) is fairly large, so the actual amounts of riparian reserves do not change quickly through time unless there is a large disturbance event.

Element 1.2 – Species Diversity

Element 1.3 – Genetic Diversity

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

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

- 12 Forest management activities conform to operational plans that include the appropriate management strategies from the SWP for blocks containing habitat for species of management concern
- 13 Suitable habitat is provided for key Species of Management Concern
- 14 Percentage of tree seed used in yearly tree planting program that is consistent with the *Chief Foresters' Standards for Seed Use*
- 15 Percentage of stands at free growing that have a component of natural regeneration; 60% of stands have 60% of their total inventory coming from natural regeneration at free growing
- 16 Percentage of hectares planted with more than one species (by year)
- 17 Percentage of maximum density spaced hectares with species diversity maintained or enhanced

Indicator 12 – Species of Management Concern – Habitat Protection

Indicator Statement	Target (Variance)
Forest management activities conform to operational plans that include the appropriate management strategies from the SWP for blocks containing habitat for species of management concern	100% (5)



What is this indicator and why is it important?

While habitat for most species should be provided through the application of the coarse and medium filter ecological strategies in this SFMP (e.g., protected areas, ecosystem representation, old growth, High Value snags, CWD, green trees retention, riparian, etc.), some species require specific management consideration to account for their habitat needs. This can be driven by the fact that their habitat requirements are

very specific, their populations are low, or that society has desires to manage for them. These species have been termed Species of Management Concern.

Canfor has defined Species of Management Concern as species that meet all of the first four points, and at least one of the eight bullets under point 5:

1. Occur and breed on the DFA,
2. Are wholly or partially dependent on forested habitat for one or more of their life stages,
3. Are potentially impacted by forestry planning and practices,
4. Their habitat needs are not sufficiently covered off by existing other coarse and medium filter SFMP strategies and SWPs, and
5. They meet one or more of the following criteria:
 - Have been assessed and recommended for listing as Endangered, Threatened, or Special Concern by COSEWIC under the Species at Risk Act,
 - Are red- or blue-listed in British Columbia or on the *Species at Risk Act* in Alberta,
 - Are migratory birds (as identified under the Migratory Bird Convention Act of Canada),
 - Have been identified as Priority 1 species on the Conservation Framework at the Conservation Data Center in British Columbia,
 - Are in SAS (Species Accounting System) grouping number 4 (species using localized habitats),
 - Are ‘focal species’ or of management or cultural concern as identified by a Canfor Public Advisory Group,
 - Are Boreal Priority Species, as identified by the Canadian Boreal Forest Agreement,
 - Are regionally rare or uncommon species that are sensitive to forestry operations,
 - Are a species of concern to local Indigenous Peoples or the public, and that pass the test of ‘reasonableness’ to manage specifically for (e.g., their habitat is not fully covered by existing legislation or strategies and can be logically and practically managed for by Canfor).



To identify Species of Management Concern, a complete known species list of all confirmed vertebrates, and red- and blue-listed invertebrates and plants was compiled for the DFA (the Canfor Species Database). This species list was checked with local naturalists, biologists, and others familiar with species in the area. Red and blue-listed plant communities were also included. Each species or plant community was categorized according to its federal, provincial, and regional conservation status, Conservation Framework priority, Species Accounting System group, and whether or it not had been identified as a key species for local

Indigenous Peoples or the Public Advisory Group. Finally, each vertebrate species was linked to the SFMP strategies thought most likely to maintain its habitat, if any. From this, the Species of Management Concern were derived, according to the definition above.

How are targets established?

The target was selected to ensure a high degree of conformance with the designated management strategies.

Current Condition

This is a new indicator so no measure of current condition is available at this time. Current condition will be reported on in the 2015 Annual Report.

Strategy

There is a Species of Management Concern Strategy associated with this indicator. In addition, there are many Standard Work Procedures, which apply to various Species of Management Concern, including:

- Species of Management Concern SWP
- Whitebark Pine SWP
- Sites of Biological Significance SWP, and its Appendix B: Common Stick Nests
- Management around Avalanche Paths SWP
- High Conservation Value Forest SWP
- Ecosystem Restoration BMPs
- High Value Snag, CWD, Green Tree Retention, SWPs
- Riparian and Hydrology SWPs
- Migratory Bird Strategy (Corporate level) and SWP
- Loop Road SWP

Which species each SWP applies to is outlined in Table 53. In addition, the management strategies written for each of the High Conservation Value Forests designated for Species of Management Concern and, for species that occur in the Flathead drainage, the Flathead Special Management Strategies, also apply to various species. See the Indicator for High Conservation Value Forests for more information.

Table 53: Species of Management Concern on the Kootenay DFA

Species	Conservation Status/Species Accounting Group	Legal Requirements	HCVF Areas identified for the Species?	Brief Description of Management Strategies	Habitat Mapped in GIS?	Applicable SWP or BMPs or other strategies	Provincial or Federal Recovery Strategy?
Woodland Caribou (South Purcell and Central Selkirk sub-populations)	Threatened (SARA), Endangered (COSEWIC), Red-listed (BC) (Southern Mountain Population), SAS Group 5	GAR Order UWR #U-4-013	Yes, same as UWR area	Follow UWR order to reserve all identified caribou habitat in the DFA.	Yes, UWR area (= EF/HCVF)	SoMC SWP	Both
Grizzly Bear, western population	Special Concern (COSEWIC), Blue-listed (BC), SAS Group 1	GAR Order Grizzly Bear Specified Area # 4-180	Yes, GB Area plus additional High Value and Connectivity HCVFs, and EFs	Follow GAR order plus HCVF strategies for high value and connectivity areas and EF strategies (intact watersheds); Flathead Special Management Strategies	Yes, Specified Area and HCVFs/EFs	Avalanche Path; Sites of Biological Significance (dens); Flathead Special Management Strategies; Loop Road SWP	Neither
American Badger (<i>jeffersonii</i> subspecies)	Endangered (SARA), Red-listed (BC), SAS Group 4	GAR Order WHA 4-088 to 4-092; 4-102, 4-103, 4-106, 4-107	Yes	Follow WHA management strategies or exemptions, Protect den Sites with MFZ or WTP; Ecosystem Restoration BMPs	Yes, WHAs and HCVFs	Sites of Biological Significance (dens); Ecosystem Restoration BMPs	Both
Wolverine	Special Concern (SARA), SAS Group 5	None	Yes, EF and HCVF	Designate Endangered Forests (intact watersheds) Limit road access into HCVFs; Manage riparian corridors; Flathead Special	Yes, EF and HCVF	Avalanche Path; Sites of Biological Significance (dens); Flathead Special Management	No

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Species	Conservation Status/Species Accounting Group	Legal Requirements	HCVF Areas identified for the Species?	Brief Description of Management Strategies	Habitat Mapped in GIS?	Applicable SWP or BMPs or other strategies	Provincial or Federal Recovery Strategy?
				Management Strategies		Strategies; Loop Road SWP	
American Marten	Species of high public and Indigenous Peoples concern, SAS Group 5	None	Yes, CCVF for furbearing animals	CCVF management strategies, Manage riparian areas, CWD, windrows in specific cutblocks	No	CWD	No
Northern Myotis, Little Brown Myotis,	Endangered (SARA), Blue-listed (BC), SAS Group 3	None	No	Retain High Value Snags, Riparian Reserves	No	High Value Snags, Riparian, Sites of Biological Significance SWP (maternity roosts, hibernacula)	Federal Recovery Strategy (proposed as of January 2016)
Bighorn Sheep	Blue-listed (BC), SAS Group 6	GAR Order UWR U-4-066 and U-4-088	Yes, UWR and Class 1 Habitat (HCVF)	Follow UWR order to manage habitat, plus HCVF strategies for Class 1 habitat	Yes, UWR and Class 1 Habitat HCVFs	Ecosystem Restoration BMPs	No
Mountain Goat	Blue-listed (BC), Conservation Framework Priority 1, SAS Group 6	GAR Order UWR U-4-066 and U-4-088	Yes, UWR	Follow UWR order to manage habitat, plus SBS for licks and associated trails to licks	Yes, UWR and known licks	Sites of Biological Significance (licks)	No
Elk, Moose and Mule Deer	Species of high public concern, SAS Group 1	GAR Order UWR U-4-066 and U-4-088	Yes, UWR	Follow UWR order to manage habitat, plus SBS for licks and wallows and associated trails. Apply Ecosystem Restoration BMPs for Open Range and Open Forest	Yes, UWR and known licks and wallows	Sites of Biological Significance (licks and wallows); Ecosystem Restoration BMPs; Loop Road SWP	No

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Species	Conservation Status/Species Accounting Group	Legal Requirements	HCVF Areas identified for the Species?	Brief Description of Management Strategies	Habitat Mapped in GIS?	Applicable SWP or BMPs or other strategies	Provincial or Federal Recovery Strategy?
Birds							
Williamson's Sapsucker	Endangered (SARA), Red-listed (BC), SAS Group 4	SARA Critical Habitat, GAR Order WHA 4-127 through 4-129, 4-136 through 4-135 (more proposed)	Yes, WHA (legal and proposed) plus critical habitat, plus the Area of Occupancy (moderate and high value habitat)	Follow WHA management strategies, Protect nest sites with WTP, Follow BC BMPs within Area of Occupancy Ecosystem Restoration Logging for Open Forest	Yes, WHAs and proposed WHAs, Critical Habitat, and Area of Occupancy (high and moderate habitat)	Sites of Biological Significance (nests); High Value Snag; Ecosystem Restoration BMPs	Federal Recovery Strategy, BC Recovery Plan and BMPs
Lewis Woodpecker	Threatened (SARA), red-listed (BC), SAS Group 4	GAR Order WHA 4-001, 002, 086, 087	Yes, WHA plus HCVF	Follow WHA management strategies, Protect nest sites with WTP, Protect High Value Snags Ecosystem Restoration Logging for Open Range	Yes, WHAs and HCVFs	Sites of Biological Significance (nests); High Value Snag; Ecosystem Restoration BMPs	Federal Management Plan
Long-billed Curlew	Special Concern (SARA), Blue-listed (BC), SAS Group 6	GAR Order WHA 4-065 through 4-075	Yes, WHA plus HCVF	Follow WHA management strategies, Protect nest sites with WTP, Ecosystem Restoration Logging for Open Range	Yes, WHAs and HCVFs	Sites of Biological Significance (nests); Ecosystem Restoration BMPs	Federal Management Plan
Flammulated Owl	Special Concern (SARA), Blue-listed (BC), SAS Group 4	GAR Order WHA 4-077 through 4-085, 4-099, 4-100, 4-101	Yes, WHA plus HCVF	Follow WHA management strategies, Protect nest sites with WTP,	Yes, WHAs and HCVFs	Sites of Biological Significance (nests); High Value	Federal Management Plan

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Species	Conservation Status/Species Accounting Group	Legal Requirements	HCVF Areas identified for the Species?	Brief Description of Management Strategies	Habitat Mapped in GIS?	Applicable SWP or BMPs or other strategies	Provincial or Federal Recovery Strategy?
				Ecosystem Restoration Logging for Open Forest, protect high value snags and vets near calling sites		Snag; Ecosystem Restoration BMPs	
Great Blue Heron	Blue-listed (BC), SAS Group 3	GAR Order WHA 4-109, 4-112 (more proposed)	Yes, WHA and Rookeries	Follow WHA management strategies (reserve and timing restrictions), Protect nest sites with WTP, Riparian Strategy	Yes, WHAs and Rookery Locations	Sites of Biological Significance (nests); Riparian SWP	No
Western Screech Owl (Macfarlanei)	Endangered (SARA), Red-listed (BC), SAS Group 4	GAR Order WHA 4-098, 4-113, 114-115, 4-145, 4-178, 179 (more proposed)	Yes, WHA (legal and proposed)	Follow WHA management strategies, Protect nest sites with WTP, Flathead Special Management Strategies	WHA (legal and proposed)	Sites of Biological Significance (nests); High Value Snag; Flathead Special Management Strategies	BC Recovery Strategy
Northern Goshawk	Sensitive to forestry practices, Regional concern, SAS Group 5	Not specific to goshawk	No	Follow Northern Goshawk BMPs for breeding areas, Old and mature forest retention, Interior Forest Habitat	Yes, Nest sites (breeding areas to come)	Sites of Biological Significance (nests); Goshawk BMPs for Interior BC, Old and Mature Forest Replacement SWP	No

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Species	Conservation Status/Species Accounting Group	Legal Requirements	HCVF Areas identified for the Species?	Brief Description of Management Strategies	Habitat Mapped in GIS?	Applicable SWP or BMPs or other strategies	Provincial or Federal Recovery Strategy?
Migratory Birds (as defined by the MBCA)	Variable by species, SAS Groups 2 through 5	Migratory Bird Convention Act (MBCA)	n/a	Avoid harvest during breeding season in identified key habitats, and/or apply BMPs depending on management category	Yes	Migratory Bird Strategy and SWP	n/a
Amphibians							
Rocky Mountain Tailed Frog	COSEWIC (Threatened), SARA (Endangered) Red-listed (BC), SAS Group 4	GAR Order WHA 4-046 through 4-064	Yes, WHAs cover all known occurrences of adults; Critical Habitat covers potential occurrences	Follow WHA strategies, follow Integrated Riparian Strategy, protect OGMAs adjacent to riparian areas (KBLUP, SRMPP)	Yes, WHAs	Riparian; Hydrology	Federal Recovery Strategy
Western Toad	Special Concern (SARA), Blue-listed (BC), SAS Group 4	None	No	Follow Integrated Riparian Strategy, protect ephemeral ponds with MFZ or WTP, maintain CWD	No	Sites of Biological Significance (ephemeral ponds); Riparian; CWD	No
Fish							
Cutthroat Trout, <i>lewisi</i> subspecies	Special Concern (SARA), Blue-listed (BC)	Fisheries Sensitive Watersheds (Palliser)	Yes, FSW and key known spawning areas and pure-strain streams, and HCV3 watersheds	Riparian, Flathead Special Management Strategies, HCV3 strategies	FSW and HCVFs and HCV3s	Riparian, Hydrology Strategy, Flathead Special Management Strategies	BC Mgmt Plan
Bull Trout, interior lineage	Special Concern (SARA), Blue-listed (BC)	Fisheries Sensitive Watersheds (Palliser)	Yes, FSW and key known spawning areas and pure-strain streams, and HCV3 watersheds	Riparian, Flathead Special Management Strategies, HCV3 strategies	FSW and HCVFs and HCV3s	Riparian, Hydrology Strategy, Flathead Special Management Strategies	No

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Species	Conservation Status/Species Accounting Group	Legal Requirements	HCVF Areas identified for the Species?	Brief Description of Management Strategies	Habitat Mapped in GIS?	Applicable SWP or BMPs or other strategies	Provincial or Federal Recovery Strategy?
Rocky Mountain Sculpin, westslope population	Special Concern (COSEWIC), Blue-listed (BC)	None. Only known from the Flathead drainage in BC.	Habitat requirements covered under Bull Trout and WSCT	Riparian, Flathead Special Management Strategies,	No, but locations where it exists are known.	Riparian, Hydrology Strategy, Flathead Special Management Strategies	No
Invertebrates							
Gillette's Checkerspot	Red-listed (BC)	GAR Order WHA 4-151 through 4-170, 4-177	Yes, WHAs (legal and proposed)	Follow WHA requirements MFZ moist areas with white	Yes, WHAs (legal and proposed)	Riparian, Flathead Special Management Strategies	No
Magnum Mantleslug	Special Concern (SARA), Blue-listed (BC)	none	no	Follow Integrated Riparian Strategy, meet FSC and FRPA riparian requirements	Yes - Detection sites	Riparian, CWD	BC Mgmt Plan under development
Plants							
Whitebark Pine	Endangered (SARA), Red-listed (BC)	None (2015)	Yes	Reserve healthy overstory and understory, develop brushing strategies in association with recovery team leaders, plant blister rust resistant seedlings.	Yes, VRI polygons and HCVFs	Whitebark Pine SWP	Federal Recovery strategy under development
Limber Pine	Threatened (COSEWIC)	None (2015)	No	Reserve all identified individuals, plant blister-rust resistant seedlings	None identified	SoMC SWP	Not yet

* Species of Management Concern on the Kootenay DFA, and information about their associated requirements and management strategies. For more detail about each species, including those not included in this table, request to view the Canfor Species database



Forecasting and Probable Trends of the Indicator

By implementing the Species of Management Concern Strategy and SWP, it is forecast that habitat for these species will be maintained. If this is shown not to be the case, the strategies and SWP associated with this indicator will be reviewed and if necessary revised in order to improve habitat outcomes.

Suitable habitat is currently being forecast for a subset of the Species of Management Concern as part of the TSR IV process. These species include the elk, mule deer, marten, grizzly bear, northern goshawk, Flammulated Owl, and Williamson Sapsucker. Results will be presented as soon as they are available (expected in 2016).

Monitoring and Reporting

Monitoring will be conducted in two ways.

First, WIM will produce an annual report summarizing any blocks containing habitat for Species of Management Concern, and the forestry management strategies written in the Site Plan to maintain the habitat. The Forest Scientist or delegate

will review this report against the SWP and check that the strategies were appropriate to the species and summarize the findings in the Annual Report. If a large number of blocks are in the sample in any given year (> 25), a sample of no less than 10 may be selected.

Second, a subset of the blocks containing Species of Management Concern that were harvested each year will be inspected in the field post-harvest as part of the HCVF Effectiveness Monitoring Program, conducted either by contractors, Canfor Field Operations Staff or the Forest Scientist or delegate. This inspection will determine whether the management strategies written in the Site Plan were followed, and whether these strategies appeared to be effective at protecting the habitat.

Any incidences of non-compliance with the Species of Management Concern SWP will be entered into the Incident Tracking System and the root cause for the non-compliance determined by a team including

representatives from harvesting, permitting, field operations, and the Forest Scientist. If necessary, changes will be made to the SWP to ensure that the problem does not occur again.

WIM will produce an annual report summarizing any incidences regarding Species of Management Concern. The Forest Scientist will summarize this report in the Annual Report, together with the report from Step 2 above.

Note that there is overlap between this monitoring and the monitoring for the Sites of Biological Significance, because some of the Species of Management Concern have habitats (such as nest sites) that are also considered Sites of Biological Significance Monitoring

In addition, there is overlap between monitoring for aquatic species and the riparian effectiveness monitoring which Canfor has conducted for four field seasons. For details see Indicator 11 – Riparian Management. This field monitoring covers some of the habitat for aquatic species such as Bull Trout and Westslope Cutthroat Trout.

Finally, in any given year, Canfor or the government may undertake specific monitoring projects for various species. Examples of this include the recent inventory and monitoring projects for mountain goats, moose, Gillette's Checkerspot butterfly, red- and blue-listed slugs and snails, and western screech owl. Details of these projects and their results are summarized in the HCVF Effectiveness Monitoring Report – Strategic Level.

For all these projects, Canfor will incorporate findings into its adaptive management review process for the strategy and SWPs.

Indicator 13 – Species of Management Concern – Habitat Suitability

Indicator Statement	Target (Variance)
Suitable habitat is provided for key Species of Management Concern	Within one quartile (+ 25%) of the Mean in the Range of Natural Variation



What is this indicator and why is it important?

The ultimate goal of Criteria 1 is to sustain productive, well-distributed populations of species throughout the DFA. In order to determine if this goal is being met, the species themselves must be monitored. However, since monitoring every species would be an impossible task, both logistically and economically, and because the populations of many species are impacted by factors other than forestry, Canfor has adopted a habitat modelling approach based on the Species Accounting System developed by Dr. Fred Bunnell and associates at the University of British Columbia.

Forests change both naturally and under management. Distribution of habitat suitable for an individual species thus changes over time. One goal of sustainable forestry is to ensure that somewhere within the planning area, the appropriate habitat is available all of the time. Moreover, the distribution of this habitat also must be favourable—some species do not do well if their habitat is provided in small, scattered pieces. The species accounting system is intended to indicate how much suitable habitat is available at any time and how that habitat is distributed. 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.

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

- 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 broadleaf trees);
- Group 4 – species restricted to specialized and highly localized habitats; and
- Group 5 – species for which patch size and the distribution of habitat are very important,

A further group is recognized:

- Group 6 – species that occur within the DFA but are not forest-dwelling (e.g., largely limited to alpine tundra, agricultural fields or lakes). This group is not monitored, but is included for completeness.

Bunnell and Vernier (2007) assigned all vertebrates (with the exception of fish) within the Radium DFA to one of the six groups on a preliminary basis, using literature reviews and expert opinion. This covered almost all species occurring within the DFA. Additional vertebrate species occurring in the Cranbrook and Kootenay Lake TSAs were assigned to groups using expert opinion. The species group assignments are included in Canfor’s species database.

Each of the Species of Management Concern has been assigned to one of the groups, as shown in Table 53. Habitat for each group is monitored in a different way, as outlined below.

Largely consistent with this approach, habitat suitability modelling is being undertaken by the Ministry of Forests, Lands, and Natural Resource Operations as a component of TSR IV for the Cranbrook and Invermere TSAs. The species modelled include elk, mule deer, marten, grizzly bear, northern goshawk, flammulated owl, and Williamson’s sapsucker. Since all of these are Species of Management Concern in Canfor’s system, they have been designated ‘key’ species of management concern for whom species-specific habitat models will be developed and targets set. Ideally these models will be both developed and tested with real data. Canfor is not involved in the development of these models.

Group 1

This group contains 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 are found in a variety of habitats.

The group requires no specific monitoring because they either respond positively to forest practices or will accommodate a wider range of forest practices than will be implemented. Some examples are American Robin, Orange-crowned Warbler, Common Raven, Black Bear, Elk, Moose, and Mule Deer.

As per point 3 above, some of these species, such as Mule Deer, may have strong associations to specific habitat elements, such as large Douglas-fir trees on their winter range in harsh winters. These requirements are specifically addressed within the SFMP, and are one of the reasons Mule Deer were designated Species of Management Concern

Group 2

Group 2 species are strongly associated with particular broad habitat types. Many of the migratory birds fall into this group. For example, Townsend’s Warbler is found at highest densities in older conifer

stands, while MacGillvray's Warbler is found in early seral stages because of its positive response to shrubs.

These species can be monitored through GIS tabular summaries of the amount of preferred forest type classes, with the inclusion of BEC in some cases. These summaries are produced through Indicator 1.1.2 Distribution of Forest Type.

Group 3

This group contains species with strong dependencies on specific habitat elements; riparian (including wetlands), shrubs, broadleaf trees, cavity sites and CWD, and large live trees. Examples of these species include Flammulated Owl (cavities) and Western Toad (wetlands).

There are two different ways of accounting for these species; 1) to model habitat elements either on their own or through stand structure classes, or 2) to evaluate the implementation of standard work procedures (SWP).

Since the projection of habitat elements from VRI data is likely to be highly inaccurate, Canfor has opted for option 2 at this time. Once LIDAR based techniques are developed this choice will be re-evaluated. Evaluating SWPs involves first determining if the SWP are indeed effective at maintaining the species in question, and then implementation monitoring to ensure that the SWPs are being implemented as intended. Effectiveness monitoring has been conducted by Canfor and the Ministry for riparian areas (based on FREP monitoring) and is being done for the other habitat elements through literature reviews, which have fed into the targets for these elements. Implementation monitoring is being completed through the HC VF Field Effectiveness Monitoring.

Group 4

These are species restricted to specialized and highly localized habitats. These species are typically considered Species-at-Risk and often have designated Wildlife Habitat Areas around known occurrences or nests. Examples include Williamson's Sapsucker, Western Screech Owl, Rocky Mountain Tailed Frog, Great Blue Heron (rookeries), Lewis's Woodpecker, and American Badger.

These species are monitored through monitoring the implementation and effectiveness of the specially designed Standard Work Procedures developed for managing their habitat, in a similar fashion as per Group 3 species.

Group 5

This group includes species for which distribution of habitat has a substantial additional effect beyond amount of habitat, such as caribou and northern goshawk. These species frequently demonstrate negative responses to edge or positive responses to patch size. Within this group connectivity relative to dispersal can influence the amount of (connected) habitat available for use.

Monitoring habitat for these species exploits one of two approaches, depending on the natural history of the species. For species that are highly mobile within a large home range or territory, suitability can be assessed by the amount of patch sizes above a certain threshold of favourable habitat types (e.g., patches of older forest for Northern Goshawk). Since this species is highly territorial when breeding, territory considerations need to be accounted for. For species that are largely restricted to a few forest types or age classes and also must range widely (to satisfy some need; usually foraging), then connectivity of favoured habitat classes can be important. In these cases, connectivity modelling may be used.

How are targets established?

Targets for the amount of suitable habitat for each of the key species of management concern have been set based on what is considered a typical range of variation around the mean of natural variation, minus the extremes (CBFA 2015). This will maintain amounts of habitat within historic ranges, which is what the species presumably is adapted to.

Current Condition

Since this is a new indicator, current condition has not yet been established. Current Condition will be the currently available amount of suitable habitat for the key species of management concern that are being modelled in TSR IV. Current condition will be presented in the 2016 Annual Report, or possibly in the 2015 report if the results are available from the TSR runs at the time the report is prepared.

Strategy

A Habitat Suitability Strategy will be written for this indicator once the TSR habitat suitability models have been made available to Canfor. There are no Standard Work Procedures specifically associated with this indicator at this time.

Forecasting and Probable Trends of the Indicator

The forecasting for this indicator will be the projected amount of suitable habitat for the key species of management concern, from time 0 (2016) through 250 years into the future. Trends in suitable habitat will be presented and analysed once they are made available to Canfor.

Monitoring and Reporting

Suitable habitat for the key species of management concern will only be modelled every time a TSR run is made, e.g. every 5-10 years. Since the habitat runs are for 250 years, this time period is appropriate. Results will be presented in the Sustainability Report in the year the models are run.

Monitoring results for species groups in the Species Accounting System will be reported out every 5 years for Group 2 species, and every three years or more frequently for Group 3 and 4 species. Group 5 species will have individual models built for those that are key species of management concern (e.g., northern goshawk)

Indicator 14 – Tree Seed

Indicator Statement	Target (Variance)
Percentage of tree seed used in yearly tree planting program that is consistent with the <i>Chief Foresters' Standards for Seed Use</i>	100% (-5%)

What is this indicator and why is it important?

The province's Chief Forester established the *Chief Forester's Standards for Seed Use* to maintain the identity, adaptability, diversity and productivity of the province's tree gene resource. This indicator focuses on two components of the standards that are important to maintain species and genetic diversity. Compliance with these standards also ensures no genetically modified seed is used in the province of B.C.



Seed Transfer

Restricting where tree seed is deployed to areas where it is suitably adapted to the physical environment is paramount to ensure future forests are productive, healthy and resilient. In BC, this is accomplished by following provincial regulations and standards as currently specified in the *Chief Foresters' Standards for Seed Use*. These standards are important as they represent the best method to ensure planted trees are genetically similar to local trees to preserve landscape adaptability.

The BC Government has conducted extensive research through provenance and progeny trials. Provenance trials plant seed, collected from the entire natural range of the species, along the geographic gradient to observe and measure the patterns of responses and correlate these responses with climate variables. These trials have clearly demonstrated that seedling performance and growth are significantly related to its seed source. Exceeding the transfer limits can result in poor seedling performance, seedling mortality, a significant decrease in productivity and increases the seedlings' susceptibility to frost, drought, insects and disease.

Seed transfer rules use latitude, longitude and elevation as surrogates for physical environment (climate). The current method establishes seed planning zones that are spatially explicit zones with similar climate and geophysical attributes within the species range.

Seed transfer guidelines are dynamic and incorporate advances in scientific knowledge and analytic methods. Extensive research is currently being completed on climate based seed transfer zones that would create zones based on similar climate and would not be spatially explicit.

Select Seed

Select Seed is collected from trees growing in natural forests. Seed is considered “select” if it exhibits superior traits from other wild stands – e.g. increased growth, pest or disease resistance, improved form. Using select seed offers a range of biological, social and economic benefits including conservation of genetic diversity, improved forest health, improved forest resiliency, increased site productivity and reduced brushing. A local example is the use of blister rust resistant White Pine (Pw). Select seed is tracked as “A” class seed and has a genetic worth (GW) applied.

Genetic diversity allows trees to adapt to changes in the environmental conditions. The tree improvement program selects trees with superior traits, breeds them and monitors the progeny across a variety of sites and climates in provenance tests. The Forest Genetics Council’s Tree Improvement Program maintains a comprehensive gene resource management strategy that includes tree breeding, gene archive activities, management of reserves and production of select tree seed.

The use of Select Seed with a GW greater than 5% is also legally required in the Chief Forester’s Standards for Seed Use. This indicator will ensure Select Seed is used when it is available and that no genetically modified seed is used in the province of B.C.

How are targets established?

The target is to meet the legal standard set by government. The legal standard is the best method to ensure planted trees area genetically suitably for the site and provides the best opportunity for the seedlings to be productive, healthy and resilient as it is based on a long running well supported government program of world respected genetic research. New information is incorporated into the standard regularly.

The *Chief Foresters’ Standards for Seed Use* recognizes that there may be instances where it is not operationally feasible to always follow the current standard (e.g. transitional sites, small areas just outside the transfer limits). It provides the flexibility to address these sites by requiring 95% compliance with the standard. This is accommodated by the -5% variance.

Current Condition

For 2014 planting, Canfor is within the 5% variance with the percent of trees planted outside of the *Chief Forester’s Standards for Seed Use*: 1.56% Cranbrook TSA, 0.4% TFL 14 and 0.46% on the Invermere TSA as demonstrated in the Infoview Seed Transfer Compliance reports. Not using select seed where it is available is included in the percent above.

Strategy

There is a Silviculture Strategy associated with this indicator, as well as a number of specific Standard Work Procedures (SWP).

Forecasting and Probable Trends of the Indicator

By implementing the Silviculture Strategy, Canfor will continue to meet the legal government standard for seed use in the tree-planting program. By meeting this legal requirement it is forecasted that Canfor will continue to establish forests from the best-known genetic sources to produce healthy, resilient and productive forests.

Monitoring and Reporting

Planting records are maintained in Cengea Resources forest management database.

1. The Silviculture Forester will run Infoview reports annually, tracking compliance with seed transfer rules by Timber Supply Area (TSA) or TFL.
2. The Silviculture Coordinator will track year over year reporting of the amount of select seed by species as a percentage of total seed planted in the DFA.

Indicator 15 – Natural Regeneration

Indicator Statement	Target (Variance)
Percentage of stands at free growing that have a component of natural regeneration	100% (-10%)
60% of stands have 60% of their total inventory coming from natural regeneration at free growing	60% (-10%)

What is this indicator and why is it important?

This indicator ensures that a significant component of regeneration in cutblocks is derived from seed sources naturally present. Conserving local seed sources contributes to maintaining genetic diversity in regenerated cutblocks. Maintaining genetic diversity is important in ensuring that tree species are adapted to local conditions and are more likely to withstand environmental extremes. Genetic diversity will also help buffer future forests from climate change and insect and disease attacks.

Natural regeneration can also contribute to maintaining a diverse mix of species. This is important to mitigate potential forest health impacts. It also provides opportunities in the future to manage the site differently. Several species are best managed for with natural regeneration, these include: Bl, Hw, Cw and deciduous species Ep, At, Act.

All harvested stands are managed for a component of natural regeneration although it is rarely the foremost reforestation method. The success of natural regeneration is completely dependent on a viable seed source, a suitable seedbed and



the maintenance of the proper conditions to support seedling growth.

Being too reliant on natural regeneration can result in reduced species diversity as site conditions generally favour one species over the others. In addition, natural regeneration can often take 7-15 years to establish and can result in less successful reforestation, loss of site occupancy and therefore a loss of productivity. Finding a balance is important a planting can increase species and genetic diversity and improve site productivity.

How are targets established?

It is important to manage for natural regeneration on all sites to ensure maximum species and genetic diversity. Two targets were established to reflect the spatial scale and significance of the component of natural regeneration. The first target of 100% of cutblocks achieving some component of natural regeneration ensures all blocks are managed for natural regeneration. The second target reflects the importance of having a significant component (defined as 60%) of natural regeneration on majority (60%) of our cutblocks. A 10% variance has been included on each target to reflect that site-limiting factors may limit the success on some sites.

The targets are based on a historical analysis of the densities of stands in the DFA at free growing and comparing that to the density of trees planted.

Current Condition

Canfor's 2014 free growing cutblocks:

2014 FG Surveys - NATURAL REGENERATION SUMMARY					
	Count Strata		% of Total		
	# strata	# Ha	strata	Ha	
Surveyed for FG in 2014	664	9476			
# with some natural regeneration	657	9460	99%	100%	
# with > 60% natural regeneration	498	7917	75%	84%	
comments: 6 blocks with less TSPH than was planted due to mortality					

Even though the current condition is significantly higher than the target, the targets were chosen to reflect a balance between site productivity objectives and maintaining genetic and species diversity.

Strategy

There is a Silviculture Strategy associated with this indicator, as well as a number of specific Standard Work Procedures (SWP).

Forecasting and Probable Trends of the Indicator

By implementing the Silviculture Strategy, and as demonstrated in the analysis of the current and past condition, Canfor will continue to manage for a significant component of natural regeneration to contribute to the maintenance of species and genetic diversity.

Monitoring and Reporting

Cutblocks are monitored regularly after harvest using Silviculture Survey where data is collected on density, species, growth and forest health. Since natural regeneration can take several years, the Free Growing Survey was chosen to compare.

Data from free-growing surveys is tracked in Canfor's forest management database (Cengea Resources). Free-growing surveys record total inventory growing on the cutblock. This will be compared with the number of trees planted to establish the percentage of natural regeneration that occurred. Species planted may also be considered (eg. If BI was not planted on the site, all BI would be considered natural).

1. Silviculture Supervisor maintains survey data in Cengea Resources.
2. In February, run Natural Regeneration Infoview Report for previous years free growing surveys.
3. Export report data to excel to create the percentage natural regeneration calculation and analysis.

Indicator 16 – Mix of Species Planted

Indicator Statement	Target (Variance)
Percentage of hectares planted with more than one species (by year)	100% (-30%)



What is this indicator and why is it important?

This indicator ensures that Canfor's reforestation program plants cutblocks with a mix of species to enhance biological diversity and site productivity.

Reforestation with a mix of species is important to produce healthy resilient forests and to maintain biological diversity. Monoculture forests are less resilient, as seen with the recent forest health outbreaks. Managing for a mix of species will reduce impacts of increasing and changing forest health issues, may reduce impacts of climate change and will provide options for the future. This indicator will strive to reduce the risk of epidemic forest health impacts contributing to the long-term health and productivity of forests.

Planting seedlings is a vital component of

Canfor's reforestation program. Planting has a substantial effect on forests and is a critical step to realize productivity objectives. Planting a mix of species also contributes to maintaining or enhancing genetic and species diversity of the cutblock.

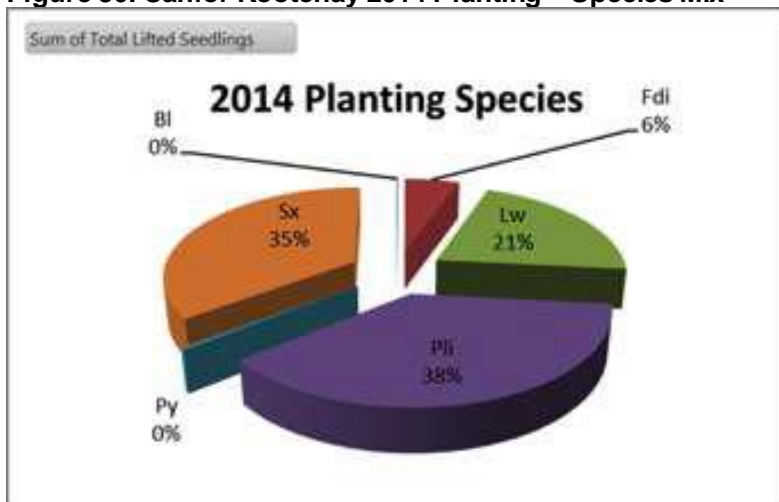
How are targets established?

The target is 100% to ensure mixed species planting is strongly considered for all sites as it is critically important to implement universally. A 30% variance was included to recognize that planting multiple species is not always ecologically feasible due to site limiting factors and some species are best managed for with natural regeneration.

Current Condition

In 2014, a total of 7206.86 hectares were planted and 92.3 % were planted with more than one species.

Figure 36: Canfor Kootenay 2014 Planting – Species Mix



Strategy

There is a Silviculture Strategy associated with this indicator, as well as a number of specific Standard Work Procedures (SWP).

Forecasting and Probable Trends of the Indicator

By implementing the Silviculture Strategy, it is forecasted that Canfor will continue to meet the target of implementing a mixed species-planting program where ecologically feasible.

Monitoring and Reporting

Seedling orders are tracked in an excel spreadsheet by request key. This is used to track costs and status of the seedlings at the nursery. This data provides a year over year comparison of seedling orders including species percentage.

Details about seedlings planted are tracked by cutblock and planting unit (PU) in Canfor's forest management database (Cengea Resources). It includes species, number of trees planted, seedlot and request key. The data is entered as planned planting and is updated to reflect what is actually planted.

Data from Cengea Resources is used to calculate the number of cutblocks planted with more than one species compared to the total number of cutblocks planted in a given year. This will be completed once per year, generally in February, for planting conducted in the previous year.

1. Silviculture Supervisor maintains planting data in Cengea Resources.
2. Silviculture Supervisor to run a report showing the number of blocks and hectares planted in a given year and calculate the % of blocks and hectares planted with multiple species.
3. Silviculture Coordinator will produce a yearly report demonstrating the species breakdown of overall Kootenay Planting Program. This report is generated from data in sow tables.

Indicator 17 – Managing for Species Diversity during Tree Thinning

Indicator Statement	Target (Variance)
Percentage of maximum density spaced hectares with species diversity maintained or enhanced	100% (-10%)

What is this indicator and why is it important?

This indicator will ensure species diversity is maintained or enhanced during maximum density spacing treatments. Maximum density spacing (also known as tree thinning or juvenile spacing) most commonly occurs on sites that were burned by a wildfire. These thinning projects represent an opportunity to influence the species composition of a stand. Species selection criteria for thinning treatments needs to balances forest health, species diversity and site productivity. This indicator is important to maintain or enhance species diversity. Species diversity is central to improving forest resiliency thereby increasing the forests capacity to withstand climate change and increases in forest insects and disease.

How are targets established?

The 100% target demonstrates that during every maximum density spacing treatment it is important to ensure the species diversity is maintained or enhanced. The variance of 10% should only occur if forest health issues supersede species diversity.



Current Condition

This is a new indicator. 20152 treatments will be summarized once the survey data is collected.

Strategy

There is a Silviculture Strategy associated with this indicator, as well as a number of specific Standard Work Procedures (SWP).



Forecasting and Probable Trends of the Indicator

By implementing the Silviculture Strategy, it is forecasted that Canfor will achieve the target and maximum density spacing treatments will have a positive effect on species diversity.



Monitoring and Reporting

Cutblocks are monitored regularly after harvest using Silviculture Survey. Data is collected on density, species, growth and forest health. Data from silviculture surveys is tracked in Canfor's forest management database (Cengea Resources). Surveys completed pre and post spacing treatment will be compared for changes in species diversity. Post spacing survey data will take a few

years to collect to allow for snow/wind damage to be accounted for. Blocks spaced should be tracked until the comparison can be made.

This will be completed once per year, generally in February, for the surveys conducted in the previous year.

1. Silviculture Supervisor maintains survey data in Cengea Resources.
2. In February, pre and post spacing survey data will be compared and tracked in an excel spreadsheet.
3. Improvements to the cutting specifications given to the spacing contractors will be implemented where necessary.

Element 1.4 – Protected Areas and Sites of Special Biological, Geological, Heritage and Cultural Significance

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

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

This suite of indicators is meant to address both Indigenous and non-Indigenous cultural values in the landscape. Research is establishing the importance of these sense-of place values³⁴ in community resilience, property values, and tourism, although they are often hard to capture or express without ethnographic methods³⁵. As well, this suite of indicators measures how well unique or significant places and features are identified and protected for Indigenous Peoples and non-Indigenous users of the DFA. Local people, landscape/cultural professionals and forest managers can identify social, cultural and spiritual features and places. These locations represent the sense of place and other important social and historical values of the communities and users in the area.

The following indicator statements have been identified for this Element:

- 2 Percent of area in protected reserves, by BEC variant and management unit, within the DFA
- 18 Forest management activities conform to operational plans that include the appropriate management strategies from the SWP for blocks containing sites of biological significance
- 19 Forest management activities conform to operational plans that include the appropriate HCVF management strategies
- 47 Forest management activities conform to operational plans that include management strategies to manage and protect Indigenous Peoples culturally important sites, practices and activities

³⁴ 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

³⁵ 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.

Indicator 2 – Protected Reserves

Indicator Statement	Target (Variance)
Percent of area in protected reserves, by BEC variant and management unit, within the DFA	12 – 24%



See the information provided under Indicator 2 – Protected Reserves as it satisfies the requirements for this indicator under Element 1.4.

Indicator 18 – Sites of Biological Significance

Indicator Statement	Target (Variance)
Forest management activities conform to operational plans that include the appropriate management strategies from the SWP for blocks containing sites of biological and geological significance	100% (0)

What is this indicator and why is it important?

Sites of Biological Significance (SBS) are defined as sites that occur on the DFA, are potentially impacted by forestry planning and practices, and require special management to ensure that their habitat value is maintained. This indicator was developed to define these sites, and unique geological features, as well as outline the management and monitoring required for them. Implementation of the SBS Strategy and SWP will ensure that they will be adequately protected.

Canfor has defined Sites of Biological Significance for the DFA as newly or previously known sites that fall into one of the following categories:

- Rare Ecosystems (as defined in Indicator 1 – Ecosystem Representation)
- Red and blue-listed plant communities in BC
- Hot or thermal springs*
- Ephemeral Ponds (vernal pools)
- Raptor Stick Nests*
- Great Blue Heron Nests or Rookeries*
- Nests of any Red* or Blue-listed Bird or Species of Management Concern
- Carnivore Dens*
- Wallows*
- Ungulate licks*
- High and moderate value avalanche paths
- Bat maternity roosts and hibernaculum*
- Unique geological features, i.e. karst, tufa, hoodoos

Brief information is provided about each one of these categories below. Those features marked with an asterisk (*) are, currently proposed as Wildlife Habitat Features under draft legislation under [Section 11 Government Action Regulation under Forest and Range Practices Act](#).

Those values that are point features (e.g., stick nests, dens, licks) are tracked in Canfor’s GIS system. Field staff and contractors record the UTM coordinates of these features when they encounter them in the field, and they are entered into the Wildlife Features database. This database has been shared with the Ministry of Forests, Lands, and Natural Resource Operations so that planning processes can be integrated.

Rare Ecosystems

Rare ecosystems are defined as those forested ecosystems with less than 2000 ha in the East Kootenay Region, as identified through the Ecosystem Representation analysis (Wells et al. 2005). These are 9 of these ecosystems. For more details, see the Ecosystem Representation indicator.

Red and Blue-listed Plant Communities

These are those plant communities that are red-listed (Endangered or Threatened) or Blue-listed (Special Concern) by the Conservation Data Center in BC ([B.C. Conservation Data Centre Home](#)). The communities that are known to occur or potentially occur within the DFA are shown in Table 54 and Table 55.

At present (March 2015) the BEC ecosystem mapping for the East Kootenay region is undergoing revision, and the site series identification tables for many of the new variants are not yet available. This

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makes implementation for some of the ecosystems challenging, however, most of them are easy to identify from the names and are non-forest, obvious riparian floodplain, or Open Range/Open Forest ecosystems, for which management is well established.

Table 54: Red-listed Plant Communities present or predicted to be present in the DFA

English Name	Site Series in the DFA	CF Priority***	Ecosystem Type	Management
ponderosa pine - trembling aspen / prairie rose	PPdh2/03**	1	Terrestrial - Flood: Flood Fringe (Ff);Terrestrial - Forest: Mixed - moist/wet	ER - OF
black cottonwood / red-osier dogwood - Nootka rose	PPdh2/04*	1	Terrestrial - Flood: Flood Midbench (Fm);Terrestrial - Forest: Broadleaf - moist/wet	Reserve (Riparian)
alkali saltgrass Herbaceous Vegetation	IDFdm2/Gs01	2	Terrestrial - Grassland: Alkali Meadow (Ga)	Reserve (non-forest)
rough fescue - bluebunch wheatgrass	PPdh2/00	2	Terrestrial - Grassland: Grassland (Gg)	ER- OR
hybrid white spruce - trembling aspen / wild sarsaparilla	IDFdm2/05	2	Terrestrial - Forest: Mixed - moist/wet	MF Dry
ponderosa pine / bluebunch wheatgrass - silky lupine	PPdh2/01	1	Terrestrial - Forest: Coniferous - mesic	ER-OR
black cottonwood / common snowberry - roses	ICHmk4/Fm01;IDFhx1/Fm01	2	Terrestrial - Flood: Flood Midbench (Fm);Terrestrial - Forest: Broadleaf - moist/wet	Reserve (riparian)
Douglas-fir - western larch / pinegrass	IDFdm2/04	2	Terrestrial - Forest: Coniferous - mesic	MF Dry or Transitional
Douglas-fir / common snowberry / arrowleaf balsamroot	IDFdm2/03	2	Terrestrial - Forest: Coniferous - dry	ER-OF
Nuttall's alkaligrass - foxtail barley	IDFdm2/Gs02;MSdk/Gs02;MSdm1/Gs02;MSdm2/Gs02	2	Terrestrial - Grassland: Alkali Meadow (Ga)	Reserve (non-forest)
antelope-brush / bluebunch wheatgrass	IDFdm2/02;PPdh2/00	2	Terrestrial - Grassland: Grassland Shrub Steppe (Gs)	ER-OR
Douglas-fir / tall Oregon-grape / parsley fern	ICHdw1/02	2	Terrestrial - Forest: Coniferous - dry	ER-OF
western snowberry - Idaho fescue	IDFdm2/00?	Not assessed	Terrestrial - Grassland: Grassland Brushland (Gb)	ER-OR or non-forest

ER – Ecosystem Restoration

OR – Open Range, Ungulate Winter Range GAR Order

OF – Open Forest, Ungulate Winter Range GAR Order

MF – Managed Forest, Ungulate Winter Range GAR Order

*This is also a rare ecosystem, group 14, ** This is also an uncommon ecosystem group, Group 8

***Priority under the Conservation Framework, and the management strategies Canfor employs for them.

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Table 55: Blue-listed Plant Communities present or predicted to be present in the DFA

English Name	Site Series in the DFA	CF Priority***	Ecosystem Type	Management
Drummond's willow / bluejoint reedgrass	MSdk/FI05; MSdm1/FI05	3	Flood Lowbench (Fl)	Reserve (non-forest)
tufted clubrush / golden star-moss	ICHmw1/Wf11; MSdm2/Wf11	2	Wetland - Peatland: Wetland Fen (Wf)	Reserve (non-forest)
scrub birch / water sedge	IDFdm2/Wf02; MSdm1/Wf02;	2	Wetland - Peatland: Wetland Fen (Wf)	Reserve (non-forest)
scrub birch / horsetails	IDFdm2/06	3	Terrestrial - Flood: Flood Lowbench (Fl)	Reserve (riparian)
slender sedge / common hook-moss	ICHmw1/Wf05; IDFdm2/Wf05; MSdk/Wf05; MSdm1/Wf05; MSdm2/Wf05	3	Wetland - Peatland: Wetland Fen (Wf)	Reserve (non-forest)
tufted hairgrass Community	IDFdm2/Gs04; MSdm1/Gs04; MSdm2/Gs04;	2	Grassland: Alkali Meadow (Ga); Wetland - Mineral: Wetland Marsh (Wm)	Reserve (non-forest)
swamp horsetail - beaked sedge	ESSFmw/Wm02; IDFdm2/Wm02	2	Wetland - Mineral: Wetland Marsh (Wm)	Reserve (non-forest)
Baltic rush - field sedge	IDFdm2/Gs03; PP/Gs03	2	Grassland: Alkali Meadow (Ga)	Reserve (non-forest)
lodgepole pine / Sitka alder / pinegrass	ICHmk1/04	2	Terrestrial - Forest: Coniferous - mesic	MF
bluebunch wheatgrass - junegrass	IDFun/00; PPdh2/02a; PPdh2/02b	2	Terrestrial - Grassland: Grassland (Gg)	ER-OR
Douglas-fir / pinegrass - twinflower	ICHmk1/03; IDFdm2/01	2	Terrestrial - Forest: Coniferous – dry and Coniferous - mesic	ER-OF
Douglas-fir / shrubby penstemon - pinegrass	ICHmk1/02; IDFmw1/03; MSdm1/02	2	Terrestrial - Forest: Coniferous - dry	ER-OF

***Priority under the Conservation Framework, and the management strategies Canfor employs for them.

Hot Springs

Hot, or thermal, springs are geothermally heated sources of water that come to the surface. The elevated water temperature, air temperature, and humidity associated with hot springs produce unique microclimates that support species specifically adapted to such environments, or those associated with warmer climates further south (BC Ministry of Environment 2014). For example, the federally endangered southern maiden-hair fern is only found at Fairmont Hot Springs. The hot water of the springs

often dissolves minerals in the surrounding bedrock, supporting unique warm-water bacteria and in some cases invertebrates and fish species (BC Ministry of Environment 2014). These waters often produce mineral deposits around the springs that are used by wildlife as mineral licks.

Most known hot springs in the East Kootenay are located within parks (e.g., Whiteswan, Radium) or ecological reserves (e.g., Ram Creek), but some are not (e.g., Kootenay River, Buhl Creek). Hot/thermal springs of any size and temperature are proposed Wildlife Habitat Features.

Ephemeral Ponds (Vernal Pools)

Ephemeral ponds or vernal pools are small, seasonal ponds or wetlands that fill with spring meltwater or seasonal rains and are typically dry by mid-summer. Some ephemeral ponds may remain dry for several years during periods of extended drought. In the valley bottoms (IDF, PP) they are often characterized by flat, hardpan soils that have become dry and, at times, deeply cracked when seasonal waters evaporate, while in the MS, ICH, and ESSF they are often grassy. These ponds can serve as breeding sites for many different species of amphibians, including the Western Toad (classified as Special Concern) and long-toed salamander.



Small ephemeral pond (with breeding salamanders) - Kari Stuart-Smith



Large ephemeral grassy pond– Kari Stuart-Smith

Raptor Stick Nests

Eagles, hawks, some owls, and osprey make large stick nests in live or dead trees. These nests are often used over multiple years, with more sticks being added each year. When abandoned by the original builders, they can be used by other species. For example, in TFL 14, one year a Great Grey Owl, Broad-winged Hawk, and Goshawk all nested in nests originally built by northern goshawks.

Nests of eagles, gyrfalcons, peregrine falcons, osprey, heron, and burrowing owl must not be destroyed or injured under Section 34 of BC's Wildlife Act. Nests of Bald Eagle, Osprey, Flammulated Owl, and Western Screech-Owl *macfarlanei* subspecies (interior), are considered Wildlife Habitat Features under the proposed Section 11 Order. Detailed management strategies have been developed for Northern Goshawk nests in the interior of British Columbia (Stuart-Smith et al. 2012).

A field guide to the identification and management of raptor stick nests for Canfor is currently being prepared and will be available to field and forestry staff and consultants in 2016.

Great Blue Heron Rookeries

Great Blue Herons nest in forest or single trees near their foraging areas. They build large, stick nest platforms about 1m in diameter. These nests tend to be more flimsy looking than raptor nests, and there are often multiple nests in the same tree and in nearby trees. Most herons are relatively intolerant of human disturbance, and unaccustomed levels of noise or human activity near the nest tree can cause the herons to abandon their nest.

Great Blue Heron nests are considered Wildlife Habitat Features under the proposed Section 11 Order.



Raptor Stick Nests

1. Northern Goshawk – Kari Stuart-Smith
2. Osprey – Krystal Dixon

Nests of Red or Blue-listed Birds in the DFA that breed in Forests, Open Forests/Open Range

This category includes the nests of Lewis Woodpecker*, Flammulated Owl*, Williamson’s Sapsucker*, Common Nighthawk, Olive-sided Flycatcher, Long-billed Curlew, Broad-winged Hawk, Western Screech Owl*, or Short-eared Owl. The nests of species with stars are also considered Wildlife Habitat Features.

Carnivore Dens

Dens, or burrows, of bears, wolverine, badgers, wolves, foxes, and coyotes are used for winter hibernation (bears) or rearing pups and kits (wolverine, badgers, wolves, foxes, and coyotes). As with raptor nests, these dens can be used over multiple years and by multiple species for resting and rearing. Management strategies for carnivore dens are set by species. Canfor has developed a Carnivore Den Guide to assist in the identification of dens (Manning 2005). Dens of grizzly bears that are used for winter denning and dens of badgers that have been used within the past year are considered Wildlife Habitat Features.



Cougar Den – Kari Stuart-Smith



Wolf Den – Kari Stuart-Smith

Ungulate and Grizzly Wallows

Wallows are wet depressions used by ungulates and bears to wallow. They can also be created by ungulates or grizzly bears by through regular digging, trampling, or rolling. Ungulates roll in wallows to cover themselves in mud or dust to provide relief from biting insects. Wallows serve a social function during the breeding season when male ungulates urinate in the wallow and roll in it to attract females. Bears will roll in wallows to help cool themselves in summer and as a method of marking their presence to other bears.

A significant wallow is defined in the proposed Wildlife Features legislation as one that is regionally rare on the landscape, typically used regularly and repeatedly by one or more species, and is used by multiple individuals within a local population (BC MOE 2014).



Small Wallows – Photos by Krystal Dixon

Avalanche Paths

Avalanche paths receive relatively regular inputs of nutrients, organic matter, and water from higher elevations, are kept open due to frequent snow slides, and are often the first areas to be snow free in the spring. These factors combine to create areas with high production of forage plants like Glacier lily, Spring beauty, Cow parsnip, Hedyserum, and Indian Hellebore (Serrouya et al. 2004) as well as shrubs like willow. As such, avalanche paths contain some of the most important early spring foraging habitat for grizzly bear, black bear, elk, deer, sheep, mountain goat and moose. South facing paths with bunchgrasses may also provide early winter habitat for elk, deer, and sheep, and paths with high willow cover may act similarly for moose.

Both bears and ungulates use forested cover adjacent to high and moderate quality tracks for bedding and security cover. Bears prefer sites located under large diameter trees and in spots with high canopy cover and live tree density.

Serrouya and McLellan (2005)



found that 95% of all grizzly bear beds were within 90 m of the forest-avalanche chute interface, with 59% located within 20 m.

Bat hibernaculum

A bat hibernaculum is a site used by bats to hibernate during the winter. Most often these sites are caves or abandoned mines, but they can also be a large fissure in a rock face or a narrow rock crevice. Karst landscapes, with their many caves and sinkholes, are significant areas for bat hibernacula. Most important are cool, constant temperatures that allow the bats to go into torpor for the winter. Frequent awakening during hibernation can be fatal to bats, so avoidance of disturbance to the site is critical.

Bat hibernacula for any species are Wildlife Habitat Features under the proposed Section 11 GAR order, and hibernacula for Little Brown Myotis and Northern Myotis are proposed critical habitat for these species (Federal Recovery Strategy 2016).

Bat maternity roosts

A bat maternity roost is a site where female bats give birth and rear their young during the summer. Some maternity roosts are used by single females, whereas others are used by large groups of females. Maternity roosts are often natural sites like large hollow trees, broken-top wildlife trees, wildlife trees with sloughing bark or hollow branches, or rock crevices. The roost is often on warm-facing aspects, to help keep the young warm while they are developing. Bat droppings (guano) are often present at the base on the entrance and the smell of ammonia from the bats urine may be noticeable at recently used roosts.

Bat maternity roosts are Wildlife Habitat Features under the proposed Section 11 GAR order and are proposed critical habitat for Little Brown Myotis and Northern Myotis are proposed critical habitat for these species (Federal Recovery Strategy 2016).

Ungulate Licks

Ungulates cannot obtain enough macronutrients such as sodium, calcium and phosphorus and trace minerals like copper, manganese and selenium from the vegetation they eat, and so must eat soil to obtain them. There are 3 main types of licks: wet, dry, and rock. Wet licks are wet, muddy seepage areas, often used by deer and elk. Dry licks are bare earth, often found under trees roots where sheep and goats have dug them out. Rock licks are found on rock faces, and are used by sheep and goats.

A significant lick is currently defined in the proposed Wildlife Habitat Features legislation as one that is regionally rare on the landscape and is used regularly and annually by one or more species (i.e., demonstrates clear evidence of heavy use) (BC MOE 2014).

Licks are protected through variable width buffers of a size depending on the size and significance of the lick, as well as timing restrictions for significant licks. Trails leading into licks are also incorporated into reserves where practicable.



Significant wet lick – Karl Bachmann



Dry Lick – Karl Bachmann

Unique Geological Features

Geological resource features found in the province include but are not limited to karst (limestone caves), tufa rock/towers (a variety of limestone), and hoodoos (eroded rock formations). Protecting these resource features considers the non-living physical and chemical attributes (e.g., distinct geological, geomorphological, and hydrological features) and its associated habitat.

How are targets established?

Because of the wide variety of Sites of Biological Significance and unique geological features, each with different management strategies to protect them and maintain their function, the target was set to ensure that the management strategies for each of the SBS were followed whenever they were encountered in the field or planning occurred around a known site.

The strategies for each SBS were developed by the Forest Scientist, based on the best available scientific information, including guidance provided by the BC Ministry of Environment for proposed Wildlife Habitat Features (2014) and for Wildlife Habitat Areas.

Current Condition

Field assessments from 2013 and 2014 in which 117 blocks were examined as part of the Canfor HCVF Effectiveness Monitoring Program suggest that Sites of Biological Significance were being well protected through Wildlife Tree Patches. Two goshawk breeding areas were found in 2014, and both were managed through WTP > 40 ha and timing restrictions. A quantitative summary of the Sites of Biological Significance from 2014 is currently being prepared and will be presented in the 2015 Annual Report.

Strategy

There is a Sites of Biological Significance Strategy associated with this indicator, the following Standard Work Procedures and appendices.

- Appendix A: Red and Blue listed Plant Communities
- Appendix B: Common Stick Nests

There is also a SWP for Management around Avalanche Paths, and an Appendix – Classification of Avalanche Paths.

Finally, there is a picture guide for identification of Carnivore Dens and one under development for the identification of raptor nests.

Forecasting and Probable Trends of the Indicator

By implementing the Sites of Biological Significance Strategy and SWP, it is forecast that the function of the various sites of biological significance will be maintained. Various effectiveness-monitoring programs have or are being conducted in order to determine if the management strategies are indeed appropriate, and management strategies will be modified as required in an adaptive management framework. These programs include:

- Ungulate lick and wallow study – in cooperation with Irene Teske, MFLNRO, ongoing.
- Goshawk nest occupancy study – Kari Stuart-Smith and William Harrower (completed)
- Effectiveness of badger den protection strategies – M. Hogg, MSc thesis (completed)

Monitoring and Reporting

Monitoring will be conducted in two ways.

First, WIM will produce an annual report summarizing any blocks containing Sites of Biological Significance, and the forestry management strategies written in the Site Plan to maintain the function of these sites. The Forest Scientist or delegate will review this report against the SWP and check that the strategies were appropriate to the sites and summarize the findings in the Annual Report.

Second, a subset of the Sites of Biological Significance that were encountered each year will be inspected in the field post-harvest as part of the HCVF Effectiveness Monitoring Program, conducted either by contractors, Canfor Field Operations Staff or the Forest Scientist or delegate. This inspection will determine whether the management strategies written in the Site Plan were followed, and whether these strategies appeared to be effective at protecting the site.

Any incidences of non-compliance with the Sites of Biological Significance SWP will be entered into the Incident Tracking System and the root cause for the non-compliance determined by a team including, as appropriate, representatives from harvesting, permitting, field operations, and the Forest Scientist. If necessary, changes will be made to the SWP to ensure that the problem does not occur again.

WIM will produce an annual report summarizing any incidences regarding Sites of Biological Significance. The Forest Scientist will summarize this report in the Annual Report, together with the report from Point 1 above.

Indicator 19 – High Conservation Value Forests

Indicator Statement	Target (Variance)
Forest management activities conform to operational plans that include the appropriate HCVF management strategies	100% ($\pm 5\%$)

What is this indicator and why is it important?

The Forest Stewardship Council (FSC) defines High Conservation Value Forests (HCVF) as areas of exceptional ecological, social, or cultural significance. Their identification and management is an extremely important part of FSC certification; an entire Principle is dedicated to them (Principle 9). This indicator is designed to ensure that HCVFs are properly identified, that management strategies are developed to maintain or restore the values within them, these strategies are correctly implemented, and monitoring is conducted to ensure the strategies are working as intended.

Under the FSC-BC standard (2005), HCVFs fall into 4 categories:

- *Forest areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g., endemism, endangered species, refugia); and/or large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance*
- *Forest areas that are in or contain rare, threatened or endangered ecosystems.*
- *Forest areas that provide basic services of nature in critical situations (i.e. watershed protection, erosion control).*
- *Forest areas fundamental to meeting basic needs of local communities (i.e. subsistence, health) and/or critical to local communities' traditional cultural identity (areas of cultural, ecological, economic, or religious significance identified in co-operation with such local communities).*



The FSC-BC standard requires that forest managers complete an assessment to determine the presence of high conservation values on the DFA and that the resultant HCVFs be mapped. The assessment must be based on the best available information, and include independent third party input from qualified specialists, as well as consultation with directly affected persons and Indigenous Peoples. Management strategies must then be developed to maintain the values within the HCVFs. The FSC-BC Standard also requires monitoring to assess the effectiveness of the strategies employed to maintain the values within HCVFs.

The first HCVF assessments for biodiversity values to be done on Canfor tenure were done by licence, beginning in 2002 in TFL 14, resulting in three separate HCVF reports. In 2015, these reports were combined into one, updated assessment for the entire Canfor DFA in the East Kootenay (Stuart-Smith, Utzig, and Johnson 2015). Similarly, the services of nature HCVF reports, originally completed in 2006 for the southern and northern parts of the DFA, were updated and combined into one assessment report for the entire DFA in 2014 (Green 2014). The Cultural and Conservation Value Assessments have been completed for the Lower Kootenay, Tobacco Plains, and A'qam and Akisqnuq Bands of the Ktunaxa Nation.

Management strategies have been developed for all the HCVFs identified in the assessment reports listed above. Assessment reports, maps and management strategies are available from Canfor

Current Condition

To date, HCVF Effectiveness Monitoring has been undertaken on a total of 120 harvested cutblocks; 63 in 2013 and 57 in 2014. Site plans were compared to the HCVF management strategies to determine if they contained forestry management strategies consistent with the HCVF strategies, and cutblocks were visited in the field to determine if the Site Plans were followed and the HCVF values were maintained or enhanced.

In both years, 84 % of the Site Plans for blocks in HCVFs contained forestry management strategies addressing all the points in the HCVF management strategies, and the majority of the remainder contained strategies for most of the points in the strategies. Only 2 of the blocks assessed in 2013 and 5 of the blocks assessed in 2014 had Site Plans in which the HCVF management objectives were not specifically referred to (this does not mean the value were not protected on the ground however). However all but one of these blocks was on the non-FSC Radium licence (A19879) and the omissions resulted from the fact that the Site Plans were written before the HCVFs were fully implemented on that licence

Achievement of HCVF Objectives improved from 2013 to 2014; in 2014 HCVF objectives were considered to be fully met by the assessors on 70% and partially met on 30% of blocks, whereas in 2013 they were fully met on 59% and partially on 41% of blocks. Partial meeting of the objectives meant that most but not all of the objectives were achieved, for example, in some of the blocks in the grizzly bear HCVFs, CWD amounts and screening from roads with understory trees were well done, but trails were not reclaimed immediately following harvest as per the Site Plan, and/or the blocks were harvested in spring, when the management objectives discourage harvesting outside the spring period unless absolutely necessary.

The monitoring recognized good practices that contribute to maintaining or enhancing the conservation values within HCVFs. Areas where good practices were noted were the inclusion of ecological values within Wildlife Tree Patches, including High Value Snags, and the protection of these WTPs by harvesting. For example, 118 Wildlife Tree Patches were visited in the field in 2014, and 88% of these were deemed to possess moderate or high ecological values such as High Value Snags, raptor nests, carnivore dens, streams, seeps, vernal pools, ungulate licks or wallows, patches of deciduous trees, old growth patches, etc.. There were no trespasses into these WTPs during harvesting.

The monitoring also identified some specific opportunities for improvement. These included:

- Reclamation of in-block trails,
- Field layout of Non-Classified Drainages (NCDs, or discontinuous small streams) and wet areas within blocks,
- Consideration of riparian management zones adjacent to the riparian reserves, in order to reduce blowdown, especially adjacent to narrow reserve zones.
- Retaining large, non-merchantable pieces of CWD within the block, rather than taking them to roadside or landings.

In 2014 a specific focus was placed on stream classification, and measuring the widths of riparian buffers compared to the widths prescribed in the site plans. Results showed that all but one of the 124 streams was classified correctly, and that buffer widths were equal to or greater than the prescribed widths in all places measured for 92% of the streams (n=85 streams, 89% if streams with post-harvest flood events are included). If the four cases are removed in which ribbons were hung on slope breaks which at one point were slightly closer to the stream than the prescribed width, the percentage of buffers meeting prescribed widths was 96.5%. Three of the cases in which streams did reportedly not meet prescribed widths were in the same block, 714-YAK0009. This block will be re-visited next summer for follow-up to determine if measurements were correct and if sediment control work on those streams is required.

More details are available in the HCVF Field Effectiveness Monitoring reports for each year.

In addition to these reports, reporting of HCVF values is also done at a strategic level, which includes information on values such as species-at-risk, water quality monitoring, and other monitoring projects that Canfor and other organizations undertake. Details can be found in the annual HCVF Strategic Effectiveness Monitoring reports, available from the Forest Scientist.



Strategy

There is a High Conservation Value Forests (Areas) Strategy and a HCVF Standard Work Procedure associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the High Conservation Value Forests (Areas) Strategy and SWP, it is forecast that the High Conservation Values will be maintained or enhanced. Given the results from the current condition of this indicator, and the fact that actions were taken to address areas requiring improvement, it is anticipated that Canfor will achieve full compliance with this indicator in future years.

Monitoring and Reporting

The Forest Scientist will establish a program to monitor the status of HCVFs and their conservation attributes. This program will be implemented and designed in a manner consistent with the monitoring requirements in the applicable FSC standard. A written report will be prepared on an annual basis, summarizing the results.

The Forest Scientist will develop and implement an HCVF Effectiveness Monitoring Program. This program will prioritize the highest conservation values for monitoring. Results will be presented in annual reports. When monitoring results indicate increasing risk to a specific conservation attribute, the Planning Team, together with other Canfor staff as appropriate, will evaluate the measures written to maintain or enhance that value, and develop the measures to reserve to trend in the case where the increased risk is due to Canfor activities.

Forest Scientist will also present the results of the HCVF Effectiveness Monitoring Program to Canfor Kootenay Region Senior Managers on an annual basis, as part of an Adaptive Management Planning Framework.

Canfor Kootenay Operations SFM Plan

Indicator 47 – Level of Management and/or Protection for Indigenous Peoples Culturally Important Sites, Practices and Activities

Indicator Statement	Target (Variance)
Forest management activities conform with operational plans which include management strategies to manage and protect Indigenous Peoples culturally important sites, practices and activities	100% compliance with operational plans (0)



See the information provided under Indicator 47 – Level of Management and/or Protection for Indigenous Peoples Culturally Important Sites, Practices and Activities as it satisfies the requirements for this indicator under Element 1.4.

Criterion 2 – Ecosystem Condition and Productivity

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

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

When trees are harvested large amounts of biomass are removed and the site is reverted to an early seral stage with relatively little biomass. Additionally, proportions of organic material (and associated nutrients) are removed from the site at this time. As with fire disturbance, the reduction of biomass is often temporary. If, however, the disturbance is excessive, it can be very damaging in terms of future forest productivity. Forest practices that minimize nutrient losses from erosion, with rotation lengths (time between successive harvests) of sufficient duration that nutrients pools are replenished, can mimic the natural cycle of fire disturbance and renewal. Protecting soil resources and planting locally adapted tree species will ensure that ecosystems develop at a rate and trajectory appropriate to site conditions.

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

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

This Criterion consists of one Element:

Element 2.1: Forest Ecosystem Condition And Productivity	Conserve forest ecosystem productivity and productive capacity by maintaining ecosystem conditions that are capable of supporting naturally occurring species. Reforest promptly and use tree species ecologically suited to the site.
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Element 2.1 – Forest Ecosystem Condition And Productivity

Element 2.1: Forest Ecosystem Condition And Productivity	Conserve forest ecosystem productivity and productive capacity by maintaining ecosystem conditions that are capable of supporting naturally occurring species. Reforest promptly and use tree species ecologically suited to the site.
Value:	Ecosystem Resilience and Productivity
SFM Objective:	<p>Maintain a natural range of variability in ecosystem function, composition, and structure, which will allow ecosystems to recover from disturbance and stress.</p> <p>Maintain ecosystem productive capacity by ensuring ecosystem conditions are maintained that are capable of supporting naturally occurring species.</p>

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

In addition to maintaining the resources necessary for sustaining the resiliency of forest ecosystems, a stable land base within which productive capability is assessed is also required. The following indicators track the status and trend of forestland base that remains productive.

The following indicator statement has been identified for this Element:

- 20 Percentage of blocks that achieve regeneration delay (RG) within the regen delay period; Percentage of blocks that achieve free growing within the free growing (FG) period
- 16 Percentage of hectares planted with more than one species (by year)
- 21 Percentage increase of occurrence of invasive plant species due to forest management activities
- 22 Percent of operable landbase converted to permanent access structures through forest management activities
- 23 Number of recordable landslides resulting from Canfor's forestry operations on permitted roads or cutblocks
- 24 Percent of DFA converted to non-forest land use through forest management activities not including roads, landings and other infrastructure directly related to forest management
- 25 Percent of volume harvested compared to allocated harvest level

Indicator 20 – Reforestation Success

Indicator Statement	Target (Variance)
Percentage of blocks that achieve regeneration delay (RG) within the regen delay period	100%
Percentage of blocks that achieve free growing within the free growing (FG) period	100%

What is this indicator and why is it important?

This indicator ensures that Canfor successfully regenerates all harvested areas with healthy, ecologically suitable species in a timely manner. Achieving reforestation objectives in a timely manner is important to achieve productivity and species diversity goals. Regeneration delay ensures prompt reforestation of cutblocks. Free growing demonstrates that the species reforested with are ecologically suitable, free from insects or disease and will likely continue to grow into maturity.

This indicator also provides an indication of site productivity. Site productivity is measured by evaluating if the growing space available is fully utilized (spatial) and how well the trees growing are performing (health, growth and vigour). The minimum and target standards specified in the stocking standards reflect productivity goals.

Forest health is also measured with this indicator. In order for a tree to count as well spaced or free growing, the surveyor must apply a list of health and damage criteria to ensure that the trees counted



can be expected to be around for the long term. Maintaining a healthy forest is paramount to achieving stand and landscape objectives in the short and long-term.

Carbon storage is maximized when stands are productive and healthy. This indicator will ensure the available growing space is utilized; all areas harvested are reforested and will contribute to achieving our carbon sequestration goals.

How are targets established?

A target of 100% will ensure Canfor meets legal reforestation obligations and demonstrate that all harvested cutblocks are regenerated with healthy ecologically suitable species in a timely manner.

A variance is not required as it is a legal obligation. However, a variance is built into the legislated standard by allowing standards to be updated to reflect site limitations. If the reforestation on a cutblock is significantly setback, the applicable stocking standards are amended to reflect this and ensure compliance continues to be feasible. For example, a wildfire burns 10- year-old regenerating cutblock. The free growing time period would be increased by 10 years. This reflects the provincially accepted procedure.

Current Condition

Within the DFA, 100% of cutblocks have met RG and FG obligations within the period. On average RG is achieved within 3 years and FG within 16.

Strategy

There is a Silviculture Strategy associated with this indicator, as well as a number of specific Standard Work Procedures (SWP).



Forecasting and Probable Trends of the Indicator

By implementing the Silviculture Strategy, it is expected that Canfor will continue to meet this target of 100% achievement of regeneration delay and free growing. The progress of cutblock regeneration is monitored regularly through silviculture surveys. This ensures treatments required to maintain successful reforestation of cutblocks are

implemented.

Monitoring and Reporting

Cutblocks are monitored regularly after harvest with silviculture surveys. Data is collected on density, species, growth, productivity and forest health. Using this data, treatments are implemented as required to maintain the health and productivity of the stand. Data from silviculture surveys is tracked in Canfor's forest management database (Cengea Resources).

1. Silviculture Supervisor maintains survey data in Cengea Resources.
2. In February, the Silviculture Supervisor will run the following Infoview reports:
 - a) Regeneration (RG) delay reports showing what blocks are coming due for RG delay or have missed RG delay.
 - b) RG delay reports showing years to achieve RG delay. This illustrates the trend in the time it takes to get trees established after harvest.
 - c) Free growing (FG) reports showing the blocks coming due or have missed FG declaration. FG achieved reports demonstrating the years it takes to achieve FG.
3. Using the report data, ensure surveys are scheduled to achieve RG and FG milestone within the allowed timeframe. If this is not possible, amend stocking standards to increase time to achieve RG/FG with a rationale of why additional time is required.

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Indicator 16 – Mix of Species Planted

Indicator Statement	Target (Variance)
Percentage of hectares planted with more than one species (by year)	100% (-30%)

See the information provided under Indicator 16 – Mix of Species Planted as it satisfies the requirements for Indicator for Element 2.1.

Canfor Kootenay Operations SFM Plan

Indicator 21 – Invasive Plant Species

Indicator Statement	Target (Variance)
A: Percentage of treatments with no monitoring	0% (10%)
B: Percentage of untreated sites	0% (10%)

What is this indicator and why is it important?

It is widely accepted that invasive plant species pose a significant danger to global biodiversity and threaten environmental, social and economic values globally and in the East Kootenay. It is important Canfor's forestry operations do not increase the occurrence of invasive plant species to ensure forest ecosystems continue to provide quality wildlife habitat, agriculture and grazing opportunities and maintain local biodiversity.

Canfor operations are on the Crown Forest land-base that includes other tenured (i.e. range and commercial recreation) and non-tenured (i.e.: recreational) users. The management of invasive plant species spans many user groups and Canfor is only one of them. The coordination of treatments and sharing of knowledge and experience across user groups is done largely through Invasive Species Councils (ISCs) which are delineated geographically along regional district boundaries. Canfor's operations include three different Invasive Species Councils: East Kootenay (EKISC), Columbia-Shuswap (CSISC), and Central-Kootenay Invasive Species Council (CKISC).

Canfor is responsible for making sure their obligations to manage invasive plant species are met in a way that is consistent with the management of invasive plant species from a broader perspective. This requires up-front (pre-development) identification of invasive plant species sites and regular communication with the respective ISCs. This will ensure Canfor addresses infests for which it is responsible for and does it in such a way that is consistent with adjacent user groups.

How are targets established?

Under Section 17 of the Forest Planning and Practices Regulations (FPPR), Canfor is required in the Forest Stewardship Plan (FSP) to specify measures that prevent the spread or introduction of certain invasive plant species as a result of forestry activities. Integral to this is treating Canfor sites (cutblocks and roads) with invasive plant species. Single-event treatments of invasive plant species sites are not always sufficient; where some infestations require treatments over multiple years to eradicate all invasive plant species. Indicator 'A' requires follow-up monitoring of treated areas to ensure the treatment was successful or to schedule another treatment, if required.

In addition, treatments are more effective when carried out promptly. Indicator 'B' ensures infests in areas that Canfor is responsible for are addressed.

The target of 0% is important to ensure Canfor's forest management activities have not resulted in an increase in invasive plant species. A 10% variance was included to recognize there are sometimes situations that are beyond Canfor's control that influences field operations (like wildfires limiting access).

Current Condition

In 2016, 14 blocks were monitored, five were treated using chemicals and eight blocks were hand-pulled. Grass seeding was done on 58 blocks (this includes blocks that did not have invasive plant species).

Indicator A (percentage of treatments with no monitoring) could not be calculated for 2016 due to inconsistent record keeping in 2015 and an evolving process. Canfor did not perform any chemical spraying in 2015, though based on invoices it did conduct a fair amount of grass seeding in 2015. This indicator will be assessed going forward and will be reported on in the 2017 Annual Report.

Indicator B (percentage of untreated sites) – All infests being monitored for invasive plant species were treated in 2016 (either with hand-pulling, chemicals, or grass seed).



Strategy

There is an Invasive Plant Species Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Invasive Plant Species Strategy, will ensure the presence of invasive plant species is followed to evaluate the impact forest management has had on the infestation. Increases or likely potential increases in the presence of invasive plant species due to forest management activities will be treated. Follow-up monitoring and treatment will occur to ensure Canfor's forest management activities do not result in an increase in occurrence of invasive plant species.

Monitoring and Reporting

Cutblocks with identified invasive plant species, including prescribed measures, will be tracked in Canfor's forest management database (Cengea Resources).

1. Field Operations crews and the Permitting Supervisor will enter invasive plant species identified and prescribed measures to prevent their spread in the Site Plan and Cengea Resources.
 - a. Special attention will be paid to any sites that either did not have a follow-up monitoring visit or missed a scheduled treatment in the previous year.
2. The Silviculture Coordinator will calculate the results for the indicator statements as follows and express them as a percentage:
 - a. Indicator A: 'the number of infests monitored' / 'the number of infests treated'
 - b. Indicator B: 'the number of infests treated' / 'the number of infests being managed'

Indicator 22 – Permanent Access Structures

Indicator Statement	Target (Variance)
Percent of operable landbase converted to permanent access structures through forest management activities	5% or less per LU (+2%)

What is this indicator and why is it important?

Forest companies have limited influence on most permanent additions or deletions to the operable forest area. These are generally a result of government land use policies for other industries such



as mining or urban development. Where forest companies can have an influence is through their practices, particularly as it pertains to permanent access structures (PAS) such as roads, landings and borrow pits. These PAS are essential to the process of accessing timber. This indicator is focused on those activities where forest companies have management responsibility (i.e. excludes other permanent losses resulting from other industries sharing the overall forest estate). In addition to the loss of forest there are a number of other potential influences PAS can have on the forest ecosystem. These include: noxious weeds, changes to wildlife movement patterns and intensified human access. Limiting the levels of land conversion to non-forest use will have an associated positive effect on these factors while ensuring the operable forest land base is maintained.

How are targets established?

This target was established to set a limit on the conversion of operable land base to PAS, where forest managers have direct management responsibility. The legal requirement for PAS within a cutting permit is

7%. The PAG requested roads outside of the cutting permits and the associated impacts were also considered, therefore, the area measured was set as the operable landbase and the target was set at 5%. It should be noted this is below the legal maximums levels, but aligns with PAS assumptions made in previous TSR determinations. The variance for this target was established to account for special circumstances such as roads within the operable land base that are outside the manager's control. This target feasibility was verified through examination of the current condition.

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The target for this indicator was calculated by measuring the total area of roads and landings constructed as compared to the operable area within each Landscape unit. The result is the percentage of the operable forest land base that has been, or will be converted to permanent access structures.

Current Condition

Table 56: Percent PAS for Landscape Units in the DFA

% PAS for Landscape Units				
>5	4.1 - 5	3.1-4	2.1-3	<2
I25	C08, C30, C36, I16, I18, I23, I25, I26, I29, I30, I33	C01, C02, C04, C06, C11, C20, C21, C24, C25, C27, C29, C32, C34, C38, I07, I09, I15, I20, I21, I22, I24, I27, I28, I32, I36	C05, C07, C09, C10, C16, C17, C18, C19, C22, C23, C31, C33, C37, I02, I03, I04, I05, I06, I08, I10, I11, I12, I13, I14, I17, I19, I35, I37, I38, K02, K03, K05	C13, C14, I01, I34, K06

Only 1 LU currently exceeds the 5% target, although it is currently within the acceptable variance. 11 LU's are approaching the 5% target. Analysis of the road layers for these LU's is planned to determine the accurate PAS levels. Any planning in LU I25 will follow the PAS strategy as it pertains to LU's over the indicator target.

Strategy

There is a Permanent Access Structures Strategy associated with this indicator.



Forecasting and Probable Trends of the Indicator

By implementing the Permanent Access Structures Strategy, it is forecast that the percent of the operable land base converted to PAS will increase in LU's where harvesting is taking place during the reporting period. PAS are unlikely to permanently exceed the target levels in any landscape units other than I25.

Monitoring and Reporting

Planning and permitting foresters on a development specific basis will monitor this indicator. When development is occurring in an LU approaching target areas, it will be run with planned roads to ensure the LU remains below target.

It will be reported annually as part of the SFMP annual report. The report is run from Canfor's GIS system and shows the percent of the operable landbase that is occupied by PAS by LU.

Indicator 23 – Landslides

Indicator Statement	Target (Variance)
Number of recordable landslides resulting from Canfor’s forestry operations on permitted roads or cutblocks	0 (4)

What is this indicator and why is it important?

Landslides are mass movements of soil, rock and/or debris generally occurring on sloped terrain. Landslides may result in reduced productivity for forested sites and/or be a problematic source of sedimentation into water features. Landslides often occur as a result of natural processes; however activities such as timber harvesting and road building may create conditions that initiate slides. This is particularly relevant when these activities occur on unstable or potentially unstable terrain. Landslides related to forestry practices need to be minimized to protect water features and sustain the productive capability of the forest.

For this indicator a recordable landslide is equal to or greater than 0.2 ha or any landslide that has deposited or is likely to deposit debris into a creek, lake or wetland or impact human safety. This indicator refers to landslides that happen within or as a result of forest roads and cut blocks that have an active permit.



How are targets established?

Landslides have not been historically tracked in the DFA so baseline data is not available. The size of movement that is considered for this indicator was set at 0.2 ha to eliminate small road and in-block sluffs, that have little to no negative effects. The exception to this is when the small slide has the potential to deliver sediment into a stream or water feature. For this reason, any slide that has the potential to deliver sediment into a water feature is recordable. Canfor’s goal is to have 0 landslides caused by forest activities. The target variance is based on reporting of landslide occurrence from years when outside elements like extreme weather have caused an increased number of events.

Current Condition

Before the implementation of this plan the size and conditions of reportable landslides differed from this indicator, and also differed between the two SFMP's for the Radium and Tembec Legacy DFA. Within the last 3 years there have been a total of 4 ITS incidents related to landslides or significant road sluffs that had the potential to impact water. One of those incidents occurred in 2014, two in 2013 and one in 2014. So far in 2015 there have been zero (0) landslides recorded.

Strategy

There is a Landslide Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

Forecasting does not apply to this indicator. Landslides will not be spatially forecasted across the DFA. However, it is believed that by implementing the Landslide Strategy, landslides will be minimized. Probable trends based on recent tracking will be reviewed and potential future trends will be determined over time.

Monitoring and Reporting

Monitoring landslide will be done in one or all of the following ways: post-harvest inspections, road inspections, silviculture surveys, overview flights, and/or reports from contractors or public.

The landslide size, location and treatment will be tracked in ITS. Reporting will include the ITS incidents related to landslides and the associated actions and comments.

Indicator 24 – Land Conversion

Indicator Statement	Target (Variance)
Percent of DFA converted to non-forest land use through forest management activities not including roads, landings and other infrastructure directly related to forest management	Less than 5% reduction of DFA annually

See the information provided under Indicator 24 – Land Conversion as it satisfies the requirements for this indicator under Element 2.1.

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Indicator 25 – Volume Harvested Vs. Allocated

Indicator Statement	Target (Variance)
Percent of volume harvested compared to allocated harvest level	100% over the legislated cut control period for Canfor's major replaceable forest licenses in the Kootenay region (+/-10%)



See the information provided under Indicator 25 – Volume Harvested Vs. Allocated as it satisfies the requirements for this indicator under Element 2.1.

Criterion 3 – Soil and Water

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

This Criterion consists of two Elements:

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

Element 3.1 – Soil Quality and Quantity

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

The following indicator statements have been identified for this Element:

- 26 Percent of site NAR with detrimental soil disturbance resulting from forestry activities
- 27 Number of large pieces of CWD per ha in harvested cutblocks each year, by BEC zone in each major Forest Licence

Indicator 26 – Detrimental Soil Disturbance

Indicator Statement	Target (Variance)
Number of blocks where the % detrimental soil disturbance exceeds acceptable limits	0 (4)

What is this indicator and why is it important?

Soil is one of the most important physical resources in the DFA, as it is directly linked to the production of forest biomass with all of its associated attributes. The intent of this indicator is to ensure the levels of soil disturbance caused by forestry activities do not exceed acceptable levels, therefore protecting the soils ability to sustain a healthy, and productive forest ecosystem.

Acceptable detrimental soil disturbance is defined in legislation as: *5% or less on sensitive soils and 10% or less on regular soils*. These levels can be temporarily exceeded by 5%.

Within a roadside area, which reduces the need for landings, a 25%-or-less limit is applied.

Detrimental soil disturbance is defined as *“disturbance caused by a forest practice on an area, including: areas*

occupied by excavated or bladed trails (greater than 30cm cut), temporary roads and landings, areas occupied by corduroyed trails, compacted areas, and areas of dispersed disturbance.”

A major factor in the risk of detrimental soil disturbance is related to the soil sensitivity. Soil sensitivity is largely based on soil type, depth of soil, slope and percent coarse fragments. Field analysis uses these to measure a sites risk for soil compaction, displacement and erosion that in turn is used to determine the presence or absence of sensitive soils.

Some degree of soil disturbance is expected during timber harvesting or silviculture activities, however it needs to be minimized. Permanent access structures (PAS), such as long-term roads and landings, are discussed in Indicator 22 – Permanent Access Structures.



How are targets established?

The target of zero blocks exceeding the detrimental soil disturbance limits was set to maintain compliance with BC legislative requirements, and to ensure the long term viability of the DFA's ability to grow forests.

The variance of 4 blocks is to account for incidents where soil disturbance has temporarily exceeded the allowable disturbance limits. It is Canfor's intention to avoid these incidents, however in some cases issues causing soil disturbance are not caught on time to prevent exceeding acceptable limits. In these incidents, the blocks will be remediated to below acceptable limits within 1 year. The variance was based on a review of past incidences related to detrimental soil disturbance issues within the DFA.

Current Condition

In 2015 Canfor has had 2 ITS incidents related to excessive soil disturbance in the Kootenay area. Both were identified through the internal surveying of highest-risk blocks. One incident is related to the roadside harvest area, and the other is related to the in block disturbance. Rehabilitation is occurring on both sites fall 2015 and both incidents are entered in Canfor's incident tracking system.

Strategy

There is a Detrimental Soil Disturbance Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Detrimental Soil Disturbance Strategy, it is forecast for this indicator that Canfor will remain in legal compliance and meet the targets as identified.

Monitoring and Reporting

This indicator tracks the number of blocks that exceed the detrimental soil disturbance limits at a site level (i.e. cutblock). The data required to monitor this indicator is derived primarily from ocular estimates on all blocks post-harvest done by Harvesting Contractors. Whether or not a block meets the associated requirements outlined in the site plan will then be documented on the contractor post-harvest checklist and stored on the block file. Additionally, Canfor's Operations Supervisors will ensure annual soil disturbance surveys done by trained staff/contractors are completed on the highest-risk sites. These same surveys will be done when a block is suspected of exceeding targets based on the ocular estimates done by operations contractors or reported by any staff onsite. Surveys will be done using Canfor's soil disturbance measurement SWP. Soil disturbance surveys will be stored on the associated block file and in the soil disturbance survey activity in Resources. Any non-conformance or non-compliance to plans will be identified and reported in Canfor's Incident tracking system.

ITS records of the cutblock identification, percent disturbance and treatment of any incidents of excessive detrimental soil disturbance occurrences will be reported in the annual report. The list of high-risk blocks and the results of the associated surveys can also be provided as supporting information.

Indicator 27 – Coarse Woody Debris



Indicator Statement	Target (Variance)
<p>Number of large pieces of CWD per ha in harvested cutblocks each year, by BEC zone in each major Forest Licence</p>	<p>The annual median and mean by BEC and License to be at or above the following:</p> <ul style="list-style-type: none"> • PP – 1 piece/ha • IDF – 2 pieces/ha • MS and ICH, PI leading stands – 2 pieces/ha • MS and ICH, non-PI leading stands – 4 pieces/ha • ESSF, PI leading stands – 8 pieces/ha • ESSF, non-PI leading stands – 10 pieces/ha <p>NOTE: Targets do not apply to blocks within community-forest interface areas being managed to reduce fire risk.</p>

What is this indicator and why is it important?

Coarse woody debris (CWD) refers to dead wood lying on or above the ground that is at least 7.5 cm in diameter (wood that is smaller than this is referred to as ‘fine woody debris’).

This indicator refers only to large CWD, which is defined here as dead wood > 20 cm in diameter and > 10 m long, which does not meet the current Canfor sawlog log quality requirements. Large logs last longer, hold more moisture, contribute more organic material to the soil, and provide habitat for a greater number of species than do smaller logs (Densmore 2010).

This indicator focuses on the density of large CWD, rather than the volume of all sizes of CWD as in previous SFMPs, for four reasons:

1. It is easier for loggers to influence the number of large pieces remaining after harvest than the number of small pieces,
2. The density of large pieces is much easier to estimate during harvest than volume, making it easier for loggers to determine if they are in compliance with targets as they harvest the block.
3. Studies of CWD over the past 10 years on Canfor's operating areas in the East Kootenay have shown that most of the post-harvest volume of CWD is comprised of small pieces, and that very few large pieces are left following logging.
4. Larger pieces of CWD provide different and longer-lasting ecological functions than smaller pieces.

Ecologically, CWD fulfills many critical ecological roles in forested ecosystems. Among them, it provides a source of organic material for soil development, and is critical for soil function, structure, and productivity. CWD also provides substrate, energy and nutrients for plants, lichen, fungi, and bryophytes, and shade and protection from browsing for tree seedlings.

CWD has also been identified as one of the key habitat elements important to maintain in forested landscapes (Bunnell et al. 1999). In British Columbia, 12-18% of forest-dwelling vertebrates commonly use CWD for breeding, or respond positively to its abundance. Some of the functions CWD provides for animals include:

- sheltered areas for reproduction,
- cover from aerial predators for small animals,
- habitat for many invertebrates, upon which a wide range of amphibian, reptile, bird and small mammal species feed,
- runways for small mammals,
- display or lookout posts for birds,
- plucking perches for avian predators like northern goshawks
- access routes below the snow for small predators like marten and weasels.

Studies from Europe, where intensive logging and CWD removal has occurred for over hundreds of years, have shown that species dependent on dead wood are at risk when CWD levels fall below 30% of what occurs naturally in the forest (Fridman and Walheim 2000).

In addition to this indicator, Canfor also has special procedures such as not burning all slash piles, and leaving windrows of woody debris across blocks that meet particular criteria, in order to provide additional habitat for furbearing species such as marten and weasel. These procedures are outlined in the CWD strategy.

How are targets established?

Due to the many ecological processes that CWD influences and the long time large pieces of CWD can take to decompose, there are many different ways in which targets for CWD in harvested areas could be set:

- 1) ***Using data from unmanaged stands recently following natural disturbance such as wildfire or blowdown.*** This method assumes that the closer forestry practices can maintain the patterns and process associated with natural disturbances, the greater degree to which biodiversity will be maintained. The difficulty with this method lies in obtaining accurate measures of CWD after natural disturbance, and then dealing with the fact that variability among wildfires can be very high and vary with through time. For example, some fires are severe and completely consume many of the trees within their boundaries, while others are less so and leave many trees dead or partly dead but standing. Although

most of these trees fall down over the following 100-30 years, becoming CWD, a subsequent fire may occur and burn them, leaving little to no CWD on site. Thus fire patterns impact CWD amount and distribution.

- 2) ***Using data from unmanaged mature stands.*** This method ignores the fact that harvesting is a disturbance in the same sense that wildfire is a disturbance, and that a stand of age 0 would not ecologically be expected to have the same CWD as a stand of age 100.
- 3) ***From the amount and distribution of CWD required by various animal species in order to maintain their populations.*** This is a very difficult method, because of the large number of species associated with CWD, the differing habitat requirements of each species, and the variability of their response. Even if one tried to select the species with the most stringent CWD requirements, determining which species to measure and the amount of CWD they require would be very difficult.
- 4) ***From the amount of CWD required to maintain soil organic matter required for good tree and/or plant growth.*** The difficulty with this method is that it would require a long time period to determine, and there would likely be very high variability associated with this.
- 5) ***Use targets set by government or other bodies.*** A provincial example is the legal requirement for a minimum of 4 logs, at least 2 m long, to be retained per ha on harvested cutblocks. A local example for the East Kootenay is the legally established target for CWD set in the General Wildlife Measures for Grizzly Bear Specified Area WHA 4-180 (a minimum of 20-40 m³ of CWD > 30 cm diameter). These targets are determined in various ways, and are often negotiated levels that consider economic factors as well as biological ones.

For this indicator Canfor has chosen a combination of methods 1 and 2, together with advice from expert Wildfire Scientists working in the Rocky Mountain Trench. A combination of data collected and analysed by MFLNRO through the FREP program, and data collected and analysed through Canfor over the past 10 years has been utilized as described below.

Setting targets based on the mean and median for a group of cutblocks rather than for each block accounts for variability among individual sites, and will provide for a range of CWD volumes in keeping with the RNV concept.

Due to the importance of reducing fuel loading within community-forest interface areas, targets do not apply to blocks within these areas.

FREP Program Results

The Forest and Range Evaluate Program (FREP) sampled large CWD in harvested blocks and retention patches as part of their resource stewardship monitoring for biodiversity. They found that, in general, the density (pieces per ha) of large CWD was much lower on harvested sites compared to natural areas within retention patches. As a long-term goal, they suggest that the CWD in the two places should be equal. This is an example of using natural forest stands as a baseline for harvested stands.

As the government goes forward with monitoring of forest practices under FRPA, they suggest a goal of 20% improvement in the median density of large CWD on harvested areas. They provide data for what the targets look like for each of the BEC variants that they sampled. Canfor used these data to provide a starting point for the targets for this indicator. However, since the FREP program did not have very many samples from the BEC variants in the DFA, some modification to these targets was necessary. For example, most of the samples in the ESSF were from the wet

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or moist variants, and not the dry variants as we have in the DFA. Since the moist variants tend to have more CWD, the targets are higher than what would be applicable in the DFA.

Over time, as samples as collected from pre-harvest stands, a baseline will be obtained for the DFA. In the meantime, data from previous sampling in the DFA for CWD volume was used to adjust the FREP targets.

Canfor Program Results

In 2001, Canfor began monitoring CWD in pre-harvest and post-harvest stands to provide baseline and monitoring data for the DFA. The key patterns identified (Adams 2002, and Stuart- Smith unpublished) from data between 2001 and 2012 were:

1. Pre-harvest volumes of CWD increased with elevation (from PP to IDF to MS/ICH to ESSF), but there was high variability within each BEC zone.
2. Lodgepole pine dominated stands had less CWD than other stand types in the MS, ICH and ESSF.
3. Total CWD volume (all piece sizes) decreased on average between pre- and post-harvest, but this difference does not appear significant due to the high variability within BEC and stand types.
4. The volume of CWD pieces > 30 cm in diameter tended to be lower post-harvest but was not always so. This could be due to the felling of large diameter unsafe snags during harvest, which added to the CWD on site post-harvest.

Current Condition

Although Canfor has been utilizing CWD volume as an indicator in the SFMP for a number of years, this revised indicator for large CWD density is new and was measured for the first time in 2014, so there is limited data available. Due to the small sample size, data from the various licenses were combined.

Table 57: Median and Mean pieces per hectare of CWD >20 cm and 10 m long from 2014

BEC Zone	Subzone	Leading species	Median	Mean	SD	n
ESSF	dk	Pl	19.5	24.1	19.7	15
	wm	Pl	7.7	10.0	4.6	21
ICH	dm	Pl	-	13.9	-	1
IDF	dm	Pl	-	5.2	-	1
MS	dk	Pl	9.7	14.9	13.6	6
		Fd	-	4.8	-	1

Strategy

There is a Coarse Woody Debris Strategy associated with this indicator, the following Standard Work Procedures.

- Pre-harvest Coarse Wood Debris SWP,
- Post-harvest Coarse Wood Debris SWP

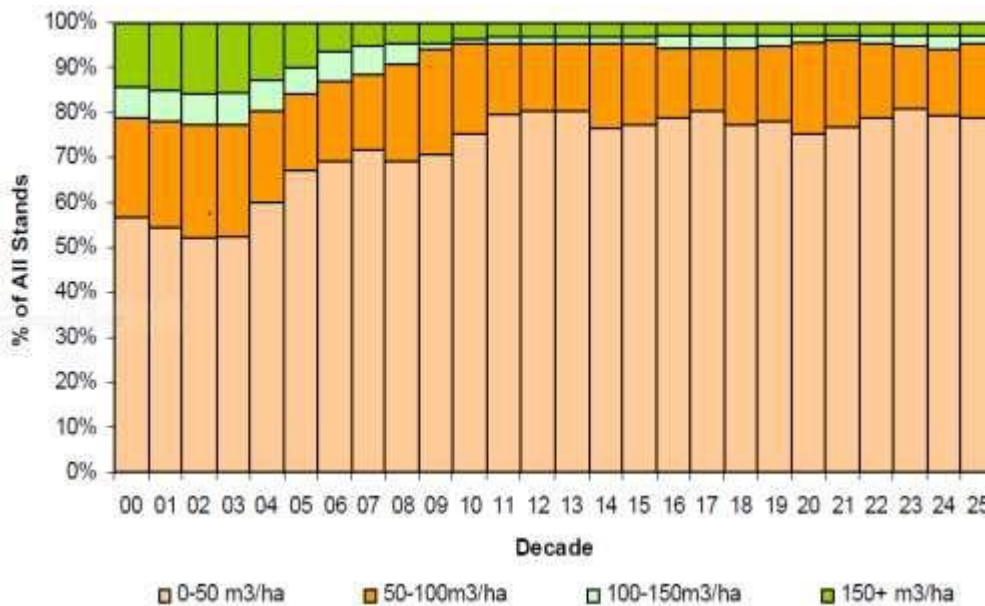
Forecasting and Probable Trends of the Indicator

Historical data from post-harvest blocks in the DFA between 2001 and 2013 shows that large pieces of CWD were present in the past, suggesting that this is possible in the future. Since the length of these pieces was not measured in the past, it is not possible to obtain density estimates from these historical data. However, they do support the general patterns of the targets (e.g., lower to higher as one goes from low to high elevation).

Similarly, there are no modelling projections specifically available for large CWD density. There are modelling projections for CWD volume, completed for TSR III (Wilson et al. 2004), which are based on data from post-harvest CWD surveys on Canfor's DFA in 2002/03. These suggest that, under the assumptions made for the base case (see below), CWD volumes will remain fairly consistent on the CFLB over the next 250 years, increase slightly on the NHLB, and decline somewhat on the THLB. Figure 37 shows CWD volumes in 4 classes on the THLB over the next 25 decades. As harvest continues through time, the percentage of stands with lower volumes of CWD increases, since more natural stands are converted to managed stands through time.

The CWD input data for this model were based on data from stands harvested before Canfor implemented CWD targets and CWD volumes were lower than those occurring once those were implemented. In particular, without a focus on leaving large pieces of CWD, volumes can be very low, since large pieces contribute disproportionately to the volume. Thus, implementation the Coarse Woody Debris Strategy to meet the large CWD targets in the indicator should help alleviate the negative trends seen in this forecast. The other assumptions of the TSR III basecase are not far from current management, however.

Figure 37: Projection of CWD Volumes on the THLB in the Invermere and Cranbrook TSAs over 250 years under TSR III



Monitoring and Reporting

The density of post-harvest large CWD levels will be measured in conjunction with waste and residue surveys according to the post-harvest CWD SWP on a sample of the blocks harvested annually. The mean and median values of large CWD density will be calculated each year and reported out in the Annual Report. Every 3 years, or more frequently, trends will be examined to check for improvements. In order to determine if targets are appropriate for the BEC variants within the DFA, large CWD density surveys will be conducted in pre-harvest stands as per the pre-harvest CWD SWP.

Element 3.2 – Water Quality and Quantity

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

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

The primary concern for water quality in the DFA is habitat for aquatic species and consumptive use, with the primary threat to water quality being increased sedimentation due to stream crossings. The primary threat to water quantity is altered stream flows as a result of changes to the forest canopy in a watershed from harvesting.

The following indicator statements have been identified for this Element:

- 28 Percent of Sensitive Watersheds, where forest development is planned, above ECA thresholds that have had further assessment by a qualified professional
- 29 Number of drainage structures on Canfor's permitted roads identified as having a high risk of significant sedimentation that are not remediated within 1 year of identification

Indicator 28 – Watersheds

Indicator Statement	Target (Variance)
Percent of Sensitive Watersheds/Riparian Assessment Units, where forest development is planned, above ECA thresholds that have had further assessment by a qualified professional	100% (-10%)

What is this indicator and why is it important?

Water quality and quantity are important for human use and consumption, as well as being necessary for the survival of aquatic species. These primary watershed characteristics can be affected by stand-replacing disturbances (human and natural-caused). The effects are normally highest in the initial post-disturbance years and diminish over time as regenerating forest cover is established.

Water Quality – Forest development can affect water quality in a number of ways. The most significant of these impacts in the Kootenay Region of south eastern British Columbia are from direct disturbances to channel bed and banks from logging or road development within the riparian area and from increased inputs of sediment to the channel from road-related debris slides and debris flows (Jordan, 2002, Bragg, 2000).

Water Quantity – In watersheds that are not dominated by runoff from steep alpine headwaters, forest development has the potential to increase peak flows and potentially decrease the amount of water during low flow. In streams with fine textured bedload, increases in the magnitude and duration of peak flows can influence channel stability and also affect water quality through increases in sediment transport rates. In some cases increases in peak discharge associated with high levels of forest development can accelerate the rate of channel avulsion and aggravate existing flooding hazards on alluvial fans.



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

For the purpose of this indicator, a sensitive watershed is defined as *a community watershed, domestic watershed or any watershed identified as having substantial downstream risks or values that can be affected by ECA levels*. A Professional Hydrologist analysed the watersheds within the DFA to determine which ones should be considered sensitive. This was based on watershed characteristics, downstream values and risks associated with forest development. These watersheds are identified within Canfor's system as HCV3 (High Conservation Value Forests related to water).

This indicator takes a measure of watersheds within the DFA that have been identified as sensitive. Any harvest activity that is planned and will exceed the sensitive watersheds ECA threshold will require a more detailed assessment that will evaluate the risk associated with increasing ECA, the associated potential impacts and provide recommendations to mitigate that risk/potential impacts.

For areas not in sensitive watersheds, this indicator addresses larger watersheds defined as Riparian Assessment Units (RAU). A professional hydrologist defined the boundaries of the RAUs. RAUs overlap the entire DFA and therefore all sensitive watersheds are included within an RAU. In the case of both watersheds requiring a watershed assessment the sensitive watershed will supersede the analysis of the RAU as the analysis and recommendations are more intensive. Using RAUs assures Canfor 100% coverage of the FSC DFA. For RAUs exceeding 25% ECA, a hydrological assessment will be done identifying areas of high sensitivity to disturbance and outlining mitigative measures for operations within that RAU.

Managing ECA levels and adhering to the strategies outlined in specific watershed assessments should not be expected to eliminate the potential or magnitude of naturally occurring extreme events (Flooding June 2013). However, it will provide Canfor Staff the information necessary to make decisions regarding development in these areas.



ECA thresholds used to trigger the need for a hydrological assessment are dependent on Peak Flow Sensitivity Indicator (PFSI). A consulting hydrologist for the Kootenay Region developed the PFSI. It is intended to identify watersheds that have the potential for experiencing harvesting related increases in peak flows. The PFSI approach is based on the premise that the greater the opportunity for de-synchronization of snowmelt runoff the lower the likelihood of peak flow influences from harvesting. To be valid the determination of PFSI should be limited to watersheds less than 30 km². PFSI has been calculated for all applicable sensitive watersheds within Canfor's Kootenay DFA:

- where PFSI = High: level of harvesting should not exceed 25 percent ECA (distributed over watershed) without a field assessment by a qualified professional.
- where PFSI = Low: level of harvesting is not a management issue but should be limited to 50 percent unless field assessed by a qualified professional.
- Community watersheds must be assessed at 25% regardless of PSFI. Any watershed where the PFSI cannot be calculated (too large) will assume a 25% threshold.

ECA calculations have been completed for sensitive watersheds and RAUs where Canfor is active, however unlike PFSI, this is a moving target. ECA's can change with harvest activity or wildfire, however ECA will go down based on stand recovery. ECA calculations must be regularly updated to maintain current information.

How are targets established?

This target was established to place emphasis and resources on the most sensitive and high-risk areas. It ensures that within these sensitive watersheds, focused assessment of hydrological conditions and drainage structures will occur when ECA thresholds are exceeded. Outside of sensitive watersheds the target uses the larger Riparian Assessment Units to ensure complete coverage of the FSC DFA. It is Canfor's goal that a qualified professional will assess all sensitive watersheds and RAUs where planned development will exceed ECA thresholds. This resulted in

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the target of 100%. The variance allows for some assessments not completed but scheduled to be finalized prior to any further harvest operations.

Current Condition

	Above ECA Threshold	Hydrological Assessment Complete	Assessment Scheduled	No Planned Activity	Assessments Required – Not Yet Scheduled
HCV3	17	10	1	6	-
CWS	5	5	-	-	-
DWS	10	5	-	3	-
RAU	8	8	-	-	-
Total	40	28	1	9	-

Strategy

There is a Watershed Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Watershed Strategy, it is forecast that acceptable levels of water quality (clean water) and quantity (maintain stream-flow regimes within natural variation) will be maintained within sensitive watersheds as described by the specific hydrologic assessments. Riparian systems will maintain existing uses and support human and ecological communities and aquatic life.

Monitoring and Reporting

Report the number of sensitive watersheds where ECA thresholds were exceeded and harvesting occurred. Identify the watershed(s) and for each, whether a further detailed assessment was conducted prior to harvest. Provide hydrology reports and associated blocks to demonstrate where recommendations were considered.

Indicator 29 – Stream Crossing Sedimentation Control

Indicator Statement	Target (Variance)
Number of drainage structures on Canfor’s permitted roads identified as having a high risk of significant sedimentation that are not remediated within 1 year of identification	0 (3)

What is this indicator and why is it important?

Drainage structures on forest roads help to ensure the protection and integrity of natural forest hydrological systems. Due to their proximity to streams and the installation and maintenance requirements, they also have the highest potential for sediment delivery of any forestry infrastructure. Proper installation, maintenance and monitoring of these structures are critical to the sustainability of many hydrological values. Structures commonly used for stream crossings include bridges, open bottom culverts, culverts and skid bridges. Additionally, stream crossings may have associated drainage control structures such as cross ditches, water bars, silt fences and settling pools. In general, steps are taken on all stream-crossing structures to minimize the risk of sediment delivery into watercourses as per the *FMG Sediment Erosion Control Document*; this indicator focuses on those stream crossings that have the highest risk to hydrological values. It is recognized that all drainage structures require some amount of monitoring and maintenance, however most low risk streams can be covered by regular road maintenance. Some sedimentation may occur at the time of installation and during the initial settling of a structure; this indicator focuses on the prevention of chronic long term or significant sediment delivery to high-risk streams.

For the purpose of this indicator:

High-risk streams include fish bearing creeks, consumptive use streams or streams flagged as critical habitat (i.e. Tailed frog).

Significant sedimentation potential refers to any source of sedimentation with the potential for chronic long-term delivery into the stream system. The significance of a sediment source will be measured using the *High-Risk Stream Crossing Evaluation SWP*, and is largely dependent on the ditch line grade and the soil type at the high-risk crossing.

Water quality and quantity are important both for aquatic species and for human drinking water. Monitoring the integrity of stream crossings is important to guarantee that potential problems are quickly identified and corrected before degradation to aquatic habitat or water quality occurs.

How are targets established?

This target places emphasis and resources on the crossing points of high-risk streams with the potential for significant sediment delivery. It is important that Canfor remediates all of the identified sources of potentially significant sedimentation into these streams annually. While Canfor will continuously strive for 0 untreated sources, it is understood that outside influences such as weather, timing and availability of machinery also play a role. To account for that, the variance was established so that when unavoidable, treatment can be completed the following year.

Current Condition

In 2015 there have been 6 ITS incidents regarding sedimentation from drainage structures into high-risk streams.³⁶ All have since been remediated.

³⁶ up to September 23rd

From 2012 to 2014 tracking of sediment related incidents in ITS was inconsistent. In 2014 only 2 incidents were recorded and both were remediated.

Strategy

There is a Stream Crossing Sedimentation Control Strategy associated with this indicator.



Forecasting and Probable Trends of the Indicator

By implementing the Stream Crossing Sedimentation Control Strategy, Canfor expects that all identified significant sediment sources associated with high-risk stream crossings will be mitigated and removed from high risk status or will be mitigated to the extent possible and monitored annually. Over time this should result in a reduction of ITS incidents related to sedimentation. Combined with the other water related strategies (Riparian, Landslides, Sensitive Watersheds), and regular road maintenance, it will ensure the maintenance of water quality, quantity and riparian habitat.

Monitoring and Reporting

Canfor will inspect all high-risk crossings upon installation and removal, as well as following harvesting and on an annual basis if unable to mitigate high-risk status as per the *High-Risk Stream Crossing Evaluation SWP*. A multi-phase inspection system will be used to monitor beyond active harvesting. Inspections will identify sources of potential incidents that can be mitigated before becoming an ITS incident as well as any active incidents. This process is outlined in the Stream Crossing Sedimentation Control Strategy.

Report the number potential significant sediment sources identified in high risk crossing inspections. Summarise actions taken to mitigate the potential hazard. Report any incidents of obstruction of flow or sedimentation into high-risk streams in ITS. The Stream Crossing Sedimentation Control indicator will be reported on an annual basis with incidents tracked in Canfor's ITS system.

Criterion 4 – Role in Global Ecological Cycles

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

This Criterion consists of two Elements:

Element 4.1: Carbon uptake and storage	Maintain the processes that take carbon from the atmosphere and store it in forest ecosystems.
Element 4.2: Forest Land Conversion	Protect forestlands from deforestation or conversion to non-forests, where ecologically appropriate.

Element 4.1 – Carbon Uptake and Storage

Element 4.1: Carbon uptake and storage	Maintain the processes that take carbon from the atmosphere and store it in forest ecosystems.
Value:	Carbon Uptake and Storage
SFM Objective:	Maintain the carbon uptake and storage processes.

Forest ecosystems are an integral part of the global carbon cycle as trees and soils absorb and release carbon dioxide (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 that is not sequestered in forest products, is then released back into the atmosphere. The recognition that forests are a carbon sink, and that land- use, land-use change and forest activities can have an effect on this sink requires consideration of forest carbon values in sustainable forest management planning.

Concern around forest carbon cycles has been spawned by concern over human caused climate change and global warming. Initiatives such as the Montréal Process, carbon requirements for forest certification, and the Kyoto Protocol are examples of guidelines to address the issue. Forests and agricultural soils in Canada are projected to provide a carbon sink of 30 Mt of carbon by continuing with current management practices. This could be increased by additional activities (Government of Canada 2002) which local forest managers will have the opportunity to support it on the ground.

The criteria, element and associated indicators for Global Carbon Cycles considers the potential influence of forests on carbon uptake and storage and its implications to forest managers.

The following indicator statements have been identified for this Element:

- 5 Percentages of old and mature stands by landscape unit and BEC variant
- 20 Percentage of blocks that achieve regeneration delay (RG) within the regen delay period; Percentage of blocks that achieve free growing within the free growing (FG) period
- 14 Percentage of tree seed used in yearly tree planting program that is consistent with the *Chief Foresters' Standards for Seed Use*
- 30 Climate Change Adaptation

Indicator 5 – Old and Mature Forest Retention

Indicator Statement	Target (Variance)
Percentages of old and mature stands by landscape unit and BEC variant	Full compliance with the mature and old targets as defined in the Kootenay Boundary Higher Level Plan and spatial identification of stands to meet these targets ($\pm 0.3\%$ of the target).

See the information provided under Indicator 5 – Old and Mature Forest Retention as it satisfies the requirements for Indicator 4.1.1.



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Indicator 20 – Reforestation Success

Indicator Statement	Target (Variance)
Percentage of blocks that achieve regeneration delay (RG) within the regen delay period	100%
Percentage of blocks that achieve free growing within the free growing (FG) period	100%

See the information provided under Indicator 20 – Reforestation Success as it satisfies the requirements for this indicator under Element 4.1.



Indicator 14 – Tree Seed

Indicator Statement	Target (Variance)
Percentage of tree seed used in yearly tree planting program that is consistent with the <i>Chief Foresters' Standards for Seed Use</i>	100% (-5%)



See the information provided under Indicator 14 – Tree Seed as it satisfies the requirements for this indicator under Element 4.1.

Indicator 30 – Climate Change Adaptation

Indicator Statement	Target (Variance)
a) Annual meeting to review: possible effects of climate change, new information available, results of monitoring other indicators/strategies (from the perspective of climate change) and determine if changes are needed for SFMP	Annual Meeting
b) Implement climate change stocking standards into regeneration plans	Within 1 year of approval of FSP climate change stocking standards.
c) Percent of cutblocks (by area) reforested with mixed species at free growing	100% (-30%)

What is this indicator and why is it important?

The climate in British Columbia is changing. In the Canadian portion of the Columbia River Basin, which includes the DFA, historical records from weather stations across the Basin indicate that over the 20th Century (1901 – 2004), the average recorded annual temperature has increased by 0.7°C to 1.7°C, with the greatest increases occurring at night and in the winter (Murdock and Werner 2011). Precipitation has also increased in all seasons over the 20th century in the Basin as a whole.

The climate in British Columbia is expected to continue to change, and at a more rapid pace than in the past. The Canadian Columbia Basin is projected to be 1.2°C to 2.7°C warmer by the 2050s according to the 10th to 90th percentile of an ensemble of 30 Global Climate Model (GCM) projections, compared to the baseline (1961-1990) temperature (Murdock and Werner 2011). Future precipitation is projected to increase by up to 15% in winter and decrease by as much as 14% in summer for the basin as a whole according to an ensemble of GCMs, with large regional differences within the basin indicated by a Regional Climate Model (Murdock and Werner 2011). With these changes are predicted a greater frequency of extreme events such as severe windstorms and precipitation events. The maps in Figure 38 and Figure 39 illustrate the potential change in mean annual temperature and precipitation (from Murdock and Werner 2011 available at [Pacific Climate Impacts Consortium](#)).

These projected changes in climate are expected to result in a wide range of effects on the natural environment (Table 58). Warmer, wetter winters and hotter, drier summers will accelerate glacial retreat, alter stream flows, promote insect and disease outbreaks, and increase the length of the wildfire season, as well as likely increase the intensity and extent of wildfires. Changes in temperature and precipitation will also influence biodiversity within the region, as the potential ranges of species will move northward and upward in elevation. Additionally, some species will expand their ranges as conditions become more favourable, while others will be intolerant of new conditions and see a decrease in their range. These changes could lead to shifts in the distribution of biogeoclimatic (BEC) variants within the DFA, as well as to the development of entirely new BEC variants as plant species reorganize themselves into new communities.

Canfor has many different indicators, targets, and strategies which address various aspects of the projected effects of climate change, as well as addressing different components of biodiversity maintenance and forest ecosystem health. For example, there is a focus on large Coarse Woody Debris retention in cutblocks (see CWD Indicator), intact watersheds are considered high conservation values and maintained as unlogged and unroaded refugia under the High

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Conservation Value Forest indicator, there has been an increasing focus on retention of green trees in patches rather than as single trees under the Green Tree Retention indicator, etc. In this way, climate change considerations are being incorporated into the relevant aspects of daily business.

Figure 38: Annual mean temperature and total precipitation 1961 – 1990 for the Columbia Basin

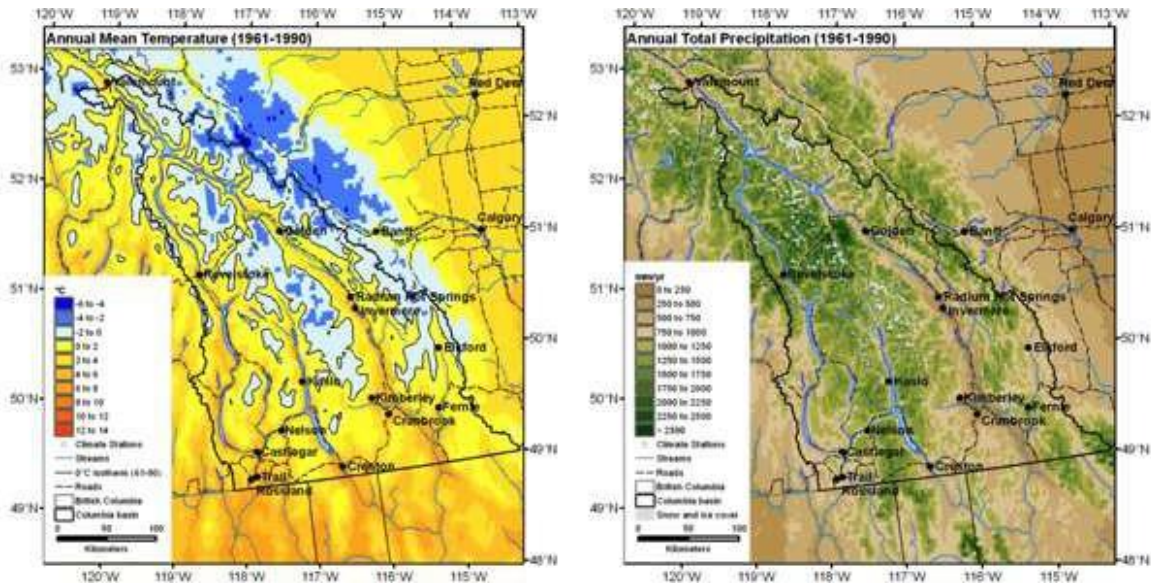
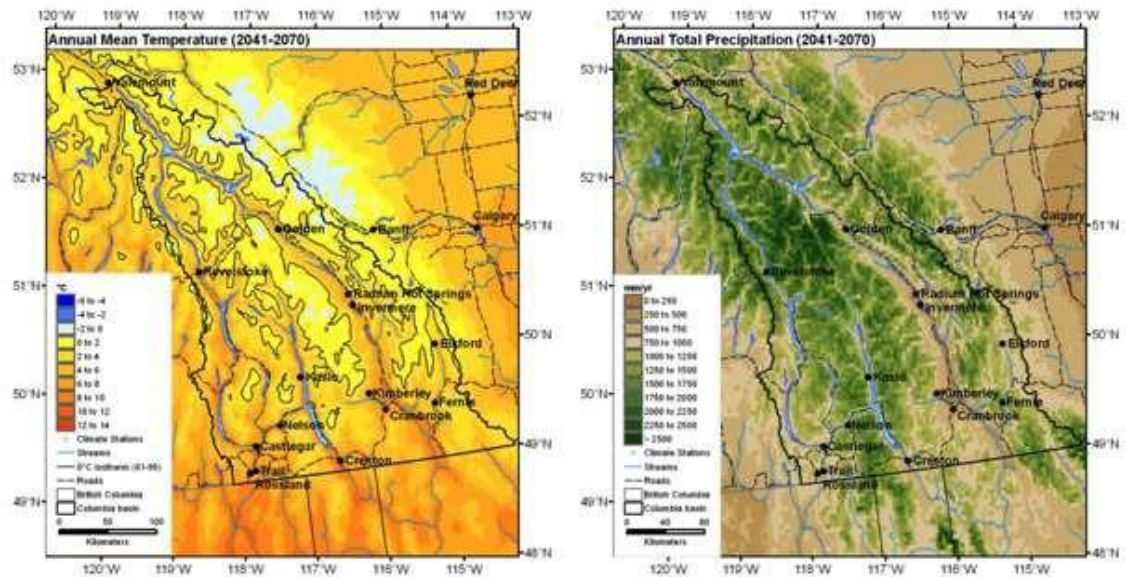


Figure 39: Projected annual mean temperature and total precipitation for the 2050s (2041 – 2070) for the Columbia Basin



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Table 58: Summary of potential impacts of climate change on forests in the DFA, and potential responses that could be implemented

Mechanism	Potential Impacts	Potential Forestry Responses
Climatic Change: Increased Frequency and Magnitude of Extreme events		
Wind Storms	<ul style="list-style-type: none"> Increased windthrow Increased dispersal of bark beetles Increased fuel loading from deadfall 	<ul style="list-style-type: none"> Increased use of RMZ to windfirm RRZ Increased use of clumps and patches of residual trees rather than single leaf trees in cutblocks
Freeze/ Thaw cycles	<ul style="list-style-type: none"> Winter thaws and late spring frosts Shorter access season where winter access requires frozen roads 	<ul style="list-style-type: none"> Modified timing of planting or harvesting. More flexible harvest schedule
High Intensity Precipitation	<ul style="list-style-type: none"> Increased flooding, surface erosion, landslides and debris flows Increased lightning, increased fire risk Reduced water quality 	<ul style="list-style-type: none"> Utilize larger culverts at high risk crossings Refine road construction, maintenance, and deactivation practices to accommodate changing stream flows, especially peak flows.
Rain-on-Snow or Rain-on-Frozen-ground	<ul style="list-style-type: none"> Increased runoff (ground less permeable) Increased occurrence of landslides, mass-wasting of hill slopes, damage to riverbanks and downstream flooding Changing avalanche activity (decreases in some areas, increases in others) 	
Heat Waves/ Droughts	<ul style="list-style-type: none"> Increased plant stress, leading to slow growth, increased mortality, and increased disease/ pest susceptibility Increased fire risk Regeneration failures at lower elevations Drier soils later in growing season 	<ul style="list-style-type: none"> Plant drought tolerant spp. Conserve forest floor organics. Retain large CWD to help conserve moisture and provide shade for seedlings
Climatic Change: Increased Variability		
Fire	<ul style="list-style-type: none"> More extreme fire behaviour with very intense, stand-replacing fires that result in destruction of vegetation and significant soil damage Increase in opportunities for invasive species, grasses, and shrubs to colonize or re-colonize a previously forested area Loss of mature timber and plantations to fire Increase in proportion of younger stands 	<ul style="list-style-type: none"> Manage for fire breaks, incorporate prescribed burning to reduce wildfire intensity Manage noxious weeds – do not allow them to establish in previously clean areas.

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Mechanism	Potential Impacts	Potential Forestry Responses
Insects/ Disease	<p>Higher temperatures leading to increase in length of transmission cycle of diseases, range expansion</p> <p>Decreased winter die-off of beetles</p> <p>Increased in Mountain Pine beetle, dothistroma needle blight</p> <p>Loss of mature timber and plantations to pests</p> <p>Increase in proportion of younger stands</p>	<p>Salvage harvesting</p> <p>Improve the monitoring of and response to disturbance agents</p> <p>Reforest with mixed species</p>
Climatic Change: <i>Shift to Warmer, Drier Summers, and Warmer, Wetter Winters</i>		
Shifting Tree Species and Climate Envelopes¹	Northward and upslope increase in potential range of species, expansion into alpine habitats where soil conditions are suitable	
	Increase in suitable habitat for Fd	Plant Fd in suitable sites
	Decrease in suitable habitat for Sx, Se, and Sw	
	Increase in favourable conditions for deciduous trees	
	Increase in favourable conditions for invasive species, or species more suited to changing climate	May require more invasive species control.
	Increased in vulnerability of Pa and La	Plant blister-rust resistant Pa seedlings in blocks where dead or dying Pa was harvested.
Shifting Ecosystem Climate Envelopes	Decrease in Western red cedar	
	Replacement of MS by ICH, and IDF BEC zones (IDF and expansion may be hindered by disease and fire)	
	ICH range projected to increase by 200% by 2085	
	Loss of ESSF	
	Loss of habitat for alpine ecosystems, decrease in alpine species due to limited range	
	Loss of forests in valleys and drier sites	Reconsider harvesting open forest stands on dry sites
	Increase in grasslands in valley bottoms and contiguous lower slopes	
Decrease in forest encroachment (possible)		
Loss of wetlands in low elevation valleys		

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Mechanism	Potential Impacts	Potential Forestry Responses
Changing Productivity	<p>Slower growth or declines in spp. that require prolonged cold to break dormancy</p> <p>Decreased productivity of forests in warmer and drier areas</p> <p>Increased productivity in mid-elevation forests</p>	Changes in rotation ages
Decreased Snowpack, Decreased Snowfall in Spring and Fall at Low Elevations	<p>Earlier snowmelt, reduced overall streamflow, and longer low flow periods, warmer water</p> <p>Earlier freshet and advancement of peak spring run-off dates</p> <p>Faster and higher streamflows in winter with increasing rain</p> <p>Initial improvements in regeneration in higher elevation forests</p> <p>Increase in fire season length (38 – 52 days)</p> <p>Increase in area burned with increase in warm and dry conditions</p>	<p>Retain riparian buffers with adequate shading to streams</p> <p>Manage within ECA levels</p> <p>Employ culverts of larger diameters on streams likely to experience higher streamflows</p>
Retreating Glaciers	<p>Loss of cold water sources in summer and fall</p> <p>Reduction in late summer stream flows</p>	
Growing Degree days²	<p>Expected to increase</p> <p>Longer growing season</p>	
Wildlife	<p>Ungulate populations may be affected by changes in forests and grasslands</p> <p>Migratory species may have earlier spring migrations and delayed fall migrations, and extension of breeding season</p>	
Flowering plants	Advanced budburst and flowering	

¹Climate envelope: Is the area of suitable climate for a species or ecosystem in terms of temperature and precipitation.

²Growing degree-days: A measure of heat accumulation over a season; used to determine when crops will reach maturity or the timing of leaf expansion

How are targets established?

Developing quantitative indicators and targets for climate change is very difficult, given the current level of uncertainty around the specific changes that will happen in the East Kootenay region. Although general patterns are becoming evident, there is still a great deal unknown about local patterns and species response, particularly on any given site. This does not negate the need for a response from the forest industry however, since there is no doubt that climate and ecosystem changes will have an impact on forestry in the region. Changes in temperature and precipitation will affect plant productivity, affecting wood quality, wood volume and log size, as

well as the ability to access wood in winter and spring. Thus, it is critical that forestry responds and adapts to the changing climate in the region.

One of the most important features about climate change science is how quickly it is changing, given the amount of research being done in the area. Reviewing trends in this data and incorporating new information is key to developing effective climate change strategies, indicators and targets. Thus, the first target was to hold an annual meeting among Canfor staff (Silviculture, Planning, Permitting, Operations) to discuss new findings and learnings on the ground, and if these should be incorporated into the appropriate SFMP strategies and SWPs going forward.

Second, the area of forestry, which is currently furthest ahead in terms of thinking about, and addressing climate change issues in silviculture. Forest management activities that determine the composition of future forests will play a significant role in determining the future impact of climate change. Flexible stocking standards (with broader species choice) to manage reforestation species in consideration of predicted changes in climate are currently being developed by FLNRO. Research is being completed to ensure new stocking standards are feasible, reliable and will maintain forest productivity. Once these are developed, it is important that these new stocking standards are implemented in a timely manner. Thus, this became the second target.

Third, managing for mixed species has been identified as a key factor in establishing healthy resilient forests capable of withstanding changes in climate. Ensuring mixed species reforestation is occurring will minimize forest health impacts and improve the resiliency of future forests. Thus, this became the third target. The target is to achieve this everywhere, i.e. on every site. A variance of 20% has been used to reflect that some sites are not ecologically suited for multiple species. This will ensure the vast majority of regenerated cutblocks are reforested with mixed species while recognizing site-specific limiting factors.

Current Condition

- a) New information to address climate change impacts has already been incorporated into other strategies, indicators and targets. An example is changes to seed transfer legislation, which has been updated to incorporate government climate change adaptation research and has become current standard practice (refer to Silviculture Strategy and Tree Seed Indicator for more information).

Some impacts are currently addressed as they happen – for example: wildfires, increasing fall/winter rain, increasing forest health issues. These immediate effects require plans to be adaptable. Some impacts of climate change are so broad and result from so many variables that it is difficult to quantify or be certain in any one year but instead will take several years of data and trend analysis.

- b) New stocking standards incorporating changes in climate are currently being developed by FLNRO.
- c) For 2014 FG surveys, mixed species reforestation occurred on 100% of survey units.

Strategy

At this time there is no one specific strategy associated with this indicator; climate change adaptations will be incorporated into existing SFMP Strategies and SWPs as required, based on results from the Annual Climate Change Meeting (late fall / early winter).

Forecasting and Probable Trends of the Indicator

Research is continuing to understand, quantify and predict the impacts of climate change on forest ecosystems and forest management. As this information becomes available, modifications to this indicator may be identified. As the impacts of climate change are identified in other strategies, the information will be reviewed to ensure necessary updates to the SFMP are made. It is expected that new information will continue to be developed resulting in regular updates to adaptive management strategies for climate change in the SFMP for the next several years.

Monitoring and Reporting

Target a) Newly reported discoveries in climate changes and trends applicable to the East Kootenay Region will be reviewed during the annual meeting and documented in meeting minutes, together with any changes made to SFMP indicators, strategies, or SWPs.

Target c) Cutblocks are monitored regularly after harvest using Silviculture Surveys. Data is collected on density, species, growth and forest health. Free Growing Survey data was chosen to compare as it is after the establishment phase and considers mortality and natural ingress. Data from free growing surveys is maintained in Canfor's forest management database (Cengea Resources) by Silviculture Supervisors. Free growing surveys record inventory information on each strata by species and density. The free growing survey data will be extracted from Cengea Resources through a WIM crystal report (FG Species Summary Query). This will be completed once per year, generally in February, for the surveys conducted in the previous year.

Element 4.2 – Forest Land Conversion

Element 4.2: Forest Land Conversion	Protect forestlands from deforestation or conversion to non-forests, where ecologically appropriate.
Value:	Forest land base
SFM Objective:	Sustain forests lands within our control within the DFA.

The following indicator statements have been identified for this Element:

- 22 Percent of operable landbase converted to permanent access structures through forest management activities

- 24 Percent of DFA converted to non-forest land use through forest management activities not including roads, landings and other infrastructure directly related to forest management

Indicator 22 – Permanent Access Structures

Indicator Statement	Target (Variance)
Percent of operable landbase converted to permanent access structures through forest management activities	5% or less per LU (+2%)



See the information provided under Indicator 22 – Permanent Access Structures as it satisfies the requirements for this indicator under Element 4.2.

Indicator 24 – Land Conversion

Indicator Statement	Target (Variance)
Percent of DFA converted to non-forest land use through forest management activities not including roads, landings and other infrastructure directly related to forest management	Less than 5% reduction of DFA annually

What is this indicator and why is it important?

This indicator is important as it tracks any changes to the forest land base which in turn sets long-term sustainable harvest levels. Forest companies generally have limited influence on any deletions or conversion of forest area by other industries. These are generally a result of government land use policies for other industries such as mining or power transmission. The focus of this indicator is on tracking the removal of productive forest land base where forest managers do not have direct management responsibility and keeping it below the threshold. This target provides an overall DFA performance measure, evaluating land base lost or increased within the DFA. There are always pressures and competing uses for the available Crown forest land base. Over time, there will be changes in the total hectares of the DFA. Those changes will be tracked to ensure the actual productive forest land base within the DFA is known and used for long-term harvest level calculations

This target is focused on those activities where forest companies do not have management responsibility and land may be converted to non-forest use (i.e. permanent clearing of forest for mine development or clearing of productive forest to build transmission lines). Additionally, Canfor's operating area agreements (spheres of influence) are changed periodically through negotiations with other forest license holders and this could increase or decrease the area within the DFA. Changes to operating areas may affect the DFA's long-term sustainable harvest levels.

In order to assess the maintenance of the productive capability of the land base, this indicator specifically tracks the amount of productive land base loss due to various non-forest uses by other industries that work with Canfor to harvest the areas and changes to the DFA. It would be impracticable to identify and track all land clearing by other parties within the DFA. This indicator will track those additions, deletions or conversions that Canfor directly participates in with other licensees and/or industries.

How are targets established?

This target is based on the threshold limit set in the FSC-BC Standard Indicator 6.10.1.

Current Condition

The total area in the DFA in 2014 was 1,194,301 ha. At that time, the AAC calculated using FSC-BC Standards was 1,013,214 m³/yr. Reductions in the DFA included; 2181 ha converted forest in Line Creek Mine expansion area, 411 ha converted for hydro R/W on TFL 14 and a reduction of 3,374 ha after the sale of a portion of Managed Forest 72 (in 2013) which contributed 6,700 m³/yr to the FSC ACC. The revised area is 1,188,335 ha which is a 5,966 ha reduction or 0.500% reduction.

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Table 59: Current FSC Certified DFA – by License

Area	Cranbrook	Invermere	Kootenay Lake	TFL 14	Total
Total Certified Area (ha)*	729,758	198,390	109,854	150,333	1,188,335

less 411 ha from hydro R/W

less 2181 ha for Line Cr expansion

Table 60: Pro-rated FSC AAC resulting from Excision

Year	ha's	AAC (m3/yr)	m3/ha/yr
2014	1,194,301	1,013,214	0.84837407
2015	1,188,335	1,008,153	
% Change	0.500%		

Strategy

There is a Land Conversion Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Land Conversion Strategy, it is forecasted that there will be less than a 5% change to the DFA annually.

Monitoring and Reporting

Productive forest that is converted through harvesting by Canfor for another industry will be tracked annually in a spreadsheet. If the percent change exceeds 2%, the long-term sustainable harvest limit using certification parameters will be re-calculated within the next year through a timber supply analysis. If the reduction or changes are less than 2%, a pro-rated average MAI/ha will be used to adjust the long-term sustained harvest level using certification parameters.

When operating spheres are renegotiated, the long-term sustainable harvest level using certification constraints parameters will be completed within a year of the negotiations being concluded unless another negotiation commences in that year period. If so, the analysis will be completed within a year of when the second negotiations conclude.

Criterion 5 – Economic and Social Benefits

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

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

The attempt was made to keep social aspects of sustainability separate from those addressed in the Economics C&Is (e.g. non-timber economic benefits), in order to avoid double counting, by focusing on socio-cultural conditions and activities affecting quality of life, public access to non-market benefits, resources, and community rights.

This Criterion consists of two Elements:

Element 5.1: Timber and Non-Timber Benefits	Manage the forest sustainably so it produces a mix of timber and non-timber benefits. Support a diversity of timber and non-timber forest products and forest-based services. Encourage, co-operate with, or help to provide opportunities for economic diversity within the community.
Element 5.2: Communities and Sustainability	Contribute to the sustainability of communities by providing diverse opportunities to derive benefits from forests and by supporting local community economies.

Element 5.1 – Timber and Non-timber Benefits

Element 5.1: Timber and Non-Timber Benefits	Manage the forest sustainably so it produces a mix of timber and non-timber benefits. Support a diversity of timber and non-timber forest products and forest-based services. Encourage, co-operate with, or help to provide opportunities for economic diversity within the community.
Value:	Timber and Non-Timber Benefits
SFM Objective:	Provide opportunities for a feasible mix of timber, recreation, and non-timber commercial activities

Forests represent not only a return on investment for an organization (measured, for example, in profit/loss, or product output) but also a source of income and non-financial benefits for DFA-related workers, local communities and governments. While there is limited information on the ecological services and non-timber benefits produced in the DFA, it is important to consider the costs and benefits of a variety of goods and services.

The following indicator statements have been identified for this Element:

- 25 Percent of volume harvested compared to allocated harvest level
- 31 Primary and by-products that are bought, sold, or traded with other forest dependent businesses in the local area
- 32 Number of incidences of documented concerns about non-timber forest benefits (NTFB) brought forward, where the NTFB strategy was not followed
- 33 Number of incidences of documented concerns related to overlapping tenures brought forward, where the Overlapping Tenures strategy was not followed

Indicator 25 – Volume Harvested Vs. Allocated

Indicator Statement	Target (Variance)
Percent of volume harvested compared to allocated harvest level	100% over the legislated cut control period for Canfor's major replaceable forest licenses in the Kootenay region (+/-10%)



What is this indicator and why is it important?

This indicator is important because sustainability involves limiting actual timber harvest to levels within the long-term capability of the forest to grow wood and provide long-term sustainable economic benefits. To track this, managers need data on both harvest levels and long-term production capability. In many locations it also requires an understanding of the nature of the transition of forests from harvesting mature stands to harvesting second growth. In practice, only the actual harvest level can be physically measured. The amount of wood that can be produced in perpetuity from a forest is a theoretical calculation in the Timber Supply Review (TSR) that depends not only on the inherent wood-growing capacity of the forest ecosystem but also on the kinds and intensities of management inputs (e.g., silvicultural treatments). Because the latter inputs are under human control, a forest can have a wide range of potential long-term sustainable wood harvest levels. One strategy to ensure the wood growing capacity of forests is fully recognized is to retain it in a productive state.

Harvest flow objectives are driven in part from the current economic and social objectives of the Crown. In the short-term, there is often a desire by government to retain the continued availability of good forest jobs and the long-term stability of communities that rely on forests. At the same time, harvest levels in the short-term must not compromise long-term sustainability. To sustain economic benefits generated by the forest industry, fibre flow is planned and managed to provide continued economic benefits. In general, a reasonable flow pattern provides for a managed and gradual transition from short-term to medium- and long-term harvest levels, and avoids large and abrupt disruptions in timber supply. A reasonable flow has a medium-term level that drops below

the long-term level to the minimum extent and only if justified. The long-term level should provide an even level of growing stock over the long-term.

Cut control is a legal term that refers to a 5-year period. A cut control period is defined in the Cut Control Regulation. It is the amount of total volume a forest license holder may harvest over a given period of time. The license holder may harvest any portion of that total volume in any given year however they must not exceed the total allowable amount of volume at the end of the cut control period or penalties and future reductions may be applied.

Timber benefits can be measured by looking at sustainable harvest levels in relation to the allocated supply levels determined by the Chief Forester of BC. The harvest level is set only after considering biological, social and economic criteria. In BC, more information on this rigorous process to determine allowable annual cut (AAC) levels can be found at the website: [Timber Supply Review Backgrounder](#)



How are targets established?

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

The allocated harvest is developed with input from stakeholders, the broader public, Indigenous Peoples, the forest industry, and government agencies. The Government Chief Forester determines the AAC for the TSA based on analysis and their recommendations. The actual AAC is outside of the direct control of forest licensees, however it is important to track AAC levels over time as many indicators and targets are directly related to AAC and a lowering or increasing of AAC will be reflected in those indicators and targets.

The government may award non-replaceable forest licenses within TSA's however only Canfor's replaceable major licenses are included in this target. The AAC is recalculated every 10 years and is based on the Timber Supply Review (TSR) process. The variance of + 10% represents the variance licensees are allowed in legislation before a financial penalty is applied.

Current Condition

Within the last two years, the following licenses ended their 5 year cut control period: FL A18978 (2011), A19040 (2012), A18979 (2014) and TFL 14 (2014). The percent of volume harvested compared to allocated harvest level for the cut control periods were; FL A18978 (93.6%), A19040 (101.1%), A18979 (91.0%) and TFL 14 (102.1%) Note – the results for A18979 and TFL 14 are preliminary pending receipt of cut control letters and may be adjusted. Note, the 214.3% rate of harvest for the Radium license represents an elevated harvest level to meet the cut control level after several years of curtailed operations due to the mill shutdown. Table 61 shows the annual harvest results for one year. The 114% represents one-year harvest not the cut control period which is balanced by each licenses specific period. The results demonstrate how there are annual fluctuations to harvest levels that are balanced over the cut control period.

Table 61: Harvest Results – 2014

License	AAC by license (m3)	2014 (m3)	% of AAC
FLA 19040 (Cranbrook)	477,652	367,543	76.9%
FLA 18978 (Canal Flats)	220,668	209,217	94.8%
FLA 20212 (Creston)	99,081	117,761	118.9%
TFL 14 (Parson)	180,000	193,395	107.4%
FLA 18979	221,005	473,677	214.3%
Total	1,198,406	1,361,594	114%

The schedule for subsequent Timber Supply Reviews for the Kootenay region can be found at:

[Forest Analysis - TFL 14](#)

[Forest Analysis - Cranbrook TSA](#)

[Forest Analysis - Invermere TSA](#)

[Forest Analysis - Kootenay Lake TSA](#)

The Invermere and Cranbrook Timber Supply Areas (TSA's) are currently undergoing a Timber Supply Review by the Chief Forester of BC. The last determination was made November 1, 2005 and each TSA was issued a postponement until November 1, 2015 by the Chief Forester under Section 8.3.1 of the Forest Act. Determinations for both Cranbrook and Invermere TSA's were made in the fall of 2017; apportionment is expected in 2018.

Strategy

There is a Fibre Flow Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

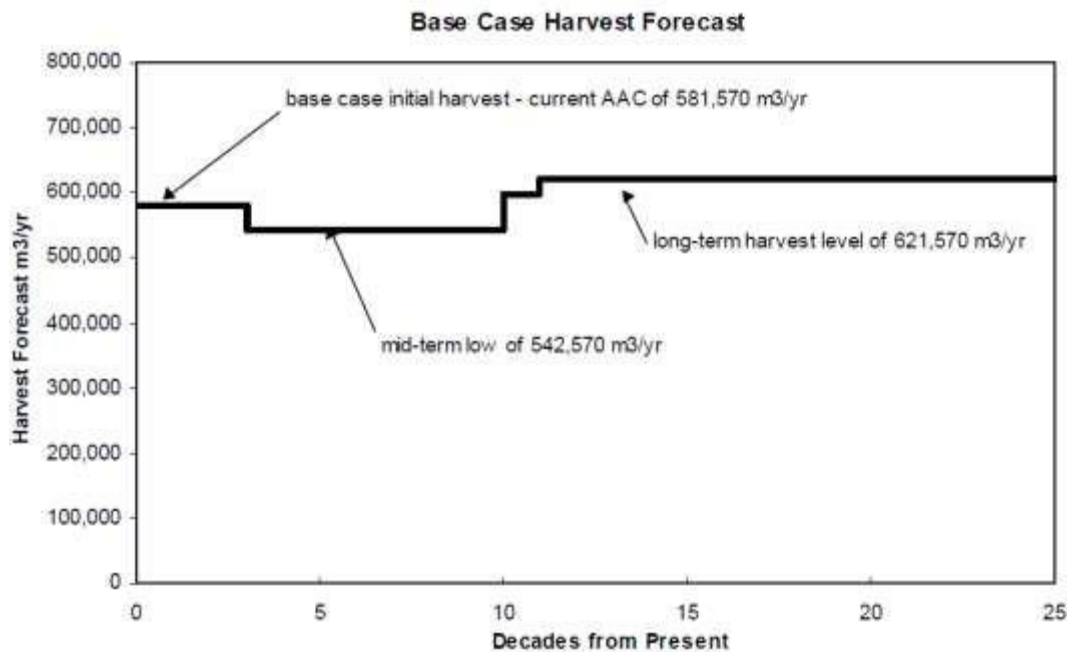
By implementing the Fibre Flow Strategy, it is forecasted that Canfor will achieve 100% (+/- 10%) of each licenses allocated AAC within their respective cut control periods.

Short and long-term harvest flows will reflect forest conditions, forest practices, and the socio-economic objectives of the Crown based on the Timber Supply Review. Timber supply forecasts rely on the Chief Forester (BC) to provide a determination of harvest levels utilizing forecast information, Crown objectives and input from the public.

A timber supply review for the Invermere and Cranbrook Timber Supply Areas were last completed in 2004 with a resulting Chief Forester's determination effective November 1, 2005. The timber supply analysis indicates an initial harvest level of 598,570 cubic metres per year in the Invermere TSA can be maintained for 3 decades. After that, harvest levels decline by 9% to

the midterm harvest level (542,570 cubic meters). It then rises to the long-term harvest level of 621,570 cubic meters in the 11th decade. This long-term level is 7% above the current AAC³⁷.

Figure 40: Invermere TSA TSR Base Case Harvest Forecast

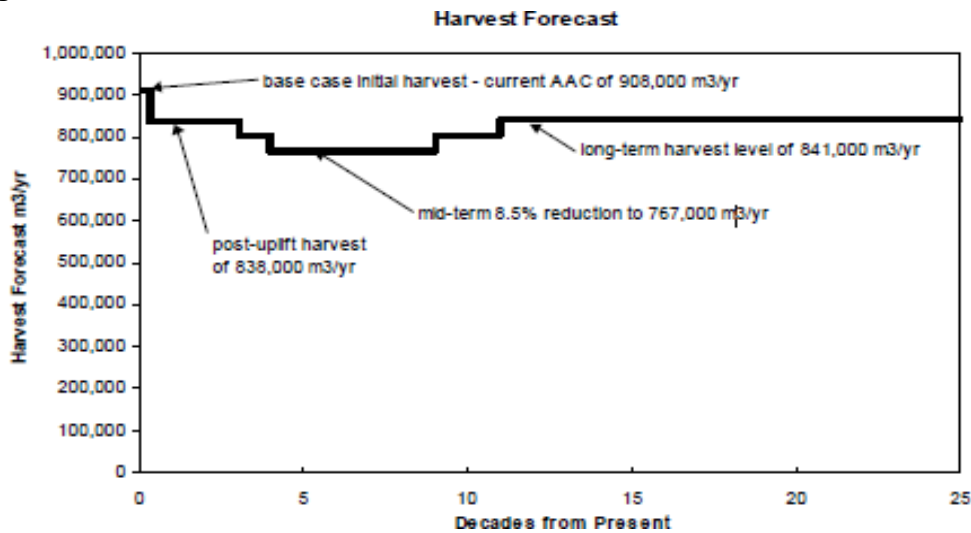


The timber supply analysis indicates a harvest level of 908,000 cubic metres per year in the Cranbrook TSA. This AAC includes a temporary uplift of 70,000 cubic metres, which will remain in place until January 1, 2007 to complete the salvage of timber from the 2003 fires. The pre-uplift AAC was maintained for the first 3 years and then it then declines in two steps totaling 8.5% to 767,000 m³/yr by decade 5, and then increases to the long term harvest level of 841,000 m³/yr by the 11th decade.³⁸

³⁷ AAC determination. <http://www.for.gov.bc.ca/hts/tsa/tsa09/tsr3/09ts2005ra.pdf> and the analysis report http://www.for.gov.bc.ca/hts/tsa/tsa09/tsr3/Invermere_TSR3_Analysis_Report_V3_submitted.pdf

³⁸ AAC determination. <http://www.for.gov.bc.ca/hts/tsa/tsa05/tsr3/05ts2005ra.pdf> and the analysis report http://www.for.gov.bc.ca/hts/tsa/tsa05/tsr3/05ts04ar_v3.pdf

Figure 41: Cranbrook TSA TSR Base Case Harvest Forecast



A timber supply review for the Kootenay Lake Timber Supply Area was last completed in 2009 with a resulting Chief Forester's determination effective August 12, 2010. The 2009 base case for the Kootenay Lake TSA indicated an initial harvest level of 645,000 cubic metres per year, which could be sustained for 20 years before declining to 600,000 cubic metres per year in years 20-30 and to a long-term harvest level of 544,000 cubic metres per year from 30 years on. This harvest forecast differed from the 2001 TSR 2 base case, which indicated an initial harvest level of 691,000 cubic metres per year could be maintained for 50 years before declining to a long-term harvest level of 605,000 cubic metres per year³⁹.

In September 2008, the Chief Forester postponed the date for the next AAC determination to a date prior to November 1, 2015 for both the Invermere and Cranbrook TSA's.⁴⁰ Determinations for both Invermere and Cranbrook TSA's were made in the fall of 2017; apportionment is expected in 2018.

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

[Forest Analysis - TFL 14](#)

[Forest Analysis - Cranbrook TSA](#)

[Forest Analysis - Invermere TSA](#)

[Forest Analysis - Kootenay Lake TSA](#)

Monitoring and Reporting

On an annual basis, report the percent of the harvest level allocated for each license and harvest level cut (cut control volume). The existing scaling system in place (monitored by Government) tracks volume delivered. Report the total actual harvest as a percent of AAC for all licenses with a 5-year cut control period within the last two years.

³⁹ AAC determination http://www2.news.gov.bc.ca/news_releases_2009-2013/2010FOR0132-000942.pdf and the analysis report <http://www.for.gov.bc.ca/hts/tsa/tsa13/tsr3/13ts10ra.pdf>

⁴⁰ Reference <http://www.for.gov.bc.ca/hts/tsa/tsa09/tsr3/09ts08pp.pdf>

Indicator 31 – Primary and By-Products

Indicator Statement	Target (Variance)
Primary and by-products that are bought, sold, or traded with other forest dependent businesses in the local area	Report annually on the total number of vendors (n/a)

What is this indicator and why is it important?

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

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



How are targets established?

Business initiatives and relationships, built on sound principles are not only beneficial to the partners, but also to the economy and vitality of all communities within and adjacent to the DFA.

Canfor determines the amount of timber to be purchased locally on an annual basis. Based on the availability of local wood, economics and the amount of timber to be harvested from tenures held by Canfor, the level of purchased wood fluctuates on an annual basis.

Current Condition

Since 2013, Canfor maintains over 30 purchase clients, 25 sales clients. In addition has number of trade/purchase agreements in place with Louisiana-Pacific, Woodex, Jemi and the Paper Excellence's Pulpmill and other smaller manufactures in the east and west Kootenay.



Strategy

The strategy for this indicator is that Canfor co-operates with other forest-dependent businesses, forest users, and the local community to strengthen and diversify the local economy.

Forecasting and Probable Trends of the Indicator

By maintaining and encouraging business relationships, it is forecasted that support for local communities through business relationships provides employment diversification and increased local revenue.

Monitoring and Reporting

Report on the number of purchase, sale or trade relationships with other forest dependant businesses within or in the vicinity of the DFA. Tracking refers to the number of vendors, not the number of transactions within each relationship.

Indicator 32 – Identified Non-Timber Forest Benefits

Indicator Statement	Target (Variance)
Number of incidences of documented concerns about non-timber forest benefits (NTFB) brought forward, where the NTFB strategy was not followed	0 incidents (0)

What is this indicator and why is it important?

Forests provide a wide range of non-timber benefits across Canfor’s Kootenay DFA. For the purpose of this indicator a non-timber forest benefit (NTFB) refers to a specific identified benefit with a spatially definable area that has the potential to be positively or negatively impacted through forestry related activities.



This indicator refers to those non-tenured NTFBs that are derived from the forest such as botanicals and non-commercial recreation, as well historic and spiritual values. Not exchanged in a marketplace, they are often dearly held by both those who directly benefit from these values, and by those who benefit by knowing these values exist. This indicator differs from the overlapping tenure holder indicator, which covers those tenured NTFBs, such as recreation, mining, guiding, range and trapping.

In general, in British Columbia there is a lack of quantifiable information about the non-timber benefits derived from BC’s forests. Therefore, this indicator was developed to encourage the public to communicate NTFB information with Canfor and ensure that there is a process in place to manage the identified areas.

How are targets established?

The target of zero incidences was set to ensure that all NTFBs brought forward by the public will be considered in forest planning, and have management strategies developed collaboratively for them through the process outlined in the NTFB strategy. The variance is set at zero as once a

NTFB is brought forward by a member of the public it is not acceptable for any deviation from the outlined process.

Current Condition

In 2014 – 2015 there were zero incidences where concerns were ignored or stakeholders that were not satisfied with Canfor's process to deal with their concerns. Prior to implementation of this plan (December 2015) there had been no formal process to consider NTFB in this way. That said, stakeholders were engaged in a similar way to that outlined in the NTFB strategy.



Strategy

There is a Non-Timber Forest Benefits Strategy and Participation Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Non-Timber Forest Benefits Strategy, it is forecasted that Canfor will continue to have zero incidences where concerns regarding NTFBs brought forward by the public that are insufficiently considered in management as per the process outlined in the NTFB strategy.

Monitoring and Reporting

Reports annually the number of entries into COPI associated with accommodations made for NTFB. Report will include any communications that resulted in the use of a decision support tool. Records will need to be separated from those that are directly associated with overlapping tenures as those records are reported on in the Overlapping Tenure Holders indicator. Any incidences of the NTFB strategy not being followed will be documented in ITS.

Indicator 33 – Overlapping Tenures

Indicator Statement	Target (Variance)
Number of incidences of documented concerns related to overlapping tenures brought forward, where the Overlapping Tenures strategy was not followed	0 incidences (0)

What is this indicator and why is it important?

Canfor shares the forest with a number of overlapping tenure holders. An overlapping tenure refers to any Government issued tenure that overlaps Canfor’s Forest licences. These commonly include Guide, Trapper, Range, Mineral, Recreational and Tourism Tenures.

Forest management must recognize the existing and potential economic benefits that can be derived from forests beyond the primary forestry industry. Forest management activities and practices have the potential to impact the rights and resources associated with the overlapping tenures. Additionally, overlapping tenures can be affected by changes to access and timing of operations. This indicator is important to ensure that overlapping tenure holders will have the opportunity to give input and helps develop management strategies intended to fairly address their concerns and protect the rights and resources associated with their tenure.



How are targets established?

The target of zero incidences was set to ensure that all concerns brought forward by overlapping tenure holders will be considered in forest planning and have strategies developed collaboratively for them through the process outlined in the overlapping tenure strategy. The variance of zero was set because once a concern regarding the overlapping tenure holders rights and resources has been brought forward by the tenure holder it is not acceptable for any deviations from the outlined process.

Current Condition

In 2014 – 2015 there were zero incidences of concerns that were ignored, or stakeholders that were dissatisfied with Canfor’s process to deal with their concerns. The process for dealing with concerns of overlapping tenure holders and the associated documentation and reporting changed with the implementation of this plan (December 2015). That said, prior to implementation, stakeholders were engaged in a similar way to that outlined in the Overlapping Tenures Strategy.

Strategy

There is an Overlapping Tenures Strategy and Participation Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Overlapping Tenures Strategy, it is forecasted that Canfor will continue to have zero incidences where concerns brought forward by overlapping tenure holders are insufficiently considered in management as per the process outlined in the Overlapping Tenures Strategy.

Monitoring and Reporting

Report annually the number of entries into COPI associated with accommodations made for overlapping tenure holders. Report will include any communications that resulted in the use of a decision support tool or dispute resolution (refer to Appendix 6). Records will need to be separated from those that are directly associated with NTFBs as those records are reported on in the NTFB indicator. Any incidences of the Overlapping Tenures Strategy not being followed will be documented in ITS.

Element 5.2 – Communities and Sustainability

Element 5.2: Communities and Sustainability	Contribute to the sustainability of communities by providing diverse opportunities to derive benefits from forests and by supporting local community economies.
Value:	Sustainable and Viable Communities
SFM Objective:	Ensure continued investment in local communities through local spending, training of workers, ensuring worker safety, providing for local employment, corporate donations, sponsorships, and scholarships.

The following indicator statements have been identified for this Element:

- 34 Maintain a high percentage of procured goods and services that are from local sources
- 35 Number of Corporate donations, scholarships or other sponsorships to local community groups, individuals or events
- 36 Training in environmental and safety procedures in compliance with company training plans
- 37 Level of direct and indirect employment

Indicator 34 – Local Procurement of Goods & Services

Indicator Statement	Target (Variance)
Maintain a high percentage of procured goods and services that are from local sources	>= 70% of FMG dollars spent in local communities; 5-year rolling average (-10%)

What is this indicator and why is it important?

This indicator is important to test the economic sustainability of the forest industry. This would measure the degree to which expenditures in forestry-related activities support the local economy. It would be an important indicator to community leaders and public advisory groups. The development of a strong local economy promotes strong labour markets, educational opportunities and amenities to attract highly qualified individuals to the forest sector. Therefore, it contributes directly to the long run sustainability of both the industry and the local economy. In the same way that larger forest organizations depend on a secure flow of resources to justify investment in an area, small businesses depend on a sustained flow of opportunities to develop and invest in their local community. As the majority of forest workers are hired locally, communities benefit by forest planning and operations.

This indicator looks at the amount of money spent by Canfor locally within the forestry sub-sector. Forests represent not only a return on investment (measured, for example, in dollar value, person-days, donations, etc.) for the organization but also a source of income and non-financial benefits for DFA-related workers, contractors, and others; stability and opportunities for communities; and revenue for local, provincial, and federal governments.

Local is defined as businesses that have mailing addresses or known established businesses located in the East Kootenay region. Procurement of local goods and services includes seeking the optimum or “highest and best” value for goods and services without compromising safety, quality and cost-competitiveness.

This indicator is tied to opportunities for Indigenous Peoples to participate in the forest economy and the optimal use and local processing of forest primary and by-products.

How are targets established?

This target is established based on past performance and input from the Radium Public Advisory Group’s input that felt the previous target of 50% was too low. The target reflects a desire to enhance community well being by ensuring a greater than 70% of forestry-related expenditures stay within local economies. The variance is intended to account for the variability associated with the business cycle and the purchase of goods and services that may not be available locally.

Current Condition

Based on the 5-year average information available for Radium (Figure 42), the 5-year average percent spend for local goods and services is 75.5%. There was a significant decrease in 2010/11 figures that is due to the Radium mill curtailment and temporary closures of the Canal Flats and Elko mills. With data from the first full year following the Tembec acquisition, the percent local spend with the entire region has average 94% since 2013 as seen in Figure 43. The current condition for local expenditures is provided in the following figures.

Figure 42: 5 Year average % local spend in Radium DFA

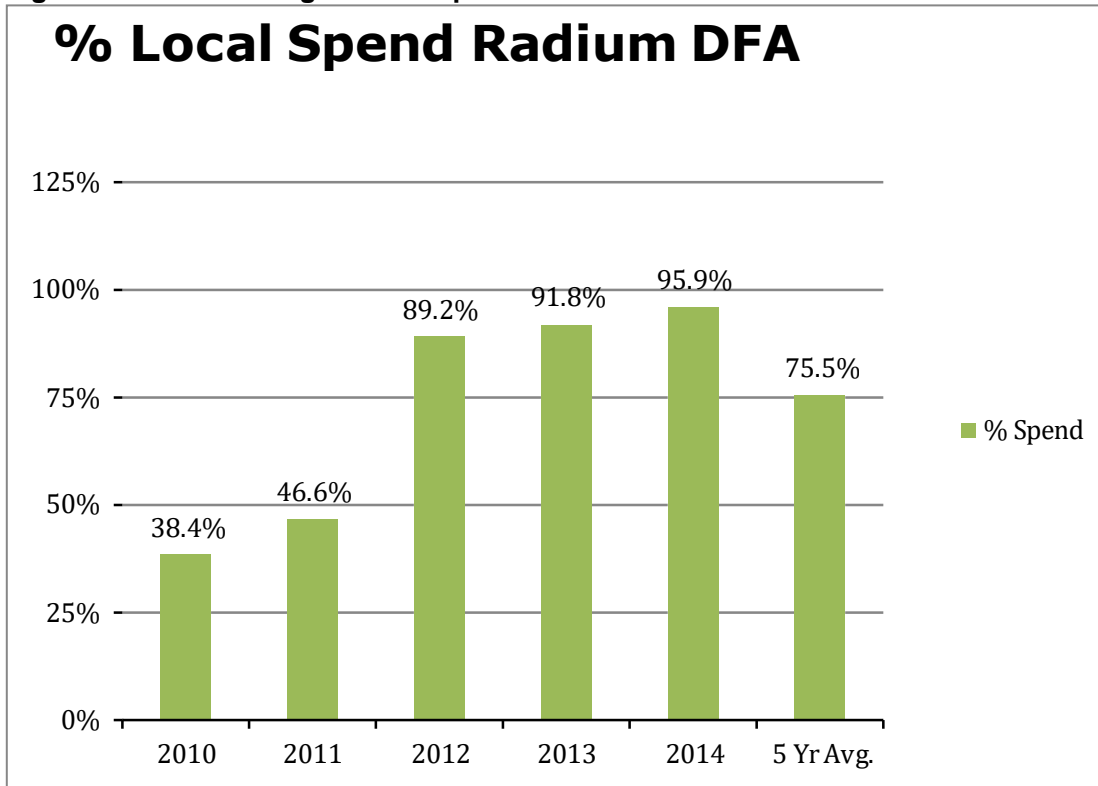
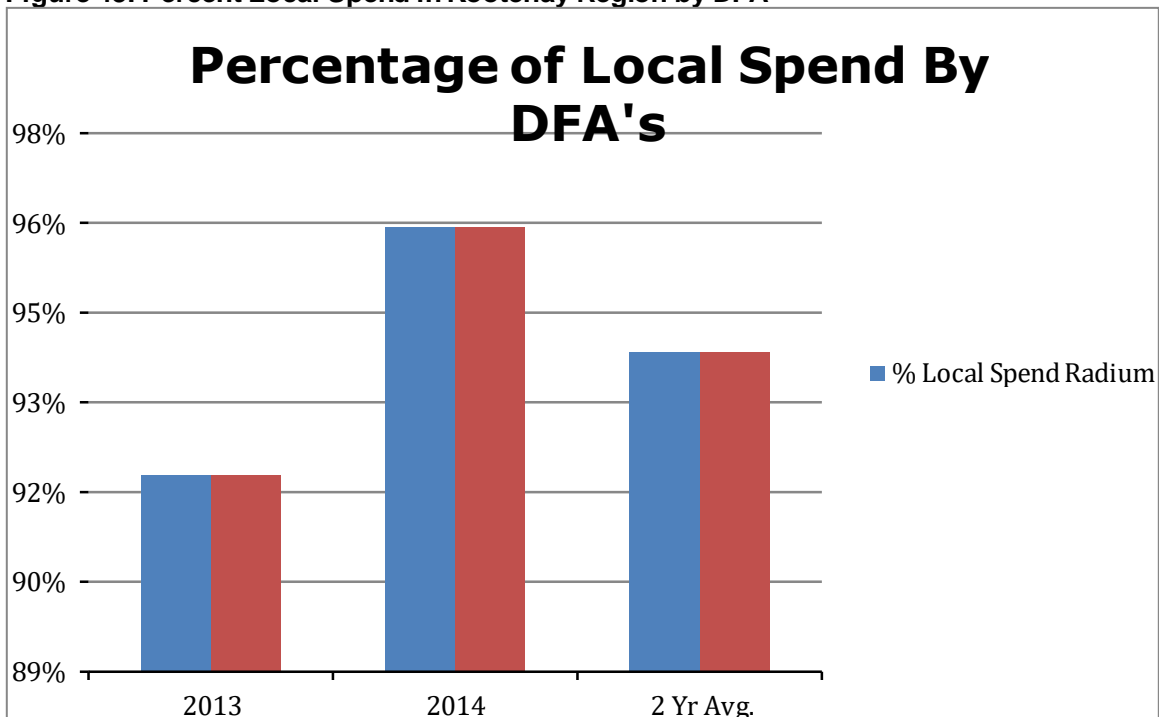


Figure 43: Percent Local Spend in Kootenay Region by DFA



Strategy

There is a Procurement of Local Goods & Services, Corporate Sponsorships, Donations & Scholarships Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Procurement of Local Goods & Services, Corporate Sponsorships, Donations & Scholarships Strategy it is forecasted that the target will be met resulting in resilient and stable communities within the region through long run sustainability of both the industry and the local economy.

Monitoring and Reporting

The total dollars spent and dollars spent locally for the forestry sub-sector will be monitored and reported annually from internal accounting systems for Canfor. Addresses of the contractors will be used as per the above definition for “local” recognizing that some addresses may be for a local companies corporate head office.

As Canfor acquired the Tembec assets in the Kootenays part way through 2012, only data from 2013 onwards is available for the entire region. Local spend data for the 5-year average is available for the Radium DFA only. This year’s annual report and current condition will include data from 2013 onwards.

As financial tracking does not differentiate between the Radium licence and the remaining part of the region, total spends are pro-rated for each area by the harvested volumes in each of the FSC and CSA DFA’s. Although the total dollars spent will vary, local percentages will be the same for each DFA as the dollars spent cannot be broken down by license area, only by local or non-local as per the definition.

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Indicator 35 – Corporate Sponsorships, Donations and Scholarships

Indicator Statement	Target (Variance)
Number of Corporate donations, scholarships or other sponsorships to local community groups, individuals or events	>= 5 donations and/or sponsorships to regional communities, events or individuals per year (- 1)

What is this indicator and why is it important?

This indicator demonstrates Canfor's commitment to local communities through corporate sponsorships, donations and scholarships. This would measure the degree to which Canfor provides economic benefits to local communities additional to expenditures in forestry-related activities that support the local economy. It would be an important indicator to community leaders and public advisory groups.

Canfor funds organizations and projects that meet the needs of the community and reflect Canfor's business goals and ideals. Canfor will seek out or give preference to unique or exclusive sponsorship or donation opportunities that will have a long-term and significant benefit to the community while providing Canfor with appropriate recognition.

How are targets established?

This target is established based on equitable distribution of available funds throughout communities within Canfor's operating areas and reflects a desire to enhance community well-being. The target will ensure that applications meet Canfor's criteria while offering fair distribution of the corporate funds available. The variance is intended to account for the variability associated with valid applications received for donations and scholarships.

Current Condition

Based on the 2014 reporting year, a total of 19 donations, scholarships or sponsorships were given within Kootenay communities at a total of \$17,455 (approximately as 3 donations were lifts of lumber with estimated current value).

Within the Radium DFA, two scholarships including a Bentley-Prentice were awarded with a total value of \$3615 and a donation was made to a minor hockey team in the amount of \$500.

Within the remaining portion of the DFA, 3 donations were made to various Indigenous communities and events, two high school awards were made in the amount of \$1500. Several donations were made to sports teams, the local food banks, a forestry education centre and a wildlife fund. Two lifts of lumber were donated to the Provincial Trapping AGM in April 2014 at an approximate value of \$2400 and the third lift was donated to the Ktunaxa Nation's AGA for a raffle prize.

Strategy

There is a Procurement of Local Goods & Services, Corporate Sponsorships, Donations & Scholarships Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Procurement of Local Goods & Services, Corporate Sponsorships, Donations & Scholarships Strategy, it is forecasted that a minimum of 5 sponsorships or donations will be made within the Kootenay region. By making these contributions, it is forecasted that communities and groups will receive benefits that will sustain and improve local communities. Additionally, scholarships will provide support for local students who choose to pursue educational programs which meet Canfor's objective of supporting students and who choose a career in the forestry industry.

Monitoring and Reporting

Donations, sponsorships and scholarships are awarded and tracked at both the corporate and local levels. The total number of donations, sponsorships and awards and their total dollar amount will be reported annually.

Indicator 36 – Environmental & Safety Training

Indicator Statement	Target (Variance)
Training in environmental and safety procedures in compliance with company training plans	100% of Canfor Kootenay FMG employees will have required environmental and safety training (-5%)

What is this indicator and why is it important?

This indicator is important, as Sustainable Forest Management (SFM) requires safety training and environmental awareness for forest workers to know how to work in a safe manner and adhere to environmental requirements. Investments in training and skill development generally pay dividends to forest organizations by way of a safer and more environmentally conscious work environment. By providing this training and associated skills development, there will be longevity and diversity of skills in local communities.

Assessing whether employees have received both safety and environmental training is a direct way of measuring this investment. Training plans should be in place for employees of the forest organizations who work in the forest. Measuring whether the training occurred in accordance with these plans will confirm an organizations commitment to training and skills development.

Contractors have training obligations to meet legal and Canfor’s requirements. Contractors are responsible for training their employees and maintaining training records.



How are targets established?

This target is established so that all Canfor Kootenay FMG employees have required training as per the training matrix to safely and properly execute plans. The variance allows for some discretion with respect to employees whose work is insulated from forest operations (for example administrative or clerical work) or who may be new hires and are completing training as part of their orientation.

Current Condition

At the time of this writing, 73 of 75 FMG employees have completed the required training (97%).

Strategy

There is an Employee & Forest Workers Training Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Employee & Forest Workers Training Strategy, it is forecasted that forest planning and operations will be conducted with a genuine focus on worker safety and environmental stewardship. Forest workers (employees and contractors) will have the sufficient knowledge and tools to conduct their jobs, performing well even under challenging conditions. Additionally, there will be a local workforce with diversity and longevity of skills in local communities.

Monitoring and Reporting

On an annual basis, the FMG Safety Coordinator in conjunction with the FMGSC will review the training matrix. The FMS coordinator is responsible for determining the education, training or experience required for each position, and for documenting these requirements. Supervisors are responsible for ensuring that before beginning work, their new employees and contractors have completed all necessary training, which includes:

- Environmental and SFM awareness education; and
- Specific roles in environmental and SFM procedures, standard work procedures, or contracts.

Eclipse database reports will contain training records for FMG employees.

On an annual basis, employees will meet with their supervisor to develop and review their Canfor Development Plans (CDP). They will adjust the plan based on progress made to date. They will also schedule regular meetings to monitor implementation of the identified action items.

Canfor Contractors are responsible for training their employees and maintaining training records. Supervisors are responsible for periodically verifying that contractors' training records are adequate.

Indicator 37 – Direct & Indirect Employment

Indicator Statement	Target (Variance)
Level of direct and indirect employment	AAC * employment multiplier – 5-year average (+/- 10%)

What is this indicator and why is it important?

This indicator is important as forests represent not only a return on investment (measured, for example, in dollar value, person-days, donations, etc.) for Canfor but also a source of income and non-financial benefits for DFA-related workers, local communities and governments.

While employment levels have been declining in many manufacturing industries including the forest industry, there remains a very direct relationship between direct and indirect employment and annual harvest levels. Direct forest sector and non-forest sector employment levels are predicted using TSR3 multipliers (person years per 1000 m³ harvested) as derived from Statistic Canada. Employment multipliers were not available in TFL 14's determination therefore the same figures were used for the Invermere TSA. The harvest levels figures do not include purchase volumes, which vary based on mill consumption requirements, which will contribute additional employment in both forest operations and manufacturing.

Invermere TSA and TFL14	Cranbrook and Kootenay Lake TSA's
Direct employment = 0.545 PY's/'000m ³	Direct employment = 0.69 PY's/'000m ³
Indirect employment = 0.20 PY's/'000m ³	Indirect employment = 0.26 PY's/'000m ³

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

The economic health and stability of a community is largely dependent on steady employment for area residents. Knowing the amount of employment in the forest industry sub-sector can help analyse the diversity of local employment opportunities for the forest industry in the DFA. As any industry continues to improve, efficiencies and as new technology comes on stream, the numbers and types of workers fluctuate. This indicator is meant to track local trends against regional/provincial trends to determine similarities.

Indirect/induced employment and income estimates relate to people who are not directly employed by the forest industry but who provide services or supplies to it. Measuring the amount of employment and income generated by related companies/individuals provides a clearer picture as to the economic impact of the forest industry in the DFA. It is one of the indicators that can be used to determine the resilience of the local economy.

How are targets established?

The target for this indicator is established from employment coefficients set during TSR but the actual numbers are derived from Statistics Canada information and apportioned based on the Canfor's licenses in the TSAs. The target represents average employment figures if the rate of annual allowable cut is balanced over the cut control period. Many licenses have different cut control dates so a 5-year average is used as a proxy to each license's actual cut control period. These critical employment statistics are monitored at the national level; the multiplier provides consistent average measure. The volumes used to determine the number of person years (PY) is based on Canfor's last five years performance from the cut control statement for FL A18979 and the other licenses in the Kootenay Region.

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Current Condition

Based on the last 5 years harvest levels within the Radium license, the calculated 5-year average employment PY's is 149 persons which is -10% of the target. It should be noted that due to Canfor Radium's shutdown in 2009-2011, these numbers are not reflective of normal operations for that license. The target is achieved.

Based on the last 5 years harvest levels within the remaining Kootenay DFA, the calculated 5 year average employment PY's is 989 persons which is + 13 % of the target. The target is exceeded in large part because of the increased annual harvest level to balance the 5-year cut control.

Figure 44: Radium Employment 2010-2014

FL A18979 Volume harvested					
Year	2010	2011	2012	2013	2014
AAC m ³	221,005	221,005	221,005	221,005	221,005
Cumulative AAC m ³	221,005	442,010	663,015	884,020	1,105,025
Annual harvest m ³	3,246	0	96,356	428,222	473,677
% of AAC	1.47%	0.00%	43.60%	193.76%	214.33%
Cumulative	3,246	3,246	99,602	527,824	1,001,501
% of cumulative AAC	1.47%	0.73%	15.02%	59.71%	90.63%
Average per year over five years	200,300				
Direct + indirect employment per 1000 m ³	0.745				
Person Year Target	165				
Person Year Calculated	149				

Figure 45: Kootenay DFA Employment

All remaining licenses administered by Canfor FSC DFA - Volume harvested					
Year	2010	2011	2012	2013	2014
AAC m ³	1,021,686	1,025,925	1,025,925	1,020,051	1,020,051
Cumulative AAC m ³	1,021,686	2,047,611	3,073,536	4,093,587	5,113,638
Annual harvest m ³	983,928	1,171,524	1,185,876	1,238,985	921,122
% of AAC	96.30%	114.19%	115.59%	121.46%	90.30%
Cumulative	983,928	2,155,452	3,341,328	4,580,313	5,501,435
% of cumulative AAC	96.30%	105.27%	108.71%	111.89%	107.58%
Average per year over five years	1,100,287				
Cranbrook & Kootenay Lake TSA Direct + indirect employment per 1000 m ³	0.95				
Invermere TSA & TFL 14 Direct + indirect employment per 1000 m ³	0.745				
TFL and A18978 total 5 year harvest	1,702,561				
Cranbrook & KL TSA – total 5 year licenses harvest	3,798,874				
Person Year Target	875				
Person Year Calculated Invermere TSA and TFL	267				
Person Year Calculated Cranbrook and KL TSA	722				
Total Person Years Calculated	989				

Strategy

There is a Fibre Flow Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Fibre Flow Strategy, it is forecasted that harvesting within sustainable harvest levels in relation to Canfor's allocation of the allowable annual cut will provide direct and indirect employment levels within +/- 10% of the targets over a 5-year period.

Forecasting of this indicator will consist of utilizing harvest related employment multipliers. The multipliers have been set up as part of TSR and are subject to change. If harvest levels increase, it is expected that, initially, employment figures for most sub-sectors will also increase.

Monitoring and Reporting

This is a process indicator and monitoring will consist of reporting out on the indicator and monitoring trends.

Periodic Monitoring

Review the national statistics that support the job multiplier and revise the multiplier every 5 years or with a new TSR determination.

Annual Reporting

Report the last 5 year cut control volumes harvested for the Radium licence and for the remaining Kootenay licenses combined and multiply those figures by the direct and indirect employment multipliers.

Criterion 6 – Society’s Responsibility

Sustainable forest management includes responsibility for worker and community safety, and the requirement for fair, equitable, and effective forest management decisions.

As forest management recognizes a broader range of forest values, particularly on public land, it is increasingly important that directly affected and interested stakeholders have input into management concerns. Current certification guidelines (e.g. Forest Stewardship Council, Canadian Standards Association) require public participation. Certification has 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 consists of two Elements:

Element 6.1: Fair and Effective Decision-Making	Demonstrate that the SFM public participation process is designed and functioning to the satisfaction of the participants and that there is general public awareness of the process and its progress.
Element 6.2: Safety	Demonstrate that the organization is providing and promoting safe working conditions for its employees and contractors.

Element 6.1 – Fair and Effective Decision-making

Element 6.1: Fair and Effective Decision-Making	Demonstrate that the SFM public participation process is designed and functioning to the satisfaction of the participants and that there is general public awareness of the process and its progress.
Value:	Fair and Effective Decision Making
SFM Objective:	Ensure that the SFM public participation process is functioning.

Fair and effective decision-making can be achieved through the implementation of effective and meaningful public participation. The benefits of effective and meaningful public participation in sustainable forest management are well known and documented. Effective public participation in sustainable forest management planning results in sharing of knowledge and expertise between multiple parties; a higher level of satisfaction for Indigenous Peoples, rights holders and directly affected parties with a right and/or interest in the forest resource; and less conflict on the land base. This results in the achievement of a higher level of sustainable forest management and more efficient operations for forest managers.

Effective and meaningful public participation has several components. Each is listed below.

1. Canfor must know who has a right and/or an interest in the resource and its management, as well as the nature of this right and/or interest. In a forest as large and complex as the DFA, tracking Indigenous Peoples, rights holders and directly affected parties and their respective rights and/or interests requires a high degree of diligence and commitment by all the forest professionals working to manage the resource.
2. Canfor must provide information in meaningful ways to Indigenous Peoples, rights holders and directly affected parties so that they can provide informed and timely input. This often means providing information in multiple ways and multiple times. For instance, information may be provided in its ‘raw’ form as data or a planning document, in addition to being presented in summary forms at public meetings or to interest groups. This step of public participation is captured more fully in Element 6.5. Conversely, there is an onus on Indigenous Peoples, rights holders and directly affected parties to provide information in a timely fashion to the resource manager regarding the nature of their right and/or interest as it relates to the resource.
3. Canfor needs to work with Indigenous Peoples, rights holders and directly affected parties to develop steps to protect their mutual rights and/or interests. Where Indigenous Peoples and rights holders have a right, the resource manager should work towards obtaining their free and informed consent to those portions of the management plan that affect that right.

Depending on the nature of the Indigenous group, rights holder, or directly affected party’s right and/or interest, this may be as simple as a conversation or as complex as participating in a multi-stakeholder process to engage multiple groups in looking at landscape level solutions to concerns. The multiple ways that Canfor works with Indigenous Peoples, rights holders and directly affected parties is outlined in the Public Participation Strategy found in Section 6.2: Sustainability Strategies.

In an effective public participation process, where parties are unable to reach a consensus on how to move forward, the implementation of a mutually agreed to dispute resolution process should be implemented (refer to Appendix 6). This gives all parties the certainty of an end to the decision-making process and on- going certainty as they move ahead.

The following indicator statements have been identified for this Element:

- 38 PAG established and maintained according to Terms of Reference (satisfaction survey implemented)
- 39 Number of educational opportunities for information/training that are delivered to the PAG
- 40 SFM monitoring report made available to the public
- 41 Independent, third party review of the degree of Canfor achievement of meaningful participation

Note: Additional requirement for Indigenous Peoples and local rights holders are also included in this SFMP in Elements 7.1 and 5.1, respectively.

Indicator 38 – PAG Satisfaction

Indicator Statement	Target (Variance)
PAG established and maintained according to Terms of Reference (satisfaction survey implemented)	80% satisfaction from surveys (-10%)

What is this indicator and why is it important?

An effective way to receive focused input from the public is to form a public advisory group (PAG). Representative members of various Indigenous Peoples, rights holder and directly affected party groups, as described in Section 2.2.2, are involved. This process is established in order to facilitate the exchange of knowledge between a wide-ranging and diverse set of Indigenous Peoples, rights holders, directly affected parties and Canfor.

Ensuring the continuing interest and participation of the PAG is an integral part of a dynamic and responsive SFM Plan. The opportunity for people to share information, discuss and solve problems, and set and meet objectives is key to achieving fair and effective decision-making.

It is important to document PAG member satisfaction with the communication and the result. This indicator ensures that a documented process is in place to track the satisfaction of the PAG members with the opportunities for the exchange of values/opinions. Over time, Canfor can assess the trend of the survey results and the comments and implement an adaptive management process. This documented process facilitates continual improvement for both Canfor's receipt of information to guiding forest management decisions, and the interested parties' capacity building.

How are targets established?

Canfor and the existing 2015 PAG established targets jointly. It was felt that 80% satisfaction and a 10% variance would indicate that the PAG was sufficiently meeting its objectives.

Current Condition

PAG satisfaction for the 2015 year was 95%, 86% in 2014 and 85% in 2013.

Strategy

There is a Participation Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the PAG component within the Participation Strategy, (item 3 of the strategy), it is forecasted that Canfor will maintain an active, engaged PAG that provides meaningful input into forest management practices and facilitates the dissemination of information back to their respective groups.

Monitoring and Reporting

The data required to monitor and report out on this indicator is the scoring of the satisfaction survey for the public advisory group. 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. Results of the feedback form is compiled and reported back to the PAG at the subsequent meeting. As well, the survey is summarized as part of annual monitoring program and contained within the SFMP Annual Report.

Indicator 39 – Educational Opportunities – Information/Training

Indicator Statement	Target (Variance)
Number of educational opportunities for information/training that are delivered to the PAG	>= 1/meeting (0)

What is this indicator and why is it important?

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

This indicator recognizes the importance of providing informational or training opportunities for members of the Public Advisory Group that in turn contributes to a more knowledgeable and effective PAG. Members of the public provide local knowledge that contributes to socially and environmentally responsible forest management. At times, public members may feel limited in their ability to contribute to discussions because they lack the technical forestry knowledge. Broadening this knowledge enables better dialogue and helps contribute to balanced decisions and an SFM Plan acceptable to the majority of public. A few of the many examples of educational opportunities would include field trips and guest presentations on a particular topic.

How are targets established?

After reviewing previous PAG minutes it was determined that at least one opportunity could be provided at every PAG meeting. Discussions with current (2015) PAG members confirmed that this was an effective and appropriate level of information exchange.

Current Condition

There were two educational opportunities provided to the PAG during the 2015 year.

Strategy

There is a Participation Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the PAG component within the Participation Strategy, it is forecasted that public participation in forest planning and operations is open, inclusive and responsive to public concerns and grounded in science. Over time, the PAGs knowledge and awareness of forest management will increase.

Monitoring and Reporting

Reporting will be based upon the number of educational opportunities that are delivered to the PAG and/or public either during the PAG meetings that take place in the reporting year, or during field tours or educational events put on by Canfor to which the PAG members are invited. PAG meeting minutes contain supporting documentation. The target will be considered to have been met if Canfor was able to provide one or more educational/training opportunities, as described above, to the PAG members at each meeting in a reporting year.

Indicator 40 – SFM Monitoring Report

Indicator Statement	Target (Variance)
SFM monitoring report made available to the public	One SFM Annual Report available to public annually via web (N/A)

What is this indicator and why is it important?

This indicator recognizes the importance of keeping Indigenous Peoples, rights holders and directly affected parties informed on the status of sustainable forest management. Issues of concern brought forward by the public are part of the discussions occurring at public advisory group meetings and often work their way into a reporting requirement of the SFM Plan. Annual reporting of the SFM Plan's performance as it relates to the indicators and targets to the Public Advisory Group and to the broader public provides an open and transparent means of demonstrating how issues of concern are being managed. As well, it provides the opportunity for the public to respond.

How are targets established?

The target is established to provide timely and topical information to the local public, as well as a worldwide audience via the Internet. In addition, this source of distribution has a contact mechanism for those looking for additional information or to provide input.

Current Condition

The SFM Annual Report is located on [Canfor Plans - select Operations of Interest](#).

Strategy

There is a Participation Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Participation Strategy, it is forecasted that Public awareness and an understanding of the SFM Plan and annual performance against the Plan's targets. A major component of a continuously improving SFM Plan is that it has openly informed, included, and responded to the public.

Monitoring and Reporting

Report a yes/no answer as to whether the annual monitoring report was made publicly available on an external website. Reporting will be based upon the previous year's Annual Report being posted on the web prior to the end of the current reporting year.

Indicator 41 – Third Party Verification

Indicator Statement	Target (Variance)
Independent, third party review of the degree of Canfor achievement of meaningful participation	Compliance with external audit

What is this indicator and why is it important?

The effectiveness of a public participation strategy is difficult to quantify with traditional indicators and measures. The best effectiveness measure is a comprehensive, independent third party review of the program to ensure it is meeting its objectives. This review could be done as part of an existing external audit process, such as a Forest Stewardship Council (FSC) audit, Canadian Standards Association (CSA) or it could be done as a stand-alone project.

How are targets established?

This target was established based on the best management practices established by FSC. In a forest as complex and dynamic as the DFA it is expected that there will be temporary lapses in achieving meaningful participation. As long as Canfor remedies these within a timely manner (timelines set by the third party reviewer), this indicator is considered met.

Current Condition

This indicator is currently being met, as verified by the valid FSC and CSA certificates for the DFA.

Strategy

There is a Participation Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the PAG component within the Participation Strategy, it is forecasted that public participation in forest planning and operations is open, inclusive and responsive to public concerns and grounded in science. Independent review will offer opportunities for continual improvement and an on-going measure will ensure the strategy is meeting its objectives.

Monitoring and Reporting

Continue to participate in the annual audits for each of FSC and CSA Certification. Make available the public reports describing the audit and findings.

Element 6.2 – Safety

Element 6.2: Safety	Demonstrate that the organization is providing and promoting safe working conditions for its employees and contractors.
Value:	Safe working conditions
SFM Objective:	Employer and contractor safety records meet current acceptable standards and demonstrate continual improvement.

The following indicator statement have been identified for this Element:

- 42 Implementation and maintenance of a certified safety program

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Indicator 42 – Certified Safety Program

Indicator Statement	Target (Variance)
Implementation and maintenance of a certified safety program	100% (0)

What is this indicator and why is it important?

Canfor’s first measure of success is the health and safety of its people. This philosophy is embraced and promoted from the mill floor through the woodlands to the executive offices. This commitment is reflected in the work practices and safety programs employed at all operations.

Worker and community safety can be impacted by forest management strategies. The provincial government sets acceptable safety limits for forest workers. Other guidelines identify other forms of risk potentially affecting communities and forest visitors, such as slope instability or fire. Monitoring safety within the SFM Framework will assist in refining forest management strategies that accomplish their intended function without putting workers and communities at risk.

This indicator is meant to measure the impact of forest management activities 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 activities. This indicator attempts to measure both procedures followed to maintain safety at acceptable levels, and actual safety outcomes.

How are targets established?

The target agreed to by the PAG was for compliance with a safety program as evidenced through safety audits conducted to the BC Forest Safety Council SAFE Companies Program. Safety audits reveal, if existing safety programs are being implemented, if the safety programs are effective and if the safety program is being continuously improved. The results of Canfor’s annual Safety Audit will be used to determine if Canfor maintains its’ SAFE certification.



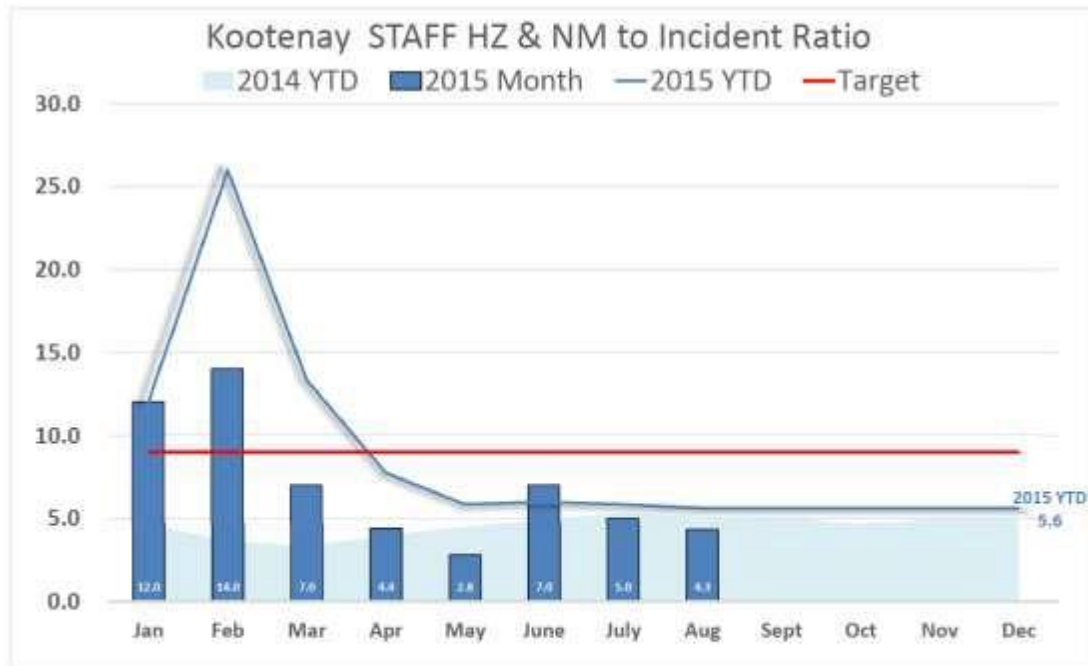
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Current Condition

Canfor maintains a certified safety Program – Occupational Health & Safety Program (May 2016). The program covers topics ranging from relevant legislation to hazard identification, risk assessment and control measures. Canfor regularly refines and improves its safety program – there were 55 improvements that planned to be incorporated into the safety system during 2014. On addition, Canfor provides training related to health and safety to staff and contractors. Contractors are required to be safe-certified by the BC Forest Council.

Canfor’s staff and contractor safety record is above the industry average and the trend is reported as improved compared to prior years.

Figure 46: Kootenay Safety Numbers – 2014



Kootenay	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	YTD	Pt YTD
Hazard	4	3	5	11	8	4	8	5	0	0	0	0	48	31
Near Miss	8	11	9	11	6	10	7	8	0	0	0	0	70	7
INCIDENTS														
Prop Damage	0	0	2	2	3	1	2	1	0	0	0	0	11	7
First Aid	0	1	0	2	0	0	1	2	0	0	0	0	6	1
Medical Aid	0	0	0	1	2	1	0	0	0	0	0	0	4	1
Medical Treatment	0	0	0	0	8	0	0	0	0	0	0	0	8	2
Last Time	0	0	0	0	0	0	0	0	0	0	0	0	0	0

9/4/2015

Strategy

There is no SFMP Strategy associated with this indicator, as all procedures follow Canfor Certified Safety Program.

Forecasting and Probable Trends of the Indicator

By implementing Canfor’s Certified Safety Program, it is forecasted that Canfor will remain in high compliance with the Safety Program.

Monitoring and Reporting

The data required to monitor this indicator is the written safety program, audit results and proof that it was administered to the workers, as well as proof that the workers understand the policy. Report a yes/no as to whether the operation has retained certification of its safety program.

Criterion 7 – Indigenous Relations

Indigenous Peoples, because of their connection to the land and its resources, have knowledge of sites that have spiritual, cultural and traditional importance to their culture. By building a trusting relationship with Indigenous Peoples, they may be more willing to share some confidential information to identify and protect important values and sites during the planning process. Canfor staff recognizes Indigenous Peoples title and rights and treaty rights and identified staff will receive appropriate training to better understand and work more closely with local Indigenous Peoples.

This Criterion consists of two Elements:

Element 7.1: Indigenous Peoples and Treaty Rights	Recognize and respect Indigenous Peoples title and rights and treaty rights. Understand and comply with current legal requirements related to Indigenous Peoples title and rights and treaty rights.
Element 7.2: Respect for Indigenous Peoples Forest Values, Knowledge, and Uses	Respect traditional Indigenous Peoples forest values, knowledge and uses as identified through the Indigenous Peoples input process.

Element 7.1 – Indigenous Peoples and Treaty Rights

Element 7.1: Indigenous Peoples and Treaty Rights	Recognize and respect Indigenous Peoples title and rights and treaty rights. Understand and comply with current legal requirements related to Indigenous Peoples title and rights and treaty rights.
Value:	Indigenous Peoples and Treaty Rights
SFM Objective:	Ensure that Indigenous rights are understood and complied with.

Broadly defined goals such as secure access to resources, the equitable sharing of benefits, and participation in decision-making are found to be important in almost every forest context where there are Indigenous Peoples interests involved. The rationale behind Element 7.1 and 7.2 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 Indigenous Peoples unique cultural, spiritual and economic needs are addressed.

The development of the indicators for Elements 7.1 and 7.2 take into account the responsibility that resource managers have in ensuring that Indigenous Peoples have access to and understanding of information on forest resources for a variety of needs. Indigenous communities may indicate a desire for this information, but managers also recognize that Indigenous Peoples may chose not to participate or may not have the capacity to meaningfully participate.

The following indicator statements have been identified for this Element:

- 43 Employees receive Indigenous Peoples awareness training
- 44 Evidence of best efforts to obtain acceptance of applicable management plans based on Indigenous communities having a clear understanding of the plans by using processes preferred by individual Indigenous communities

Indicator 43 – Indigenous Peoples Awareness Training

Indicator Statement	Target (Variance)
Employees receive Indigenous Peoples awareness training	100% of staff who are required to have Indigenous Peoples awareness training as per the staff training matrix. (-10%)

What is this indicator and why is it important?

This indicator recognizes that it is important for staff who work with Indigenous Peoples to have a clear understanding of Indigenous Peoples titles and rights, treaty rights and an appreciation of their culture. It is important that staff understand these rights, as there may be a potential to impact or infringe on those rights without proper training or understanding. [Section 35 of the Constitution Act, 1867 to 1982, Part II - Rights of the Aboriginal Peoples of Canada](#) states:

“The existing aboriginal and treaty rights of Aboriginal Peoples of Canada are hereby recognized and affirmed”.

Examples of rights that Section 35 has been found to protect include hunting, fishing, trapping, gathering, sacred and spiritual practices, and title. SFM requirements are not in any way intended to define, limit, interpret, or prejudice on-going or future discussions and negotiations regarding these legal rights and do not stipulate how to deal with Indigenous Peoples title and rights, and treaty rights. The first step toward respecting Indigenous Peoples title and rights, and treaty rights is compliance with the law. It is important for companies to have an understanding of applicable Indigenous Peoples title and rights, and treaty rights, as well as the Indigenous Peoples interests that relate to the DFA.

How are targets established?

The target of 100% compliance for required staff to complete Indigenous Peoples Awareness training supports Canfor’s requirement to comply with laws and their desire to have positive open communications with local Indigenous Peoples. This involves all Canfor’s required managers and FMG staff members have a good understanding of Indigenous Peoples culture, title and rights, and treaty rights. For this reason, 100% of required staff will have Indigenous Peoples Awareness training. The Canfor training matrix identifies FMG staff who require Indigenous Peoples awareness training. The variance allows for staff who may be changing roles a short time period to complete the training.

Current Condition

100% of required staff has completed Indigenous Peoples Awareness Training.

Strategy

There is an Indigenous Peoples Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Indigenous Awareness Training in the Indigenous Peoples Strategy, 100% of staff that is required to have this training will complete it. Based on staff having Indigenous Peoples Awareness training, staff will gain a better understanding of Indigenous Peoples title and rights and reflect the timber and non-timber interests of local Indigenous Peoples in plans and operations.

Monitoring and Reporting

This indicator will be tracked and reported out on an annual basis and it will apply to all full time and temporary staff employed during the reporting year. It will utilize the employee-training database to plan and record awareness training for employees of the Forest Management Group as per the training matrix. Staff required to have Indigenous Peoples awareness training will

complete the Indigenous Peoples Awareness course and update their records. The number of active employees working within the DFA who are required to receive the training compared to the total number of active employees who are required and taken the training, will be reported out as a percentage.

Indicator 44 – Indigenous Peoples Understanding of Plans

Indicator Statement	Target (Variance)
Evidence of best efforts to obtain acceptance of applicable management plans based on Indigenous communities having a clear understanding of the plans by using processes preferred by individual Indigenous communities	≥ 3 forms of communication for all applicable management plans (0)

What is this indicator and why is it important?

This indicator was designed to measure Canfor’s effort in increasing Indigenous Peoples of the plans and information that they receive. Simply making plans available does not ensure that the management plans and what they represent are necessarily understood. It is important that Indigenous Peoples be asked if they have any questions of clarification regarding the information presented. Any questions arising must be clearly responded to and tracked through an appropriate method. Applicable management plans include Forest Stewardship Plans and major amendments, SFM Plan, information sharing on proposed forest development and TFL Management Plan.

Open, respectful communication with local Indigenous Peoples includes not only Canfor understanding of Indigenous rights and interests but for Indigenous Peoples to understand Canfor’s forest management plans. With this open dialogue, the two parties can then best work towards plans and operations that are mutually agreeable. Canfor’s forest management planning will incorporate and seek to accommodate local Indigenous Peoples’ interests and values at the administrative, strategic and operational planning levels.

The preferred processes of communication for the Ktunaxa Nation and Shuswap Indian Band include face-to-face meetings, information sharing submissions in the format preferred by the Nation or Bands, emails and phone calls. The Ktunaxa Lands and Resource Agency (KLRA) represents the Bands in the Ktunaxa Nation. The KLRA distributes information sharing packages to the various Ktunaxa Nation Bands. Referrals are made directly to the Neskonlith and Adams Lake Indian Bands using information sharing submissions in the format preferred by the Bands, emails and phone calls. Given the distance to the Band offices from the Kootenays, face-to-face meetings tend to be infrequent.

How are targets established?

The target is established to provide several opportunities and various formats for Indigenous Peoples to clearly understand management plans on an annual basis. This target represents a reasonable level of effort by Canfor to provide information recognizing that capacity issues may limit the Nation and Bands. For Indigenous Peoples to provide input to plans and operations, they must have an understanding of forest management plans. To ensure Indigenous Peoples are provided opportunity for input into forest management, best efforts to obtain acceptance of all management plans will be made using a variety of forms of communication. To assess how clearly management plans are understood, qualitative measures may provide additional information. A variance from this target is not considered appropriate.

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Current Condition

Nation or Band	# Plans Shared Annually with Indigenous Peoples	Forms of Communication	Qualitative Information
Ktunaxa Nation (and Bands)	6	Face-to-face meetings, phone calls, letters and information sharing digital submissions.	Several meetings were held between Canfor and the Nation. Canfor also met directly with Bands. Canfor also met face-to-face with the Manager of KLRA and a general overview of forestry, forest management, certification and license management were reviewed. Two face-to-face meetings were held directly with TPIB to review proposed developments in the Wigwam. Canfor also made a presentation as requested by the Akisqnuq Chief and Council on the FSP amendment. A MoU was signed with the St-Mary's Indian Band which includes commitments for Canfor to work closely with SMIB on forest capacity development.
Shuswap Indian Band	5	Face-to-face meetings, phone calls, letters and information sharing hard copy submissions.	Several meetings were held with the Shuswap Band's Kinbasket Development Company who are the assigned holders of SIB's forest licenses and responsible for information sharing. Canfor met their referrals contact person (Gary Oja) twice and had a follow up phone call on information sharing submissions. Since the recent Band elections, there was 1 face-to-face meeting held with the new Chief to discuss information sharing processes, provide an overview of forest management and agreements in place between Canfor and the Band. One FSP amendment was initiated to include the Shuswap as a license holder.
Adams Lake Indian Band	5	Face-to-face meetings, phone calls, letters and information sharing digital submissions.	ALIB's claim of traditional territory over northern parts of the Kootenay region has been brought to Canfor's attention in 2013. Two face-to-face meetings occurred this year and ALIB stated that information sharing form and content met their needs. The FSP amendment and fire salvage were also referred.
Neskonlith Indian Band	5	Face-to-face meetings, phone calls, letters and information sharing digital submissions.	NIB's claim of traditional territory over northern parts of the Kootenay region has been brought to Canfor's attention after ALIB's claim. Two face-to-face meetings occurred this year and NIB stated that information sharing form and content met their needs. The FSP amendment was referred to NIB as well as fire salvage.

Strategy

There is an Indigenous Peoples Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Indigenous Peoples Strategy, it is forecasted that Indigenous Peoples will understand forest management planning and they will have adequate opportunity to provide input to management plans. The timber and non-timber interests of local Indigenous Peoples will be included in management plans and that those plans will be understood by local Indigenous Peoples.

Monitoring and Reporting

Canfor will retain a record of the Indigenous communities whose traditional territory (any part) overlaps with the DFA for the purpose of communicating with affected parties.

This indicator will track and report the number of forest management plans pertaining to Crown tenures held by Canfor within the DFA and the number of those plans that were referred to Indigenous Peoples during the reporting year. Reporting will rely upon meetings held, materials provided for consideration, evidence of effort to provide time and resources, formal training opportunities and responses to requests for input. These records will be stored in COPI, information sharing records, referrals to Nation and the Bands, recorded meetings and may include qualitative information. This will be reported out annually.

Element 7.2 – Respect for Indigenous Peoples Forest Values, Knowledge, and Uses

Element 6.2: Respect for Indigenous Peoples Forest Values, Knowledge, and Uses	Respect traditional Indigenous Peoples forest values, knowledge and uses as identified through the Indigenous Peoples input process.
Value:	Indigenous Peoples Forest Values and Uses
SFM Objective:	Respect known traditional Indigenous Peoples forest values and uses

The following indicator statements have been identified for this Element:

- 45 Evidence of Indigenous Peoples participation in the forest economy and efforts to increase the level of participation
- 46 Management strategies, developed through a collaborative process, including traditional knowledge and use, to protect identified Indigenous Peoples and other cultural forest values or sites of spiritual importance
- 47 Forest management activities conform with operational plans which include management strategies to manage and protect Indigenous Peoples culturally important sites, practices and activities

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Indicator 45 – Level of Indigenous Peoples Participation in the Forest Economy

Indicator Statement	Target (Variance)
Evidence of Indigenous Peoples participation in the forest economy and efforts to increase the level of participation	Maintain 2013 levels of Indigenous Peoples participation in the forest economy at a minimum and continual improvement towards strategies to increase those levels of participation based on a 3-year average (-10%)

What is this indicator and why is it important?

This indicator is important, as Canfor wants to ensure Indigenous Peoples participate in the forest economy and realize benefits from operations within their traditional territories. This indicator and related target looks specifically at Indigenous Peoples participation in the forest economy and how to maintain and increase those levels of Indigenous Peoples employment, contracting, business activities and delivery of goods and services in support of Canfor’s core business. Canfor will implement strategies with the goal of maximizing the involvement of Indigenous persons and businesses in employment and procurement within Canfor’s regional operations.

Canfor is committed to working with the best value suppliers and contractors including Indigenous Peoples businesses. Canfor will not compromise safety, health and wellness, environment, quality and ethical standards.



How are targets established?

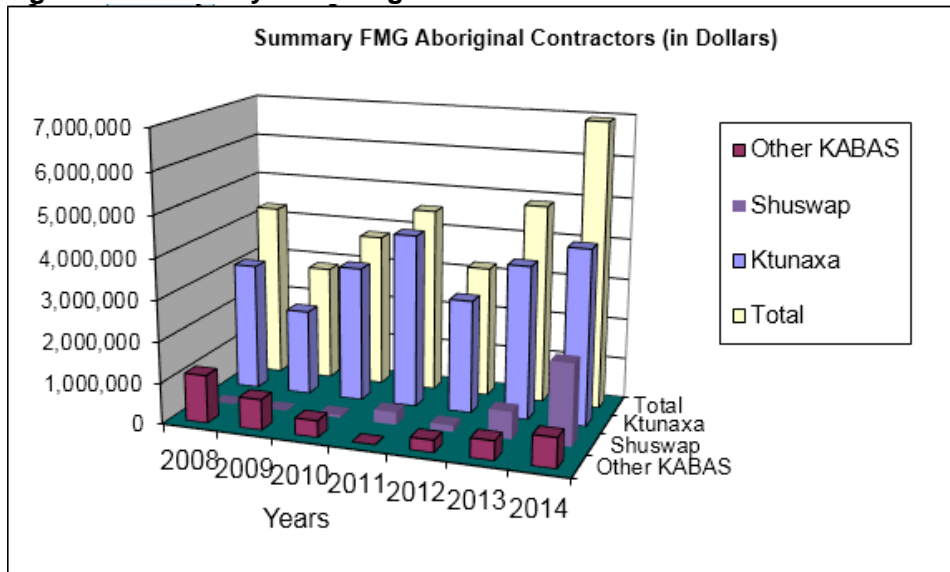
This target is established based on 2013 levels of participation as it was the first full year of Canfor operating in the Kootenay region and after procurement target setting input from the Ktunaxa Nation at the Joint Management and Advisory Committee (JMAC) The target is set to promote and encourage Indigenous Peoples participation in the forest economy and increase the amount of opportunities and benefits they derive from forest operations within their traditional territory. Canfor engages in building mutually beneficial relationships with Indigenous peoples including employment and business relationships. Given the varying level of harvesting levels due to the economy’s performance, total dollars spent in the region will vary from year to year therefore total expenditures may not accurately reflect efforts to increase Indigenous Peoples participation and is set over a 3 year period to account for annual variation on harvest levels. The variance is set to account for any downturn in regional forest activity.

When Indigenous Peoples, after being given the opportunity, elect not to participate and is respectful of those decisions.

Current Condition

Based on 2014 results, the target is achieved. The total amount of business between Canfor and Indigenous vendors and contractors in 2014 exceeded 2013 levels. A total of 13 Indigenous contractors and vendors provided goods and services to Canfor. 2014 levels increased by \$2,312,870. In 2014, 28 self-identified Indigenous Peoples were employed at Canfor Kootenay mills. Several identified as Ktunaxa citizens, the remaining employees were Metis, Inuit or identified with non-specific Bands. Employment figures for 2013 are not available as the voluntary disclosure survey was conducted in 2014.

Figure 47: Summary FMG Indigenous Contractors: 2008 – 2014



Strategy

There is an Indigenous Peoples Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Indigenous Peoples Strategy, it is forecasted that Indigenous Peoples participation in the forest economy will be maintained at 2013 levels at a minimum and increase in the future.

Monitoring and Reporting

On an annual basis, the total amount of business in dollars between Canfor and Indigenous businesses will be reported. It will be compared to the 2013 level. The report will also include the total number of identified Indigenous businesses who provided goods and services to Canfor. The report may include opportunities on contracts for work/services offered directly to Indigenous Peoples that, for whatever reason, were declined. Levels of employment may be included in the annual report although there are privacy concerns regarding self-identification that may make it difficult to have an accurate number of Indigenous Peoples employed by Canfor.

Examples of a business contract include a specific work/service agreement or joint tenure arrangement with an Indigenous Band or Indigenous Contractor⁴¹. For consistency in reporting, multiple work agreements with one Band or contractor or purchase agreements with one Band or contractor will count as a single business contract. Canfor will report this figure as a rolling three-year average. For annual reporting, the information for the current year will be combined with the previous two years reporting, and then averaged for the three years from 2013 onward.

⁴¹ Indigenous Contractor is a company where one or more of the principles are of Indigenous Peoples decent.

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Indicator 46 – Evidence of Understanding and Use of Indigenous Peoples Knowledge

Indicator Statement	Target (Variance)
Management strategies, developed through a collaborative process, including traditional knowledge and use, to protect identified Indigenous Peoples and other cultural forest values or sites of spiritual importance	Minimum of 1 process in place with willing Indigenous communities to identify and manage culturally important resources and values.

What is this indicator and why is it important?

This indicator recognizes Canfor should ensure that processes are in place to identify any sites of biological and cultural significance that may be threatened by forest management activities without the implementation of special management strategies. This indicator is important to ensure that processes are in place that identify and respect the social, cultural and spiritual needs of local Indigenous Peoples 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 Indigenous Peoples to identify, define and develop management strategies that encompass traditional values and uses is an important component of the forest industry's SFM initiative. Indigenous Peoples, with the benefit of local and traditional knowledge, may provide valuable information concerning the specific location and use of these sites, as well as the specific forest characteristics requiring protection or management. The outcome of these discussions and the means to manage/protect values and uses are included in operational plans. Continued availability of these sites for Indigenous Peoples allows them the opportunity to utilize the areas.

The intent of the indicator is to manage and/or protect those truly important sites through a collaborative process with willing Indigenous Peoples.

How are targets established?

The target has been established to ensure that at least one agreed upon process is established with each willing Indigenous community. Once a culturally sensitive area or feature is identified and verified through discussions with Indigenous Peoples, 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 with those plans. A variance from this target is not considered appropriate.

Current Condition

The CCVF process is in place with the Ktunaxa Nation to identify culturally important sites. In 2013, 802 ha's of CCVF's were included in harvested areas. All proposed forest management was referred to other Bands and no information was provided to Canfor on culturally important resources or values by the other Bands not part of the Ktunaxa Nation. The process for completing archaeological assessments adheres to the process as described by the Ktunaxa Nation's guidelines. There are no instances of non-compliance noted in ITS.

Strategy

There is an Indigenous Peoples Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Indigenous Peoples Strategy, it is forecasted that processes will identify and manage culturally important resources and values. Forest management plans will contain information on how these sites will be managed or protected. Operations will properly execute the forest plans to maintain Indigenous Peoples and other cultural forest values or sites of spiritual importance while protecting the confidential information Indigenous Peoples share. Open and meaningful dialogue with Indigenous Peoples, trust will be established to share sensitive information to identify culturally important sites and features.

Monitoring and Reporting

This indicator will be tracked and reported annually. Canfor will retain a record of the Indigenous communities whose traditional territory (any part) overlaps with the DFA for the purpose of communication with affected parties. Canfor will retain a record that proposed forest development areas have a consultation record and the outcome of the consultation.

Report the number of harvest areas that fell within a CCVF or contained other identified Indigenous Peoples cultural forest values or sites of spiritual importance and a random number of blocks will be field verified to ensure the management strategies were implemented. A monitoring protocol for CCVF's is currently being jointly developed with the Ktunaxa Lands and Resource Agency. The frequency of monitoring will be annual. Applicable records to satisfy this indicator, while protecting privacy and confidentiality of Indigenous Peoples, will be available to auditors and not made public.

Indicator 47 – Level of Management and/or Protection for Indigenous Peoples Culturally Important Sites, Practices and Activities

Indicator Statement	Target (Variance)
Forest management activities conform with operational plans which include management strategies to manage and protect Indigenous Peoples culturally important sites, practices and activities	100% compliance with operational plans (0)

What is this indicator and why is it important?

This indicator recognizes the importance of managing and protecting culturally important sites, practices and activities during forestry operations. Indigenous Peoples, with the benefit of local and traditional knowledge, may provide valuable information concerning the specific location and use of these sites as well as the specific forest characteristics requiring protection or management. The outcome of these discussions and the means to manage/protect values and uses are included in operational plans. The intent of this indicator is that important cultural heritage sites are identified, managed and/or protected through management strategies in operational plans.

Canfor and the Ktunaxa Nation identified culturally important High Conservation Value Forests (CCVF) for all its Kootenay operating areas except for the Radium license area that was not part of the assessment at that time. Management strategies were developed for each CCVF and are now included into site specific plans. A monitoring program is under development with the Ktunaxa Nation's Lands and Resources Sector to monitor the effectiveness and implementation of those strategies. Several of the CCVF management strategies may be incorporated in operational plans, as applicable.

The CCVF process will need to be implemented for the Radium license area. The Shuswap Band has elected to not proceed with the CCVF process at this time but may choose to engage in the future. The relationship with the Neskonlith and Adams Lake Bands is in the early phase and CCVF's have not been identified as priorities by either Band.



How are targets established?

The target of 100% compliance with operational plans is established to ensure forest areas significant to Indigenous Peoples for culturally important sites, practices and activities are maintained to provide the same benefits to Indigenous Peoples. The target verifies that consideration was given in plans, and then follows through with assessing plan execution. A variance from this target is not considered appropriate.

Current Condition

100% compliance with operational plans as there are no reported incidences of non-compliance in ITS.

Strategy

There is an Indigenous Peoples Strategy associated with this indicator.

Forecasting and Probable Trends of the Indicator

By implementing the Indigenous Peoples Strategy, operational plans will include management strategies to protect culturally important sites, practices and activities that are identified to continue to provide benefits to Indigenous Peoples.

Monitoring and Reporting

This indicator will track and report out on compliance of operational plans implemented during the reporting year and their compliance with management strategies for the protection of culturally important sites, practices and activities for Indigenous Peoples. The reporting will be based upon the percentage of conformance with plans where input from Indigenous communities was given and the plan was changed to consider the input. Specifically, the report will include the number of roads constructed or cutblocks harvested where operational plans had specific content requirements to manage or protect Indigenous Peoples forest values, knowledge and uses and the number of roads constructed or cutblocks harvested referenced above where the plan requirements were followed

The indicator will be considered met for plans that followed management strategies for these values during the operations phase. Any non-conformance will be reported in the Incident Tracking System (ITS).

Once the monitoring program is established for CCVF's, its results will be made available to the Ktunaxa Lands and Resources Agency and Canfor only as the CCVF's are specific to the Ktunaxa. Due to the confidential and sensitive nature of some of these areas that report will not be made public.

6.0 Tactical Level

This section describes the aspects of SFM Planning that occur at the tactical level for the DFA. The objective of the tactical level is to establish forest management strategies that are sustainable for a range of forestry related values. This level localizes planning to meet the broad goals developed in the strategic planning level. The operational level is the place where those practices are described and implemented and monitored to meet sustainability targets.

At the tactical level, inventories are prepared, assumptions are made and future forest conditions are forecast. Tactical level assessments and planning will identify strategies and potential management practices that are considered sustainable. If current conditions do not meet the goals of sustainability, alternative strategies are designed and forecast to assess their effectiveness in meeting sustainability targets and goals. The strategies that best meet the goals of sustainability are developed in consultation with the stakeholders.

Section 6.0 Tactical Level provides the details, but the main components completed at the tactical level included:

- Timber Supply Area Rationale for AAC Determination, as it relates to the SFMP;
- Forest Stewardship Plan (FSP) under the *Forest & Range Practices Act (FRPA)* – outlines results or strategies for objectives of the Kootenay Boundary Higher Level Plan Order (KBHLPO) and *FRPA* objectives; and
- Sustainability Strategies developed based on the most current inventories, assessments and best practices to best achieve indicator targets.

6.1 Regional Forecasting Related to SFMP

The Timber Supply Area Rationale for AAC Determination, for each of the three TSA include sensitivity analysis around the following:

- Size of THLB
- Stand Yields
- Minimum Harvest Ages
- Site Productivity Estimates
- New UWR Guidelines
- Gains from Use of Selected Seed
- Regeneration Delay
- OGMA/MMA Modelling
- MPB Infestation

The analysis is conducted using information related to the timber harvesting land base (THLB), timber volumes, and management strategies to indicate future state projected out for a period of 400 years. Prior to the Chief Forester making a determination, the public is invited to review and comment on the Timber Supply Review (TSR). Additional information on the opportunities that are provided for public input can be found in the TSR Public Discussion Paper and the Data Package, [Cranbrook TSA Public Discussion Paper](#) and [Invermere TSA Public Discussion Paper](#) released in September 2016. Further information pertaining to assumptions and analysis can be found within the Chief Forester's Rationale for AAC Determination for the respectable TSA.

Determinations for both Invermere (July 2017) and Cranbrook (August 2017) TSA's were made but the Government is required to complete apportionment sometime in 2018. Appropriate information from TSR will be incorporated in the SFM Plan, via the Sustainability Strategies and Practices (SWP).

6.2 Forest Stewardship Plans

Forest Stewardship Plan (FSP) of the *Forest & Range Practices Act (FRPA)* outlines results or strategies for objectives of the Kootenay Boundary Higher Level Plan Order (KBHLPO) and *FRPA* objectives set by government, such as for visual, soil or water objectives. The FSPs outline results and strategies and are considered a tactical component of the SFM Plan.

FSP has a public component and can be vetted through the PAG, as well as the general public. The current operating schedule under the approved FSP can be viewed at the Canfor office.

Canfor FSP Summary

Canfor operations are based on an identified supply of timber, stemming from a 20-year forecast of available volume within the Timber Supply Review for each of the three Timber Supply Areas.

The FSP shows the location of Forest Development Units (FDU) for the next 5 years. FDU's can be as small as cutblocks or as large as a Licencee's Operating Area. FDU's within Canfor's FSP are parallel with the existing landscape units within each of the three Timber Supply Areas.

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 *FRPA* or otherwise established by government.

The FSP also specifies measures for preventing the introduction or spread of invasive plant species 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 FSP 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 FSP will be referred to those parties who may have the potential to be affected by these changes prior to submitting an FSP Amendment 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 Indigenous Peoples.

During 2016, Canfor combined their two FSPs into one that will cover the entire Kootenay region. This FSP was submitted to the Government in 2017. Based on comments received, Canfor is in the process of revising the FSP and will resubmit in 2018. Any changes required to SFMP based on approved FSP will be addressed at that time.

6.3 Sustainability Strategies

Strategies are a coordinated set of actions designed to meet established targets. Sustainability Strategies are developed and implemented at the tactical level, with the outcomes/results demonstrated at the operational level. Sustainability Strategies have been developed to address the ecological and socio-economic values, as identified in Section 5.0 Strategic Level for the DFA. Strategies, applicable to all areas within the DFA, have been developed based on the most current inventories, assessments and best practices. Strategy updates 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. Sustainability Strategies are used to guide the development of new practices or the refinement of existing sustainability practices (e.g. Standard Work Procedures (SWP)).

In order to ensure that practices/actions are completed that help to achieve or move towards the targets for each indicator, Canfor has developed and implemented the Responsibility Action Matrix (Appendix 3). The RAM 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 appropriate skills and training for specific components of the work they are undertaking.

Currently the following Sustainability Strategies have been developed and are described below:

- Coarse Woody Debris
- Detrimental Soil Disturbance
- Distribution of Forest Type
- Ecological Representation
- Employee & Forest Worker Training
- Fibre Flow
- Green Tree and Snag Retention
- High Conservation Value Forests
- Indigenous Peoples
- High Value Snag Retention
- Interior Forest Habitat
- Invasive Plant Species
- Land Conversion
- Landslide
- Non-Timber Forest Benefits
- Old & Mature Forest ID & Recruitment
- Overlapping Tenures
- Patch Size Distribution
- Permanent Access Structure
- Procurement of Local Goods & Services, Corporate Donations and Scholarship
- Protected Reserves
- Participation Process
- Riparian Management
- Seral and Structural Stage
- Silviculture
- Sites of Biological Significance
- Species of Management Concern
- Stream Crossing Sedimentation Control
- Watershed
- Wildlife Tree Patch Retention

NOTE: Migratory Bird Strategy (Corporate Document – not included within this SFMP, although key for planning and implementation within the DFA)

The following strategies are described in other documents:

- Stream Crossing – FSP Supporting documents
- Consumptive Use Stream – FSP Supporting documents
- Community Watershed – FSP Supporting documents
- Natural Disturbance – FSP Supporting documents
- Mountain Pine Beetle – Forest Health Strategy

Additional Sustainability Strategies will be developed from time to time as practices or conditions change that require a new strategy as part of continuous improvement. Below are the strategies applicable to this SFMP.

Coarse Woody Debris Strategy

Purpose

To ensure that the targets for large Coarse Woody Debris (CWD) retention are met for harvested blocks, by BEC zone, on an annual basis. This strategy will assist Canfor in meeting, assessing, and monitoring targets for CWD in harvested blocks.

Rationale

CWD plays many critical roles in forested ecosystems and maintaining adequate amounts and sizes will positively impact forest productivity and biodiversity over the long-term. More information can be found under Indicator 27 – Coarse Woody Debris.

Strategy

Landscape/Strategic Level

1. In addition to the actual CWD retained on the ground within harvested blocks, CWD will be recruited for the future by leaving variable numbers and species of live trees, including deciduous trees, and stub snags within conventionally-harvested portions of cutblocks, with allowances for safety, and harvesting and road logistics (see the Green Tree and Snag IDS).
2. Wildlife Tree Patches (WTP), Riparian Reserves, and other Reserves will be established around high value biodiversity features including areas with large CWD, large amounts of CWD (e.g., blowdown areas, unless these are being salvaged), and high value wildlife trees, which will recruit into large CWD through time.
3. Areas burned by wildfire will have some places left unsalvaged in order to capture areas with high densities of fire-killed snags and CWD. WTPs will also be established within wildfires in order to reserve places with high densities of fire-killed trees and mixtures of dead and live trees, which are often highly valuable for wildlife.

Block Level

CWD Targets:

1. The Forest Scientist will set or review targets for CWD every 5 years at a minimum. These targets will be based on the best available scientific information applicable to the region, including data collected from the DFA, as well as information from fire history studies in the region, relevant information from the FREP program, information from the monitoring program in the DFA, as well as other information the Forest Scientist deems important.

Pre-harvest Data Collection:

1. Field Operations (Staff and Consultants) will collect data on the density of large CWD in pre-harvest stands, as per the methods outlined in the 3.1.2 SWP Measurement of Pre-harvest CWD.
2. Data will be entered into an EXCEL file and submitted to the Forest Scientist, until such time as there is a place for this data in Canfor's GIS system.
3. On an annual basis, the Forest Scientist will analyze data to assist in determining pre-harvest baselines by BEC zone for the DFA.

Site Plans:

1. Permitting Foresters shall ensure that the appropriate CWD targets are prescribed for each block within the DFA, by BEC zone. The pre-harvest large CWD density for that block, if available, shall be added to the Site Plan as well. If this density is lower than the target for the block, the Permitting Forester will note this in the Site Plan, together with wording to the

effect that that the target may not be attainable, and that strong efforts must be made to retain existing CWD on site, and that existing CWD including dead larch, must not be removed from the site (see point 4).

2. The only exception to CWD targets will be blocks within community fire interface zones (within 2 km of communities), which should have a minimum level of CWD prescribed, i.e. harvesting should try to leave little to no CWD to reduce the fire hazard.
3. Permitting Foresters shall ensure that all cutblocks within the specified areas for Grizzly Bear (WHA 4-180) have CWD volume requirements prescribed (minimum 20-40 m³/ha), as well as the large CWD density targets. The volume requirement is a legal requirement associated with the WHA. Given that this requirement is to be preferentially composed of large CWD pieces, keeping the large CWD target in place in these blocks will help achieve the legal requirements.
4. Cutblocks within the specified areas for Grizzly Bear (WHA 4-180) or in Grizzly Bear HCVMs shall have it prescribed in the Site Plan that removal of dead larch (standing or down) from the block is not acceptable.
5. Cutblocks that are large (> 100 ha) and have little structure left within them (e.g., few WTP, riparian reserves or residual live trees), are in furbearer habitat, are in areas where extensive logging has or will occur, and are in areas where trappers have concerns shall be considered by Permitting Foresters for retention of some slash-piles rather than burning and for windrow retention within the block. These practices have been deemed beneficial to furbearers such as marten. These practices should be prescribed in the Site Plan where legal and practicable. Detailed information on how to implement these practices is available here:

\\cranbrookfs1.canfor.ca\Kootenay_Woods\CERTIFICATION\Species of Management Concern\Furbearers\WoodyDebrisBrochure.pdf
6. Once a place in Canfor's GIS system for storing pre-harvest CWD data has been established, Permitting Foresters or their delegates will enter this information into the system, so that it can be quickly and easily extracted for data analysis.

Harvest Operations:

1. Operations Supervisors shall review the CWD targets in the Site Plan with logging crews during pre-works, as well as the methods by which they can be attained on that particular block. Education and training has been shown to be critically important in whether targets are attained. Methods include but are not limited to:
 - Leave existing CWD in place, and do not bring logs to the roadside or the slash-pile.
 - Avoid running over large existing CWD with machinery – this is especially important for rotten pieces that will disintegrate. Pick up intact pieces of CWD and place it parallel to a skid trail so that machine traffic does not crush it.
 - Buncherman should place non-merchantable trees than were cut with merchantable trees aside from the bundle, so they are not skidded to the landing with the bundle.
 - If non-merchantable trees such as aspen must be cut for safety or the road ROW, leave the trees in the block or on the low side of the road, rather than bringing them to the slash pile.
 - Leave the felled portion of unsafe snags in the block – do not skid it to roadside.
 - Leaving portions of felled snags 'jack-strawed' off the ground will enable them to persist longer, where this is safe and practical to do.
2. Operations Supervisors shall review methods with loggers to assess their CWD target attainment as progress logging the block. Visual estimates can be used to determine if the block is meeting the target or not, and thus if practices need to be adjusted. Although not

every block needs to meet the target in order for the median to meet the target every year, the majority does.

3. Cutblocks within the specified areas for Grizzly Bear (WHA 4-180) or in Grizzly Bear HCVFs shall have it written into the Site Plan that firewood should not be removed from the cutblock during harvest, unless it is determined by the Permitting Forester that, due to the location of the block, the retained logs are highly likely to be removed for firewood by local people.
4. If, during or after harvest, Operations Supervisors note excessive amounts of large CWD brought into roadside, and/or targets not being achieved in multiple blocks by the same contractor, the fact will be entered into ITS and the root cause investigated and actions taken to that the situation does not occur again.

Post-harvest Data Collection and Analysis:

1. The Forest Scientist is responsible to work with the Forestry Supervisor-Scaling to see that data is collected on the density of large CWD in a sample of post-harvest cutblocks, as per the methods outlined in the 3.1.2 SWP Measurement of Post-harvest CWD.
2. Until such time as there is a place for this data in Canfor's GIS system, field staff that collected the data or their Supervisor will enter post-harvest CWD data into an EXCEL file and submit to the Forest Scientist.
3. On an annual basis, data will be analyzed by the Forest Scientist to determine if post-harvest CWD targets by BEC zone have been met.
4. Every 3 years, or more frequently, trends in amounts through time will be analyzed to check for improvements or lack there-of. In order to determine if targets are appropriate for this region, pre- and post-harvest data will be compared, by block and by BEC, as part of the target review process.

Detrimental Soil Disturbance Strategy

Purpose

To ensure soil productivity is maintained during Canfor's forest management activities.

Rationale

Forestry activities such as temporary road construction, falling, skidding, loading, and mechanized silviculture have the potential to detrimentally impact soil productivity in both the short and long term. Impacting soil resources can reduce increment growth for regenerating forests, decrease forage availability for wildlife and impact streams. Negative impacts can include long-term changes in the physical, chemical or biological properties of the soil. More information can be found under Indicator 26 – Detrimental Soil Disturbance.

Strategy

1. Canfor's Field Operations staff or layout contractors will collect soil information to determine soil sensitivity during SP data collection and under the supervision of the Forestry Supervisor – Permitting. This will be done in accordance with the *FMG Kootenay Field Operations Multiphase Standards*. Scanned field cards will be stored on the block file.
2. Canfor's Forestry Supervisor – Permitting will determine whether or not the cutblock or SU has sensitive soils based on the field information. Acceptable detrimental soil disturbance limits will be entered into site plans (5% for sensitive soils otherwise 10%. 25% in roadside harvest areas).
3. Soil disturbance limits from step 2 will be adhered to by harvesting contractors and monitored by Canfor Forestry Supervisor - Operations. In block soil disturbance levels can be exceeded temporarily by 5%, but must be rehabilitated within 1 year of harvest.
4. During harvest supervision the Forestry Operations staff will enter the soil disturbance survey activity in Cengea Resources if there are concerns over soil disturbance due to any unforeseen conditions (Example: Heavy rain event).
5. To prevent soil disturbance, contractors will follow the wet weather shutdown SWP during all operations. Additionally, if excessive soil disturbance is occurring, Operations or any other Contractors are responsible to stop the associated activity and contact the respective Supervisor to assess the area. The supervisor will determine the best course of action to avoid further soil disturbance.
6. At harvest completion, the Harvesting Contractors will do an ocular estimate of all cutblocks. Any that are close to the target limits from the site plan will be flagged for an on-ground soil disturbance survey. The Canfor supervisor will enter the soil disturbance survey activity in resources. Results on these ocular estimates will be recorded on the contractor's post-harvest checklist. Training to ensure contractors can competently assess soil disturbance levels will occur during annual spring training.
7. Operations Supervisors will ensure trained staff or consultants complete soil disturbance surveys, in accordance with Canfor's soil disturbance measurement SWP. In addition to sites flagged in step 2, surveys will be done at minimum once per season (spring/summer and fall/winter) on each harvesting contractor's site. This will allow for confirmation of accurate ocular estimates and help to calibrate the Harvesting Contractors.
8. Sites chosen for Soil Disturbance Surveys will be determined through analysis of the Soil Disturbance Risk Report. The Soil Disturbance Risk Report is delivered monthly to Operations Supervisors via email. The report considers soil sensitivity, slopes of conventional harvest units and harvest season. A minimum of 20% (if 20% is greater than 1 per contractor) of high-risk sites will be surveyed. Sites can be removed from the report based on Operations

Supervisors' risk assessment. If an Incident of non-conformance occurs this percentage will be intensified.

9. If at any time post-harvest, any Canfor staff member or consultant suspects an area to have excessive soil disturbance they will ensure a Soil Disturbance Survey is done by a trained staff member or consultant, and inform the Operations Supervisor of the result.
10. The person who performed the survey will record all incidents of excessive detrimental soil disturbance in the Incident Tracking System (ITS). Any block flagged in ITS will have associated actions to mitigate the damage through reclamation.
11. Soil Disturbance Surveys and Contractor Post-Harvest Checklists will be stored in on associated block files.
12. Reclamation – All temporary access structures and unplanned detrimental soil disturbance are to be reclaimed. This includes temporary roads and skid trails with a greater than 30cm cut. All reclamation must be done under dry soil conditions or it has the potential to further disturb/compact soils.
13. In the event that Canfor exceeds the detrimental soil disturbance targets, Canfor will rehabilitate areas of soil disturbance to bring the site into compliance within 1 year.

Distribution of Forest Type Strategy

Purpose

To ensure that broadleaf and mixedwood stands are maintained in Canfor's DFA to sustain the species associated with them. This strategy is required to ensure that managed stands are treated appropriately during operations, silviculture, and stand-tending, so that targets set for them in the IDS are reached.

Rationale

Maintaining the proportion of broadleaf and mixedwood stands on the DFA is an important component of maintaining biodiversity within the DFA, and of Canfor's Conservation Framework. More information can be found under Indicator 4 – Distribution of Forest Type.

Strategy

Planning/Permitting/Operations/Silviculture

1. Canfor will not harvest broadleaf leading stands. These stands are netted out of the Timber Supply Review (TSR). The only exception to this would be for special wildlife circumstances, for example, to increase regeneration of aspen. In this case, approval from the Forest Scientist is required.
2. Within stands that have a component of broadleaf trees, Canfor will retain the majority of individual broadleaf stems as single residual trees, with exceptions for roads, roadside harvesting, trails, landings, and safety. This will be specified in the Site Plan. Clumps of broadleaf trees will be prioritized for inclusion in Wildlife Tree Patches, or left out of the harvested area of cutblocks. For further detail, see the 1.1.4a Appendix A – Guidance for Locating Wildlife Tree Patches.
3. In important Ungulate Winter Range areas, or locations known to have heavy browse problems (e.g., ungulates browsing on planted seedlings and killing or seriously damaging them), a component of the aspen trees will be knocked down to encourage suckering. This provides forage for deer and elk, as well as a deterring these animals from browsing on planted seedlings.
4. Silviculture brushing procedures specify that incidental broadleaf trees within regenerating stands shall not be slashed down. In situations where there is a high density of suckering broadleaf trees that is impeding conifer growth, one (preferably the largest) broadleaf tree will be retained per circle of approximately 3-5 m radius. In this way, the growth of the clone will be concentrated on one tree rather than many, and the conifer trees will survive and grow. For details see the Silviculture Brushing SWP

Ecosystem Representation Strategy

Purpose

To ensure that a proportion of each ecosystem is represented in an unmanaged state in Canfor's DFA to help sustain lesser known species and ecological functions.

Rationale

Maintaining some portion of each ecosystem in an unmanaged state (i.e., no logging, roads, urban or industrial development) is an important component of management plans designed to sustain biodiversity. This strategy is required to ensure that ecosystems are treated appropriately during planning and operations, so that targets set for them in the indicator are reached. More information can be found under Indicator 1 – Ecosystem Representation.

Strategy

1. Forest Scientist will ensure that an ecosystem representation analysis has been completed for the DFA, and that it is updated within 3 years after each new TSR determination, or after new ecosystem mapping has been legally designated for management. Quantitative targets will be determined for each ecosystem group as outlined in the Ecosystem Representation Indicator. For an example, see the report by Wells et al. 2004, listed in the indicator.
2. Rare ecosystems and uncommon ecosystems below target representation will be identified in a digital map layer, and made available on Canfor's GIS system. The Forest Scientist is responsible to communicate requirements to the WIM group to create and update this layer, and the WIM group is responsible for creating it and updating it when indicated.
3. Rare or uncommon ecosystem groups potentially occurring within planned blocks will be identified by Planning and communicated to Permitting, as per the SWP.
4. Permitting will confirm the presence or absence of these sites within proposed blocks or along roads during field layout.
5. If a rare or uncommon ecosystem is confirmed in the field, Permitting will ensure that the ecosystem is reserved from harvesting and road-building except for required road or trail crossings where no other practicable option exists, following the SWP. Uncommon ecosystems may have high levels of retention prescribed for them, rather than reserved them, as per the SWP.
6. Uncommon ecosystem groups and common ecosystem groups with <25% representation will be targeted for HCVF placement during HCVF identification and update processes, and/or for ecosystem restoration. These areas will be managed under an ecosystem restoration or HCVF management regime. The Forest Scientist is responsible to ensure that each HCVF has an appropriate management strategy.
7. Rare and uncommon ecosystem groups below target will be prioritized for OGMA replacement locations, as long as they have equal or better old growth characteristics as the OGMA that is being harvested (see the OGMA Replacement SWP for details).

Employee & Forest Workers Training Strategy

Purpose

To ensure forest workers receive adequate safety and environmental training to work safely, meet legal requirements and protect the environment.

Rationale

A trained workforce is critical to safe and proper execution of plans. Training allows workers to contribute to their maximum ability and maintain high performance standards, in both safety and environmental situations. Training also focuses on Canfor employee to prepare them for career advancement opportunities. By providing training, there will be a diversity and longevity in the local workforce that will contribute to community investment.

Although Canfor is not responsible for delivering contractor training, the company provides guidance and some FMS training material to contractors to ensure they are a trained workforce.

More information can be found under Indicator 36 – Environmental & Safety Training.

Strategy

This strategy includes safety and environmental training and personal development planning.

Safety and Environmental Training

Safety and environmental training requirements for Canfor employee are determined by analysing the following internal/external resources:

- Legislatively mandated training
- FMG OHS Management Review
- Incident Pareto analysis
- Hazard and Risk Assessment
- Review of audits conducted

The FMG Training Matrix is the outcome of this analysis and will be used to identify initial and on-going training needs. Training shall be provided to employee and hourly employees according to the FMG training matrix and delivered via Eclipse on-line training modules, developed in-house training material or local course offerings. Canfor specific training materials are provided to contractors and they are responsible for providing required training to their workers.

Workers are responsible for completing all required training as per the training matrix. Supervisors are responsible for ensuring that all employees under their direct supervision have completed all required mandatory training. The supervisor must also ensure that employees transferring from other divisions or departments have the required training. Supervisors must address deficiencies in a timely manner.

The site OHS Committee is responsible for setting up the annual orientation and training program to ensure employees are able to acquire the necessary training. Mandatory training requirements will usually be met during an annual orientation and training program in the spring of every year, which includes both employees and contractors. Seasonal employees will be trained, and existing employees will be able to renew their competencies. Additional on the job training requirements will be identified based on records, statistics, trends, and FMG Safety Committee (FMGSC) recommendations.

Personal Development

Canfor supports education and training, which enable regular full-time employees to be more effective in their present positions and which properly equips them for further advancement with Canfor. Canfor has two categories of educational and training programs. The first category includes those programs that are a company requirement. This category also includes those programs that help employees to be more effective in their present positions. The second category includes those programs that are marginal to the effectiveness of an employee in his or her present position but which may help the employee qualify for other positions within Canfor. Consideration will also be given to individual performance and advancement potential.

Canfor employees will review their development needs and complete a Personal Development Plan and review it with their supervisor. Employees will make any required revisions and develop action items to achieve the developmental goals. The employee will be responsible for implementing the action items. Employees will meet with the supervisor on a regular basis and to monitor progress and make any required revisions to the PDP. Employees will review and update the plan annually.

Fibre Flow Strategy

Purpose

To support the economic and employment components of Sustainable Forest Management (SFM) while maintaining forest productivity.

Rationale

Canfor's Forest Management Group (FMG) staff are accountable for managing all fibre assets for maximum long-term profitability, employment opportunities and security of supply. Recognising that the forest industry is the primary economic driver in many rural communities, the economic viability of Canfor is critical to the public, employees and other service providers. By implementing this strategy, there will be a positive contribution to local, regional and national economies of the timber and non-timber sectors. In pursuit of economic viability and enhanced social benefits, this strategy is intended to encourage an even flow of the forests multiple products and services. More information can be found under Indicator 25 – Volume Harvested Vs. Allocated and Indicator 37 – Direct & Indirect Employment.

Strategy

Cut Control regulations are designed to govern rates of harvest over a specified period of time. The rates of harvest govern the fibre flow to various processing facilities. By regulating fibre flow, economically viable fibre supply will be available to provide both employment on forest operations and at manufacturing facilities. Typically this period is a five-year "cut control period", however legislation provides additional flexibility for public land tenures.

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

Each year, in co-operation with Canfor's mill management team, an annual fibre delivery target (budget) is established for planning purposes. Operational plans are developed such that the annual delivery target may be achieved. In addition to this, as required by legislation, the annual delivery target (on public land tenures) is planned with the intention of balancing to within 100% of the overall periodic "cut control" amount.

As available annual quota volumes are not sufficient to meet mill consumption, purchase wood will supplement deliveries to ensure adequate fibre supply to the mills. Purchase wood will meet chain of custody requirements.

Annual fibre flows are managed considering the following factors:

- balancing periodic cut-control;
- meeting sawmills' inventory requirements;
- maintaining an even flow of fibre to the sawmills (i.e. no "spikes" in deliveries);
- maximising operating days for contractors and employees; and
- adjusting schedules in consideration of forest health issues or other major events such as fires and "swings" in the market.

Flexibility in this strategy is required to deal with unforeseen circumstances such as forest health issues, forest fires and changing market conditions.

Green Tree and Snag Retention Strategy

Purpose

To ensure that Green Tree and Snag retention targets are met on an annual basis.

Rationale

The retention of live and dead trees within cutblocks, both in patches and singly, strongly influences the species using the block following harvest. This strategy plays a key role in maintaining biodiversity within harvested areas. More information can be found under Indicator 8 – Green Tree and Snag Retention.

Strategy

1. Canfor has a practice of placing reserves (wildlife trees patches, riparian reserves, other reserves) in association with cutblocks in order to contribute to biodiversity objectives for forest management. Guidance for field crews has been developed on the most ecologically valuable locations for these reserves and how to minimize impacts on timber supply (1.1.4a SWP Appendix A – Guidance for Locating Wildlife Tree Patches).
2. Canfor has also developed a field card (Reserve Tracking Form – Kootenay Operations) on which to record estimate of the density of live trees and snags within wildlife trees patches, riparian reserves, and other reserves associated with cutblocks prior to harvest. The Reserve Tracking Form will be completed by layout crews (both Field Operations and Consultants) for each reserve associated with all blocks laid out within the DFA. Field crew that collected the data into the web-based Reserve Tracking Form database on the Canfor intranet will enter data. See the Green Tree and Snag Retention SWP for details.
3. Permitting Foresters and their delegates must ensure that each block or group of nearby blocks meets the set targets for green trees and snags, and for snags alone, in the Green Tree and Snag Indicator, before signing off on the site plan. The Green Tree and Snag Retention form (1.1.4a SWP Appendix B) should be used to assist with this; the targets are written on the form, and the form will automatically calculate gross block retention densities once data from the Reserve Tracking Form and on the block area are entered.
4. If a block does not meet the green tree and snag targets through reserves alone, leave trees must be prescribed to meet the green tree minimum targets, or the block must be averaged with one or more other blocks (all < 100 ha) in the same area such that targets are met on all blocks being averaged. See the Green Tree and Snag Retention SWP for more detail.

High Conservation Value Forests (Areas) Strategy

Purpose

To ensure High Conservation Value Forests (HCVF), or Areas, are identified, maintained and/or enhanced, and monitored in Canfor's operating area in the East Kootenay.

Rationale

The identification and management of High Conservation Value Forests will assist in the maintenance of biodiversity in the DFA, because these areas include biodiversity hot spots and sensitive areas for water quality and terrain features. It will also assist in the maintenance of cultural values, through Cultural and Conservation Value Forests (CCVFs). More information can be found under Indicator 19 – High Conservation Value Forests.

Strategy

HCVF Assessments

1. Canfor, under the responsibility of the Forest Scientist, will complete an assessment of its operating areas in the East Kootenay for the presence of HCVF, in a manner consistent with the current applicable FSC standard. A technical advisory group (TAG) will be formed to conduct the assessment for HCVF Categories 1 (significant concentrations of biodiversity values and/or large landscape level forests) and 2 (rare, threatened and endangered ecosystems). The TAG will be composed of representatives from Canfor, environmental groups, government, and potentially academia, and will work in a collaborative fashion. Expert local scientists will be brought in as needed. The assessment will include consultant with directly affected person and relevant interests. A Decision Making Group (DMG), whose membership will differ from the TAG, will make final HCVF designations.
2. Qualified specialists will complete the assessment for HCVF for Category 3 (Basic services of nature in critical situations, e.g., watershed protection, erosion control). HCVF for category 4 (also referred to as Cultural and Conservation Value Forests or CCVF) will be identified in a collaborative process with local Indigenous Peoples (see Indicator 47 – Level of Management and/or Protection for Indigenous Peoples Culturally Important Sites, Practices and Activities).

HCVF Management Strategies

1. Management strategies will be written for each HCVF or High Conservation Value within an HCVF. The strategies will outline measures for the maintenance and/or enhancement of the high conservation values in HCVFs, consistent with the precautionary approach. Canfor's Forest Scientist or delegate(s) will develop the strategies for Categories 1-3. Strategies will then be reviewed by the TAG, and signed off by the DMG.
2. The management strategies for HCVF Category 4 will be developed in a collaborative process with local Indigenous Peoples.
3. The management strategies will be contained in a separate document from the SFMP and HCVF assessment report, which is available upon request from the Forest Scientist.
4. Qualified specialists, directly affected persons, and relevant interests will review the HCVF assessment reports and management strategies. The advice and comments received through this review process will be documented and maintained by Canfor, and are available upon request from the Forest Scientist.

Review and Update

1. At least once every 5 years, Canfor will review and update the HCVF assessment reports. Major revisions for HCVF categories 1-3 will be completed by the TAG, or completed by the Forest Scientist and reviewed by the TAG. The update of CCVFs will be done through a collaborative process with the applicable Indigenous Peoples.
2. If changes to Canfor's operating area, or significant changes to any of the High Conservation Values occur in-between HCVF assessment report updates, an HCVF assessment for categories 1-3 in new operating areas will be completed by the Forest Scientist or delegate, and the TAG provided an opportunity to review these. An assessment on new operating areas for CCVFs shall be completed in a collaborative fashion with local Indigenous Peoples.

High Value Snag Retention Strategy

Purpose

To ensure that High Value Snag Retention targets are met on an annual basis.

Rationale

Snags have been identified as one of the key elements to maintain in forested landscapes in order to conserve biodiversity. This strategy will assist Canfor in identifying and retaining High Value Snags on the landscape. More information can be found under Indicator 10 – High Value Snags.

Strategy

Pre-Harvest

1. Layout crews (both Canfor Field Operations and consultants) will use the High Value Snag field card to record the location and characteristics of high value snags encountered within and adjacent to gross block areas during block layout, following the HV Snag SWP.
2. Field Operations will place as many HV Snags in reserves as practicable, given constraints such as terrain and logging method, stand type, road locations, economic timber chance, etc.
3. Field staff or Consultants will ensure that HV cards are scanned and sent to the Kootenay WIM team is responsible for entering the High Value Snag data into the Wildlife Features database as the forms come in to them. Field Staff or Permitting Foresters will ensure that the scanned cards are filed in the block files under pre-harvest assessments.

During Harvest

1. The Logging Plan map includes High Value Snags on it, so that loggers are aware of the location of these snags. Most should be within reserves, although some Class 2 trees may be marked as well that are outside of reserves.
2. During harvest, it is always loggers choice whether to fell an identified HV snag or not, UNLESS the snag has a nest identified under Section 34 of the Wildlife Act, i.e. a Bald Eagle, Osprey. In this case the nest must be protected with a safe reserve patch around it – the tree must NOT be felled.

Indigenous Peoples Strategy

Purpose

The purpose of this strategy is to ensure that Canfor's relationships with Indigenous communities are conducted with respect, openness and integrity. This strategy is written to address the education of Canfor staff to ensure the understanding of Indigenous Peoples titles and rights as they pertain to legal obligations. This strategy will also mitigate potential impacts of forest management activities, ensure proposed information regarding forest management activities is shared and understood by Indigenous Peoples, develop strategies to identify and minimize impacts on culturally important values and sites. The strategy includes aspects to ensure Indigenous Peoples have the opportunity to participate in the forest economy.

Rationale

Based on their distinct historical and legal rights, Indigenous Peoples express a connection to the forest, and a desire to benefit from forest management and related activities. It is the belief of Canfor that it makes sound strategic and business sense to recognize the role of Indigenous

Peoples in the region's economic growth, and to pro-actively build mutually beneficial relationships with Indigenous Peoples.

Canfor's Kootenay operations fall within the Ktunaxa Nation's traditional territory. The Kootenay operations also overlap the Shuswap Indian Band's, and portions of the Adam's Lake and Neskonlith's Bands, traditional territories. It is Canfor's intention to promote a working relationship between the Ktunaxa Nation and other Bands based on the spirit of mutual professionalism, good faith, respect, openness, trust, understanding and integrity. These objectives may be achieved through agreements, sharing of information to identify sites of importance, development of mitigative strategies and business relationships with willing Indigenous communities.

By promoting long-term and mutually beneficial relationships, harmonisation between Canfor operations and the Indigenous communities can be accomplished. Encouraging participation at the strategic planning level and operational level, all values of the forests can be considered, – social, environmental, and economic.

More information can be found under the following indicators:

- Indicator 43 – Indigenous Peoples Awareness Training
- Indicator 44 – Indigenous Peoples Understanding of Plans
- Indicator 45 – Level of Indigenous Peoples Participation in the Forest Economy
- Indicator 46 – Evidence of Understanding and Use of Indigenous Peoples Knowledge
- Indicator 47 – Level of Management and/or Protection for Indigenous Peoples Culturally Important Sites, Practices and Activities

Strategy

There are many facets to this strategy. They include the following:

Cultural Awareness and Training

Canfor's requirement to comply with laws, as well as the desire to have positive open communications with local Indigenous Peoples requires that managers and FMG staff members who interact with Indigenous Peoples have a good understanding of Indigenous culture, title and rights, and treaty rights. It has also been identified that Indigenous communities and citizens who deal with Canfor would benefit from a better understanding of Canfor's culture.

To achieve better cultural awareness, Canfor staff that work with Indigenous Peoples will receive Indigenous Peoples Awareness training. The training matrix identifies staff that are required to complete this training. Canfor staff and local Indigenous communities will seek to better understand each other's culture through improved communication driven by various initiatives and mutually beneficial business relationships. Canfor will identify and promote cross-cultural learning opportunities to improve both parties' understanding of each other's culture. These may include Canfor staff taking tours of communities, Interpretive Centres, facilities and participation in various events. Canfor will invite Indigenous Peoples to tour Canfor's operations, manufacturing and other facilities.

Working Relationships

Canfor is committed to developing working relationships with willing Indigenous communities. These working relationships may cover areas such as information sharing processes, employment and procurement opportunities. Through a collaborative process, Canfor and Ktunaxa Nation Council (KNC) signed a Relationship Protocol (RP) and Engagement and Benefits Agreement (EBA) in July 2014.

From those agreements a Joint Management Advisory Committee (JMAC) was established to develop strategies and programs to achieve the objectives and targets set out in the agreements. The agreements also include a consultation matrix for how the Ktunaxa wish to engage in various aspects of forest development.

Work plans will be developed and sub-committees will be formed to jointly implement the strategies for Canfor and KNC to strengthen the social, environmental and economic partnerships. The three sub-committees established to date are:

- Procurement Sub-committee.
- Employment (and Training) Sub-committee; and
- Consultation Sub-committee; (pending establishment at the time of writing this plan)

The employment and procurement sub-committees will be charged with setting targets for employment and procurement by implementing key initiatives to promote and increase the Ktunaxa Nation and its Bands participation in the forest economy.

For other Indigenous communities not part of the RP or EBA, Canfor is committed to working with Bands to identify their social, environmental, economic and cultural interests in a way that meets their needs.

Participation in the Forest Economy

Canfor will work with willing communities to develop forestry capacity and explore mutually beneficial business opportunities. Canfor will work with best value suppliers and contractors including Indigenous businesses. Canfor will not compromise safety, health and wellness, environment, quality and ethical standards with any vendor.

Canfor will meet with Indigenous communities to identify their interests and capacity and develop strategies to increase their participation in the forest economy. These strategies may include a review of core business areas and activities which Indigenous vendors or suppliers may provide goods and services to Canfor. Additionally, Canfor and Indigenous communities may

enter into Operating Agreements to work cooperatively on management of the community's forest licenses.

Under the terms of the RP and EBA, Canfor committed to cooperatively increase the participation of Ktunaxa businesses in its procurement activities. Canfor will increase awareness internally of identified Ktunaxa businesses that provide goods and services. Canfor and the KNC will jointly organize and conduct events that introduce Ktunaxa vendors and suppliers to Canfor staff and contractors to identify potential business opportunities.

Canfor and the KNC's Employment staff will work together to increase awareness of Canfor employment opportunities amongst Ktunaxa citizens and identify barriers and potential solutions to increase Ktunaxa employment participation within Canfor. These initiatives may include identifying occupations within Canfor, education requirements and orientation on the recruitment process. Canfor will work with KNC Employment staff to identify opportunities where citizens can participate in training programs delivered by Canfor.

Information Sharing and Understanding of Plans

Canfor is committed to respecting the social, cultural and spiritual needs of local Indigenous Peoples 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 Indigenous Peoples to identify, define and develop management strategies that encompass traditional values and uses is an important component of the forest industry's SFM initiative. Information sharing agreements are made with willing Indigenous communities to promote the use and protection of sensitive information. When forest areas are proposed for development, the information is sent to Indigenous communities in information sharing packages in the format they request.

Open communication with Indigenous Peoples that includes a sharing of information enables Canfor to understand and incorporate traditional knowledge into operational plans. Canfor is aware of some culturally important, sacred and spiritual sites leading to their appropriate management or protection. Once incorporated, block and road site plans will include mitigative strategies to protect the identified values and resources. Post harvest evaluations and other inspections assess plan conformance.

When Canfor sends forest development proposals and management plans to Indigenous communities, they will offer to meet with the Nation or Band to explain the submission, answer any questions, and modify plans if required to accommodate and protect Indigenous Peoples cultural values. The level of effort to engage with Indigenous Peoples will increase as proposed plans are more strategic. Various forms of communication will be used to improve the effectiveness of communications and understanding of the plans. Forms of communication will include face-to-face meetings, emails, phone calls, information sharing packages and other referrals. Informal discussions regarding forest development and planning also occurs through various business agreement discussions with the Bands that are forest license holders and may also have an overlapping tenure, such as range or trapping tenures.

Canfor and the Ktunaxa Nation's signed RP commits the parties to adhering to an agreed upon Consultation Process as outlined in the Consultation Matrix. In the matrix, Canfor sends information on plans to the Ktunaxa Lands and Resource Agency (KLRA) that distributes the information to Bands and the KLRA collates that information for a comprehensive response to Canfor. If a Band requests additional information specific to plans within the Bands territory, Canfor will offer to meet with that potentially directly affected Band to review the plan in detail and develop potential mitigative measures.

Identification and Protection of Culturally Important Resources and Values

Processes will be established with willing Indigenous communities to identify and protect culturally important resources and values. Agreements based on information sharing and engagement should encourage the dissemination and use of information, respect confidentiality, and specify the parameters for the release of information. In order to address the issues regarding the sharing of confidential and sensitive information from Indigenous communities, Canfor will develop information-sharing agreements, such as partnership agreements and memoranda of understanding, that outline ways to protect this information. Processes may include:

- A procedure for engagement and information exchange that already exists or is jointly developed between Canfor and willing Indigenous communities;
- The use of Indigenous Peoples knowledge in planning and management of forest lands and resources;
- Encouraging willing Indigenous communities to identify important cultural resources, sites, and values;
- Planning based on the mutually agreeable incorporation of values and management of sites and values;
- Tracking and fulfillment of agreements and commitments made between the organization and Indigenous communities; and
- Assessment of potential archaeological sites. If any are identified, qualified professionals, using the Ktunaxa's archaeological guidelines, complete a more intensive and site-specific assessments.

Canfor worked cooperatively with the four Bands within the Ktunaxa Nation to identify culturally important High Conservation Value Forests (CCVF's) for all areas within the East Kootenay except for the Radium license area, as it was not part of the project area at the time. It is Canfor's intent to identify CCVF's within the Radium license area by the end of 2016. Management strategies for the CCVF's were developed to protect and conserve the culturally important sites, resources and values. These management strategies are included in operational plans however due to the confidential nature of the CCVF's, they are not identified explicitly within the site plans. A monitoring program is under development with the Ktunaxa Nation's Lands and Resources Sector to monitor the effectiveness and implementation of those strategies. The Shuswap Band has elected to not proceed with the CCVF process at this time but may choose to engage in the future. The relationship with the Neskonlith and Adams Lake Bands is in the early phase and CCVF's have not been identified as priorities by either Band.

Interior Forest Habitat Strategy

Purpose

To ensure that the size class distribution of Old Growth Management Areas (OGMAs) and Mature Management Areas (MMAs) by Natural Disturbance Type (NDT) and ecosection is maintained or, preferably, shifted towards larger areas through time.

Rationale

All else being equal, larger OGMAs/MMAs have less edge associated with them than smaller OGMAs/MMAs, and thus provide more effective habitat for many species associated with old and mature forest. More information can be found under Indicator 7 – Interior Forest Habitat.

Strategy

Strategic and Field Implementation

1. In strategic planning processes that re-distribute OGMAs or MMAs, all else being equal, weight larger OGMAs and MMAs more heavily than smaller ones (i.e., for OGMAs within the same BEC, species group, etc).
2. When selecting a replacement OGMA/MMA for one that is being harvested, Planning/Permitting will, where possible, try to add on to existing OGMAs or MMAs in the same BEC and LU, to create a larger OGMA/MMA, as per the Old and Mature Forest Replacement SWP.

Analysis

1. The data for OGMA/ MMA size distributions will be provided by the Woodlands Information Management team (WIM) every five years, or more frequently at the direction of the Forest Scientist. Distributions will be calculated by NDT within each Ecosection in the DFA.
2. For these calculations, BEC variants will be classified into the five NDTs as specified in the Biodiversity Guidebook, with the exception that there will be no differentiation for BEC variants based on the presence or absence of Douglas-fir as per the Patch Size Strategy. Only NDT3 and NDT4 will be used for calculations, since these are the main NDTs occurring with the forested portion of the DFA. MMAs will only be included for Ecosections containing Landscape Units where legislation requires MMAs.
3. Ecosections will be defined by groups of Landscape Units as per Table 63. These groupings are based on the Ecosections as delineated by the Ministry of Forest, Lands, and Natural Resource Operations, with the boundaries modified slightly so they match LU boundaries and TSA boundaries in areas where both boundaries are close.
4. OGMA/MMA analysis will be conducted using the entire Crown Forest Landbase within each Ecosection in which Canfor operates in the East Kootenay, including parks or portions of parks that are found within LU boundaries in the LUs that Canfor operates (similar to the way Old Growth percentages are calculated).
5. The Forest Scientist will plot trends in OGMA/MMA size class distributions by NDT and ecosection in 5-yr increments and compare them statistically to determine if distributions are stable (no change) or any shift has occurred in the distributions. Trends will be summarized in the Annual Report. The parameters for the analysis are provided in Table 62.

Canfor Kootenay Operations SFM Plan

Table 62: Parameters for OGMA/ MMA analysis for interior forest habitat

NDTs to include	Size class divisions (ha)	Ecosections ¹	
		OGMAs – required in all ecosections	MMAAs – only present within the ecosections listed below as per legislative requirements under KBLUP
3 4	≥1.00 <5.00 ≥5.00 <10.00 ≥10.00 <20.00 ≥20.00 <40.00 ≥40.00 <80.00 ≥80.00 <100.00 ≥100.00 <250.00 ≥250.00 <500.00 ≥500.00 <1000.00 ≥1000.00	All	Flathead Upper Elk South Park Central South Park North EK Trench North McGillivray Eastern Purcell North Eastern Purcell Central Southern Purcell Cranbrook

Invasive Plant Species Strategy

Purpose

To prevent the spread of invasive plant species due to forest management activities.

Rationale

It is important Canfor's forestry operations do not increase the occurrence of invasive plant species to ensure forest ecosystems' continue to provide quality wildlife habitat, agriculture and grazing opportunities and maintain biodiversity. More information can be found under Indicator 21 – Invasive Plant Species.

Strategy

1. The Silviculture Coordinator will meet with East Kootenay Invasive Species Council (EKISC) once per year. The purpose of this meeting will be to communicate any new invasives that have been identified by EKISC. A review of both invasive plant programs should also occur to encourage the coordination of plans and share expertise.
2. The Silviculture Coordinator will review the annual operating plans for the other two ISCs (Columbia-Shuswap (CSISC) and Central-Kootenay Invasive Species Council (CKISC)) and ensure any year-to-year changes are reflected in Canfor's operations as appropriate.
3. The Silviculture Coordinator will ensure information on new invasive plant species is communicated to field staff.
4. At any stage of development or post-harvest activities, any staff or contractor working for Canfor must identify the presence of invasive plant species. The requirement for this will be reviewed during preworks.
5. Identified infestations will be recorded using "Report-A-Weed". The Province's Report-a-Weed-wizard takes you through three easy steps to report a suspected new sighting of an invasive plant species in BC. This is also available on a smartphone app for iPhone or Android. – See more at: Invasive Species Council of British Columbia
6. The Permitting Supervisor will add measures to the site plan to ensure the presence of invasive plant species is not increased by Canfor's forestry operations. This will be tracked in the forest management database (Cengea Resources). Measures include:
 - a. Where possible, avoid disturbing the infested site
 - b. Minimize exposed soil
 - c. Grass seed immediately after road building
 - d. Recommended timing of harvest to "on snowpack"
 - e. Wash equipment that has travelled through infestation before moving to another site
 - f. Treat invasive plant species before harvest may also be considered
7. The Silviculture Supervisor will ensure follow-up monitoring occurs on blocks with invasive plant species identified. This will be tracked in Cengea Resources.
8. If the occurrence of invasive plant species is or likely will be increased due to Canfor's forest management activities, treatment is required. The Silviculture Supervisor will be responsible for treatments and follow-up activities. Invasive plant species treatments will be scheduled in Cengea Resources.
9. Utilize existing expertise like EKISC and the Legislative Guidebook to Invasive Plant Management in BC to ensure newly identified species are incorporated, to provide training/ education and to consider all options when prescribing treatments. [East Kootenay Invasive Plant Council](http://www.invasiveplantcouncilbc.ca); www.invasiveplantcouncilbc.ca

Land Conversion Strategy

Purpose

To ensure there is an accurate method to update the area of the DFA when there are changes to the total land base or reductions due to conversion of the forest to non-forest use. The total area is used to calculate the long-term sustainable harvest levels using certification parameters.

Rationale

A methodology is required to update the DFA when changes occur in operating areas or forest is converted to non-forest use. When an area is converted to non-forest use, it will be excised from the DFA. More information can be found under Indicator 24 – Land Conversion.

Strategy

1. Canfor will work cooperatively with other industries and stakeholders to minimize the conversion of productive forest to non-forest use.
2. In instances where Canfor is asked to remove forest cover and the land will be converted to serve another purpose that has been authorized by the Crown, the hectares converted will be excised from the DFA.
3. Land that is converted to non-forest where Canfor does not have management responsibilities will be excised from the DFA as elements of certification requirements can no longer be met.
4. The area will be reduced from the DFA and the amount of reduction will be calculated annually by WIM.
5. If the reduction is less than 2%, the Planning Coordinator will use a pro-rated reduction based on average MAI to recalculate the long-term sustained harvest limit under certification constraints.
6. If the reduction is greater than 2%, then a formal independent timber supply analysis will be completed using certification constraints.
7. Following the successful conclusion of any operating area agreements, a formal timber supply analysis will be completed within a year unless another is commenced in that year period. Then the analysis will be completed within a year of the conclusion of the second negotiations.

Landslide Strategy

Purpose

To ensure that landslides caused by forest management activities are minimized and that when natural or forestry caused landslides do occur, mitigative measures are taken to protect human safety, soil productivity and water features.

Rationale

Forest management activities such as road construction, skid trail construction, and timber harvesting have the potential to trigger landslides, especially in areas with terrain instability. Following this strategy will ensure these risks are minimised in planning and operational phases, and any negative effects of landslide occurrence are mitigated. More information can be found under Indicator 23 – Landslides.

Strategy

Preventative Measures

1. Qualified professionals have completed Terrain Stability Overview Assessments for all of Canfor's public land (Crown) operating areas. This process is completed to identify areas of potential terrain instability (i.e. unstable and potentially unstable areas).
2. Site Assessments by qualified professionals will be completed for all proposed:
 - a. roads/landings that overlap areas classified as unstable or potentially unstable on overview mapping.
 - b. cutblocks that overlap areas classified as unstable.
 - c. cutblocks classified as 'Potentially Unstable' if skid trail construction is planned.
3. Planning and Permitting Contractors, as well as Field Operations staff, perform secondary identification of sensitive areas during field observations. This is an ongoing process performed at the time of recce/layout. Field crews identify stability concerns such as steep slopes, 'pistol-butt' trees, exposed bedrock and old or new naturally occurring slope failures.
4. Based on this field information site assessments may be completed by a qualified professional, at the discretion of the Permitting Forester.
5. Recommendations from the qualified professional will be incorporated into the specific site plan or road construction plans.
6. Operations staff will review site plans and any strategies associated with terrain stability with the Harvesting and Road-building Contractors during preworks.
7. Harvesting Contractors will follow Canfor's EPRP for road construction, and skid trail construction, as well as Canfor's wet weather shutdown procedures, to avoid causing potential landslide initiating conditions.
8. Within a year of harvest completion, Harvesting Contractors will reclaim bladed skid trails and will ensure roads are hydrologically stabilized in accordance with applicable terrain reports, site plan recommendations and Canfor's deactivation standards.

Landslide Identification

1. Landslides do not always occur at the time of operations. For this reason Canfor uses a multiple opportunity strategy for landslide identification.
 - Landslides can be picked up during post-harvest inspections completed by Harvesting Contractors.
 - All Canfor staff and contractors will report any landslides found in block during post-harvest inspections, planting, road inspections and silviculture surveys.
 - Canfor does annual helicopter flights to inspect for hot landings. At this time a large sample of the land base where recent activity has occurred is flown. Contractors and staff on landing inspection flights are instructed to look for landslides.
 - Road inspections done by Canfor staff and contractors.
 - Landslides are sometimes reported by the public or overlapping tenure holders and then followed up on by Canfor Forestry Supervisors.
2. Any landslide identified by staff, field contractors or reported by the public will be reported within 24 hours to the Canfor Operations Supervisor for that area. The report will include the location, size and potential impacts of the landslide.
3. The Forestry Supervisor who identified the landslide or who was informed of the landslide from a contractor, or the public will enter the incident into Canfor's Incident Tracking System (ITS). If the landslide is greater than 0.2 ha or is likely to deposit debris into a water feature the Operations supervisor will follow up with an investigation.

Mitigative Measures

1. The investigation will develop action plans to mitigate any significant damage and propose strategies for improved practice. In some cases a qualified terrain specialist will be brought in to determine the best mitigative strategy.
2. All actions taken will be added to the ITS entry, and will be updated when completed.

Non-Timber Forest Benefits Strategy

Purpose

To ensure that stakeholder who derive specific identifiable benefits from the forest are given the opportunity to take part in the development of management strategies to mitigate any negative effects of forestry management activities.

Rationale

Maintaining the abundance and diversity of NTFB derived from DFA forests is an important part of Canfor's commitment to communication and socially responsible forestry. More information can be found under Indicator 32 – Identified Non-Timber Forest Benefits.

Strategy

Identification of NTFB:

- Stakeholders who have already identified an area associated with one or more NTFB have been linked to their identified area or in some cases a larger area (Landscape unit) to ensure they are notified through letters or email during the planning phases of cut- block development by the Planning Supervisor.
- To reach unknown stakeholders with NTFB concerns planned harvest areas are also referred in local newspapers with an invitation to comment. This allows for new NTFB identification.
- There are a number of reoccurring group meetings that interested public are invited to participate in. These include PAG, EVIRTF, city council and regional district meetings. Canfor staff has and will continue to attend other group meetings upon request.
- An open door policy is adhered to throughout the planning phases, allowing interested public to identify NTFB and discuss potential impacts with Planning Supervisors.
- Any stakeholder who identifies a NTFB area through direct contact, response to advertisement, or at a group meeting will be entered or updated in COPI and attached to that area spatially.

Development of Management Strategy:

- Individual or group meetings will be set up upon request of any public interested in reviewing proposed harvest plans. Reviews will include maps and all available planning documents.
- Planning Supervisors will work with the member of the public to accurately identify the spatial area associated with the NTFB that has been presented. This may require site visits to GPS areas.
- Explanation by Planning Supervisors of all planned activities in the area will help both parties identify aspects of the plan with the potential to affect the identified NTFB.
- If required, potential mitigative strategies to minimise the effects on the identified NTFB will be presented by Planning Supervisors to be considered and discussed with the identifier.
- If no resolution is attainable, Canfor's Decision Support Tool will be used to come to a fair and effective decision for balancing the values in the identified area.
- Meeting notes along with any collaboratively developed strategies will be recorded in COPI and passed on to Permitting Supervisors through email and on SFMP checklists. Decision Support Tools will be stored on the block file.

Implementation:

- The Permitting Supervisor will enter any associated strategies from the email communication (described above) or SFMP checklist into the site plan. If fieldwork is required then the Permitting Supervisor is responsible for communicating the associated strategy to field staff, and ensuring it is properly executed.
- The Operations Supervisor will review the strategy with Harvesting Contractors and ensure it is understood as part of the harvesting pre-work.
- Harvest supervision done by Operations Supervisors and Contractors will ensure strategies from the site plan are being adhered to.
- Post harvest checklists done by Operations Contractors, and post harvest inspections done by Silviculture Contractors, are done after harvest completion to ensure compliance with the site plan. These documents are stored on block files and in Cengea Resources respectively. These will flag any potential issues or non-conformances with the strategies from the site plan.
- Any non conformance will be entered into ITS by Operations or Silviculture Supervisors and investigated by the same person.

Old and Mature Forest Identification and Recruitment Strategy

Purpose

To ensure that old growth (OGMA) and mature (MMA) management areas are present in Canfor's DFA throughout the short and long term, as a component of maintaining biodiversity.

Rationale

Due to the length of time required to develop old stands, a spatial identification and recruitment strategy is required to ensure their presence on the landscape. Managing to the KBLUP targets without spatial identification of OGMA/MMA areas is very difficult, because it necessitates running analyses when harvest is proposed to ensure that the proposed harvest will not encroach upon targets. This strategy describes the spatial identification of OGMA and MMAs, as well as the identification of recruitment stands. More information can be found under Indicator 5 – Old and Mature Forest Retention.

Strategy

1. Planning Coordinator will ensure that Canfor has spatially identified old and mature forest areas by BEC variant, landscape unit (LU), and biodiversity emphasis option, up to the target amounts specified in Section 2 of the Kootenay-Boundary Higher Level Plan Order (2002) and the most current variances to that order.
2. The OGMA/MMA identification and allocation process will be consistent with the requirements outlined in KBHLPO and associated variances regarding stand age and type. The oldest stands will generally be selected first, but factors such as the ecological 'Old-growth quality' from air or ground surveys will be incorporated into the selection process where this data is available. Priority will also be given to old and mature stands in rare ecosystems and habitat for species-at-risk, and to non-lodgepole pine leading stands. If connectivity mapping for grizzly is available (Objective 5 under KBLUP), placement within these areas will also be prioritized (NOTE: this mapping was not available at the time the OGMA's were selected in 2006/7). Stands less than 2 ha should not be selected. Details of the selection process can be found in the reports listed in the reference section of the Indicator Data Sheet for Old and Mature Forests.
3. In units where old and/or mature stands are in deficit, recruitment stands will generally be designed to meet the targets in the shortest amount of time, however, other factors such as connectivity between existing old stands, whether it is in a riparian area or provides habitat for a species-at-risk may also be considered.
4. The selected stands will be made into a digital layer and incorporated into Canfor's GIS system so they can be avoided when forest development is planned.
5. Canfor Planning, Permitting, and Field Operations will respect the selected OGMA and MMA boundaries and treat these areas as reserves unless one or more of the conditions set out under Point 1 in the Old Growth SWP are met.
6. Where OGMA's/MMAs or portions of OGMA's/MMAs that are > 1 ha are logged as part of a cutblock or new road, a replacement stand or set of stands will be identified that are of equal or superior old or mature forest value. These stands will be in the same BEC variant/LU/ as the logged OGMA/MMA. The replacement stands will be digitized and incorporated into the digital layer on an on-going basis. The Old Growth SOP provides details on responsibilities and methods for how these replacement stands will be selected and digitized.

7. Forest Scientist is responsible to work with WIM to ensure that the current amount of mature and old forest identified as OGMA/MMA is compared to the KBLUPO targets requirements in conjunction with Timber Supply Reviews or every 5 years, whichever comes first. Results of the comparisons will be presented in the Annual Report and/or SFMP in the year they are done.
8. If deficits are identified through the analysis in Point 7, the Planning Team is responsible to ensure that additional stands are identified so that targets are met. This must be done within one year of deficits being reported.
9. Identified Old and Mature stands that have had their old or mature values significantly impacted by wildfire, flood, outbreak or insects or disease or other unforeseen biotic or abiotic factors will be replaced with existing old and mature stands or recruitment stands following the selection principles in Point 2 of this strategy. Note that some stands impacted by wildfire, for example, retain very high biodiversity values for a number of years following the fire, including values which are not found in young stands created through logging (e.g., habitat for Black-backed woodpeckers). Thus, not all OGMAs/MMAs burned by wildfire need to be replaced.
10. Old and mature stands will be considered a High Conservation Value and be one of the factors considered in High Conservation Value Forest identification.

Overlapping Tenures Strategy

Purpose

To ensure that forest management activities are planned with consideration given to all concerns brought forward by overlapping tenure holders. Tenure Holders will be encouraged to assist in the development of management strategies intended to protect their rights as tenure holders, and minimize negative impacts on their associated resources.

Rationale

Ensuring the protection of overlapping tenure holders' rights and resources is an important part of Canfor's commitment to communication and socially responsible forestry. More information can be found under Indicator 33 – Overlapping Tenures.

Strategy

Identification

- The Planning Supervisor will notify overlapping tenure holders through letters or email during the planning phases of cut-block development.
- As a backup to letters and email, planned harvest areas are also referred in local newspapers.
- There are a number of reoccurring group meetings that overlapping tenure holders are invited to participate in. Group meetings include PAG, EVIRTF and city council meetings. Canfor staff has and will continue to attend other group meetings upon request.
- An open door policy is adhered to throughout the planning phases, allowing tenure holders the opportunity to discuss potential impacts with Planning Supervisors.
- The tenure holder is responsible to contact Canfor Planning Supervisors with any potential concerns.

Development of Management Strategies:

- If concerns are not addressed in initial contact, an in-person meeting will be set up to review the details of the proposed activity and the concern of the tenure holder.
- Meetings will review maps and proposed plans.
- If required, mitigative strategies will be developed to satisfy the concerns and protect the rights and resources of the Overlapping Tenure Holder.
- Meeting notes along with any collaboratively developed strategies will be recorded in COPI and passed on to Permitting Supervisors through email and on SFMP checklists.
- If no resolution is attainable, Canfor's Decision Support Tool will be used to come to a fair and effective decision for balancing the values in the area. Decision Support Tool documents will be stored on the block file.
- If the tenure holder still feels that his rights or resources are not being fairly managed Canfor will enter into a mutually agreed upon dispute resolution. Results of dispute resolution will be filed on the associated block file and noted in COPI (refer to Appendix 6).

Implementation:

- The Permitting Supervisor will enter any associated strategies from email communications (described above) or SFMP checklist into the site plan. If fieldwork is required then the Permitting Supervisor is responsible for communicating the associated strategy to field staff, and ensuring it is properly executed.
- The Operations Supervisor will review the strategy with Operations Contractors and ensure it is understood as part of the harvesting pre-work.
- Harvest supervision done by Operations Supervisors and Contractors will ensure strategies from the site plan are being adhered to.
- Post-harvest checklists done by Operations Contractors, and post-harvest inspections done by Silviculture Contractors, are done after harvest completion to ensure compliance with the site plan. These documents are stored on block files and in Cengea Resources respectively. These will flag any potential issues or non-conformances with the strategies from the site plan.
- Any non-conformance will be entered into ITS by Operations or Silviculture Supervisors and investigated by the same person.

Participation Strategy

Purpose

To ensure that the interests of Indigenous Peoples, rights holders and directly affected parties are identified and managed for in a mutually agreeable, ecologically, socially and economically responsible manner.

Rationale

Ensuring the protection of Indigenous Peoples, right holders and directly affected parties rights and/or interests is important for Canfor's social license. The objectives of this strategy are to ensure that Canfor:

1. Knows the Indigenous Peoples, rights holders and directly affected parties with a right and/or interest on the DFA;
2. Takes effective steps to provide directly affected parties with information;
3. Puts in place steps to protect rights of Indigenous Peoples and rights holders and the interests of directly affected parties; and
4. Implements a mutually agreed-to dispute resolution process where agreement on steps to protect the interests of directly affected parties is not reached (refer to Appendix 6).

More information can be found under the following indicators:

- Indicator 32 – Identified Non-Timber Forest Benefits
- Indicator 33 – Overlapping Tenures
- Indicator 38 – PAG Satisfaction
- Indicator 39 – Educational Opportunities – Information/Training
- Indicator 40 – SFM Monitoring Report
- Indicator 41 – Third Party Verification
- Indicator 44 – Indigenous Peoples Understanding of Plans
- Indigenous Peoples Strategy

Strategy

Canfor is committed to working with all parties with an interest in the DFA, including Indigenous Peoples, rights holders and directly affected parties. This commitment includes: on-going sustained efforts to provide and receive information relevant to forest management; to continuous, multiple efforts to meet people in a way that works for them; and provision of a forum where people feel they can bring their concerns and be heard. The objective is that there is an on-going dialogue between Canfor and Indigenous Peoples, rights holders and directly affected parties so that Canfor can better understand the rights and/or interests and can work in collaboration with other parties to best ensure that forest management plans can accommodate or lessen impacts to other parties' rights and/or interests.

Conversations and correspondence will be recorded in COPI and passed on to Permitting and Operations Supervisors through email and/or the SFMP checklists and stored on the block file.

This strategy includes seven key components:

1. Knowing Indigenous Groups, Rights Holders and Directly Affected Parties on the DFA

Canfor strives to ensure that they are aware of Indigenous Peoples, rights holders and directly affected parties on the DFA. A database is managed to track Indigenous Peoples, rights holders and directly affected parties, their rights and/or interests, and communications on a continual basis.

2. Strong Relationship With Local Indigenous Groups

The Relationship Protocol and the Engagement and Benefits Agreement govern the relationship with the KNC. Canfor has relationships with other Indigenous Peoples, but no formal agreements in place at this time, yet discussions continue.

3. Public Advisory Group (PAG)

An effective PAG needs to accommodate local circumstances. Establishing and implementing an agreed upon Terms of Reference (TOR) provides for a fair, effective, open and accountable process to exist for the PAG. The range of those involved in the process must be involved in the development of the Terms of Reference.

This forum is designed to provide Indigenous Peoples, rights holders and directly affected parties with an opportunity to provide input on important issues, as well as learn about many aspects of SFM and forestry operations. Canfor considers the public input seriously and demonstrates that it is responsive to and respectful of this input. The TOR explains how decisions are reached within the public advisory group.

The strength of this group is two-fold: 1) to assist with development and improvement of the decision-making processes that guide forest management; and 2) to promote awareness and capacity building for both the group and the forest managers.

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

Canfor will keep minutes of each meeting and will track input into management planning and the outcomes of that input within the documents input was given on.

4. On-Going Site Level Engagement

The Planning Supervisor will make direct contact with Indigenous Peoples, rights holders and directly affected parties with a known right/interest in the area during the early planning stages at the site level. At the request of an Indigenous group, right holder and/or directly affected party a meeting will be set-up in order that Canfor can explain the site plans and provide educational/information exchange opportunities as needed and so that the other party can explain their right and/or interest. Potential impacts to a right and/or interest will be discussed and steps to protect the right and/or interest will be developed and agreed to.

The Planning Supervisor will distribute a notification during the planning phases of cut-block development in local newspapers and/or mail-outs.

Canfor will keep records of communications with all parties and will track input into management planning and the outcomes of that input within the appropriate documents.

5. On-Going Broad-Based Engagement

All known parties will be emailed or mailed direct notices of proposed forest development. Notifications will also be published in local newspapers. There are a number of group meetings set up that Canfor regularly participates in and Indigenous Peoples, rights holders and directly affected parties are invited to participate in these meetings if, and when, appropriate. These include Elk Valley Integrated Resource Task Force and city council meetings. Canfor staff has, and will continue to, attend other group meetings upon request.

Canfor will keep records of communications with all parties, track input into management planning, and track the outcomes of that input within the documents input was given on.

6. An Open Door Policy

An open door policy is adhered to throughout the planning phases, allowing Indigenous Peoples, rights holder and directly affected parties to discuss potential impacts with Planning Supervisors regardless of notification timelines.

7. Dispute Resolution

Implementation of a mutually agreed to dispute resolution process in situations where Canfor and Indigenous Peoples, rights holders or directly affected parties are not able to agree to measures that ensure the protection of the rights and/or interests of parties (refer to Appendix 6).

Patch Size Distribution Strategy

Purpose

To ensure that a diversity of patch sizes is created and maintained within the DFA, and that Canfor meets the patch size requirements of [FRPA – Forest Planning and Practices Regulation \(Section 64\)](#).

Rationale

Implementation of this strategy will result in a range of patch sizes on the landscape over time, which has been deemed important to maintain biodiversity. More information can be found under Indicator 3 – Patch Size Distribution.

Strategy

Analysis

1. Woodlands Information Management team (WIM) will calculate Patch size distributions every 5 years at a minimum. Distributions will be calculated for the Natural Disturbance Type (NDT) within each ecosection in the DFA.
2. For these calculations, BEC variants will be classified into the NDTs as specified in the Biodiversity Guidebook, with the exception that there will be no differentiation for BEC variants based on the presence or absence of Douglas-fir. The WIM team has a table linking each BEC variant to its NDT.
3. Ecosections are based on those delineated by the Ministry of Forest, Lands, and Natural Resource Operations, with the boundaries modified slightly so they match Landscape Unit boundaries and TSA boundaries in areas where both boundaries are close together. Ecosections will be defined by groups of Landscape Units as per Table 63.
4. Patch size analysis will be conducted using the entire CFLB within each Ecosection in which Canfor operates in the East Kootenay, including parks or portions of parks that are found within LU boundaries in the LUs that Canfor operates (similar to the way Old Growth percentages are calculated in the Old Growth Strategy).
5. Patch size distributions will be calculated only for stands aged 0-19 years (very early seral). Patches originating from logging and natural disturbance (i.e. fire, windthrow, etc.) origin will be included in the calculations. For each NDT, the calculation is:
$$\frac{\text{Area of very early seral patches in each size category/}}{\text{Total area of all very early seral patches}}$$
6. If a very large disturbance event occurs (e.g., a large wildfire) within specific ecosections, the calculations may be re-run more frequently than every 5 years. It is the responsibility of the Forest Scientist to direct WIM to re-run the calculations based on large disturbance events.

Implementation

1. Planning will ensure to the extent possible that the size of new cutblocks made 'Available' fits within or trends towards the desired patch size distribution targets for very early seral patches, by NDT and Ecosection (Table 43) and meets legal requirements.
2. Legal requirements under Section 64 are that the Net Area to be Reforested (NAR) of a cutblock does not exceed 40 ha, unless:
 - o The block is being harvested for salvage of timber damaged by fire, insect infestation, wind, or other similar events, or for sanitation treatments;
 - o 40% or more of the Basal Area is retained on the cutblock after harvesting;

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- o No point within the NAR is more than two tree lengths from the block boundary or a reserve patch of trees ≥ 0.25 ha, or more than one tree length from a patch of trees < 0.25 ha in size; or
- o The block is designed to be consistent with the structural characteristics and the temporal and spatial distribution of an opening that would result from a natural disturbance.

Following the target patch size distributions will be considered to meet the temporal and spatial distribution of an opening resulting from natural disturbance. Structural characteristics will be met by green tree and snag retention, as well as WTP and riparian reserve retention.

3. Permitting will design cutblocks such that the cutblocks remain within the size category they were originally placed in by Planning. If the size category changes due to deletions of proposed areas or incorporation of areas previously not identified, Permitting will inform Planning, who will determine whether or not the changes are consistent with patch size target ranges and/or legal requirements. If they are not, Planning will inform Permitting and together they will agree upon a block size that meets requirements.
4. Patch size distribution targets will not be applied to patches in Open Range or Open Forest as defined in the [Ungulate Winter Range Government Action Regulation U-4-006 and U-4-008](#).

Table 63: Ecoregion analysis units, the landscape unit groupings they are comprised of, and the rationale for these groupings

Ecoregion Number	Ecoregion Name/ Abbreviation	Rationale	LUs included (in their entirety)
1	Flathead Valley/Crown of Continent FLV/COC	<ul style="list-style-type: none"> • Group the FV and COC ecoregions because the current boundary between them roughly follows the MS/ESSF line in the middle of C18. There is some biodiversity rationale for this, but for patch size it is not as important because fires burning in the MS often burn up into the ESSF. Also, leaving the COC on its own would result in a small unit that splits a LU in half. • Include all of C17 and C15 because the FV ecoregion cuts off the top part for no obvious reason. • Exclude C13 (which is included in portion in the FV) because fire studies show the MS and ESSF above the IDF in the trench had a fire regime more similar to the IDF than to the MS/ESSF in interior mountainous valleys. 	C14, C15, C16, C17, C18 (partly BCTS)
2	Mid-Elk Valley ELV	1) Split the Elk Valley ecoregion in two – the mid valley (wetter) and the upper valley (drier, larger more extensive fires). This difference is reflected in	C24, C25 (Galloway), C26 (Galloway), C19

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Ecosection Number	Ecosection Name/ Abbreviation	Rationale	LUs included (in their entirety)
		the BECs (ESSFwm vs ESSFdk for example)	
3	Upper Elk Valley ELV	<ul style="list-style-type: none"> Split the Elk Valley ecosection in two – the mid valley (wetter) and the upper valley (drier, larger more extensive fires) The ecosection boundary runs on the west side of the Elk River, roughly where the mountains start up from the valley – not sure why it is there – makes more sense to include the side valleys off the elk with the Elk Valley unit for patch size analysis. 	C21, C22, C23, C38, C20,
4	Southern Park Ranges – South SPK	Use the TSA line for as a division point for administrative purposes.	C27, C28, C29
5	Southern Park Ranges – Central SPK	Defined by the TSA line for admin purposes and the legacy Canfor/Tembec boundary line (roughly).	I05, I06, I07, I08, I09, I10, I19
6	Southern Park Ranges – North SPK	I25 included here because the portion in the Upper Columbia Valley ecosection is largely Open range/Open Forest, for which patch size is not formally considered for planning purposes.	I20, I21, I22, I23, I24, I25, I33. Kootenay National Park (KNP1, 2 and 3) is technically included within this unit but is not included in patch size analysis calculations.
7	East Kootenay Trench – South EKT	Exclude Open Range and Open Forest from the calculations. C30 is split in half by the ecosection line with the trench, but since the part in the trench is mostly BCTS, put it in the McGillivary Range.	C13, C32, C33, C34, C35, C36, C37
8	East Kootenay Trench – North EKT	I03 is split by 2 ecosections, the trench and the EPMs. It was placed with the EPM section since a decision needed to be made either way.	I03, I04, I11, I13
9	McGillivary Range MCR	C30 is split in half by the ecosection line with the trench, but since the part in the trench is mostly BCTS, put it here. Although C01 and C09 are in the SPM, they were grouped here because they seem to be more similar to this	C02, C10, C11, C12, C30, C01, C09

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Ecosection Number	Ecosection Name/ Abbreviation	Rationale	LUs included (in their entirety)
		unit than to Hawkins Creek and the Goat River.	
10	Upper Columbia Valley – TFL14 UCV	These two LUs almost entirely contained within this ecosection – division clear. The TFL14 boundary retained for administrative purposes.	I38, I35
11	Upper Columbia Valley – Radium UCV	Keep the TFL boundary as an administrative line. I32 is split between the trench and the EPM, but the majority occurs in the trench so put it here. I30 is split between the trench and mountain ecosections, and could have gone with either.	I29, I18, I32, I36, I30
12	Eastern Purcell Mountains – TFL14 EPM	These two LUs almost entirely contained within this ecosection – division clear. Keep the TFL boundary as an administrative line.	I37, I34
13	Eastern Purcell Mountains – North EPM	All of these LUs fall entirely or almost entirely within this ecosection so put them here. The old Canfor/Tembec operating area line split was kept to divide the EPM-North from the EPM-South so that the analysis units did not become too large.	I31, I28, I27, I26, I15, I16, I17
14	Eastern Purcell Mountains – Central EPM	I12 split by ecosection line for 3 ecosections, but majority is in the EPM ecosection. I03 split by this ecosection and the trench, but most in the trench.	I01, I02, I12, I14,
15	Eastern Purcell Mountains – South EPM	C08 is split in half by the ecosection line between the EPM and the SPM, but since putting it in the SPM would leave only C31 by itself, it was grouped here.	C08, C31
16	Southern Purcell Mountains - Cranbrook SPM	These LUs are all entirely within this ecosection.	C04, C05, C06, C07
17	Southern Purcell Mountains – Kootenay Lake SPM	These LUs are all completely within this ecosection.	K02, K03, K05, K06

Permanent Access Structures Strategy

Purpose

To limit the percent of operable forest area converted to non-forest use through the development of permanent access structures (PAS).

Rationale

Permanent access structures such as permanent roads, landings and borrow pits, result in the conversion of operable land base to non-forest uses. This has an obvious negative affect on the long-term timber supply, as there is less productive land available to grow trees. The density of PAS can also contribute to environmental pressures such as spread of noxious weeds, changes to animal movement patterns and increased human pressure on wildlife. Sustaining productivity within the Timber Harvest Landbase (THLB) and limiting potential negative environmental effects from increased road density is an important component of maintaining social, economic and ecological sustainability. More information can be found under Indicator 22 – Permanent Access Structures.

Strategy

1. When developing permits Planning and Permitting Foresters will determine the amount of PAS currently in the specific LU from the PAS annual report. The amount of PAS proposed will be considered and planned to ensure the total remains below the 5% target. If numbers are approaching target levels, the PAS report can be re run for that LU including proposed roads for the new development.
2. Wherever possible, permanent access structures will be designed for total chance harvesting. This means planners will look at all the timber that will be available in the area and ensure the road system works to access it all and not for one specific block. Over the long term this helps to minimize the percent PAS. It should be noted that Planners and Permitting have to work with what PAS are currently on the landbase and in some cases this may not result in optimal total chance planning.
3. When accessing sites where no future timber is available temporary roads will be considered as the primary option. This can help protect environmentally sensitive areas from increased human access as well as decreasing the impact on the THLB. All temporary access structures are to be reclaimed. This includes temporary roads and landings.
4. Canfor will continue to work with other forest companies and overlapping industries so that road systems and borrow pits can be shared. This requires sharing of GIS layers, required road specifications and future plans. Frequent communication with overlapping industries is achieved through ongoing relationships and Canfor's referral process. (As described in detail in Overlapping Tenures Strategy).
5. If a landscape unit is at the maximum target for conversion of operable land base to PAS, The Planning Supervisor and WIM analyst will complete an analysis of the road layers in the LU to determine the accuracy. This can include photo analysis and, in some cases, on ground verification of the layer. PAS can easily be overestimated with historical road data. In some cases sections of roads may need to be added or removed, in others the area of the PAS may be an over or underestimate.
6. If levels exceed the maximum target for PAS, no new PAS will be added. If new permanent access is necessary, then reclamation of existing permanent access will be required to offset the new road.

Procurement of Local Goods & Services, Corporate Sponsorships, Donations & Scholarships Strategy

Purpose

To support the economic component of Sustainable Forest Management (SFM) through sustained economic benefits and contributions to local communities.

Rationale

To develop partnerships with local vendors that consistently meets Canfor's specifications for quality, service and price, and to build relationships on trust, mutual respect, benefit and understanding of each other's expectations.

The strategy is intended to provide guidance for the purchase, sale, lease, or requisition of materials, commodities, or services and corporate donations. Canfor seeks to: exhibit prudent financial management; respect loyal and dependable suppliers; demonstrate commitment to environmental protection, and the safety of employees, customers and the public; while encouraging industries in the communities and regions in which it operates.

Canfor's Corporate Sponsorship and Donation Program serves as the principal funding entity for Canfor's charitable contributions. The program approves and allocates funding for organizations and events in an equitable manner in communities where Canfor operates. Canfor awards a variety of scholarships to support students and provide opportunities for a career in the forestry industry. More information can be found under Indicator 34 – Local Procurement of Goods & Services and Indicator 35 – Corporate Sponsorships, Donations and Scholarships.

Strategy

Procurement

The purchasing department is responsible for the procurement of goods and services as requisitioned by various managers and department heads, in both the Forest Management Group (FMG) and Forest Products Group (FPG). Canfor tracks all spending pertaining to forest related activities (operations, management, within the DFA).

In order to achieve this, the purchasers follow corporate policy and in-house practises. These give direction to develop and promote industry in the communities and regions in which Canfor operates while being financially prudent and purchasing quality goods and services. The policy provides guidance for such items as contract purchases, quotes, tendering, etc. When these criteria are met, the purchases of quality products and/or services on a competitive basis with priorities given to:

- Local suppliers and manufacturers
- Regional suppliers and manufacturers
- Provincial suppliers and manufacturers
- National and International suppliers and manufacturers.

In order to promote local businesses within the community or region, Canfor on occasion will give discretionary consideration. The decision to buy must still be based on the criteria of delivery, quality, freight costs, FMS requirements and local versus out-of town vendors.

There are certain situations where local purchasing does not occur. These include specific brands of equipment and repair parts that are only available from the manufacturers or the product and/or services are not available within the local area. Cost competitiveness from economy of scale purchases from Canfor's ability to leverage its purchasing power may favour certain supplier relationships.

Donations

Canfor's Sponsorship & Donations program funds charitable organizations that deliver innovative community programs focusing on:

- Youth and Education
- Community Enhancement
- Forestry and Environment
- Amateur Sports
- Health and Wellness

For corporate donations, Canfor funds organizations and projects that meet the needs of the community and reflect Canfor's business goals and ideals. Canfor will seek out or give preference to unique or exclusive sponsorship or donation opportunities that will have a long-term and significant benefit to the community while providing Canfor with appropriate recognition.

Canfor provides funds to non-profit organizations and preference will be given to organizations that have been granted a charitable registration number by Revenue Canada.

At Canfor, employees who live and work in the community make sponsorship decisions locally. Canfor chooses to support those organizations that best meet funding priorities and guidelines. Organizations seeking funding are asked to submit an application form. Alternatively, they can send an e-mail or letter clearly stating information on the event/project including a brief description of the project, the project/event dates, the specific amount being requested, who the project will benefit, and how Canfor will be recognized for its contribution.

Canfor partners with post-secondary institutions to provide scholarships to students in forestry, wood products manufacturing, and other forestry-related engineering and trades programs. These scholarships are managed directly by Canfor's partner institutions. Canfor also provides scholarships to students entering degree or trades foundation programs related to forestry, and in areas in which there is a skills shortage. Students applying to receive a scholarship must identify their intent to pursue a career in the forest products industry. Awards are in the amount of \$500.

The Bentley-Prentice Scholarships are awards that commemorate the founders of Canfor, and was established in 2013 to mark Canfor's 75th anniversary. It recognizes academic excellence among children of current Canfor employees who plan to pursue a career in forestry or a relevant trade. There are six awards available each year, one for each of our operating regions. Students receiving these awards will receive a payment of up to \$5000 to cover the cost of tuition. Recipients will not be eligible for other Canfor scholarships in the same year.

The following awards are sponsored by Canfor, but are not directly administered through Canfor's corporate office. The New Relationship Trust Foundation (NRTF) Scholarships in BC are awards administered by NRTF specifically for Indigenous students in Canfor's operating communities. While Indigenous students are eligible in all other scholarship categories, Canfor's partnership with NRTF provides dedicated support for Indigenous students entering targeted education streams. One (1) \$5,000 scholarship, and two (2) \$2,000 bursaries will be awarded.

For information on the criteria and applying for any of these scholarships, [Canfor Scholarships & Career Development](#)

Protected Reserves Strategy

Purpose

To ensure that a proportion of each BEC variant occurring within Canfor's DFA is represented in protected reserves to sustain lesser known species and ecological functions.

Rationale

Maintaining a portion of each ecosystem in protected reserves is considered to be key component of conservation strategies for sustaining biodiversity in managed forests. More information can be found under Indicator 2 – Protected Reserves.

Strategy

1. Forest Scientist is responsible to ensure that an analysis has been completed for the DFA (as a whole or in parts) that reports on the status of protected reserves within each BEC variant relative to targets. The analysis and targets will be in conformance with FSC-BC standard methodology.
2. Forest Scientist will ensure that the report(s) on the analysis in point 1 above is updated at least every 10 years, or within 2 years of significant changes to the area of protected reserves within the DFA or within the extent of the variants, or within 2 years of the legal adoption of new mapping of the variants.
3. BEC variants that do not meet targets will have one of the following strategies applied to them. The Forest Scientist is responsible to ensure these strategies are completed and the BEC variants are up to targets.
 - a. Additional reserves will be identified and mapped, up to the required target amount. As an example, this was done for the deficit of protected reserves in the ICHmw1 and ICHmk1 variants in TFL14 (see report by Woody Forest Management 2007).
 - b. Portions of the deficit BEC variant up to or exceeding target requirements will be included in High Conservation Value Forests (HCVFs). This will applied to BEC variants such as the PPdh2 and IDFdm2 that historically experienced frequent stand-maintaining fires and in which ecosystem restoration has been deemed necessary to restore function and wildlife habitat. HCVFs in these BEC variants have management strategies written and implemented that are designed to maintain or restore ecological function and habitat for native species.
4. Forest Scientist, working together with WIM, is responsible to see that annual reporting on the amount of harvesting and road-building outside the operability line is completed and included within the Annual Report for all BEC variants within 1000 ha of their target amounts. This annual reporting is intended as an 'early warning system' for the possibility that logging in the inoperable will bring a particular unit below target.
5. Should logging/road-building bring any particular BEC variant below or within 20 ha of its target, the Forest Scientist and Planning and Permitting Foresters will meet and enact a system such that any areas with a protected reserves designation that are planned for harvesting must have an equivalent area designated as protected reserve, so that targets will not be exceeded. As a group they will also ensure that there are mapped reserves up to target levels.

Riparian Management Strategy

Purpose

To provide an objective driven, ecosystem approach to the management of riparian areas while ensuring minimum FSP (FRPA) and FSC requirements are achieved.

Rationale

Riparian reserve zones (RRZ's) are ecologically important, sensitive areas where, in general, harvesting and road building should not occur. Riparian management zones (RMZ's) are areas where the intent of management prescriptions should be to protect the ecological integrity of RRZ's and/or to maintain/enhance important associated values. A strategy is required to ensure that Canfor implements consistent and appropriate riparian management and avoids negatively impacting riparian or aquatic habitat. More information can be found under Indicator 11 – Riparian Management.

Strategy

1. Forest Scientist will ensure that Canfor has developed an approach to meeting the riparian indicator in the FSC-BC Standards, and that Canfor staff and contractors whose work involves layout of cutblocks around waterbodies and watercourses are trained on the approach.
2. Forest Scientist will ensure that the strategic budget calculations in the Integrated Riparian Assessment will be recalculated at a minimum every eight years for RAUs that had logging within them during these 8 years, or on a RAU specific basis following a major disturbance. Individual RAU's with relatively small budget surpluses and with large-scale proposed developments, will have the analysis will be run on an 'as-needed basis' to ensure that any planned development does not result in a deficit condition.
3. Effectiveness monitoring to determine if the riparian management approach is indeed protecting riparian integrity will be conducted, following FREP protocols. Results will be communicated to Canfor staff and consultants and riparian strategies then be revised, if necessary, in an adaptive management framework.

Seral and Structural Stages Relative to the Range of Natural Variability Strategy

Purpose

To ensure that the area of old, mature and early seral and structural stages is monitored, projected through time and compared to the historic range of natural variability (RNV) so that a comparison of current, historic, and future conditions can be made.

Rationale

Comparing present and projected ecosystem conditions to RNV represents a type of environmental risk assessment; the more current ecosystem condition deviates from the historic range, the greater the risk to that ecosystem and the species within it. More information can be found under Indicator 6 – Seral and Structural Stages Relative to the Range of Natural Variability.

Strategy

1. The Forest Scientist is responsible to ensure that a simulation model exists, appropriate to the East Kootenay that can be used to estimate the range of historic variability and project future trends in forest seral stages.
2. The Forest Scientist will ensure that this model will be re-run every 15 years, or:
 - within 5 years of a new Timber Supply Review (TSR) being released with significantly different forest management assumptions than the previous TSR.
 - when new data on the range of natural variability become available that are sufficiently different from the current model's assumptions of the range of natural variability that it warrants adjusting/ re-running the model.
3. The Forest Scientist will ensure that the report on results of the model simulation will include comparisons of current, historic, and future conditions of each seral and structural stage, by ecosystem and TSA.
4. If the current condition of a seral/structural stage is significantly outside RNV, and the projected future trend is not towards RNV, an assessment containing the following will be conducted by the Planning Team:
 - Potential reasons for the deviation.
 - A comparison between current trends and the 20-year projected trends to determine if trends will diverge or converge.
 - An assessment of the impacts of climate change on that particular seral or structural stage.
 - An assessment of current harvest practices on that particular seral or structural stage, and if there are practicable changes that could be implemented to bring the stage closer to RNV.
5. If there are practicable changes that could be implemented, the Planning Team will discuss these with the appropriate Canfor staff (e.g., Permitting, Silviculture, Operations) and develop strategies to implement them.

Silviculture Strategy

Purpose

The silviculture strategy provides a guide to achieve Canfor's reforestation goals for species diversity, genetic diversity, forest productivity, carbon storage and the establishment of healthy, resilient forests capable of tolerating changes in climate as well as meeting legal obligations.

Rationale

Silviculture is the art and science of controlling the establishment, growth, composition, and quality of forest vegetation for the full range of forest resource objectives. Successful silviculture programs depend on clearly defined management objectives for timber, wildlife, water, recreation, aesthetics and other forest uses. Silviculture plans that are dynamic, incorporating new research and the results of regular monitoring tend to be more successful as they allow for adjustment of factors that are out of the control of the manager; such as weather, seed crops, animal populations and new forest health issues.

Silviculture programs balance stand productivity with ecological objectives given individual site characteristics like soil, moisture and nutrients. This usually comes at a trade-off (eg. species diversity over maximizing site productivity) and has long-term implications. Once a new stand is established through natural regeneration and planting, treatments like fill planting, brushing or spacing are sometimes required. This is identified through monitoring surveys. The milestone of free growing generally takes 10-20 years after a disturbance and marks the achievement of crown legal obligations.

Although other functional departments complete block design, layout and harvesting, those actions have a profound effect on the success of the silviculture program. Silviculture staff need to communicate issues with other functional departments so they understand these effects and provide the opportunity to manage trade-offs together. Re-occurring issues with reforestation are identified as critical site limiting factors and are communicated to field staff looking at new potential harvest sites.

With the role of creating the forests of tomorrow, the Silviculture Program has a long lasting legacy. To be successful, it requires the tracking of decades of monitoring surveys over large geographic areas and incorporating the results into current practices while synthesizing multiple objectives.

More information can be found under the following: Indicator 14 – Tree Seed, Indicator 15 – Natural Regeneration, Indicator 16 – Mix of Species Planted, Indicator 17 – Managing for Species Diversity during Tree Thinning and Indicator 20 – Reforestation Success.

Strategy

This strategy is broken down into the following four phases: pre-harvest, harvesting, reforestation and post free-growing.

Pre-Harvest

1. The Planning and Permitting Supervisors are responsible to collect pre-harvest cutblock data during recce and layout phases. The site is classified into biogeoclimatic (BEC) zones, subzone, variant and site series. BEC is a provincial classification system that combines climate, vegetation and site characteristics to allow the prediction of what will grow there. Before harvesting occurs, the stocking standards are established based on the BEC classification by site series.

Canfor Kootenay Operations SFM Plan

- The Planning and Permitting Supervisors consult the Critical Site Limiting Factors Guide for the proposed area to ensure any known issues for that site are managed upfront.
- The Permitting Supervisor specifies minimum and target standards in the site plan document and forest management database (eg. Cengea Resources). The stocking standards specify what tree species are preferred and acceptable on a site at target and minimum densities. On crown land, these standards are approved by the MFLNRO. The stocking standards guide what species cutblocks are reforested with.
- The Permitting Forester prescribe what trees should be reserved from harvest in the site plan. Residual trees modify the site conditions (moisture, nutrients, light, temperature) and effect growing regeneration. Targets for residual trees should consider silviculture implications including silvical characteristics of each species. Residual trees also increase the genetic diversity, provide a seed source for natural regeneration, provide perch sites for raptors and birds, and influence animal use of the site. These all can affect a successful silviculture program. Determination of what trees to reserve needs to consider:
 - Impacts on site productivity and timber supply.** Larger trees take up more growing space so standard clearcut regeneration objectives may not be possible. Residuals already have roots established so they can monopolize scarce site resources (moisture and nutrients). On sites with limited resources, the number and size of residuals will have a bigger impact on regeneration. Refer to the Basal Area by Stem Diameter and Density table to identify when the threshold of 5-20m² BA occurs. Below 5 m², competition is not considered to be significant. Above 20 m² the site is considered fully occupied.

Basal Area by Stem Diameter and Stems Per Hectare ... pink highlights the the zone of concern for maintaining stand productivity through regeneration

STEM DIAMETER	10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20											
1	0.008	0.011	0.015	0.020	0.025	0.031	0.038	0.045	0.053	0.062	0.066	0.071	0.080	0.102	0.113	0.126	0.139	0.152	0.166	0.181	0.196	0.212	0.229	0.246	0.264	0.283	0.302	0.322	0.342	0.363	0.385
5	0.040	0.065	0.075	0.100	0.125	0.155	0.190	0.225	0.265	0.310	0.330	0.355	0.400	0.510	0.565	0.630	0.695	0.760	0.830	0.905	0.980	1.060	1.145	1.230	1.320	1.415	1.510	1.610	1.700	1.815	1.925
10	0.080	0.110	0.150	0.200	0.250	0.310	0.380	0.460	0.530	0.620	0.660	0.710	0.800	1.020	1.130	1.260	1.390	1.520	1.660	1.810	1.960	2.120	2.290	2.460	2.640	2.830	3.000	3.220	3.420	3.630	3.850
15	0.120	0.165	0.225	0.300	0.375	0.465	0.570	0.675	0.795	0.930	0.990	1.065	1.200	1.530	1.695	1.890	2.085	2.280	2.490	2.715	2.940	3.180	3.435	3.690	3.940	4.245	4.530	4.830	5.130	5.445	5.775
20	0.160	0.230	0.330	0.440	0.550	0.670	0.800	0.940	1.090	1.240	1.300	1.400	1.600	2.040	2.240	2.520	2.780	3.040	3.320	3.620	3.920	4.240	4.580	4.920	5.280	5.640	6.000	6.400	6.800	7.200	7.700
25	0.200	0.275	0.375	0.500	0.625	0.775	0.950	1.125	1.325	1.550	1.650	1.775	2.000	2.550	2.825	3.180	3.475	3.800	4.150	4.525	4.900	5.300	5.725	6.160	6.600	7.075	7.550	8.050	8.550	9.075	9.625
30	0.240	0.330	0.450	0.600	0.750	0.930	1.140	1.350	1.590	1.860	1.980	2.100	2.400	3.090	3.390	3.780	4.170	4.560	4.980	5.430	5.880	6.360	6.870	7.380	7.920	8.490	9.060	9.610	10.260	10.850	11.550
35	0.280	0.385	0.525	0.700	0.875	1.085	1.330	1.575	1.855	2.170	2.310	2.485	2.800	3.570	3.955	4.410	4.865	5.320	5.810	6.335	6.860	7.420	8.005	8.610	9.240	9.900	10.570	11.270	11.970	12.705	13.475
40	0.320	0.440	0.600	0.800	1.000	1.240	1.520	1.800	2.120	2.480	2.640	2.840	3.200	4.080	4.520	5.040	5.560	6.080	6.640	7.240	7.840	8.480	9.160	9.840	10.560	11.320	12.080	12.880	13.680	14.520	15.400
45	0.360	0.495	0.675	0.900	1.125	1.395	1.710	2.025	2.385	2.790	2.970	3.195	3.600	4.590	5.085	5.670	6.255	6.840	7.470	8.145	8.820	9.540	10.305	11.070	11.880	12.735	13.590	14.490	15.390	16.335	17.325
50	0.400	0.550	0.750	1.000	1.250	1.550	1.900	2.250	2.650	3.100	3.300	3.550	4.000	5.100	5.650	6.300	6.950	7.600	8.300	9.050	9.800	10.600	11.450	12.350	13.200	14.100	15.050	16.000	17.000	18.050	19.250
55	0.440	0.605	0.825	1.100	1.375	1.705	2.090	2.475	2.915	3.410	3.630	3.905	4.400	5.610	6.215	6.930	7.645	8.360	9.130	9.955	10.780	11.660	12.595	13.530	14.520	15.565	16.610	17.710	18.810	19.965	21.175
60	0.480	0.660	0.900	1.200	1.500	1.860	2.280	2.700	3.180	3.720	3.960	4.260	4.800	6.120	6.780	7.560	8.340	9.120	9.960	10.860	11.760	12.720	13.740	14.760	15.840	16.980	18.180	19.420	20.720	22.080	23.500
65	0.520	0.715	0.975	1.300	1.625	2.015	2.470	2.925	3.445	4.030	4.290	4.615	5.200	6.630	7.395	8.190	9.035	9.880	10.790	11.765	12.740	13.780	14.885	15.990	17.160	18.395	19.630	20.930	22.290	23.715	25.205
70	0.560	0.770	1.050	1.400	1.750	2.170	2.660	3.130	3.710	4.340	4.620	4.970	5.600	7.140	7.910	8.820	9.710	10.640	11.620	12.650	13.720	14.840	15.930	17.120	18.360	19.680	21.040	22.440	23.890	25.400	26.965
75	0.600	0.825	1.125	1.500	1.895	2.325	2.830	3.375	3.975	4.650	4.950	5.325	6.000	7.650	8.475	9.450	10.455	11.490	12.570	13.695	14.870	16.090	17.360	18.680	20.040	21.450	22.910	24.420	25.980	27.600	29.275
80	0.640	0.880	1.200	1.600	2.000	2.480	3.040	3.660	4.240	4.960	5.280	5.640	6.400	8.100	9.040	10.080	11.200	12.360	13.580	14.840	16.160	17.540	18.980	20.480	22.040	23.660	25.340	27.080	28.880	30.740	32.665
85	0.680	0.935	1.275	1.700	2.125	2.635	3.220	3.855	4.520	5.270	5.610	6.035	6.900	8.700	9.605	10.710	11.815	12.920	14.130	15.380	16.680	18.040	19.460	20.940	22.480	24.080	25.740	27.460	29.240	31.080	33.000
90	0.720	0.990	1.350	1.800	2.250	2.790	3.420	4.090	4.770	5.580	5.940	6.390	7.400	9.300	10.170	11.340	12.520	13.800	15.180	16.600	18.080	19.620	21.220	22.880	24.600	26.380	28.220	30.120	32.080	34.100	36.180
95	0.760	1.045	1.425	1.900	2.375	2.965	3.610	4.275	5.035	5.890	6.270	6.745	7.900	9.900	10.755	11.970	13.205	14.440	15.770	17.195	18.620	20.140	21.755	23.370	25.080	26.885	28.780	30.760	32.820	34.950	37.150
100	0.800	1.100	1.500	2.000	2.500	3.100	3.800	4.500	5.300	6.200	6.600	7.100	8.400	10.400	11.300	12.600	13.900	15.200	16.600	18.000	19.500	21.100	22.700	24.300	26.000	27.800	29.600	31.500	33.500	35.500	37.600
105	0.840	1.155	1.575	2.100	2.625	3.255	3.990	4.725	5.565	6.510	6.930	7.465	8.840	10.700	11.650	13.020	14.395	15.770	17.145	18.620	20.200	21.780	23.360	25.040	26.820	28.700	30.680	32.760	34.940	37.220	39.600
110	0.880	1.210	1.650	2.200	2.750	3.400	4.180	4.990	5.830	6.820	7.260	7.800	9.200	11.100	12.100	13.560	14.935	16.310	17.685	19.160	20.740	22.320	23.900	25.580	27.360	29.240	31.220	33.300	35.480	37.760	40.140
115	0.920	1.265	1.725	2.300	2.895	3.565	4.370	5.175	6.095	7.130	7.590	8.105	9.500	11.400	12.450	14.020	15.395	16.770	18.145	19.620	21.200	22.780	24.360	26.040	27.820	29.700	31.680	33.760	35.940	38.220	40.600
120	0.960	1.300	1.800	2.400	3.000	3.700	4.560	5.400	6.360	7.440	7.920	8.500	9.900	11.800	12.900	14.580	16.055	17.530	19.005	20.580	22.260	23.940	25.620	27.400	29.280	31.260	33.340	35.520	37.800	40.180	42.660
125	1.000	1.375	1.875	2.500	3.125	3.875	4.730	5.625	6.6375	7.750	8.250	8.875	10.300	12.200	13.350	15.150	16.725	18.300	19.875	21.450	23.025	24.600	26.175	27.850	29.525	31.200	32.875	34.550	36.225	37.900	39.575
130	1.040	1.430	1.950	2.600	3.250	4.030	4.940	5.890	6.960	8.060	8.580	9.210	10.640	12.540	13.750	15.660	17.235	18.810	20.385	21.960	23.535	25.110	26.685	28.260	29.835	31.410	32.985	34.560	36.135	37.710	39.285
135	1.080	1.485	2.025	2.700	3.375	4.185	5.130	6.075	7.155	8.270	8.810	9.385	10.820	12.720	14.005	16.020	17.695	19.270	20.845	22.420	24.000	25.580	27.160	28.740	30.320	31.900	33.480	35.060	36.640	38.220	39.800
140	1.120	1.540	2.100	2.800	3.500	4.340	5.320	6.300	7.420	8.560	9.110	9.700	11.140	13.040	14.395	16.540	18.215	19.790	21.365	22.940	24.515	26.090	27.665	29.240	30.815	32.390	33.965	35.540	37.115	38.690	40.265
145	1.160	1.595	2.175	2.900	3.625	4.485	5.500	6.525	7.680	8.850	9.500	10.100	11.540	13.440	14.855	17.140	18.815	20.390	21.965	23.540	25.115	26.690	28.265	29.840	31.415	32.990	34.565	36.140	37.715	39.290	40.865
150	1.200	1.650	2.250	3.000	3.750	4.650	5.700	6.750	7.950	9.180	9.790	10.400	11.840	13.740	15.215	17.600	19.275	20.850	22.425	24.000	25.575	27.150	28.725	30.300	31.875	33.450	35.025	36.600	38.175	39.750	41.325

- Regeneration species options.** The silvical characteristics of each species dictates what trees will be successful given particular site characteristics (see post-harvest regeneration species section for specific species information).
- Applicable stocking standards.** Residual trees will impact regeneration and may make it impossible to meet typical stocking standards. In these situations, partial stocking standards may be required. These standards acknowledge that bigger trees take up more growing space. There are strict conditions that need to be met before using partial cut stocking standards (e.g. management objectives).
- Forest health or animal issues in the area.**

5. The Permitting Forester should consider prescribing residual trees to have a positive effect on reforestation (e.g. on a frost prone site, reserve understory balsam to provide frost protection to planted spruce). See site limiting factors guide.
6. The Permitting Forester will schedule roads for deactivation and re-contouring within the site plan. Unless otherwise critical, schedule road deactivation and re-contouring after tree planting. Sites without pickup access should be discussed with Silviculture Supervisors to ensure the timing of silviculture treatments is optimized and provides for worker safety in the event of an emergency evacuation. (e.g. mechanical site preparation may occur during harvesting before a bridge is removed).
7. The Permitting and Operations Supervisors and Coordinators are responsible for development of the harvest schedule. This is important to follow as it provides the Silviculture Supervisor the opportunity to see harvest blocks coming online and to identify any with critical site factors that would benefit from ordering trees in advance of harvesting. The Permitting and Operations Supervisors will also consider the timing of harvest, harvest system, equipment and contractor as it influences site disturbance and residuals.

Harvesting

1. The Operations Supervisors are responsible to ensure the objectives for residual trees prescribed in the site plan are met. Important residual tree characteristics to silviculture include species, density, health, and spatial distribution.
2. The Operations Supervisors are responsible to ensure the objectives site degradation prescribed in the site plan are met. Site degradation above the maximum prescribed value may have a negative effect on site productivity and establishment of regeneration.
3. The Operations Supervisors will ensure proper deactivation. This is important to silviculture to ensure the safety and efficiency of our staff and contractors over the 10-20 year period it takes to achieve free growing. Proper deactivation is guided by the following documents on Sharepoint:
 - [FMG Post Harvest Erosion Control and Temporary Deactivation Standards](#)
 - [FMG Post Harvest Access and Erosion Control Communication Strategy](#)

Post Harvest

1. The Silviculture Supervisors complete post-harvest assessments, immediately following harvesting. This is a critical step to ensure a successful cost effective silviculture program. Post-harvest assessments include collecting field data to provide:
 - a) Verify BEC classification and stocking standards. If BEC appears inaccurate:
 - Evaluate site moisture and nutrient levels, soils and vegetation
 - Re-stratify BEC zones and amend the Site Plan
 - b) Evaluate forest health condition:
 - consider issues within the block (e.g. mistletoe, root rot)
 - issues in nearby blocks (e.g. gall rust, mistletoe, root rot, voles, browse)
 - regional trends
 - c) Identify site-limiting factors. This key step identifies site factors that will significantly limit the growth or establishment of regeneration and evaluate potential

for frost, drought, rock, cold soils and heavy snow. This information is summarized in the following document located on FMG Sharepoint:

- [Critical Site Limiting Factor Guide Kootenay](#)
- d) Determine if mechanical site preparation is necessary. Mechanical site preparation is used to mitigate impacts of site limiting factors or improve seedling survival. Consider the cost benefit of increasing planting density or stock size and the likelihood of plantation failure (options are referenced in the critical site limiting factors guide linked above).
- e) Evaluate residual trees:
- Density, species and health – meet free growing standards according to the stocking standards and damage criteria.
 - Cones / seed source – a viable seed source, is the forest floor a suitable seedbed to facilitate natural regeneration.
 - Potential effect on planted seedlings – species, moisture, vigour (example - is it too shady for Lw to grow).
 - Are the stocking standards from the site plan appropriate or is an amendment required (e.g. partial cut standards).
 - Review the objectives for the residual targets from the site plan. This will affect decisions to remove unhealthy residuals, perform mechanical site preparation or to perform other silviculture treatments.
- f) Evaluate the potential for natural regeneration. All stands are managed for a component of natural regeneration although it is rarely the foremost reforestation method. The success of natural regeneration is completely dependent on:
- Viable seed source – Although trees start to produce seed when juvenile, large viable cone crops are produced when closer to maturity. Even then, the periodicity of reliable cone crops is cyclical with some species only producing cones every 6-15 years. Seed development is also very weather dependent and susceptible to summer frost and drought. One or two years after a hot dry summer, trees will often produce a viable cone crop (stress crop). Large cone crops do not occur in consecutive years. Seed viability generally decreases with elevation.
 - Suitable seedbed – The characteristics of a suitable seedbed vary by species but are generally exposed mineral soil or a mix of mineral soil and decomposed LFH. The substrate heavily influences the temperature and moisture that are critical for cones to open and seeds to sprout and develop. Timing and method of harvest and the use of site preparation can heavily influence this aspect.
 - Maintenance of the proper conditions to support seedling growth – Moisture, nutrient, light and temperature will determine how the seedling performs. In some instances, many seedlings may germinate but few remain 10 years later.

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The above three steps must consider the following information by species:

Species	Cone Crop Periodicity	Site Characteristics	Regeneration Success
Lw	6-15 years	Requires exposed mineral soil. Cones often abort in areas with cold air drainage.	Very successful as a seed tree with burn. If seed trees are present, expect high Lw regen with hand-pulling (to reduce overstocking).
Fdi	1-3 years	Strong need for mycorrhiza in soil that requires organic layer to protect from moisture stress.	Generally takes 8-14 years to establish
Pli	1-3 years, usually serotinous (viable cones stored on tree)	Exposed mineral soil (30%) or soil mixed with disturbed LFH. Need heat to open to cones (exposed soil increases temperature)	Requires abundant class I and II cones. Prone to overstocking.
Sx	6 years	Moderate but regular. Mature Sx are not usually reserved from harvest due to blowdown so generally need to plant	
Bl	2-4 years, layer 2 produce viable seed	Tolerates frost and wet soils	Continues to seed in after logging, more reliable to come in naturally than planted.
Py	1-2 / 10 years, non-serotinous	Dry, PP or IDF	Seeds are large so dispersal is low and predation is high.
At	Sprout from cut stumps	Encourage At (by cutting) in areas with high ungulates, as they will eat At over planted conifers.	
Act	Sprouts from cut stumps	Wet sites, usually	Moderate to high in wet soils

- g) Evaluate the ecologically feasible species and determine the best combination of natural regeneration and planting. The goal is to maintain or increase species diversity where possible. Consider what species was present on site before harvest (cruise), how species are performing in adjacent stands and site objectives (SP). Strive to find a balance between forest health, stand productivity and ecological objectives.
- h) Determine what level of planting is required. Where ecologically feasible, mixed species planting should occur. This is important to contribute to maintain or enhancing species diversity and developing a resilient forest. Specify:
- Species – Silvical characteristics which determine feasibility of planting a particular species include:
 - Sx – mesic or wetter moisture, moderate nutrients, very frost sensitive, moisture receiving sites not shedding sites.
 - Lw – does not like shade / competition, very frost sensitive, likes nutrients and not too dry, wind-firm tree so a good choice for sides of riparian gullies.
 - Pli - very tolerate of environmental stresses like drought, flooding and frost. Generally a feasible tree for establishment but has forest health and browse issues to consider.

- Fdi – tolerates a variety of conditions for shade and drought, seed performance is quite variable, frost sensitive, slow to establish.
 - Py – sub zeric to zeric, similar to Pli but lower elevation and not good on wet sites.
 - Stock size – smaller stock types (309) on dry and mesic sites with little competition and not too cold or snowy. Large stock types (412) in areas with heavy brush competition, cold/wet sites, steep slopes with snow creep. Guided by stock size SWP.
 - Density – depends on target stocking, natural regeneration and expected mortality.
2. Post-harvest information is stored on the block files / forest management database (e.g. Cengea Resources). The following procedures guide the process:
- [Post Harvest Prescription Mgt System](#)
3. The Silviculture Supervisor schedules all activities required to achieve free growing in the forest management database (Cengea Resources) based on the post-harvest information
4. If site preparation is required, the Silviculture Supervisor must:
- Consider archaeology sites (check SP), site degradation, timing
 - Consider completing with harvesting contractor especially if small job (saves mob/demob costs to move equipment)
 - Review plan with Operations Supervisor to see if any roadwork needs to be completed at the same time (e.g. cross ditch).

The following procedures guide the process:

[MSP Management System](#)
[SWP MSP](#)

5. Planting
- The Silviculture Supervisor will order trees for the planting program by completing a sowing request. The planting program must consider cost savings now relative to potential for increased costs later (e.g. fill planting due to inadequate stock size or density of original plant). Considerations include:
 - Spring trees are ordered in Sept/Oct for planting 18 months later, from April 15 to June 21.
 - Summer trees are ordered in September for planting the following July. These are only for sites that will have sufficient moisture in July, generally snowy, high elevation and cold/wet soils. Summer planted trees only grow roots the year they are planted.
 - Heartier two-year-old stock requires an extra year advanced notice. They generally have thicker caliper and are better able to with-stand brush competition. This is an economical way to get a big tree for less cost.
 - Some sites will benefit from hot planting which refers to planting ASAP after harvest. This requires ordering trees before the cutblock is harvested. Consider the risk of the harvest plan changing (will there be another block that is suitable to plant the stock in).
 - The *Chief Forester's Standards for Seed Use* must be followed.

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- Use seed orchard (select) seed with >5% genetic gain where available. This is a legal requirement on crown land to ensure stand productivity objectives are achieved. Review seed available in SPAR (detailed guidance documents linked below – seed transfer and sow request).
- Seed transfer rules governing what seed can be planted in a particular site must be followed. Specific computer programs like JRP's Plant Wizard and Cengea Resources should be used to assist Silviculture Supervisors to manage the transfer rules site by site.
- The use of genetically modified organisms is prohibited.

- Guidance documents on Sharepoint include:
 - [Seed Transfer One Point Lesson](#)
 - [SWP Sowing Request](#)

- The Silviculture Coordinator must ensure the nurseries selected to grow the stock in the sow plan follows the Minimizing Pesticide Use at the Nursery SWP.

- The Silviculture Supervisor will implement the planting program in accordance with the Planting Management System. Critical aspects include:
 - Stocking handling
 - Planting quality
 - Density management (spacing)

- The Tree Planting Contractor will ensure the tree planters understand and follow the steps identified in the Planting Management System.
 - Critical to match microsite to species and stock size

- Guidance documents for planting, stored on Sharepoint, include:
 - https://info.canfor.ca/fmg/FMG_Main/Procedures/Silviculture/opl_plant_wizard_allocation.doc
 - https://info.canfor.ca/fmg/FMG_Main/Planting_Management_System.doc
 - https://info.canfor.ca/fmg/FMG_Main/Procedures/Silviculture/swp_seedling_allocation.xls

- The Silviculture Supervisor is responsible for the implement of the survey program to access species performance, forest health and stocking densities in accordance with the stocking standards. The following surveys are completed by silviculture contractors or trained staff in accordance with the Survey Management System (timing is approximate):
 1. Regeneration Delay Surveys (with final plant)
 2. Monitoring surveys (2 years after plant, 5 years after plant, as required)
 3. Free Growing Surveys (10-20 years after harvest)

- Results from surveys are stored in the forest management database and block files. This information is used to modify the planned activities required to achieve free growing.

- The Silviculture Supervisor will declare Regeneration Delay (RG) and Free Growing (FG) achieved using the results of the surveys. The RG and FG period, stated in the Site Plan, is the maximum number of years after harvesting to declare that regeneration delay and free growing have been achieved.
 - The declarations will be entered into Resources and RESULTS.
 - RG delay reports identify what blocks are coming due for RG delay or have missed RG delay.
 - Free growing (FG) reports showing the blocks coming due or have missed FG declaration.
 - Once a year, a RESULTS-to-Cengea Resources comparison report is run to identify any inconsistencies between the two databases. Silviculture Supervisors are responsible ensure the data is clean.

- The Silviculture Supervisor will schedule and implement the following treatments as required to maintain regeneration on the cutblock:
 - a) Fill Planting – review root causes of seedling mortality and devise new species/stock type plan necessary to achieve full stocking.

 - b) Brushing – release regeneration from competing vegetation. Only implement when impacts to regeneration are identified (reduced leader growth, small caliper, poor colour or vigour)
 - Avoid cutting berry species
 - Leave an untreated strip along the roadside to maintain an effective visual screen (roadside hedge, max 10m) for wildlife.
 - 7m on either side of wet areas or creeks should not be treated to protect riparian habitat.
 - Retain 1 aspen/deciduous every 6m and sporadic patches less than 1 ha to maintain species diversity.

[Manual Brushing Mgmt System](#)

[OPL Manual Brushing Genus](#)

- c) Maximum Density Spacing (tree thinning) – site has more trees than it can support which impacts growth and productivity. Cutting specifications need to balance forest health, productivity and species diversity. Generic cutting prescriptions are difficult to establish as each block is a unique combination of forest health factors, tree performance (growth and vigour) and species composition considered both at the stand and landscape level. Finding the right balance is the key to managing the stand successfully.

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Consider the following examples:

Pre-spacing Species Label	Site Factors	Cutting Prescription	Post Spacing Label
Pli100 (scattered Lw, Fdi, Sx)		Reserve all non-pine species.	Pli100 (scattered Lw, Fdi, Sx)
Pli90 Lw10		Target crop trees are tallest healthiest trees	Pli80 Lw20
Lw50 Fdi10 Pli30	Heavy gall rust in the area (Pli)	Target healthiest Lw and Fdi for crop trees, cut gall rust infected Pli where possible	Lw70 Fdi20 Pli10
Lw50 Fdi10 Pli30	No gall rust in area	Target crop trees are tallest healthiest trees	Lw50 Pli 40 Fdi 10
B180 Pli10 Sx10		Target crop trees are tallest healthiest trees	Pli 40 Sx 30 B130

- The Silviculture Supervisor will consider implementing a variety of treatments to maintain ecological diversity and facilitate potential future improvement.
 - Try not to implement the same plan everywhere. Mix up mechanical site preparation and species planted within limits of feasibility and cost.
 - Attempt to mimic natural variability and historic local patterns – this includes completing necessary amendments to not reforest non-productive or non-forested openings within cutblocks to avoid forest conversion.
 - Use brushing and thinning treatments to reduce forest health impacts and increase species diversity.
 - Establish trials with control and sufficient data recorded to evaluate treatment effectiveness. Information is stored on block files and in forest management database (Cengea Resources).

- The Silviculture Coordinator and Supervisors are responsible to facilitate continuous improvement through Kaizen events, field visits, root cause analysis, contractor evaluations and provide feedback to other FMG Departments Initiatives are often FMG wide. Examples include:
 - Updates to Kootenay Critical Site Limiting Factors Guide.
 - Erosion Control and Temporary Deactivation Standards and feedback to operations.
 - Sinocast cones to protect seedlings from animal browse. Can increase drought susceptibility so not viable option for Lw and on some sites Sx. Very expensive so limited to small areas.
 - Teabag Fertilizer – In addition to increased nutrients (potential increased growth) there are also current mixes for drought prone sites (retains moisture) and to reduce animal impacts (adds sulphur).
 - Stand density management trials on overstocked stands from 2003 fires.

Post Free-Growing

Beyond basic silviculture and the achievement of free-growing, the Silviculture Coordinator participates in the analysis and management of performance trends to ensure continued long term health, productivity and resilience of forests. This information is used to modify the reforestation program and or District strategies through Silviculture Steering Sub-Committees. Examples include:

- Forest health trends (rust strategy, reduced planting of Pli)
- Performance of stands after free growing is declared (FREP monitoring)
- Growth modelling and assumptions

Sites of Biological Significance Strategy

Purpose

To ensure that Sites of Biological Significance, including unique geological features are defined, management strategies for them are developed, that these strategies are communicated to Field and Permitting staff so they are incorporated into Site Plans. Implementation and monitoring of this strategy and the associated SWP will ensure that Sites of Biological Significance are identified and appropriately managed.

Rationale

Sites of Biological Significance are critical in order for various wildlife species to meet their life history requirements. Unique geological features are apart of a functional ecosystem, providing unique physical and chemical attributes. Maintaining these sites in effective functional condition is a key part of sustainable forest management. More information can be found under Indicator 18 – Sites of Biological Significance.

Strategy

Definition, Management Strategies, and Training

1. Forest Scientist is responsible to ensure that a definition of Sites of Biological Significance has been developed and that these sites are identified in the SFMP.
2. This definition will be reviewed on an annual basis in association with the proposed Wildlife Features legislation and the current list of Species at Risk and Species of Management Concern to determine if updates are required.
3. Forest Scientist is responsible to develop a Standard Work Procedure (SWP) outlining the forest management strategies to be applied to Sites of Biological Significance and unique geological features when they are identified in the field. These strategies will be based on the best available science, and have the goal that these sites not be damaged or rendered ineffective by forest practices.
4. Forest Scientist will review the SWP every 3 years at a minimum or as needed when monitoring indicates, to determine if changes are required in order to keep the SWP based on best-available science.
5. Forest Scientist or delegate will develop and deliver an annual training program to Field Staff and Contractors and Permitting Foresters including information on what Sites of Biological Significance and unique geological features are and what to do when they are encountered in the field.
6. Management strategies for Sites of Biological Significance will be written in the Site Plan as per the SWP.

Species of Management Concern Strategy

Purpose

To outline the strategies used to identify and manage for Species of Management Concern within the DFA.

Rational

While habitat for most species should be provided through the application of coarse and medium filter SFMP strategies, there are some species that require specific management consideration to provide for their specific habitat needs. More information can be found under Indicator 12 – Species of Management Concern – Habitat Protection and Indicator 13 – Species of Management Concern – Habitat Suitability.

Strategy

Definition, Management Strategies, and Training

1. Forest Scientist is responsible for the upkeep of the Canfor Species Database, through which the Species of Management Concern are defined. This entails updating the database at least annually to account for changes in the status of species at risk, or changes in the other categories that designate species of management concern.
2. Forest Scientist is responsible to develop a Standard Work Procedure (SWP) outlining the forest management strategies to be applied to Species of Management Concern when their habitat falls within proposed cutblocks. These strategies will be based on the best available science.
3. Forest Scientist will review the SWP every 3 years at a minimum or as needed when monitoring indicates, to determine if changes are required in order to keep the SWP based on best-available science.
4. Forest Scientist or delegate will develop and deliver an annual training program to Field Staff and Contractors and Permitting Foresters including information on what Species of Management Concern are and what the SWP entails.
5. Management strategies for Species of Management Concern will be written into the Site Plan as per the SWP.

Stream Crossing Sedimentation Control Strategy

Purpose

To ensure that all potential sources of significant sedimentation or flow obstruction from crossings of high risk streams on Canfor's permitted roads are identified and treated to mitigate negative impact.

Rationale

Forest road development has the potential to create sources of sedimentation and therefore negatively impact water quality and quantity. The risk of sedimentation is especially high at sites of stream crossing where structures such as bridges and culverts are installed. Following this strategy will ensure that these structures are installed using best practices and are monitored to proactively prevent incidents of sedimentation. More information can be found Indicator 29 – Stream Crossing Sedimentation Control.

Strategy

Crossing Design

Characteristics of crossings design such as location, slope grade and the size of the structure can affect the risk of creating sedimentation sources.

1. Field operations crews or layout consultants will identify high-risk stream crossings on a field map. Field staff will measure streams at crossing points as per Canfor's SP data collection procedures and provide this information to the permitting forester. Stream cards and field maps are stored on the block files.
2. During the layout phase of roads that cross high risk streams field crews will, to the extent practicable, flatten out the grade in and out of the crossing location in order to avoid creating long unbroken runoff zones.
3. If an engineer is not designing the crossing, the Permitting Forester will use this information to calculate the required culvert size as per the 200-year flood event measurement.
4. The Permitting Forester schedules this design. A qualified engineer designs all bridges and most crossings of fish bearing.
5. When permitting existing non-status roads, evaluation of the existing crossings must use the same diligence as with new crossings. If crossings are deemed a significant risk then the same process that applies to new roads will be followed.

Installation

Some temporary sedimentation is inevitable during the installation of crossing structures. The key during installation is to minimise that sedimentation and ensure no long-term sediment sources are created.

1. Operation Supervisors will review the engineered design plan with contractors during the road building pre-works.
2. If applicable, the designing engineer or a qualified representative is on site during installation to oversee the stream crossing engineered design plan. This ensures the engineered plan is understood and properly executed.
3. Contractors follow the plan as well as employ the *FMG Sediment Erosion Control Document* and the *Bridge Handling Installation and Deactivation Instructions*.
4. Training in *Erosion and Sediment Control Practices for Forest Roads and Stream Crossings* was provided to Operations Staff and Contractors in August of 2014 and will continue as needed.

Inspection

A key component of this strategy is to identify potential sediment sources before they become a chronic sediment source. To do this Canfor employs a multi-phase monitoring system. All monitoring will assess the potential sediment source in accordance with the *High-Risk Stream Crossing Evaluation SWP*.

1. At the time of installation or removal, the designing engineer or a qualified representative, inspects crossings for potential sediment sources. Post installation inspections are stored on the crossing file.
2. Post-harvest, the Harvesting Contractors will review the high-risk crossings and communicate any potential sediment sources to the Operations Supervisors. If none are found, it will be documented on the Post-Harvest checklist.
3. Silviculture Supervisors preform post harvest surveys within one year of harvest completion and at this time will re-assess high-risk stream crossing and document results in Cengea Resources.
4. During silviculture activities (planting and surveying), silviculture contractors will notify the Silviculture Supervisors of any potential sediment sources. This ensures crossings are inspected a number of times in the 1 to 5 years post-harvest period.
5. Operations Supervisors will be responsible to ensure inspection of high-risk crossings annually as part of *The Bridge and Road Monitoring Program*.
6. If at any time during any field activities, Canfor staff or contractors notice a potential sediment source it will be evaluated and the results of that evaluation will be communicated to Operations Supervisors.

Mitigation

A potential high-risk sediment source does not equal an incident. It does however require mitigation.

1. Whenever the risk of sedimentation is high, as per the *High-Risk Stream Crossing Evaluation SWP*, a mitigation strategy will be developed to control or eliminate the potential sediment source.
2. The strategy, as well as acceptable timelines completion, will be outlined in the evaluation and communicated to Operations Supervisors. Evaluations will be stored on the crossing file.
3. High-risk sedimentation status can be removed if mitigation is successful and the sedimentation risk is lowered. This will eliminate the annual inspection requirement.

Tracking

1. If an incident of sedimentation occurs at a high risk stream crossing, it will be entered into ITS by the staff member who discovered it or by the Canfor staff member it was reported to. Incident investigation will include remediation actions that will be updated when complete, as per ITS Standard Work Procedures (SWP).

Watershed Strategy

Purpose

This strategy is intended to guide forest development in order to minimize the potential effects of forest harvesting on the hydrological function of sensitive watersheds.

Rationale

Forest development has the potential to negatively impact the water quality and quantity in sensitive watersheds. Ensuring that forest development will only proceed under the guidance of assessments completed by qualified professionals will confirm Canfor has the necessary information to manage the risks and mitigate potential impacts associated with logging in sensitive watersheds. More information can be found under Indicator 28 – Watersheds.

Strategy

1. When planning harvest areas within a sensitive watershed the Planning Supervisor will examine the latest ECA report and map to ensure it is up to date. When outside of a sensitive watershed the Planning Supervisor will look at the RAU ECA calculations.
2. If information is no longer valid the Planning Supervisor will initiate a WIM Task to run a current ECA report.
3. If the ECA run indicates that the watershed will exceed ECA thresholds (High PFSI = 25%, Low PFSI = 50% RAU – 25%) with the proposed harvest, then the Planning Supervisor will initiate a reconnaissance level watershed assessment by a qualified professional to determine risk to watershed values from existing or proposed development.
4. The WIM Analyst, running the ECA calculations, and the Planning Forester, requesting the information, will maintain the ECA tracking spreadsheet. All most recent information must be entered in the Watershed ECA Tracking spreadsheet.
5. Watershed assessments will provide forest managers with information regarding the hydro-geomorphological condition of the watershed and recommendations to minimize the risk of development related impacts to hydro-geomorphic function.
6. After the watershed assessment is complete, if blocks can be made available, Permitting Foresters will incorporate mitigation strategies and recommendations from the assessment into the layout design and site plan for the development.
7. Operations Supervisors will ensure strategies from the site plan are understood and followed by Harvesting and Road-building Contractors. This will be done during the cut block prework phase.
8. Post-harvest assessments will ensure compliance with the strategies outlined in the site plan.
9. Any non-conformance with the hydrological guidelines included in site plans will be entered into Canfor's Incident Tracking System (ITS).
10. Investigations of the ITS incident will include mitigative actions, and the ITS incident will be updated when actions are complete.

Wildlife Tree Patch Retention (Landscape Unit Level) Strategy

Purpose

To ensure that Canfor meets the Wildlife Tree Patch (WTP) Retention requirements at the Landscape Unit scale outlined in its current FSPs in order to help maintain biodiversity within managed forests on the DFA.

Rationale

Implementation of this strategy will result in the retention of Wildlife Tree Patches on the landscape over time, which has been deemed important to maintain biodiversity. More information can be found under Indicator 9 – Landscape Unit Wildlife Tree Patch Retention.

Strategy

Analysis

1. Each time a new Forest Stewardship Plan is written, the WTP Retention targets will be reviewed by Permitting and Planning Foresters and updated if required, using best available data.
2. WIM or a contractor will complete the analysis.
3. The decision on whether to update them will be done by the Permitting and Planning Foresters.

Implementation

1. Permitting will ensure that every cutblock or cutting permit will meet the LU/BEC variant WTP retention targets for the LU/BEC variant that the block or permit falls within. Targets may be met either through reserve patches or single trees, or a combination of the two.
2. Permitting will ensure that the spacing requirements for WTP are met, such that there is a suitable stand or WTP every 500 m. To be suitable a stand is supposed to be capable of producing wildlife trees, that is, a mature stand capable of producing large snags.

7.0 Operational Level

The operational planning level reflects the “on-the-ground” implementation of the strategies identified through the tactical level planning. The operational level plan essentially translates these strategies into site-specific practices (Standard Work Procedures – SWP) and forest management activities such as harvesting, silviculture and road building to be implemented and adjusted in order to meet sustainability targets.

The challenge for operational level plans is to provide unambiguous instructions to guide “on-the-ground” 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 (See Section 6.3 Sustainability Strategies). Flowing from the strategies, sustainability practices (7.2 Implementation – Sustainability Practices (SWP) Standard Work Procedures) 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 the operational level through strategies, standard work procedures, practices or special projects. The assessment of monitoring information is described in Section 8.0 Adaptive Management of this SFM Plan.

7.1 Operational Level Plans/Schedules

Operational level plans can span from a one to 20-year time period. Annual scheduling of operations is completed, typically covering a five-year planning horizon. The operational planning level adheres to all required legislation and can act as both a reporting function as well as a mechanism to approve current operations.

7.2 Implementation – Sustainability Practices (SWP)

Sustainability practices (aka: Standard Work Procedures – SWP) are developed following current proven practices or flowing from the Strategies, as described in Section 6.3 Sustainability Strategies. Sustainability practices are implemented at the operational level. Sustainability practices are established and maintained documented procedures to cover situations in which the absence of such procedures could lead to deviations from the SFM requirements. Contractors working on behalf of Canfor are required to follow the applicable SWP. The refinement of sustainability practices at the operational level provides for a practical and site-specific approach. The operational level is where the results of the practices are evaluated (via monitoring programs) against the strategic goals.

Resource professionals and managers need to develop sustainability practices that reflect the requirements set out at the strategic and tactical levels, specifically the Sustainability Strategies. Practices include:

- Harvesting
- Silviculture
- Roads & Road Building
- Rehabilitation/Restoration

The current management scenario has been assessed for sustainability, both through the TSR process and through the public advisory process. Once the analysis of monitoring data for each indicator has taken place, practices can be re-evaluated to determine what/if any changes are required. Further details on practices and operating procedures can be discussed with Canfor Staff at any Canfor office.

7.3 Training

Canfor provides training to all employees and contract personnel to ensure they are aware of their responsibilities, and are trained and competent to carry out these responsibilities. Environmental and SFM awareness training for staff employees, operations employees, and contractors includes an explanation of (at a minimum):

- responsibilities for supporting the commitments in the Environment Policy, the SFM Commitments, and the SFM Plan,
- responsibilities for following written procedures, and the potential consequences of not following operating procedures (impact on the environment, liability),
- the concept of sustainable forest management and how their work supports SFM,
- the benefits of SFM and improved environmental performance,
- responsibilities in environmental emergencies, and
- significant environmental aspects of the operation, and the employee's responsibilities for reducing environmental impacts.

Details on training can be found within Canfor FMS.

Further, to training, in order to ensure that practices/actions are completed that help to achieve or move towards the targets for each indicator, Canfor has developed and implemented the Responsibility Action Matrix (Appendix 3).

8.0 Adaptive Management

Given that the SFM Plan is a living document, it is understood that changes will occur over time. In a competent management system, this change is considered to be continual improvement. The SFM Plan is based on the principle of adaptive management, which enables and encourages the improvement of management actions and practices based on knowledge gained from experience. SFM requires the establishment of relationships between forest values (i.e. Criteria & Indicators) and management actions (i.e. strategies, operational level plans, 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 and the overall plan.

To be successful, AM also requires decision-makers to acknowledge that uncertainty is a given. Therefore, forest managers need to recognize that reality and work within it, rather than planning to eliminate uncertainty. This has implications for not only how the problems are defined, but also the mandate given to those who are responsible for addressing the problems.

A comprehensive AM approach has been developed to address the needs of a forest manager in relation to SFM. The resultant AM framework consists of:

- Program level approaches for incorporating AM principles into strategic, tactical and operational planning processes to create the necessary context for successful use of AM at the project-level. For example, training and the development of operational level plans that work with this SFM Plan.
- Project level assessment of opportunities/benefits/costs for implementing AM approaches on a project-by-project basis.

Continuous improvement, as exemplified in an AM Framework, is built into the SFM system. The following subsections detail the steps that work together to ensure the continuous improvement loop of the SFM Planning process

- Managing information
- Monitoring
- Evaluation and analysis
- Reporting
- Adjustment/Adaptation

8.1 Information Management System

Over time, information management has become an increasingly essential component of resource management. It has become even more important with the science-based, integrated nature of the SFM concept. A variety of information needs to be warehoused, in easily accessible formats including, scientific background data and reports, resource inventory data, forecasting results, key uncertainties, risks, implementation reports and monitoring/evaluation outcomes. Canfor planning and operations staff and, in some cases, personnel from several levels of government and stakeholders, need access to the system to input and extract information. A cooperative, multi-user information management system (IMS) supports the shared learning and resultant knowledge approach of adaptive management, and the hierarchical structure of the SFM concept.

To address operational requirements, Canfor has a variety of information capture and management approaches. The current system includes the following components:

- Canfor’s corporate website (www.canfor.ca) – which contains among other items, the SFM Plans and Annual Reports,
- Canfor currently uses specialize forestry software and database to capture and track all data related to roads, blocks and silviculture, and
- Strategic and operational level plans are developed using a geographic information system.

Canfor has standardized reports, developed a protocol for information management data exchange and developed a plan to involve other government agencies.

Current baseline data sources include the following for most indicators:

- TSR data package
- Terrain Stability
- Forest Cover/Vegetation Resources Inventory (VRI)
- In-house baseline data from Canfor
- SFM C&I rationales
- SFM developed reports
- Statistics Canada
- Local policy/strategy/guide documents

8.2 Monitoring Plan

Monitoring is the collecting of information to track indicators and to check performance against an expected outcome (i.e. target) for that indicator. Monitoring allows for observation of changes over time and space. A monitoring and evaluation process is necessary to ensure that management plans and activities contribute to meeting the objectives (i.e. values being sustained) and are capable of alerting the manager for any needed change in practices.

A monitoring plan or protocol is required for each indicator. There are essentially two types of indicators: process and performance. Process indicators describe a process, not an outcome. For process indicators neither trend nor effectiveness monitoring is relevant. These indicators are not so much monitored as reported out within the SFMP Annual Report.

For performance indicators (i.e. non-process indicators), status and trend monitoring plans have been, or are being, developed. Status monitoring provides a snapshot of how the indicator is currently doing. These measurements over time provide the trend of the indicator. Trend analysis can be used to assess how well forest practices are helping in meeting targets. Monitoring data for non-process indicators also improve the forecasting models that are to be used in the next round of sustainable forest management planning.

Further to monitoring performance-type indicators, Effectiveness Monitoring tests assumptions that are made about indicators (e.g. do the indicators under C2 really measure productivity?). It can assist in determining:

- What the relationship between the trend of an indicator and practices is, and
- When, or how to change a practice.

The following steps summarize the process to develop local monitoring plans:

- a) Review of Scientific Reports
- b) Consultation with Specialists/Experts
- c) Review monitoring rationales for each indicator
- d) Adapt monitoring rationales to local area by engaging with appropriate local Stakeholders/Experts/Managers
- e) Develop localized Monitoring Plan (unit/frequency/data source)

The monitoring plan for each indicator is included as part of the detailed discussion for the indicators in Section 5.0 and is summarized in Appendix 3. For the purposes of this SFM Plan, the current condition for each indicator will be the starting point for trend monitoring and the basis from which analysis will take place in subsequent SFMP Annual Reports and updates to the SFM Plan.

8.3 Evaluation / Analysis and Reporting

As monitoring information is stored in the specified Information Management System, it will be evaluated for completeness and accuracy and then analysed against the targets and/or forecasts developed for the DFA. Analysis takes place at the tactical levels, which is dependant on the indicator. Details of indicators analysis will be discussed, as the monitoring plans are refined. Results of analysis of each indicator will be reported out as part of the SFMP Annual Report. Stakeholders will be involved in the review of the SFMP Annual Report. While respecting confidentiality, results from the monitoring will be included in the SFMP Annual Report and will be made a publicly available document.

8.4 Adaptation

As part of Adaptive Management/continual improvement, the analysis and reporting steps may lead to adaptations in management strategies, the target or the indicator itself. As well, new information (locally or from outside the area) or changes to policy and legislation may require changes to a component of the SFM Plan.

The following process will be undertaken to propose changes to the SFM Plan's components:

- Analysis of monitoring data reviewed by Canfor
- Recommendations for changes put forward as a result of the review of the monitoring data
- Recommendations or non-conformances from internal and external audit results
- Review of recommendations by Canfor top management (i.e. management review)
- Review of recommendations from the PAG, Stakeholders, Indigenous Peoples
- Further evaluation, if required
- Alternatives explored
- Changes made to the SFM Policy
- SFMP Annual Report

As part of the certification process, non-compliances or non-conformances may be found through internal and/or external audits. Canfor will address these through the Forest Management System (FMS) process and protocols. For example, those defined as having the responsibility and authority to:

- Identify and investigate non-conformance;
- Take action to mitigate any impacts caused; and
- Initiating, completing and documenting, root cause, corrective and preventive action and expected results.

Any corrective or preventive action taken to eliminate the causes of actual and potential non-conformances shall be appropriate to the magnitude of the problem and commensurate with the impact encountered.

Strategic Review

Strategic review of management plans, policies or strategies is cornerstone to sustainable forest management. Annual reviews will be necessary at strategic, tactical and operational levels. Canfor top management and the staff identified as responsible for various components of the SFM Plan will undertake annual strategic reviews.

The strategic review will consist of reviewing:

- data from monitoring,
- comparing the status and trend against the target,
- updating knowledge gaps filled in through monitoring data, as well as
- analysing the effectiveness of strategies used to achieve targets.

Findings will be summarized and reported out through the SFMP Annual Report. As well, recommendations for changes to the SFM Plan will be summarized in the SFMP Annual Report.

8.5 Integration with the Forest 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.

CAN/CSA ISO 14001 is an internationally recognized environmental management system standard that was revised in 2004 by the International Organization for Standardization. As a preparatory step to sustainable forest management certification, Canfor developed and maintained an Environmental Management System for their respective operations. In July of 2001, Canfor Kootenay operation was certified to ISO 14001 – Forest Management System (FMS).

Canfor's FMS⁴² provides a platform on which to build the sustainable forest management elements required to meet the CSA SFM standard and many FSC-BC requirements.

Canfor's FMS provide a system for the continual improvement of performance that supports the adaptive management process within this SFM Plan in the following ways:

- The provision of mechanisms for the periodic reporting of performance, including environmental indicators within the FMS and relevant indicators within this SFM Plan;
- An annual internal audit program that assesses the implementation and maintenance of the FMS and this SFM Plan; and
- A management review process that ensures top management is aware of performance and is able to provide guidance and direction for the continual improvement of the FMS and this SFM Plan.

In addition, the FMS provides the assignment of roles and responsibilities, and the tracking of related training, to ensure the consistent implementation of these processes. The SFM Plan also makes use of the FMS document control and record keeping system to provide evidence of conformance to these procedures where relevant.

The SFM Plan will be revised, when appropriate, to reflect applicable changes that result from the FMS process.

⁴² 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

1. Range of Natural Variability – Scientific Papers
2. Ecological Indicators – References & Further Reading
3. Responsibility Action Matrix (RAM)
4. SFMP Acronym List
5. SFMP Glossary
6. Dispute Resolution Process