

Integrated Silviculture Strategy for the Invermere TSA

Situation Analysis

Version 1.1

March 11, 2017

Project 419-38

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Executive Summary

The Integrated Silviculture Strategy (ISS) for the Invermere TSA aims to **facilitate a respectful and collaborative planning process that supports the delivery of defined stewardship outcomes - which in turn improves business certainty for licensees operating within the TSA.**

This Situation Analysis is the first of seven documents to make up the ISS. It describes the status of the resources within the Invermere TSA and the issues that affect their sustainable use.

The Invermere TSA is home or traditional territory to two First Nation Councils. The Ktunaxa Nation Council represented the ?Akisq'nuk First Nation (Columbia Lake Indian Band). As well, the Shuswap Nation Tribal Council, represented by three Shuswap Indian Band (Secwepemc people).

Besides BC Timber Sales, four forest licensees currently operate within the Invermere TSA: Canadian Forest Products Ltd, North Star Planning Co Ltd, Kinbasket Development Corp, and Akisq'nuk Resources Limited Partnership. Each licensee generally works within a defined, albeit unofficial, operating area.

The First Nations, licensees, interest groups, and public stakeholders can play a vital role ensuring that all relevant and recent information is compiled for use in the planned analyses. In particular, we welcome First Nations' active participation to provide traditional knowledge to help develop more robust and appropriate management scenarios that will be examined in future phases of this project.

In recent years, government agencies and licensees operating within the Invermere TSA have developed an array of strategies and plans, including:

- Legal objectives set by government
- Provincial timber management goals and objectives
- Strategic land and resource planning (Kootenay-Boundary Land Use Plan Order)
- Federal/Provincial Recovery Strategies for various species
- Sustainable Forest Management Plans
- Silviculture Strategies
- BC Mountain Pine Beetle model (BCMPBv12)
- Provincial Stewardship/Timber Harvest Land Base Stabilization
- Future Forest Products and Fibre Use Strategy
- Multiple Resource Value Assessment
- Forest Health Strategy
- Ecosystem Restoration
- Whitebark Pine Tactical Recovery Plan
- Wildfire and Fuel Management

While parks, ungulate winter ranges and wildlife habitat areas contribute to maintaining biological diversity, more focused consideration of these values is applied through the establishment of landscape- and stand-level reserves (i.e., old growth management areas), wildlife trees, and riparian areas. Other biodiversity considerations include coarse woody debris management and patch size distribution.

Other key values and issues relevant to the Invermere TSA include climate change adaptation, watershed health, visual quality, recreation, guide outfitters, trappers, road density and access issues, and sustainable forest management certification.

This Situation Analysis document provides a valuable reference for future discussions on analysis scenarios aimed to maintain values, mitigate issues, and explore opportunities within the Invermere TSA.

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List of Acronyms

AAC	Allowable Annual Cut
BCMPB	BC Mountain Pine Beetle Model
BCTS	BC Timber Sales
BEC	Biogeoclimatic Ecosystem Classification
FLNRO	BC Ministry of Forests, Lands and Natural Resource Operations
FPPR	Forest Planning and Practices Regulation
FREP	Forest and Range Evaluation Program
FRPA	Forest and Range Practices Act
FSP	Forest Stewardship Plan
FSW	Fisheries Sensitive Watershed
GAR	Government Action Regulation
GWM	General Wildlife Measures
ISS	Integrated Silviculture Strategy
KBHLP	Kootenay-Boundary Higher Level Plan
MoE	BC Ministry of Environment
MPB	Mountain Pine Beetle
MRVA	Multiple Resource Value Assessment
NDT	Natural Disturbance Type
OGMA	Old Growth Management Area
RESULTS	Reporting Silviculture Updates and Land status Tracking System
SFMP	Sustainable Forest Management Plan
THLB	Timber Harvesting Land Base
TSA	Timber Supply Area
TSB	Timber Supply Block
TSR	Timber Supply Review
UWR	Ungulate Winter Range
VRI	Vegetation Resources Inventory
WHA	Wildlife Habitat Area
WTR	Wildlife Tree Retention

Acknowledgements

The ISS Project Team acknowledges and thanks the following individuals who contributed in the completion of this document:

- Brenda Hopkin, Hopkin Forest Management (Fairmont Hot Springs)
- Brian Watson, FLNRO (Cranbrook)
- Bryce Bancroft, Symmetree (Victoria)
- Cam Brown, Forsite (Salmon Arm)
- Cosmin Man, Forsite (Salmon Arm)
- Deb MacKillop, FLNRO (Nelson)
- Jeremy Hachey, Forsite (Salmon Arm)
- Jessica Koroll, Forsite (Salmon Arm)
- Kari Stuart-Smith, Canfor (Cranbrook)
- Ken Walburger, FLNRO (Cranbrook)
- Lyn Konowalyk, FLNRO (Cranbrook)
- Mike Clarkson, FLNRO (Victoria)
- Mike Knapik, FLNRO (Nelson)
- Patrick Bryant, Forsite (Salmon Arm)
- Paul Rehsler, FLNRO (Victoria)
- Reg Davis, Forsite (Cranbrook)
- Rick Fraser, FLNRO (Cranbrook)
- Scott Hicks, FLNRO (Cranbrook)
- Shelley Desautels, Forsite (Salmon Arm)
- Steve Jablanczy, FLNRO (Cranbrook)
- Tim Davis, FLNRO (Nelson)

Revision History

Version	Date	Notes/Revisions
1.0	Jan 18, 2017	First version distributed for review and comment.
1.1	Mar 11, 2017	Added section 9.5 on range management. Added section 9.8 on new BEC and field guides.

1 Introduction

The British Columbia (BC) Ministry of Forests, Lands and Natural Resource Operations (FLNRO) has initiated an Integrated Silviculture Strategy (ISS) within the Invermere TSA. The ISS is an evolving planning process that aims to provide context for management decisions necessary to achieve forest level objectives. It integrates other planning processes that have historically been separate or disjointed, such as:

- wildfire management planning,
- forest health,
- wildlife habitat planning,
- biodiversity habitat planning,
- cumulative effects, and
- silviculture strategies.

Aligning these plans and strategies within a common process will focus landbase investments, improve planning outcomes, and enhance communications with First Nations and stakeholders—resulting in increased efficiency and effectiveness to stewardship planning relative to status quo.

1.1 Integrated Silviculture Strategy Objectives

In support of government objectives to mitigate impacts on timber and habitat supply, this ISS project aims to:

Facilitate a respectful and collaborative planning process that supports the delivery of defined stewardship outcomes - which in turn improves business certainty for licensees operating within Invermere TSA.

This improved certainty will be achieved through the creation of:

1. A common understanding among participants of the goals, values, issues, and challenges facing the Invermere TSA.
2. A well designed Landscape Reserve Scenario that realigns existing land-use designations and constraints to increase, or minimize impacts to, the timber harvesting land base (THLB) while addressing as many stewardship issues as possible. This includes First Nation's interest and will ultimately help indicate the areas of the landbase that are currently suitable for harvesting by licensees.
3. A coordinated Harvest Scenario that identifies approaches to harvest scheduling aimed at addressing common interests (MBP salvage, equitable access to green timber, landscape level fuel breaks, etc.).
4. A Silviculture Scenario that provides clear direction on how to achieve improved timber and habitat outcomes in the future through investments in silviculture.
5. A plan for monitoring and evaluating progress and effectiveness towards meeting key goals and objectives that support future management decisions in the Invermere TSA.

These objectives are meant to align with Provincial Timber Management Goals and Objectives (FLNRO 2014), the Chief Forester's *Provincial Stewardship Optimization/Timber Harvesting Land Base (THLB) Stabilization Project* (FLNRO 2015) and FLNRO staff.

1.2 Context

The situation analysis is the first of seven documents developed through the ISS process:

1. **Situation Analysis** – describes in general terms the situation for the unit – this document may be augmented by spatial information presented on a web map or a PowerPoint presentation with associated notes.
2. **Scenario Development** – describes the development of the overall (preferred) scenario to be explored through forest-level modelling. Scenarios are grouped into three broad categories:
 - a. **Landscape-Level Reserve Scenario** – review and analyze existing and proposed management zonation and develop strategy options that provide for the sustainable management of non-timber values.
 - b. **Landscape-Level Harvest Scenario** – review and analyze timber harvesting schedules, infrastructure, and technical capabilities while considering wildfire management and landscape-level reserves.
 - c. **Silviculture Scenario** – provides treatment options, associated targets, timeframes, and benefits to improve timber and non-timber resources.
3. **Data Package** – describes the information that is material to the analysis including the model used, data inputs and assumptions.
4. **Analysis Report** – provides modeling outputs and rationale for choosing a preferred scenario.
5. **Tactical Plan** – direction for the implementation of the preferred scenario.
6. **Final Report** – summary of all project work completed.
7. **Monitoring Plan** – direction on monitoring the implementation of the ISS; establishing a list appropriate performance indicators, developing monitoring responsibilities and timeframe and a reporting format and schedule.

This particular document aims to provide brief summaries of the current situation for a very wide range of forest resource values and issues of concern that pertain to the Invermere TSA. Ultimately this reference is not expected to provide answers but rather invite questions and stimulate ideas for the next phases of the ISS project.

In some cases the authors have extracted or paraphrased sections from existing material and referenced the appropriate sources for the reader to explore further. This list of topics was limited to those being considered – at this time – for the project as other topics may be currently outside of the project scope.

1.3 Project Area

The project area (Invermere TSA - Figure 1) is within the Kootenay-Boundary Natural Resource Region – Rocky Mountain Natural Resource District (RMNRD) and is administered out of the district office in Cranbrook. The RMNRD is situated in the southeastern corner of BC and was created in 2003 by amalgamating the previous Cranbrook and Invermere Forest Districts. The district contains approximately 2.63 million hectares, of which 1.15 million hectares falls within the Invermere TSA.

The Invermere TSA is bounded by the Cranbrook TSA to the south, the Golden TSA and Tree Farm Licence (TFL) 14 to the north, the Rocky Mountains / Alberta border to the east, and the Purcell Mountains to the west. Between these two mountain ranges lies the Rocky Mountain Trench, a broad, flat valley with numerous rivers and wetlands. The Columbia River flows north through the trench from Columbia Lake, creating a large, complex wetland ecosystem called the Columbia Wetlands.

The TSA includes one national park (Kootenay) and eleven provincial parks: Mount Assiniboine, Height of the Rockies, Top of the World, Purcell Wilderness Conservancy, Bugaboo Glacier, Windermere Lake, Whiteswan Lake, Premier Lake, Canal Flats, James Chabot, and Dry Gulch.

Protected areas applicable to Invermere TSA include: Bugaboo extension, East Purcells, Elk Lakes, and Height of the Rockies.

Forests are mostly comprised of stands dominated by lodgepole pine. The other major species are Douglas-fir; spruce, larch, balsam and other species comprise a minor component of the THLB.

Ecosystems and climates in the East Kootenay are highly diverse. Grasslands and dry forests in lower elevations of the Rocky Mountain Trench separate the Rocky Mountains from the Purcell Mountains. Montane spruce forests with mixed lodgepole pine, spruce, Douglas-fir, and larch typify mid elevations, although scattered interior cedar-hemlock forests occur in moister areas. Subalpine forests are predominantly mixed spruce, subalpine fir, and lodgepole pine in drier climates, with moist ESSF in the Elk, Bull, upper Kootenay, St Mary's, and Spillimacheen valleys, and Yoho National Park.

Extensive wetland complexes occur in the Rocky Mountain Trench, from Columbia Lake north to Golden. Large riparian habitats are rare throughout the Columbia due to flooding for hydroelectric dams.

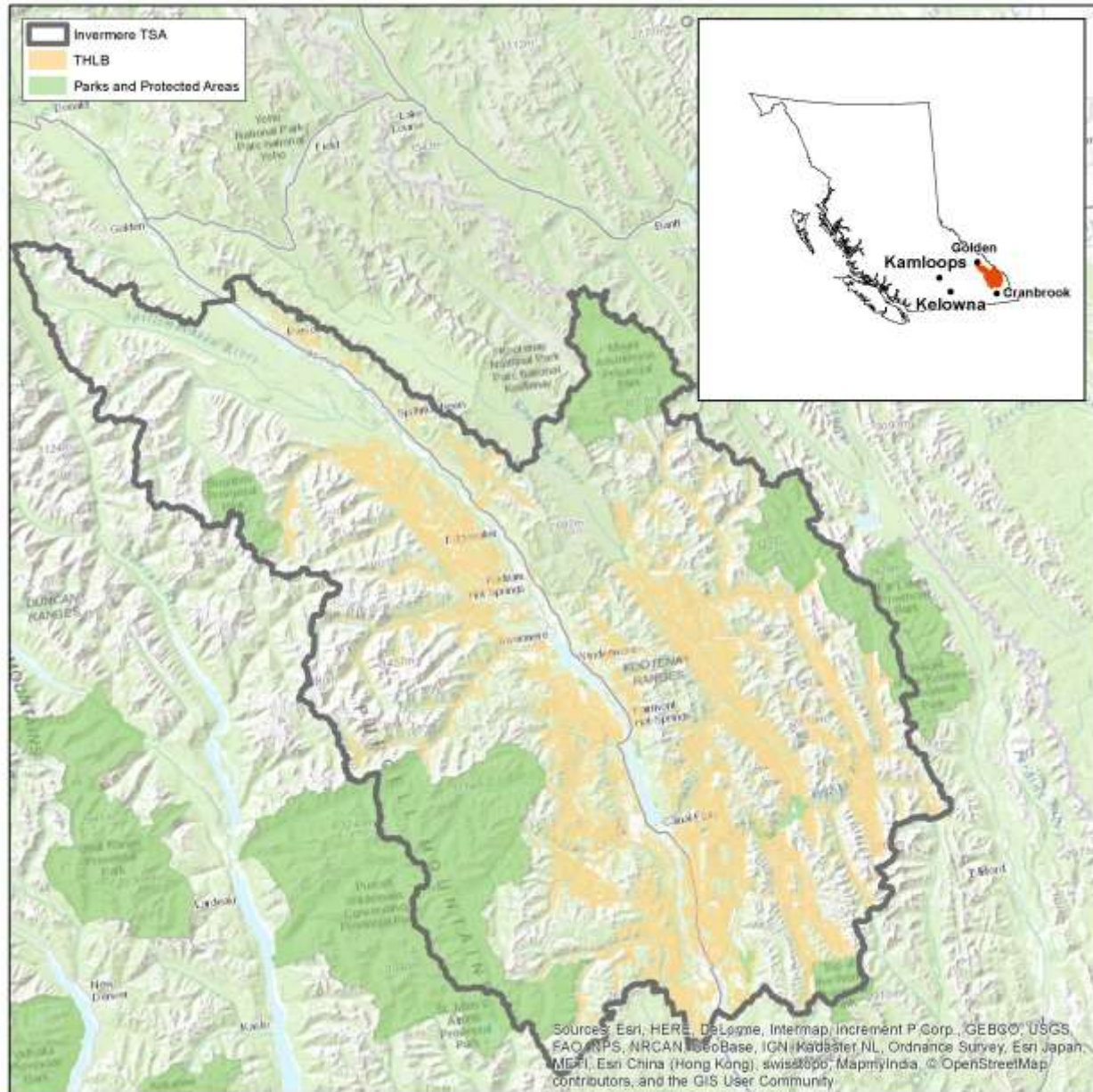


Figure 1 Project Area – Invermere TSA

Source: Invermere Timber Supply Area Timber Supply Analysis, Discussion Paper September 2016

The Invermere TSA has a relatively small population of about 8,490, 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 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.

Source: Columbia Basin Rural Development Institute website (<http://www.cbrdi.ca/communities/columbia-valley/invermere-3/>)

2 Summary of Current Plans and Strategies

The subsections below provide a brief summary of the strategies and plans that may pertain to this project. Others are specifically identified in various sections of this document (e.g., climate change adaptation).

2.1 Provincial Timber Management Goals and Objectives

Provincial Timber Management Goals and Objectives (FLNRO 2016) set high-level provincial timber management goals, objectives and targets to provide context and guidance for planning across management units – including specific direction to ISS projects.

The 5 main timber management goals are summarized below while context and much more detail is available in the source document.

2.1.1 Timber volume flow over time

Timber volume flow over time describes what has traditionally been the focus of sustainable forest management. The provincial aim is not a strict even flow regime, but rather predictable and reliable flows to support economic and social objectives. Timber flow will be managed in an integrated manner with other key forest values.

Goal	Promote resilient and diverse forest ecosystems that will provide a sustainable flow of economically valuable timber that generates public revenues, supports robust communities, healthy economies that provide an opportunity for a vigorous efficient and world competitive timber processing industry.
Objectives	<ol style="list-style-type: none"> 1) Timber is managed in an adaptive manner to address the dynamic nature of natural processes and the inherent uncertainty of managing over long time frames. 2) Attainment in the long-term of realized harvest flows that benefit from timber management activities including harvest practices and silviculture investments. 3) Data used to determine timber flows will be continuously improved, to verify assumptions and to reduce uncertainty.
Targets	<ul style="list-style-type: none"> • Based on a 22 million hectare timber harvesting land base (THLB), to produce: <ul style="list-style-type: none"> ○ a mid-term timber supply of at least 57 million m³/year, and ○ a long-term timber supply of at least 65 million m³/year.
Local Targets	<ul style="list-style-type: none"> • Local targets should incorporate the assumptions and outcomes from the most recent Timber Supply Review and Integrated Silviculture Strategy information available in individual management units. Local targets include but should not be limited to: <ul style="list-style-type: none"> ○ HBS Harvest volumes relative to AAC volumes and partitions. ○ Species harvest versus species inventory profile.

2.1.2 Timber quality

Timber quality is defined by species, log sizes and grades, end use, and economic value that combine to achieve desired characteristics in the marketplace. In order to minimize risks and maintain future options for different products, a diverse portfolio of timber quality is desirable.

Goal	Maintain a diversity of timber-related economic opportunities through time.
Objectives	<ol style="list-style-type: none"> 1) Proportions of high-value tree species within each management unit will be maintained at no less than pre-harvest levels (based on the forest inventory). 2) To restock new forests with trees which will produce high quality fibre (including sawlogs) as the primary product objective. 3) To ensure a proportion of the growing stock will produce future logs of premium grade.
Targets	<ul style="list-style-type: none"> • To produce a minimum of 10% premium grades annually from B.C.'s Forests both now and in the future.
Local Targets	<ul style="list-style-type: none"> • Local targets should incorporate the assumptions and outcomes from the most recent Timber Supply Review and Integrated Silviculture Strategy information available in individual management units. Local targets include but should not be limited to: <ul style="list-style-type: none"> ○ Harvest performance versus timber supply review assumptions for harvestable volume and harvestable age, and ○ To produce a minimum of 10% premium grades reported to HBS in the last 5 reporting periods.

2.1.3 Tree Species Composition

Tree species composition is an important overall forest resource consideration as it influences timber values, health, resilience, and non-timber values. Tree species diversity is a fundamental climate change adaptation strategy. Tree species composition overlaps with other timber management goals such as timber quality and stand productivity.

Goal	To maintain or enhance timber and non-timber values, forest health, and resilience, through the management of tree species composition.
Objectives	<ol style="list-style-type: none"> 1) Where it is ecological feasible, reliable and productive, a resilient mix of species at both the stand and landscape scales will be used to reduce long-term forest risks and maintain future options. 2) Promote reforestation of species compositions that reduce vulnerability from climate change and forest health impacts on timber and other forest values. 3) Management will reduce the occurrence of species where future risks (ecological and economic) are disproportionately high compared with other species. 4) Seedlings planted are grown from source-identified and genetically-diverse tree seed that is climatically-suitable to the planting site.
Targets	<ul style="list-style-type: none"> • At least 80% of harvested area reforested with more than 1 species. • Pre- and post-harvest tree species composition in the last 5 reporting periods is within +/- 2 percentage points unless it increases the proportion of higher value species. • By 2020, all tree seed used to establish a free growing stand is registered and selected in accordance with new climate-based seed transfer standards.
Local Targets	<ul style="list-style-type: none"> • Initial timber targets for each management unit, will be set using tree species diversity information. • Additional local targets should incorporate the assumptions and outcomes from the most recent Timber Supply Review and Integrated Silviculture Strategy information available in individual management units.

2.1.4 Stand productivity and growing stock

Management of stand productivity and growing stock focuses on trends in standing timber (all ages) over the management unit through time. This encompasses the health, genetics, density, and stocking of various stands so that they can productively utilize site resources, balanced against the various risks, which threaten that growing stock through its life span.

Goal	Maintain or improve stand productivity.
Objectives	<ol style="list-style-type: none"> 1) After significant and sudden changes to growing stock from natural disturbances and salvage harvesting, cost effective management options with timely management unit analysis and planning will be developed for the consideration of government. 2) Management will target full site occupancy of growing space, after making effective allowances for other values and risks. 3) The proportion of high-risk species¹ across a management unit will not be increased and, where future risks for such species are disproportionately high compared with other species, they will be gradually reduced. 4) Decisions at the stand level will not be made solely on the basis of return-on-investment data, but will consider stand level risks and management unit objectives and targets. 5) Tree seed selected for improved growth or pest tolerance is used, where available.
Targets	<ul style="list-style-type: none"> • Free growing stems per hectare exceeds 75% of the target stocking 80% of the time • The average planting regeneration delays is less than 2 years on harvested areas • By 2020, 75% of all trees planted will be grown from selected seed with an average genetic gain of 20%.
Local Targets	<ul style="list-style-type: none"> • Local targets should incorporate the assumptions and outcomes from the most recent Timber Supply Review and Integrated Silviculture Strategy information available in individual management units. Local targets include but should not be limited to: <ul style="list-style-type: none"> ○ The species planted are consistent with timber supply assumptions, ○ The amount of area planted consistent with timber supply assumptions, and ○ The average planting regeneration delays is consistent with timber supply assumptions.

2.1.5 Inherent site capacity

From a timber perspective, inherent site capacity is about the biophysical attributes of the land as they relate to timber productivity. While the focus for this goal is timber, site capacity is important for all values. Site capacity is mostly influenced by soil attributes, hydrological flows and balances, and associated processes such as decomposition and nutrient cycling.

Goal	To maintain the inherent site capacity of B.C.'s forested ecosystems.
Objectives	<ol style="list-style-type: none"> 1) The permanent footprint of road, trails, and landings will not exceed what is necessary for logical and efficient natural resource management. 2) Access construction and maintenance will maintain natural drainage patterns and flows, and will not contribute to slope failures or chronic erosion over the long term. 3) Harvesting, silviculture and other management activities will not result in significant soil compaction and/or erosion on growing sites, temporary trails and work areas that will be reforested. 4) Harvesting, silviculture and other management activities will be conducted to provide for maintenance or recovery of proper nutrient cycling and soil nutrition.
Targets	<ul style="list-style-type: none"> • The area-weighted permanent access structures percent reported to RESULTS is less than 5.
Local Targets	<ul style="list-style-type: none"> • Local targets should incorporate the assumptions and outcomes from the most recent Timber Supply Review and Integrated Silviculture Strategy information available in individual management units. Local targets include but should not be limited to: <ul style="list-style-type: none"> ○ The actual amount of non-productive roads and landings are consistent with timber supply assumptions.

Source: FLNRO 2016 – Provincial Timber Management Goals and Objectives

¹ **High-risk species** – Species with a high risk of mortality during its development stages due to a range of biophysical influences including climate change (an example is lodgepole pine in some provincial ecosystems as identified through vulnerability analysis or district forest health strategy).

2.2 Strategic Land and Resource Planning

In January 1993, a regional [Land and Resource Management Planning](#) process began in the Kootenays, resulting in the [East Kootenay Land Use Plan \(March 1995\)](#). The [Kootenay/Boundary Land Use Plan \(KBLUP\) Implementation Strategy \(June 1997\)](#) consolidates the results of those planning efforts. Legally established [Orders & Amendments](#) resulted in October 2002; and subsequent [Variances](#).

2.2.1 East Kootenay Land Use Plan (EKLUP)

The [East Kootenay Land Use Plan \(March 1995\)](#) was intended to end land-use uncertainty, ensure stability and security for communities and families, and provide a sustainable environment.

Secure access to natural resources is an essential first step in sustaining the region's economy and keeping people working for present and future generations. The East Kootenay Land-Use Plan provides that security of access by confirming the 74 per cent of the region's lands will be available for sustainable commercial resource use and recreation activities.

Source: East Kootenay Land-Use Plan, March 1995

Under the Land Use Plan, the government divided the resource land base (74%) into three resource management zones:

- Integrated Resource Management Zone (55%) - The primary objective in the IRMZ designation is to balance environmental, economic and social benefits from the resource values within the zone.
- Enhanced Resource Development Zone (7.7%) - Lands designated as ERDZ (Coal and Timber) indicate the suitability or potential suitability of those lands for relatively intensive resource development activities, aimed primarily at regional economic development and community and work force stability.
- Special Resource Management Zone (11.3%) - This land use designation was assigned to areas with high concentrations of regionally significant and sensitive resource values, such as critical fish and wildlife habitat, ecosystems that are under-represented in the region's protected area system, communicate the general resource management priority to maintain the integrity of the numerous special and sensitive values that are known to exist in those areas.

In addition, the government designated protected areas and recognized private, settlement lands:

- Protected Areas (16.5%) - The objective of this designation is to protect viable representative examples of natural diversity and special natural, cultural heritage and recreational features, consistent with the provincial protected area strategy. Land use within protected areas emphasizes resource conservation to the degree that resource extraction is excluded and other land uses may be limited or excluded. Land use and management within protected areas is guided by existing park master plans, or interim management direction statements which provide temporary management direction for new protected areas, pending development of comprehensive park master plans. Protected areas applicable to Invermere TSA include: Bugaboo extension, East Purcells, Elk Lakes, and Height of the Rockies.
- Private, Settlement Lands (9.1%) - The privately owned land is primarily used for compact and dispersed residential, agricultural, private forestry, commercial, industrial, utility, transportation and institutional purposes. Settlement oriented uses on these lands are planned and regulated by local governments under authority of the *Municipal Act*. The plan

does not contain prescriptive direction for privately owned land, although a number of the plan's objectives assume certain environmental and economic contributions from the region's relatively extensive proportions of private land.

2.2.2 Kootenay Boundary Land Use Plan Implementation Strategy (June 1997)

[EKLUP](#) and [Implementation Strategy](#) were approved / adopted at the Cabinet level; representing BC's corporate policy. Accordingly, all relevant provincial government agencies, in delivering their mandated responsibilities, are required to observe, comply with, and implement the guidance contained in the plan. Responsibilities / mechanisms for KBLUP management and administration (including provisions for plan adoption, implementation, monitoring and reporting, interpretation and dispute resolution and plan amendment) are within the [Implementation Strategy](#).

2.2.3 Kootenay / Boundary Higher Level Plan Order

The [Kootenay / Boundary Higher Level Plan Order](#) took effect on October 26, 2002 and established Resource Management Zones (RMZ) and Resource Management Objectives² with the area covered by the Kootenay-Boundary Land Use Plan as a Higher Level Plan pursuant to Sections 3(1), 3(2), and 9.1 of the Forest Practices Code of the BC Act. The Invermere TSA is an established Resource Management Zone.

Table 1 KBLUPO Objectives

1) Biodiversity Emphasis	To contribute to the conservation of biodiversity.
2) Old and Mature	To contribute to the conservation of biodiversity, maintain mature forests and old forests to all landscape units and associated biodiversity emphasis.
3) Caribou	To retain seasonal habitats for mountain caribou in order to contribute to maintaining viability of the existing subpopulations according to the forest cover requirements within the caribou habitat areas.
4) Green-up	To establish Green-up requirements.
5) Grizzly Bear Habitat and Connectivity Corridors	To maintain mature and/or forests adjacent to important grizzly bear habitat (avalanche tracks, denning sites, etc.). To maintain mature and/or old forests within connectivity corridors.
6) Consumptive Use Streams	To reduce the impacts of forest development on streams licensed for human consumption, applying stream side management provisions.
7) Enhanced Resource Development Zones – Timber	To support intensive forest management for the purpose of increasing volumes of merchantable timber and reduce industry costs while maintain adequate environmental stewardship Enhanced Resource Development Zones (ERDZ-T).
8) Fire-Maintained Ecosystems	To restore and maintain the ecological integrity of fire-maintained ecosystems, provide for treatments to areas as shrublands, open range, open forest, and managed forest ecosystem components in NDT4.
9) Visuals	To conserve the quality of views from communities, major waterways and major highways by establishing the areas as known scenic areas.
10) Social and Economic Stability	To ensure that there are no unintended outcomes of the bringing into force objectives 1 to 9 on the social and economic stability of the communities located within the area of the higher level plan the Ministry of Sustainable Resource Management in consultation with communities, forest licensees and other interests will create thresholds for timber supply, costs and timber profiles that will initiate a review of these objectives.

² Resource Management objectives do not affect operational plans required for construction of trails or roads, or for other exploration, development, and production activities when these activities have been authorized for purposes of subsurface resource exploration, development, or production by the Mineral Tenure Act, the *Coal Act*, the *Mines Act*, the *Petroleum and Natural Gas Act*, the *Pipeline Act*, or the *Geothermal Resources Act*.

Source: Kootenay-Boundary Higher Level Plan Order, October 26, 2002

Since the establishment of the KBHLP Order and Objectives, variances have been established and enacted. Table 2 provides a listing of the current variances.

Table 2 KBHLP Order Variances

Variance Order #	Resource Management Zone	Specific Location (Landscape Unit)	Effective Date of Order	Objective(s) Varied
KBHLP-01	Arrow	N525 Wilson and N528 Kuskanax	May 8, 2003	2 and 3
KBHLP-02	Boundary	B-11 Rendell	May 30, 2003	2
KBHLP-03	All	Areas affected by 2003 fires	Nov 12, 2003	2, 3, 5, and 9
KBHLP-04	All	Caribou habitat areas	Mar 18, 2005	3
KBHLP-05	Cranbrook	C04	Feb 2, 2004	3
KBHLP-06	All	Not Specific	Sep 23, 2004	2 and 3
KBHLP-07	Cranbrook and Invermere	Not specific deals with Biodiversity Options	Sep 30, 2005	1 and 2
KBHLP-08	Golden	G01 Upper Wood River, G02 Molson and G03 Lower Wood River	Nov 2, 2006	1, 2, and 3
KBHLP-09	All RMZ with Caribou Objectives	Landscape Units subject to Objective 2	Feb 13, 2009	3 and 7

Source: https://www.for.gov.bc.ca/tasb/slrp/lrmp/cranbrook/kootenay/pdf/KBHLPO_variance_table0309.pdf

Since the establishment of KHBPO, government action regulations (GAR) have been established for Grizzly Bear / Connectivity Corridors and Caribou (see Section 7 Fish and Wildlife Habitat for more detail).

2.3 Federal / Provincial Recovery Strategy

Under the Federal Species at Risk Act (SARA) a Recovery Strategy must be prepared for a threatened species, which includes identification of Critical Habitat (Section 37 of SARA). Critical habitat is defined as habitat necessary for a species survival or recovery and includes Core and Matrix Habitat. *Core habitat* is occupied by the threatened species, and *Matrix habitat* is the surrounding areas that influences predator –prey dynamics. The ultimate objective of threatened species management is to create or maintain habitat conditions that allow the threatened species to be naturally self-sustaining.

The following species currently have Recovery Strategies within the Invermere TSA:

Table 3 Applicable Recovery Strategies / Management Plans – Invermere TSA

Species	Recovery Strategy	Final/Proposed
American Badger	Federal/Provincial	Updated (from 2008) Draft
Common Nighthawk	Federal	Final
Flammulated Owl	Federal	Proposed
Lewis' Woodpecker	Federal	Final
Long-billed Curlew	Federal	Final
Mountain Caribou	Federal/Provincial	Final
Northern Leopard Frog	Federal	Proposed
Northern Myotis / Little Brown Myotis	Federal	Proposed
Olive-sided Fly Catcher	Federal	Final
Painted Turtle	Provincial	Draft
Rocky Mountain Tailed Frog	Federal	Final
Western Screech Owl	Provincial	Final
Westslope Cutthroat Trout	Federal	Proposed
Whitebark Pine	Federal	Draft
Williamson's Sapsucker	Federal/Provincial	Final

2.4 Sustainable Forest Management Plan

To promote responsible forestry practices, some forest companies have achieved forest management certification through independent third-party auditors (Table 4). Requirements under the FSC and SFI standards include measures to protect biodiversity, wildlife habitat, species at risk, water quality, and forests with conservation value. The CSA SFM standards take environmental, social, and economic factors into account – in part, by facilitating public advisory groups. All three standards require the development of a Sustainable Forest Management Plan that describes commitments made, through a set of management and operational principles, to conduct business in a manner that protects the environment while ensuring sustainable development of forests. These plans are typically available for public review.

More details on certification-related forest management assumptions that potentially affect the THLB are provided in Section 9.8.

Table 4 Forest Management Certification

	Certification Standard Achieved and Maintained	Licensees	License
CSA	Canadian Standards Association Z809-08 Sustainable Forest Management Standard	Canfor	A18979
FSC	Forest Stewardship Council Regional Standards for British Columbia – Oct. 2005	Canfor	TFL14, A18978, A19040
SFI	Sustainable Forestry Initiative 2015-2019 Forest Management Standard	BCTS	BCTS

2.5 Silviculture Strategies

In 1999, an Interim Silviculture Strategy was completed for the Invermere TSA. This strategy was intended to help optimize the application of available funding for silviculture activities towards the goals of improving the future quantity and quality of both habitat and timber supply. A secondary goal of the strategy was to be one of several inputs in deciding upon funding allocations and treatment activities. TSR2 analysis was not complete and it was difficult to identify with any precision the silvicultural opportunities and their relative importance. Participants involved in developing this strategy provided local knowledge of issues and opportunities. While much of this information is dated, many of the issues and treatment options may still be “generically” relevant. Table 5 provides a listing of potential “non-spatial” options.

Table 5 Treatment options from the Type 1 Silviculture Strategy

Objectives	Treatment Options
Increase the quantity of timber to be available for harvesting.	<p>Achieve merchantable size 30 years earlier in approximately 60% of stands currently 1-30 years old and increase their volumes by 20% by:</p> <ul style="list-style-type: none"> • In addition to the 16 400 hectares already spaced, spacing an additional 20 000 hectares at the rate of 2 850 ha/yr as follows: <ul style="list-style-type: none"> ○ 5 000 hectares of PI stands subject to severe repression at the rate of 1 650 ha/yr for 3 yrs; ○ 7 000 hectares of stands having a stocking level of 4-10 000 sph at the rate of 700 ha/yr; ○ 5 000 hectares of moderate density clumpy stands having 3-5 000 sph at the rate of 200 ha/yr; and ○ mixed Fdi/Lw stands having future commercial thinning potential at the rate of 300 ha/yr. • Repeat fertilizing 30 000 hectares of spaced stands currently aged 1-30 yrs (about ½ of the total area in this age class) on a 15 year cycle at the rate of 2 000 ha/yr. (Note: the total area of

Objectives	Treatment Options
	fertilization will gradually rise over time to 5 000 ha/yr as more areas are harvested and regenerated to managed stands)
Maximize long term timber production within a context of sound multiple resource stewardship.	<p>Maintain the timber harvesting land base by:</p> <ul style="list-style-type: none"> • Fill-planting approximately 300 hectares of backlog NSR at the rate of 100 ha/yr for the next 3 yrs, • Surveying 6 000 ha/yr of pre-1987 SR areas to ensure they remain fully stocked; <p>Increase the volume of regenerated stands by 17% by:</p> <ul style="list-style-type: none"> • By 2011, expanding the use of improved seed to include PI, with the expected result of a 5% gain in LTHL. • Repeat fertilizing 2 000 ha/yr, rising gradually over about 60 years to 5 000 ha/yr as more stands come under management, for an expected result of a 6% gain in LTHL. <p>Reduce losses to root rot by surveying 1 200 ha/yr to monitor root rot development in stands. (Note: basic silviculture practices are also employed to reduce the incidence of root rot.)</p> <p>Monitor stands for mountain pine beetle attack by surveying 200 km/yr of strip lines.</p>
Improve the quality of the timber to be harvested.	First-lift prune 50 ha/yr.
Maximize ungulate habitat and foster biodiversity through harvesting and silvicultural activities.	<p>Space 300 ha/yr of mixed species and clumpy stands</p> <p>Improve UWR by spacing 40 ha/yr with the objectives of removing pine trees, leaving clumpiness and creating/enlarging voids.</p> <p>Create NDT4 fingers into NDT3 areas at the rate of 50 ha/yr in order to better emulate the naturally ragged boundary between the 2 disturbance types.</p>

Source: Invermere Timber Supply Area Interim Silviculture Strategy – Version 1.1. September 15, 1999

2.6 BC Mountain Pine Beetle Model

FLNRO developed a BC Mountain Pine Beetle model (BCMPB) to project the annual volume of mature pine killed by MPB. Data from a series of annual aerial overview surveys are used to calibrate the BCMPB.

The FLNRO Forest Analysis and Inventory Branch recommends using MPB mortality data generated through BCMPBv13 modeling and updated in the latest vegetation resources inventory. These data indicate that approximately 2.0 million m³ of the pine within the THLB (6.4 million m³ on the CFLB) is dead due to MPB. This mortality represents approximately 5.9% of the total volume and 16.1% of the pine volume on the THLB.

The current data summary (BCMPBv13) from the vegetation resources inventory indicates that about 6% or about 2.0 million m³ of the pine volume on the THLB is currently dead (as defined in 1999) had been killed by 2015 (Figure 2). As the infestation recedes, the BCMPB model predicts an additional 120,000 m³ of mortality by 2020.

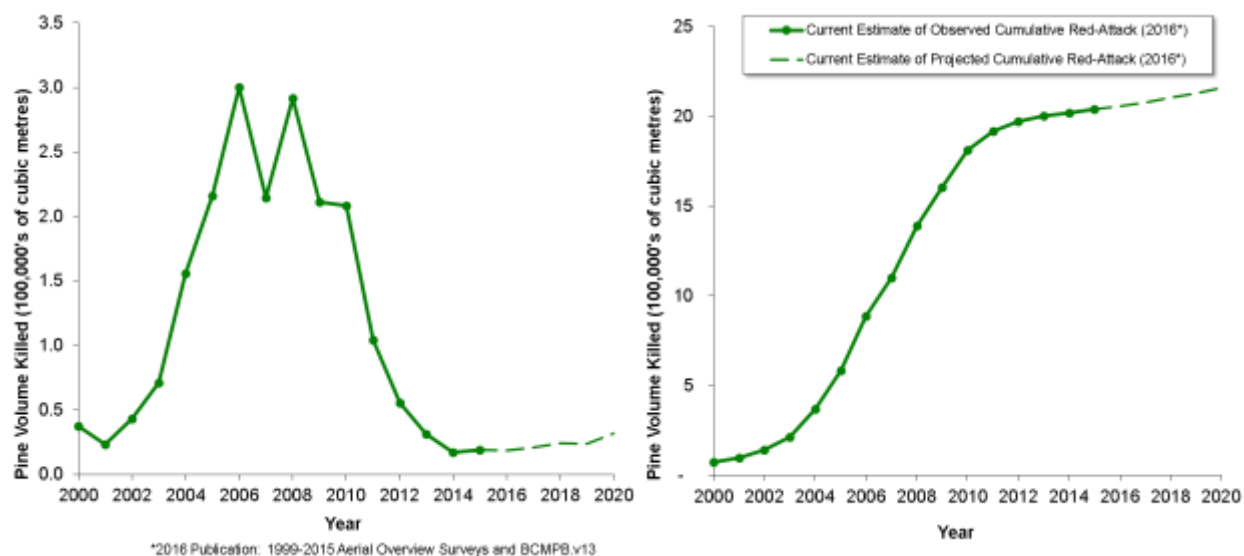


Figure 2 Observed and projected annual and cumulative MPB Red-Attack – Invermere TSA

2.7 Future Forest Products and Fibre Use Strategy

In 2006 the Southern Interior Beetle Action Coalition (SIBAC) was formally established to address the potential environmental, economic and social impacts of the Mountain Pine Beetle epidemic. SIBAC is a member-based organization comprised of the nine Regional Districts and six Tribal Councils in the southern interior; and the Community Futures Development Corporation of Central Interior First Nations. The purpose of SIBAC was to provide a local perspective on the MPB epidemic and its impacts and to prepare a regional MPB mitigation plan with recommendations for the Provincial and Federal Governments. The report was also to be used to communicate the issues and recommendations to a variety of local partners including First Nation and local governments.

SIBAC commissioned a number of reports and processes. The Forest Sector Trend Analysis study was completed in the Invermere TSA. This study documents the current status of the Southern Interior forest industry sector, major historical trends (last 20 years) in the sector, major challenges facing the Southern Interior forest sector (including Mountain Pine Beetle) and the most probable changes in the Southern Interior forest sector in the next decade. In addition, the Timber Supply Fact Sheet was developed to provide a detailed historical and anticipated timber supply for the Invermere TSA. The Fact Sheet summarizes the impacts of MPB epidemic thus far on timber supply, log flow, and industrial milling capacity in the Invermere TSA. An accompanying wall map “Invermere Timber Supply Area – Forest Sector Trends Analysis and the Mountain Pine Beetle” has been produced that provides visual detail on the estimated impacts of the MPB in the Invermere TSA. Due to their higher percentages of pine the Lillooet, Merritt, Kamloops, and Invermere TSAs will experience the greatest pressures on mid-term timber supply due to the MPB epidemic.

The full SIBAC MPB Mitigation Plan report contains 24 recommendations grouped into six major theme areas. While SIBAC believes that all of the Plan report recommendations are important, based on community consultations the following six recommendations are seen as the most urgent priority in the short-term.

Theme	Recommendation
1) Environment	Province work with communities and First Nations to assess consumptive watersheds at high risk of negative water quality impacts as a result of the MPB epidemic and undertake appropriate mitigation activities.
2) Forest Sector	Province should work with local Governments and First Nations to continue to seek methods that maximize value from the timber supply through innovation, partnering and access to fibre.
3) Community Safety	Province should work with local Governments and First Nations to continue to seek methods that maximize value from the timber supply through innovation, partnering and access to fibre.
4) Government Revenues	Provincial Government develop new methods of regional resource revenue sharing with Local Governments and First Nations.
5) Rural Development	Provincial and Federal Governments dedicate funding for diversification for rural economic development in BC.
6) Communities At-Risk	That the Provincial Government provide implementation resources to MPB at-risk communities and Tribal Councils.

Source: SIBAC Mountain Pine Beetle Assessment and Mitigation Plan, 2009.

2.8 Multiple Resource Value Assessment

The goal of sustainable forest management is to achieve a balance between environmental, social and economic objectives. Multiple Resource Value Assessments (MRVA) show the results of stand and landscape-level monitoring carried out under the Forest and Range Evaluation Program (FREP). These reports provide resource professionals and decision makers with information about the environmental component of this 'balance' so that they can assess actual outcomes compared to expectations.

The Forest and Range Practices Act (FRPA) lists eleven resource values essential to sustainable forest management in the province: biodiversity, cultural heritage, fish/riparian and watershed, forage and associated plant communities, recreation, resource features, soils, timber, visual quality, water, and wildlife. MRVA reports summarize the conditions of these values through available field assessments. These assessments are generally conducted on or near recently harvested cut blocks and therefore are only evaluating the impact of industrial activity and not the condition of the value overall (i.e., they do not take into account protected areas and reserves). Most of the information gathered is focused on the ecological state of the values which provides useful information to resource managers and professionals on the outcomes of their plans and practices. This information is also valuable for communicating resource management outcomes to First Nations, stakeholders, and the public, and providing a foundation for refining government's expectations for sustainable resource management in specific areas of the Province.

Source: FLNRO, Invermere TSA MRVA December 2013

The extraction and development of natural resources, along with natural factors (e.g., insects, wind, and floods), influence and impact the ecological conditions of a management unit. The goal of effectiveness evaluations is to assess these impacts on public natural resource values (i.e., status, trends, and causal factors). These evaluations do not assess compliance with legal requirements but do help resource managers:

1. assess whether the impacts of resource development result in sustainable resource management,
2. provide transparency and accountability for the management of public resources,
3. support the decision-making balance between environmental, social, and economic factors, and
4. inform the ongoing improvement of resource management practices, policies, and legislation.

The MRVA for the Invermere TSA produced a summary of key findings and, in some cases, identified performance trends (Figure 3) to provide excellent baseline data for comparing performance against strategies developed from this and other future projects.

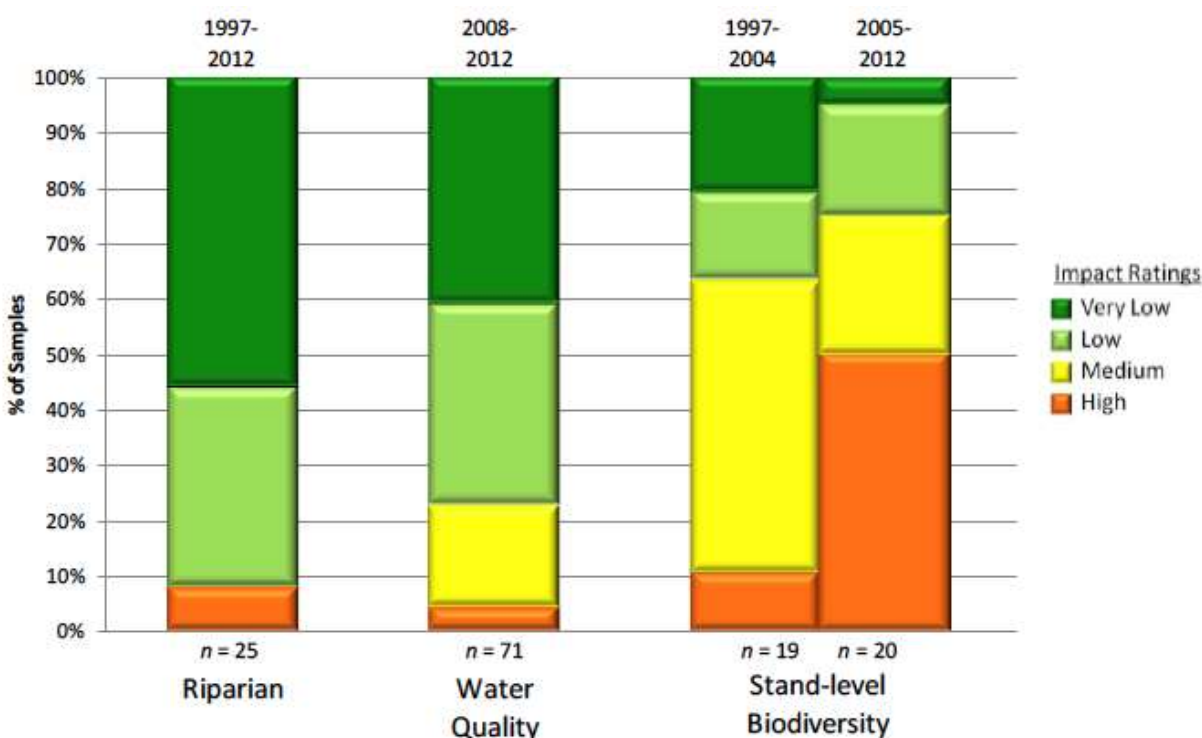


Figure 3 MRVA Performance and Trends – Invermere TSA

Source: Invermere TSA MRVA Report, December 2013

2.9 Provincial Stewardship/Timber Harvesting Land Base Stabilization

The FLNRO's Forest Competitiveness Initiative recently produced guidelines for implementing Provincial Stewardship/THLB Stabilization Projects. The intent of these projects is to optimize the stewardship of Provincial forest and natural resources while realizing the full operational potential of the timber harvesting land base. While these projects, often referred to as co-location, do not change existing land use plans or legislation, they explore the best possible combination of overlapping the many constraints on timber harvesting. The key objective of the process is optimizing the placement of spatial constraints that results in an overall increase in THLB.

Source: FLNRO, Chief Forester Information Bulletin – Stewardship and Stabilizing the Timber Harvesting Land Base, March 2015

2.10 Forest Health Strategy

A Forest Health Strategy was developed in 2010 for the Invermere TSA. A new strategy is being developed and will be consistent with the Provincial Forest Health Strategy and Forest Health Implementation Strategy goals and objectives.

On an annual basis, identification and prioritization of the existing forest health issues and factors have been completed through detailed aerial flights and ground surveys. An active, yet declining, Fall & Burn Program is implemented to mitigate the impact.

2.11 Ecosystem Restoration

The KBLUP provides for the restorations and maintenance of fire-maintained ecosystems, and provides for treatments that contribute to the creation of a complex, ecologically-appropriate mosaic of habitats over the long term, and treatments in open range and open forest that will remove excessive immature and understory trees and emphasize the retention of the oldest and largest trees.

Source: Invermere Timber Supply Area Timber Supply Review, Updated Data Package May 2016

Ecosystem Restoration is defined as the process of assisting with the recovery of an ecosystem that has been degraded, damaged, or destroyed by re-establishing its structural characteristics, species composition, and ecological processes. The vision of the Provincial Ecosystem Restoration Program is to restore identified ecosystems to an ecologically appropriate condition, creating a resilient landscape that supports the economic, social, and cultural interests of BC. The province has produced a draft strategic plan (Ministry of Forests and Range 2009) with goals, strategic priorities, and methods to help guide the program.

Within the Invermere TSA, much of the Ecosystem Restoration Program is administered through the Rocky Mountain Trench Ecosystem Restoration Program (Trench Society). The Trench Society has operated as a successful partnership of government, industry, First Nations, NGOs and the public since 1998. Trench Society receives its funding through the Provincial Habitat Conservation Trust Foundation, the anglers, hunters, trappers, and guides who contribute to the Trust, and other sources.

The long-term goal is to restore East Kootenay/Columbia Valley fire-maintained low-elevation grasslands and dry Ponderosa pine/Douglas-fir forests to their natural state. Restoring grasslands and open forests enhances biodiversity, restores habitat for species at risk, improves grazing for cattle and wildlife, improves forest health and reduces the risk of severe wildfire. Restoration is taking place on Crown land, within provincial and national parks, on private conservation properties, and on First Nations reserves from Radium Hot Springs to the US border.

The “Blueprint for Action” describes the goals of the Ecosystem Restoration Program in the Rocky Mountain Trench (RMT). This document is not legal, but it provides information and interpretation of the KBLUP for citizen groups. The Vision is as follows:

A restored Trench Landscape functioning at its ecological potential and thereby supporting:

- *The native and historical and condition matrix of trees plants and animals*
- *A sustainable forage resource for wild and domestic grazing ungulates and*
- *The social, economic, and cultural needs of stakeholders as they relate to the open range and open forests of the Trench.*

The Mission is as follows:

- i) *Progressively restore the designated 118,500 hectares of the Trench to an ecologically appropriate fire maintenance condition by 2030, in accordance with tree stocking standards for open range and open forest sits.*
- ii) *Maintain the restored 118,500 hectares in an open range or open forest condition in perpetuity.*

Following concerns raised that Ecosystem Restoration treatments in the Rocky Mountain Trench were not achieving the objective of restoring the native plant community and enhancing forage production, a sub-committee of Ecosystem Restoration Operations practitioners reviewed on the ground practices

and results. Following analysis, Ecosystem Restoration Best Management Practices were developed, mostly to address the mitigation of impact due to invasive plant species and or sensitive soils. The Best Management Practices provide guidance for each of the activities: planning and layout, harvesting, chipping and grinding, roads – post harvest, landings, blowdown salvage, seeding, and grazing.

Source: Ecosystem Restoration Best Management Practices, 2014

Restoration and maintenance of fire-maintained ecosystems in the Trench comprise approximately 5.3% of the THLB. Continued restoration planning would add more certainty to the long-term contribution of these components. Treatment of Open Range and Open Forest stands, through timber removal, to reduce ingress/encroachment is critical to ungulate populations. It should be noted that this volume has already been accounted for in the TSR3 analysis and that mid-term harvest levels were sensitive to the availability of this volume. Stand thinning treatments in managed forest stand types (NDT4) are also considered beneficial to both wildlife and timber values because resulting stands provide more merchantable volume and cover habitat in the future. In his TSR3 determination, the Chief Forester increased the AAC by 5000 m³/yr to assist with ecosystem restoration.

Source: Invermere Timber Supply Area Timber Supply Review, Updated Data Package May 2016

2.12 Whitebark Pine

Due to various forest health factors, (white pine blister rust, pine beetle, others), fire suppression and global climate change, whitebark pine (Pa) has declined across its range and as of June 2012 is listed as a species at risk (blue-list). A Federal Recovery Strategy is under development.

Maintaining these stands will be important for the recovery of the species, for facilitating future migration north with a changing climate, and for maintaining biodiversity – particularly supporting species that rely so closely on whitebark pine. As well, planting rust-resistant trees can promote the recovery of whitebark pine in BC.

Source: FLNRO. 2015. Promoting Whitebark Pine Recovery in British Columbia. Prepared by Don Pigott, Randy Moody, and Alana Clason. April 28, 2015

It has been suggested that whitebark pine leading stands and stands in which whitebark pine forms more than 50% of the species composition should be netted out of the TSR for high biodiversity and ecological reasons. These stands should be left out of harvest areas, or reserved through WTP or Old Growth Management Areas (OGMA), that contribute to stand-level biodiversity. Post-harvest activities such as burning and thinning can also be designed to avoid damage to whitebark pine.

Source: Canfor SFMP, 2016

The FLNRO also developed a bulletin that provides general recommendations on how to consider whitebark pine in harvesting and silviculture operations:

Logging in high-elevation spruce-fir and lodgepole pine stands can cause unintended damage to and removal of whitebark pine. Removing whitebark pine trees reduces the seed supply, which is an important, sometimes essential, food source for wildlife and necessary for regeneration. In particular, Clark's nutcracker not only utilize seed as a food source, their habit of caching seed in the ground is the primary means by which whitebark pine regenerates. Harvesting may also remove trees that could be genetically resistant to blister-rust. Retaining stands and individual trees, and promoting natural regeneration of whitebark pine will help conserve this species and the ecosystem services it provides.

Minor amendments to forest stewardship plans at the landscape level, and harvesting and site plans at the stand level, could also help conserve this species. For example, adjustments to cutblock boundaries and locating wildlife tree patches in areas with whitebark pine could protect small stands and individual trees. Identifying whitebark pine as an acceptable species in stocking standards for appropriate sites would also preclude the need to plant another species adjacent to naturally regenerated whitebark pine seedlings and larger residual trees.

Source: Whitebark Pine Bulletin, FLNRO, Ministry of Environment, ISSUE 01 December 2011

Figure 4 shows the current location of whitebark pine in the Invermere TSA.

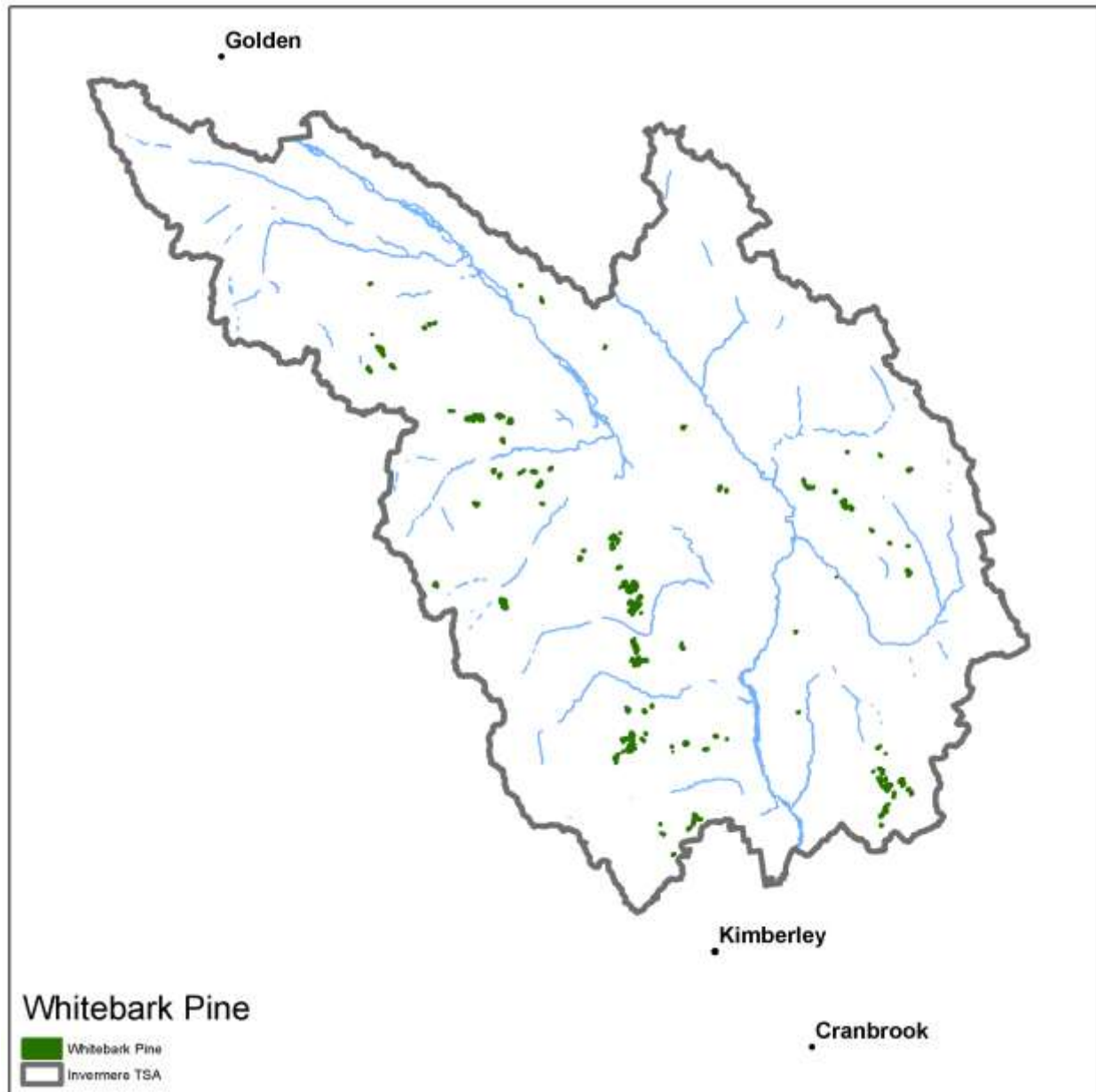


Figure 4 Location of Whitebark Pine in the Invermere TSA

2.13 Wildfire and Fuel Management

Provincial – Strategic Level

The BC Wildland Fire Management Strategy (MFR 2010³) provides direction for a proactive provincial wildland fire management program aimed to:

1. Reduce fire hazards and risks (particularly in and around communities and other high-value areas).
2. Carefully use controlled burning where the benefits are clearly defined and the risks can be cost-effectively managed.
3. Monitor and manage, rather than suppress, fires that are of minimal risk to communities, infrastructure or resource values.
4. Implement land, natural resource and community planning that incorporates management of wildland fire at all appropriate scales.
5. Develop a high level of public awareness and support for wildland fire management.

The Provincial Strategic Threat Analysis 2015 Wildfire Threat Analysis Component project provides a spatial representation of wildfire threats across BC (Figure 5).

The Wildfire Threat Analysis informs the government's landscape fire management planning and the Strategic Wildfire Prevention Initiative fuel treatment programs. The Wildfire Threat Analysis is meant to be used at a strategic level and at a relatively coarse resolution that is suitable for the area in question.

However, the present wildfire situation in BC is presenting challenges:

- Continued growth of the wildland urban interface and the expansion of infrastructure related to energy development (and other industries) on the forested landbase
- Suppression of naturally occurring wildfires has contributed to unhealthy forest and range ecosystems and habitats, and unnaturally high fuel loads
- The effects of climate change are resulting in longer and more extreme fire seasons

If the 2015 Wildfire Threat Analysis identifies a high threat area, then land managers and development proponents should look at the stand-level characteristics to confirm this rating. The next step for a "high threat" area is to analyze potential site modification and structure development options. Finally, they could strategically alter or reduce fuel levels and potentially conduct landscape-level fuel treatments through the enhancement of natural features, targeted harvesting, the establishment of linear fuel breaks, prescribed burning and the use of alternative silviculture practices such as modified stocking standards. During this process, land managers could also identify areas where fire would be ecologically beneficial and where they would support the reintroduction of fire (natural or prescribed) on the landscape.

Fuel management is the process of modifying forest or rangeland fuels (vegetation and biomass) to reduce aggressive wildfire behaviour. Treating the existing fuels on the landscape is the best opportunity for land managers to modify fire behaviour. The other two factors (weather and topography) are outside of their control.

Forest health issues must be considered at the fire management level, since pests and disease can alter the composition of forest fuels. These factors can change how flammable a forest stand is and can increase the chances of a catastrophic wildfire.

³ Revised Strategy currently under review

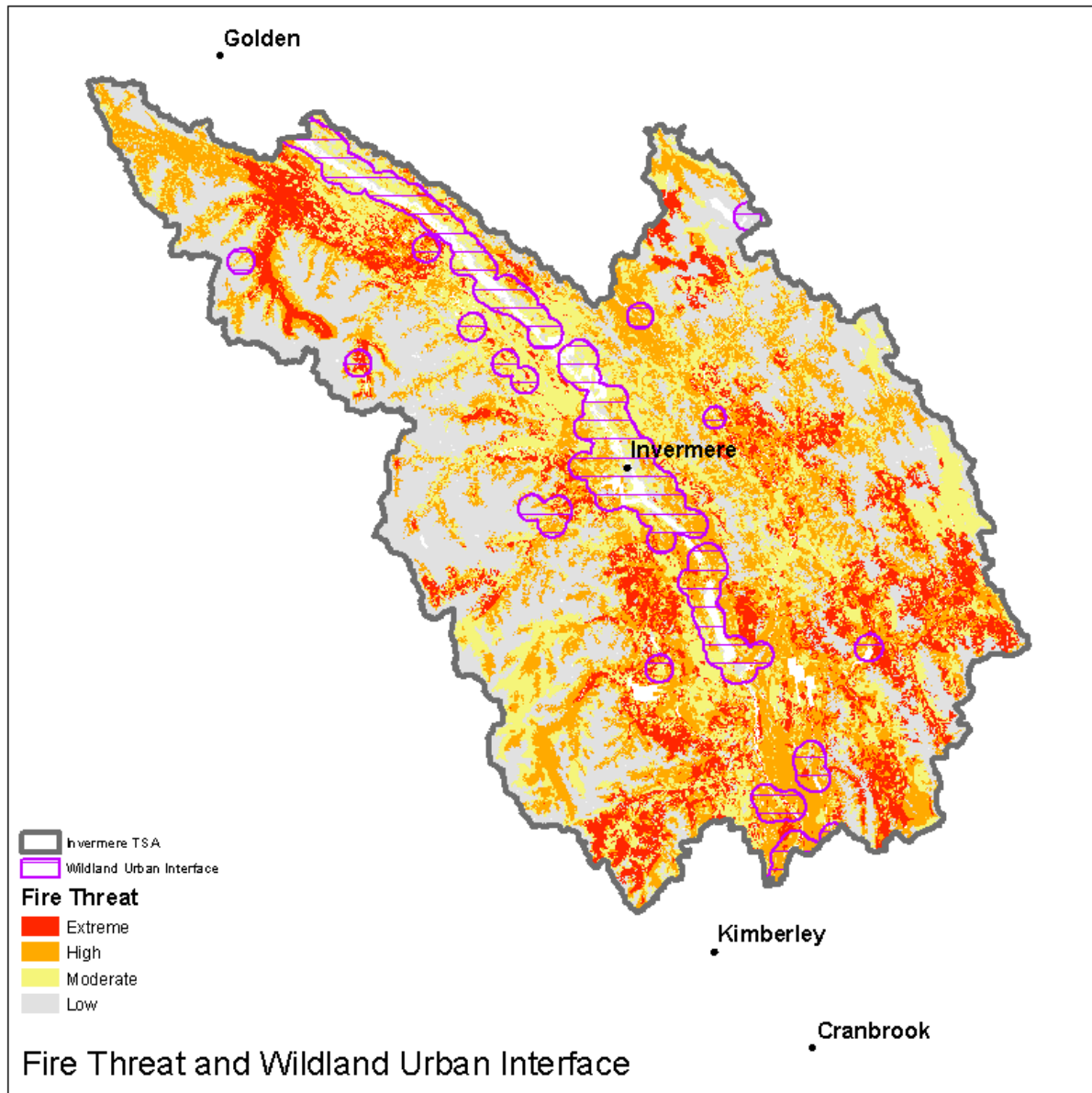


Figure 5 Fire Threat and Wildland Urban Interface

Source: 2015 Provincial Strategic Threat Analysis (PSTA) Data Package - Invermere TSAs

Forest District – Tactical Level

Fire Management Plans are tools used by land managers and response staff to identify values at risk in developing a fire analysis that describes general control objectives and strategies. These plans are developed by the Forest Districts. Priority is given to protecting values ranked as follows: human life and safety, property, high environmental values, and resource values. A *draft* Fire Management Plan for the Rocky Mountain Forest District is being developed⁴ and will include the Invermere TSA.

⁴ Anticipated in 2017

Community – Local Level

All communities within the Invermere TSA have a completed and valid Community Wildfire Protection Plan which identifies areas at risk from wildfire in and around the community. The wildland urban interface is any area where combustible wildland fuels are found near residential structures, businesses, or other built assets or infrastructure that may be damaged by a wildfire. Figure 5 identifies wildland urban interface areas throughout the Invermere TSA.

3 First Nations and Cultural Heritage

Archaeological evidence suggests aboriginal peoples have inhabited the East Kootenay region, adjacent to the Columbia and Kootenay Rivers, since the last glaciation over 10,000 years ago.

Cultural heritage resources and other areas of importance to First Nations are continually being noted and documented throughout the Invermere TSA. Frequently – though not always – these areas are accounted for through riparian habitat, wildlife areas or other removals from the THLB including buffered trails and archaeological sites. The magnitude of this assumption may change as the extent of cultural heritage and other First Nation areas of importance and their impact on timber harvest activities are better understood.

The member bands of two First Nation Councils have territories that encompass areas within the Invermere TSA: the Ktunaxa Nation Council and the Shuswap Nation Tribal Council.

The majority of Nation citizens originate from the Ktunaxa or Kootenai culture. The ?Akisq'nuk First Nation (Columbia Lake Indian Band) community resides within the Invermere TSA.

A small group of Shuswap (Secwepemc) people, descendants of the Kinbasket family, settled in this area in the 1840's.

The following subsections provides a brief description of the First Nations that reside, claim traditional territories, and have social and economic interests within the Invermere TSA. These bands have asserted their traditional territories within the area.

3.1 Ktunaxa Nation

[Ktunaxa](#) (pronounced 'k-too-nah-ha') people have engaged in subsistence activities (hunting, fishing and gathering – food, medicine and material for shelter and clothing) throughout their traditional territory and beyond, seasonally migrating throughout their traditional territory to follow vegetation and hunting cycles. The Ktunaxa language is unique among Native linguistic groups in North America. Ktunaxa names for landmarks exist throughout the region.

The Ktunaxa Nation is involved in discussions with Selkirk and Rocky Mountain resource districts related to access to increased timber supply in the Arrow, Boundary and Invermere TSAs.

The Ktunaxa Nation Council (KNC), on behalf of the Ktunaxa Nation, is nearing completion of Stage 4 – Agreement-in-Principle treaty negotiations.

Source: www.ktunaxa.org

3.1.1 ?Akisq'nuk First Nation

The [?Akisq'nuk First Nation](#) (called Akisqnukniks in Ktunaxa), located at Windermere, is a member band of the Ktunaxa with a population of approximately 270. The Akisqnuk First Nation is home to several businesses and business ventures.

?Akisq'nuk First Nation is the Ktunaxa Community that is in closest proximity to Columbia Lake and has been actively engaged in activities to protect the archaeological, cultural, historical and environmental values on the east side of this lake. The Ktunaxa connection to Columbia Lake is established in its creation story. The Spirit Trail traverses the east side of Columbia Lake and numerous pictographs are recorded in this area.

?Akisq'nuk First Nation is also the Ktunaxa Community in closest proximity to the Jumbo Creek valley. In 2010, the Ktunaxa Nation established, through the Qat'muk Declaration, Jumbo (Qat'muk) as a Ktunaxa

protected area and has since developed a management plan for the area. Ktunaxa Nation is requesting that the Province establish a legislative conservancy over the area.

?Akisq'nuk First Nation has expressed interest in title (and in the interim, a partnership with the province for stewardship) over the Madias Tatley area adjacent to their reserve. A significant portion of the Madias-Tatley is within a Ktunaxa Treaty Land and Cash Offer land parcel.

Source: FLNRO, TSR Data Package, 2016

3.2 Shuswap Nation

The [Shuswap Nation Tribal Council \(SNTC\)](#) is a political organization comprised of most of the Southern Secwepemc bands. Shuswap Nation Tribal Council (SNTC) member bands are not involved in the BC treaty process. As an organization, it works on matters of common concern, including the development of self-government and the settlement of the aboriginal land title question. SNTC is involved in resource management within the Secwepemc Nation territory and also provides technical support to member communities to improve services in health, child welfare, employment and training, research on traditional territories and community development.

Source: FLNRO, TSR Data Package, 2016

3.2.1 Shuswap Indian Band

The [Shuswap Indian Band](#) is located two kilometers northeast of Invermere, is a member of the Shuswap Nation Tribal Council with a population of approximately 230. The Shuswap Band is very interested in forestry opportunities and currently holds Forest Consultation and Revenue Sharing and Forest Tenure Opportunity Agreements with the province. The Shuswap Band is involved in discussions with Selkirk and Rocky Mountain resource districts related to access to increased timber supply in the Arrow, Boundary and Invermere Timber Supply Areas.

The Kinbasket Development Corporation is a wholly-owned corporate extension of the Shuswap Indian Band. They operate as a regular company, independent from band activities, with a duly appointed board of directors and a full-time manager.

Source: FLNRO, TSR Data Package, 2016

3.2.2 Adams Lake Indian Band

The [Adams Lake Indian Band](#) is a member of the Shuswap Nation Tribal Council. Adams Lake Development Corporation, owned by the Band, is undergoing a restructuring process which has already produced measurable benefits. Although their reserve is not located within the Invermere TSA, their asserted traditional territories encompass approximately the northern half of the Invermere TSA.

Source: FLNRO, TSR Data Package, 2016

3.2.3 Neskonlith Indian Band

The [Neskonlith Indian Band](#) is a member of the Shuswap Nation Tribal Council. Although their reserve is not located within the Invermere TSA, their asserted traditional territories encompass approximately the northern half of the Invermere TSA.

Source: FLNRO, TSR Data Package, 2016

4 Forest Licensees

AAC apportionment and commitments to licensees are assigned at the TSA level. Operating areas are a non-legal, negotiated agreement among licensees. Within the Invermere TSA, operating areas exist for Canfor and BC Timber Sales (Figure 6).

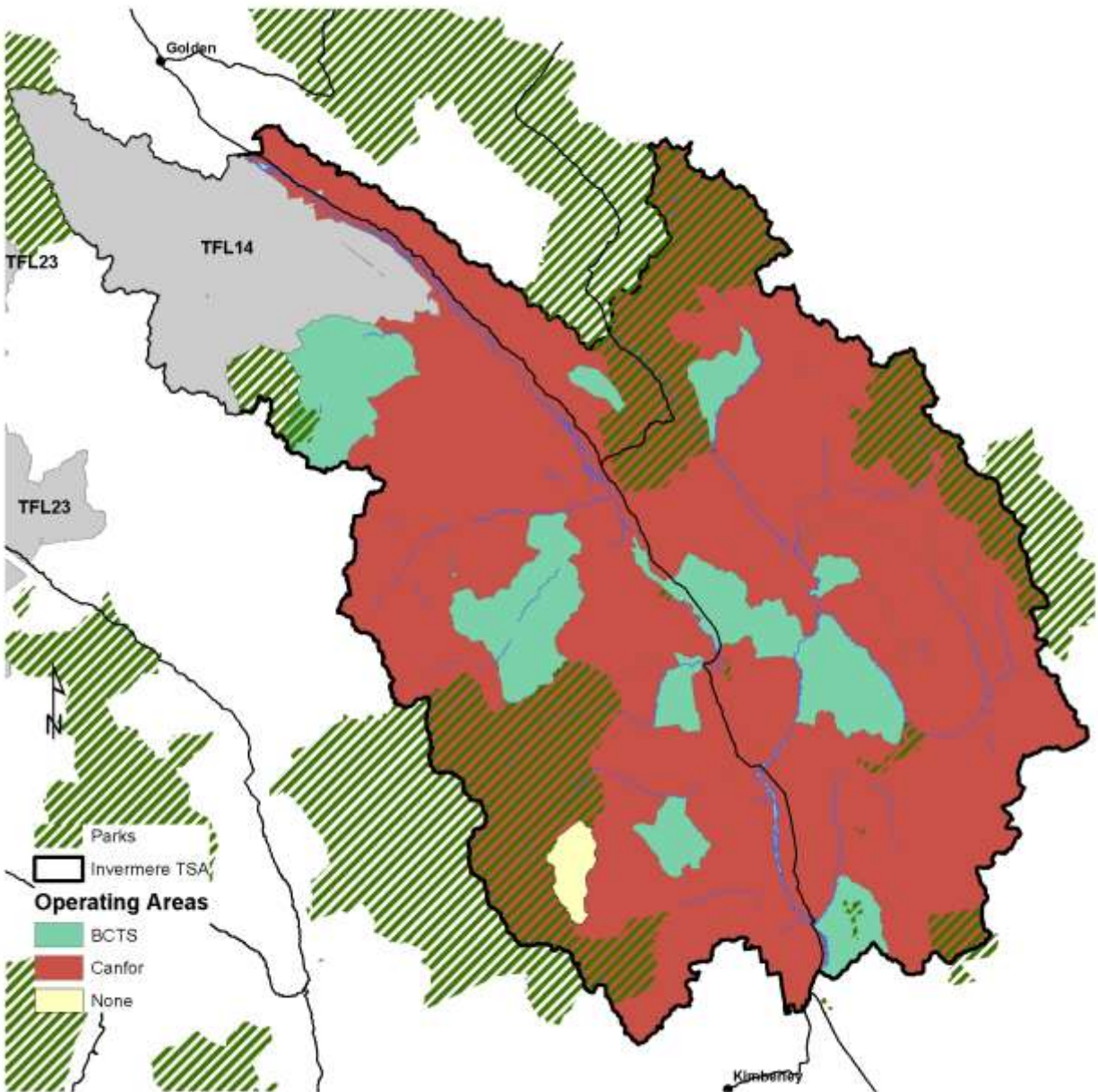


Figure 6 Licensee Operating Areas (2010)

4.1 Replaceable Forest Licensees

At present, four forest licensees operate within the Invermere TSA through replaceable forest licensees.

4.1.1 Canadian Forest Products Ltd.

Canadian Forest Products Limited (Canfor) is the Invermere TSA's main forest industry player; the company has rights to approximately two thirds of the TSA's AAC and owns about 70% of the TSA's timber processing capacity. 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 pulp making operations.

In the Invermere TSA, Canfor's replaceable forest license volume is 441,673 m³/year. Canfor operates a dimension lumber mill at Radium Hot Springs, producing 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 Excellence's Skookumchuk Pulp mill and sells other sawmill by-products such as sawdust, planer shavings and hog fuel to other manufactures.

4.1.2 North Star Planning Co. Ltd.

North Star holds a forest licence of 7,505 m³/year that is currently managed by Canfor.

4.1.3 Kinbasket Development Corporation

KDC holds a forest licence of 12,000 m³/year that is currently managed by Canfor.

4.1.4 Akisqnuq Resources Limited Partnership

Akisqnuq holds a forest licence of 13,500 m³/year that is currently managed by Canfor.

4.2 BC Timber Sales

BC Timber Sales (BCTS) is a semi-autonomous program within FLNRO. BCTS has a mandate to provide cost and price benchmarks for timber harvested from public land by auctioning blocks through timber sale licenses. As indicated above (Figure 6), BCTS operates within a number of landscape units in the Invermere TSA with an AAC allocation of 90,089 m³/year. BCTS's operations within the Invermere TSA are administered and managed through its Kootenay Business Area, with a field presence in Cranbrook.

BCTS is currently certified to the ISO 14001: 2004 Environmental Management System (EMS) Standard and, as part of the Provincial Sustainable Forestry Initiative single certificate initiative, BCTS Kootenay Business Area is certified under the 2015 – 2019 Sustainable Forestry Initiative Standard (SFI).

4.3 Area-Based Tenures

Area-based tenures within Invermere TSA are designated with their own AAC based on defined area and management regimes. While these tenures are managed separately from the TSA (i.e., not within the scope of this project), they are affected by many similar issues and regulatory regimes.

Community Forests

No Community Forests have been established within the Invermere TSA.

Woodlots

Within the Invermere TSA, 18 woodlots comprise approximately 11,000 hectares.

First Nation Woodland Licenses

No First Nation Woodland Licenses have been established within the Invermere TSA.

5 Timber Supply

5.1 Vegetation Resource Inventory

The Vegetation Resource Inventory Management System is used to update the Provincial Forest Inventory. In this process, new harvest and free-growing data are extracted from the Reporting Silviculture Updates and Land status Tracking System (RESULTS), verified and integrated into the Vegetation Resource Inventory.

While the vegetation inventory available for the Invermere TSA has been acquired over several decades (Figure 7), the majority of the inventory was conducted in 1991.

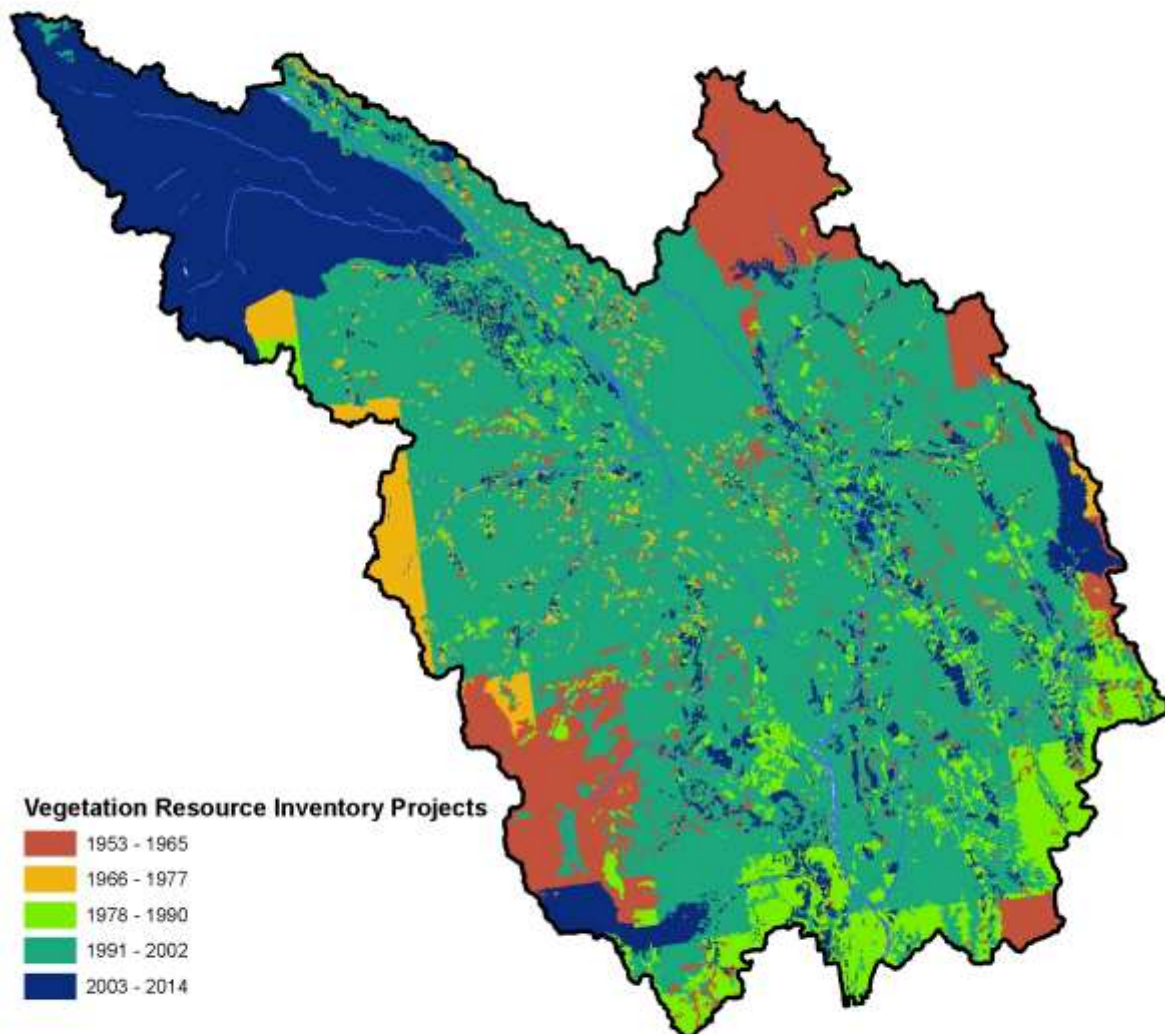


Figure 7 VRI Photo Interpretation Projects

5.2 Timber Profile

Forests of the Invermere TSA are mostly lodgepole pine, Douglas-fir, and Spruce. Larch, balsam, aspen, cedar, and hemlock also occur at lower levels (Figure 8, Figure 9, Figure 10). A history of frequent wildfires and harvesting activities has left a mosaic of forest ages.

Source: Forsite - VRI 2014

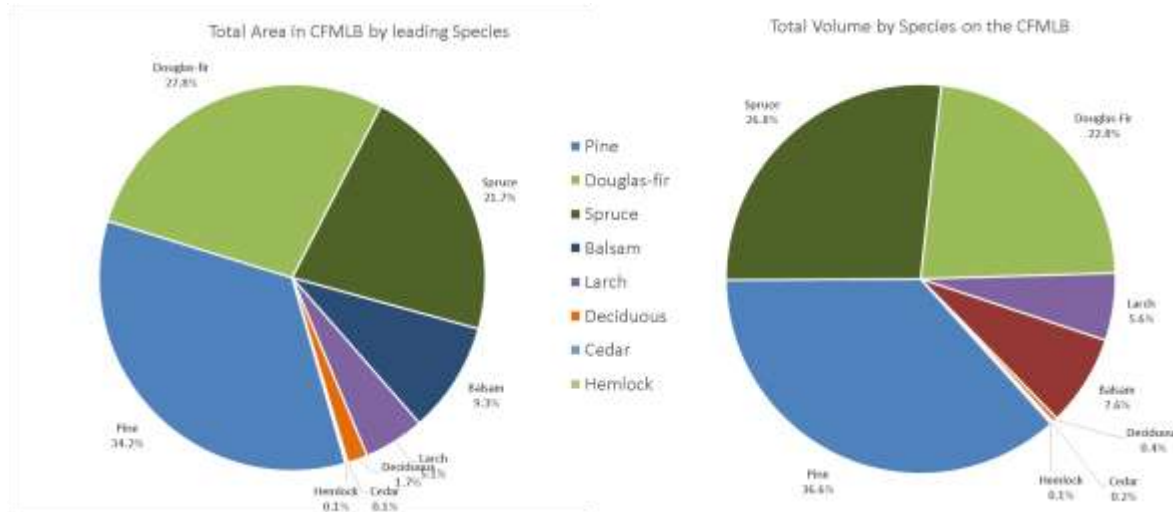


Figure 8 Total volume by species within the Invermere TSA CFMLB

Source: Forsite - VRI 2014

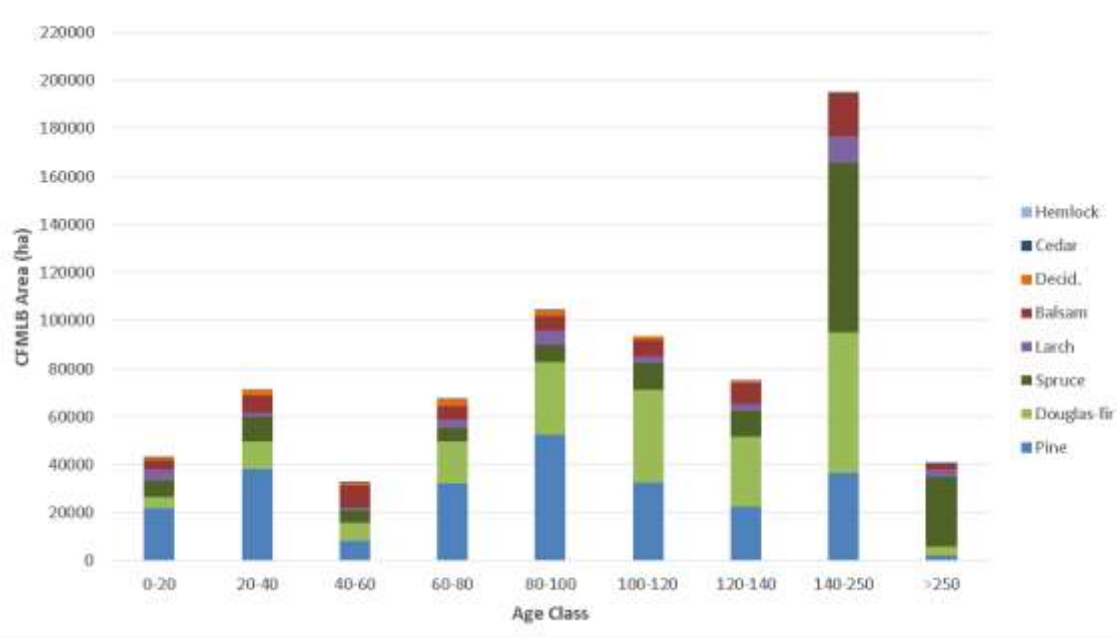


Figure 9 Area distribution by age class and species within the Invermere TSA CFMLB

Source: Forsite - VRI 2014

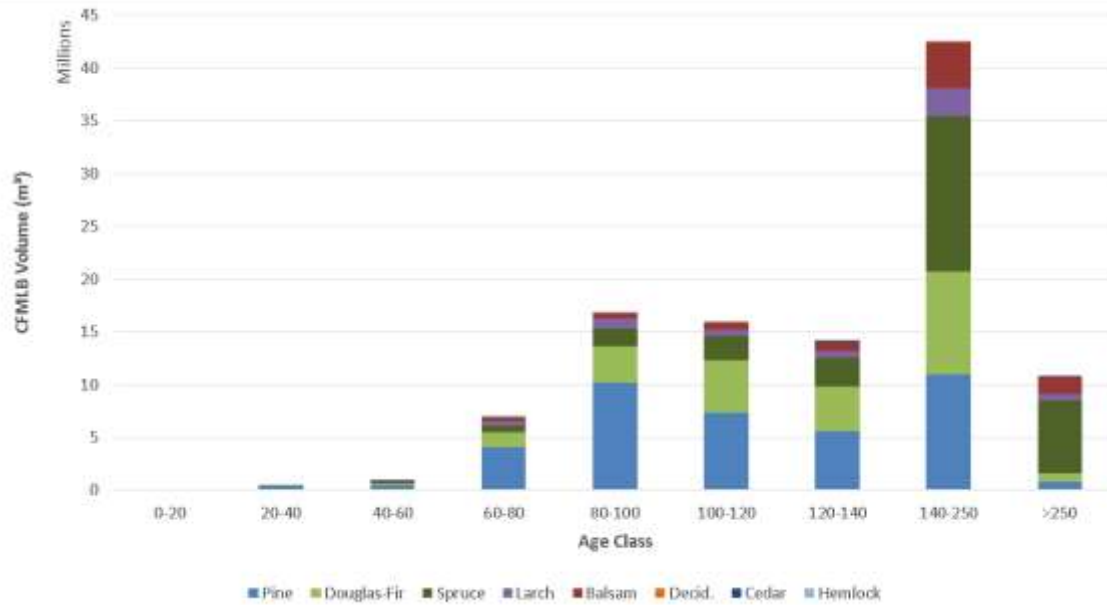


Figure 10 Volume distribution by age class and species within the Invermere TSA CFMLB

Source: Forsite - VRI 2014

5.3 Allowable Annual Cut

5.3.1 Past and Current AAC

Over the past 35 years, the regular AAC has averaged about 650,000 m³/yr; 598,570 m³/yr since 2005. Despite the predominance of pine in the Invermere TSA, this area of the province came through the most recent MPB epidemic relatively unscathed. No uplift was needed for MPB salvage as licensees were generally responsive to harvest affected stands promptly. A large fire season in the early 1980's prompted a substantial AAC uplift in 1985. There has been no subsequent fires or AAC uplift since.

Source: 2005 AAC rationale, 2016 TSR4 Public discussion paper



Figure 11 Allowable Annual Cut (AAC) History in the Invermere TSA

5.3.2 Existing Apportionment and License Commitments

The AAC is currently partitioned according to Table 6, apportioned by tenure type according to Table 7, and distributed among licensees as shown in Table 8. Only 79% of the current AAC has been committed to licensees operating within the Invermere TSA.

Canfor clearly has the largest apportionment within the Invermere TSA. While operating areas are not a legal instrument, a well-respected agreement exists to define geographical operating areas, as shown previously in Figure 6.

Table 6 Current AAC Partition by partition for the Invermere TSA

Partition	Volume (m³/yr)	Percent
Conventional Stands	598,570	100%
	598,570	

Table 7 Current AAC apportionment by tenure type for the Invermere TSA

Tenure Type	Conventional	
	Volume (m³/yr)	%
Replaceable Forest Licences	449,178	75.0%
Non-Replaceable Forest Licences	51,836	8.7%
BCTS Forest Licence (Non-Replaceable)	90,089	15.1%
Forest Service Reserve	7,467	1.2%
	598,570	

Table 8 Current AAC commitments by licensee and partition for Invermere TSA

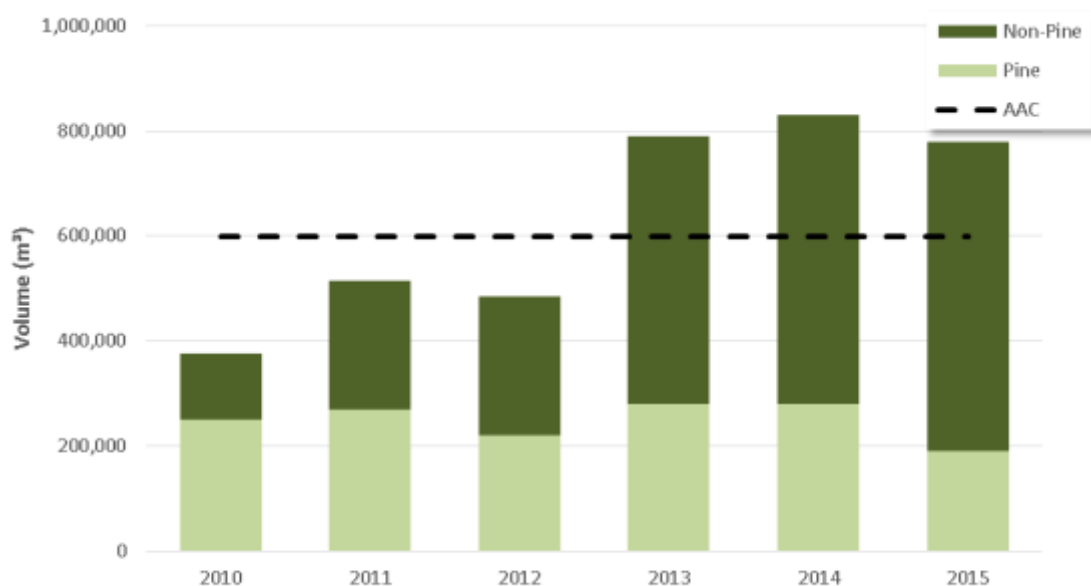
Licence Type	Licence No.	Licensee	Conventional (m ³ /yr)
Replaceable Forest Licences	A18978	Canadian Forest Products Ltd	220,668
	A18979	Canadian Forest Products Ltd.	221,005
	A78604	North Star Planing Co. Ltd	7,505
	A90310	Kinbasket Development Corporation	12,000
	A91308	Akisqnuq Resources Limited Partnership	13,500
Total			474,678

Source: Ministry of Forests and Range – Apportionment System, Kootenay-Boundary Natural Resource Region Invermere TSA
Report Effective Date: 2016-07-22

5.3.3 Harvest Performance

A review of the last 6 years of harvest on the Invermere TSA shows that the annual harvest has been trending slightly higher than the current AAC (Figure 12). However, due to varying cut control periods, the actual harvest is actually below the cut control level.

FLNRO staff also reviewed the recent harvest profile and found that current harvest performance on steeper slopes (40%-50%) is approximately 50%. Accordingly, the current TSR imposed a constraint of 50% on this component of the landbase.


Figure 12 Volume harvested from the Invermere TSA

Source: Invermere Timber Supply Area Timber Supply Discussion Paper, 2016

5.3.4 Projected Harvest

The base case scenario from the 2005 TSR (Figure 13) supported the current AAC of 598,570 m³/yr along with a reduction over the mid-term to 542,570 m³/yr; 9.5% lower than the current AAC. With direction from the Minister (FLNRO 2010), the base case harvest project was modelled as an even-flow harvest to

produce the highest mid-term harvest level. The resulting even-flow harvest level of 447,158 m³/yr is 23% lower than the 2005 AAC.

Other factors that contributed to the significantly lower timber supply forecast included a significant reduction in the contributing THLB from constraining the harvest from steep slopes, removing Wildlife habitat Areas (WHA), and removing spatial OGMA's. Together, these factors reduced the THLB by 16% relative to the previous TSR.

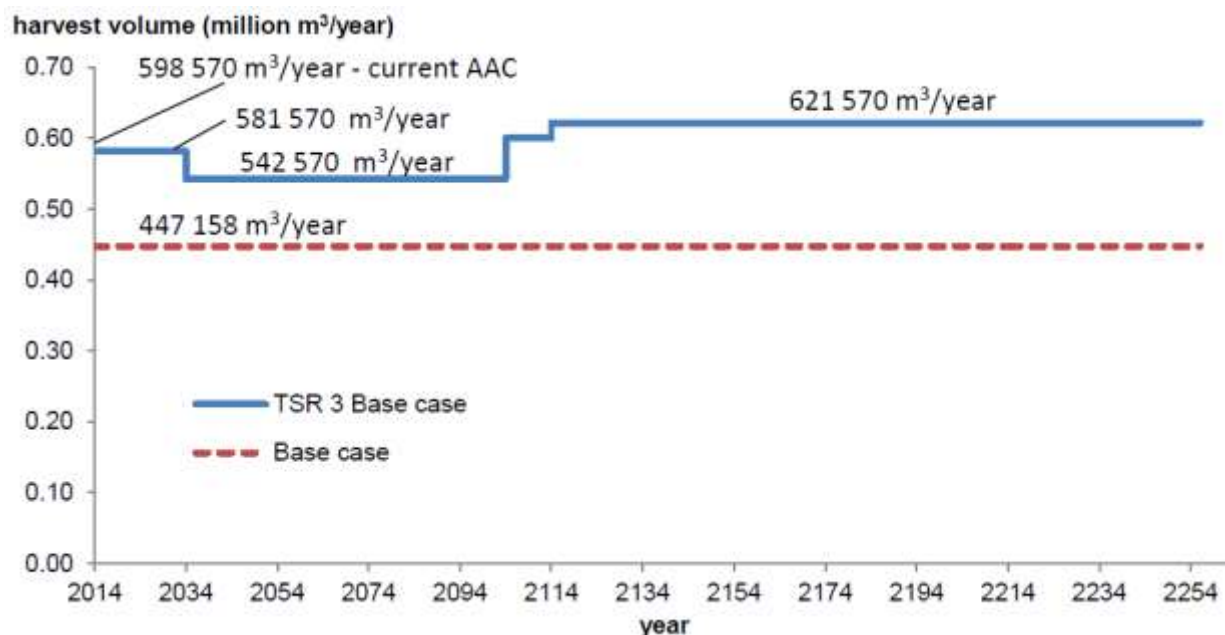


Figure 13 Invermere TSA Timber Supply Forecast for TSR4 vs. TSR3

Total and merchantable growing stock is shown in Figure 14. The even-flow harvest policy produces a growing stock over time that gradually declines for 40 year before beginning to recover. The rate of recovery increases near the end of the planning horizon indicating that the land base may be able to support a higher harvest level at that time.

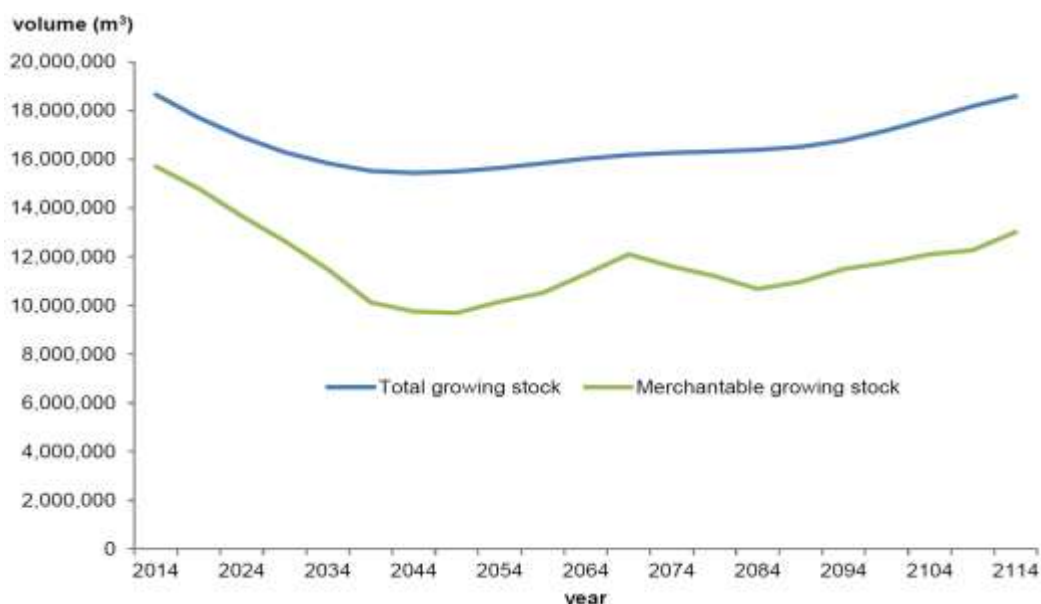


Figure 14 Total and merchantable growing stock – Invermere TSA

The contribution of natural and managed stands is shown in Figure 15. This shows that volume from managed stands starts to contribute to the harvest forecast almost immediately and becomes the major source of volume in about 50 years.

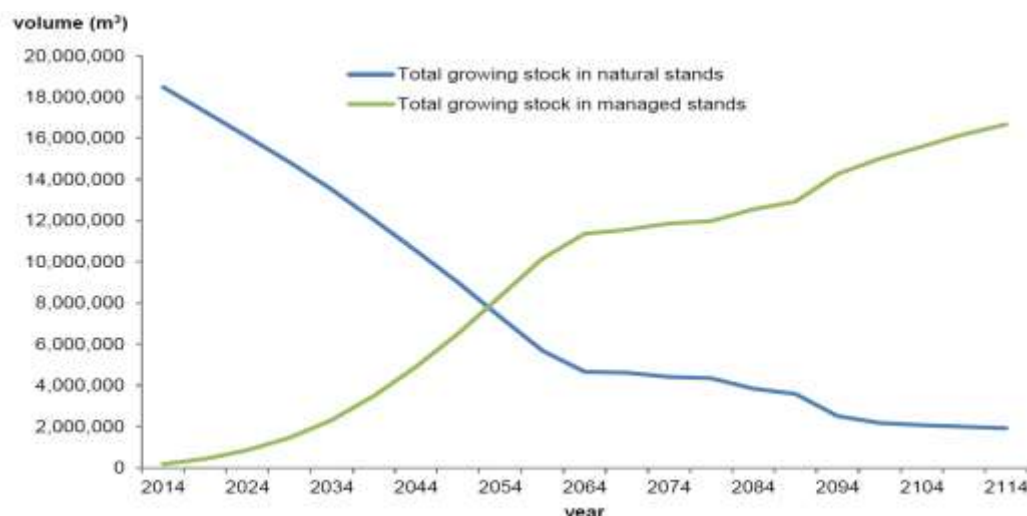


Figure 15 *Transition from natural to managed stands - Invermere TSA*

The average volume harvested over time (Figure 16) is relatively stable throughout the planning horizon except for a period of time 20-40 years from now. This reflects an era when mature natural stands will become increasingly scarce and harvesting will begin to rely more on managed, second-growth stands, as well as, younger natural stands.

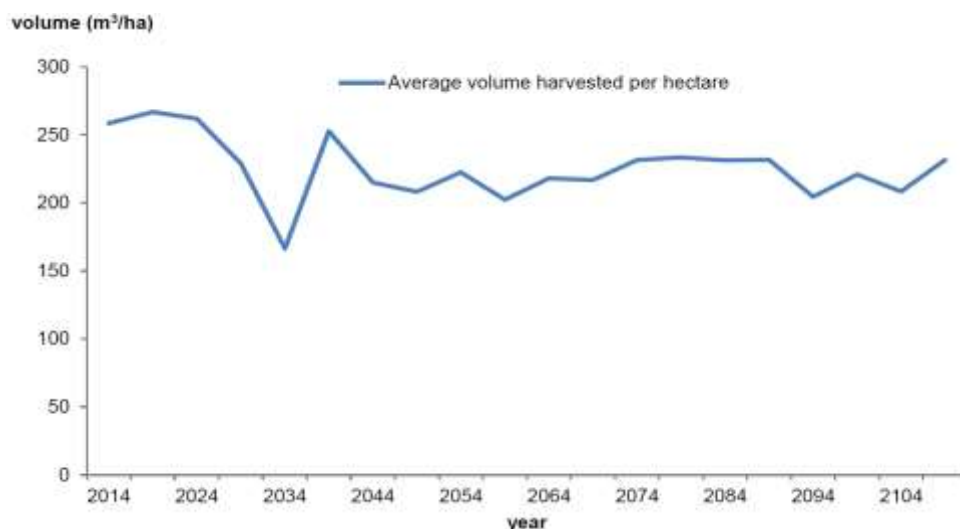


Figure 16 *Average volume harvested per hectare – Invermere TSA*

5.4 Forest Health Impacts

5.4.1 Spruce Beetle

Spruce Beetle (IBS) is a highly destructive pest of mature spruce trees evident throughout the range of spruce in the Southern Interior Forest Region. Preferred hosts include weakened or wind thrown trees, stumps and large slash. IBS prefers stands composed of 65% spruce, along well-drained creek bottoms.

Within the Invermere TSA, new infestations of IBS continue to be observed in the Upper North White drainage. During the spring of 2016, salvage harvesting began and continues here, on accessible areas. As well, trap trees intended to capture IBS were felled along the leading edge of Lower North White drainage. Plans are in place to harvest infected stands here and Grave Creek before the next IBS flight (spring 2017). The Upper Palliser (north of the North White drainage) is also heavily infested with IBS and sanitation harvesting is ongoing.

Areas impacted by the 2013 floods exacerbates the infestation potential, since these areas have resulted in blowdown or compromised stands. This is even more challenging as access to some of these flood-impacted areas was lost so salvage operations and mitigation controls for further spread have been non-existent. Without these responses, green, spruce-leading stands within these riparian areas are threatened.

The IBS infestation continues to head east and north within the Park boundaries and across into Alberta. These geographic and administrative boundaries hinders the ability to control the infestation spread.

Source: Pers. Comms. Canfor Staff and RMFD FH Officer; <https://www.for.gov.bc.ca/rsi/ForestHealth/PDF/SBpamphlet.pdf>

5.4.2 Mountain Pine Beetle

The Mountain Pine Beetle (IBM) is the most destructive forest insect pest of mature lodgepole pine in the Southern Interior Region. It also attacks ponderosa, whitebark, Scotch, jack pine and limber pine trees. IBM typically attacks old or weakened pine trees, however, unusually hot, dry summers and mild winters throughout the region have resulted in all pine – including immature – to be subject to attack.

As mentioned in section 2.6, current data from the vegetation resources inventory indicate that about 2.0 million m³ or 17% of the pine volume on the THLB is currently dead. The geographical distribution of dead pine and estimated year of attack within the Invermere TSA is illustrated in Figure 17.

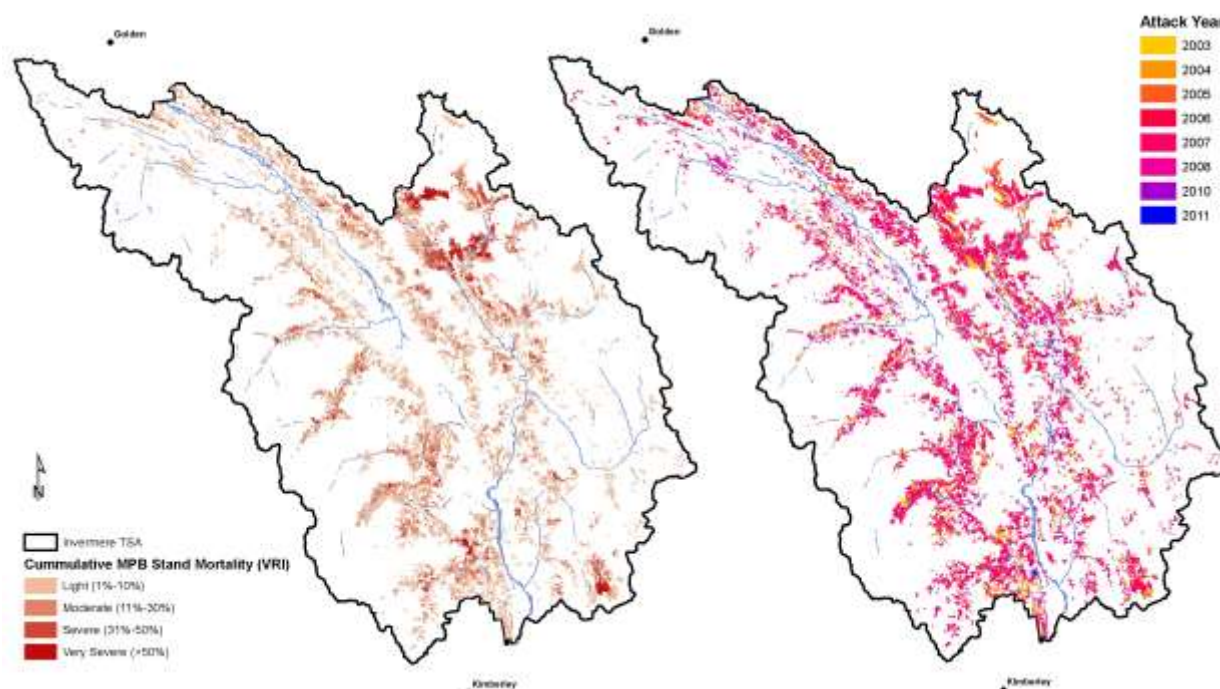


Figure 17 Cumulative Stand Mortality due to MPB and Estimated Year of Death

Source: Forsite 2016 – MPB Summary of vegetation resources inventory for Invermere TSA; <https://www.for.gov.bc.ca/rsi/ForestHealth/PDF/MPBpamphlet.pdf>

5.4.3 Douglas-fir Bark Beetle

The Douglas-fir beetle (IBD) attacks older Douglas-fir (occasionally western larch) stands in the Southern Interior Forest Region. IBD attacks frequently follow stand disturbances such as fire, wind or disease. Attacked trees are most often felled, wind thrown, injured, diseased, or otherwise stressed. As beetle population levels increase to epidemic proportions the beetle will frequently attack live, large diameter, mature Douglas-fir trees. While infestations are commonly sporadic and short in duration, outbreaks are capable of killing large numbers of trees.

Within the Invermere TSA, a major IBD infestation is underway in the Nine Mile area and has also been mapped in the Kootenay Bypass and Lower Lussier area. Treatment options include harvesting, as well as funnel or trap tree programs. Treatment options in many of the affected landscape units are often complicated by harvesting constraints, such as UWR.

Source: Pers. Comms. Canfor Staff and RMFD FH Officer; <https://www.for.gov.bc.ca/rsi/ForestHealth/PDF/DFBpamphlet.pdf>

5.4.4 Unsalvaged Losses

The volume of timber annually killed or damaged by natural causes (e.g., fire, wind, insects, and disease) that is not harvested is referred to as unsalvaged losses. Annual unsalvaged loss assumed to be 14,811 m³ (Table 9).

Table 9 *Estimates of unsalvaged losses applied in the TSR for the Invermere TSA*

Analysis Unit	Species	Cause of Loss	Annual Unsalvaged loss (m ³ /year)
All	F	Douglas-fir beetle	1,387
All	F	Fir engraver beetle	44
All	All	Fire	2,341
All	All	Flooding	801
All	Sx/Se	Spruce bark beetle	7,781
All	PI	Western pine beetle	5
All	All	Wind throw/snow press	32
All	BI	Western balsam bark beetle	2,420
Total Annual Loss (m³/year)			14,811

Wind throw/snow press estimates have not been updated since 2005.

All other NRL estimates are based on 10-year average loss derived from data provided by FAIB.

Source: Invermere Timber Supply Area Timber Supply Review, Updated Data Package May 2016

5.4.5 Invasive Plants

Invasive plants pose a significant danger to biodiversity and threaten environmental, social and economic values. Potential impacts of climate change on forests include the increase in opportunities for invasive species, resulting in reduction to quality wildlife habitat, agriculture and grazing opportunities, as well as the reduction to the productive land base. It is important that forestry operations do not increase the occurrence of invasive plants.

Invasive species are increasing in prevalence in the TSA and continued investments in control are recommended. Some control measures could increase the use of pesticides. Plant population levels are still within reason of being controlled but could soon become endemic to the TSA. This issue and recommendation was developed through a review of a number of strategic planning documents relevant to Invermere TSA.

Source: A Guide for Investment Planning in the Invermere Timber Supply Area, 2006

Licensees manage for invasive plant species under their Forest Stewardship Plans (FSP). Specifically the Forest Planning and Practices Regulation (FPPR) S.17 is to prevent the introduction or spread of invasive plants as a result of forest practices. Licensees identify the areas of operations, as well as, provide the measures taken.

5.5 Operability Criteria

Many site factors play a role in determining the economic feasibility or operability of any stand. These criteria can include: timber value, species, volume, piece size, slopes requiring cable logging, and haul distances. The Timber Operability line for the TSA was reviewed and adjusted in 2004 to better reflect current practices and stand merchantability.

5.5.1 Minimum Harvest Criteria

Minimum harvest criteria are key assumptions used to define the timber supply and quality for a management unit and is often a source of debate when comparing past harvesting performance with future opportunities. The stand operability criteria applied in the ongoing TSR for the Invermere TSA are shown in Table 10.

Table 10 Stand operability criteria used in the ongoing TSR for the Invermere TSA

Leading Species	Minimum Volume	Minimum Age	Slope
Pine	150 m ³ /ha @ 120 yrs	60	<40%
	200 m ³ /ha @ 120 yrs	60	40% to 70%
Douglas-fir	100 m ³ /ha @ 150 yrs	80	<40%
	150 m ³ /ha @ 150 yrs	80	40% to 70%
All other	<182 m ³ /ha	80	All

Note: more detailed specifications were developed for open range, open forest and problem forest

Source: Invermere Timber Supply Area Timber Supply Review, Updated Data Package May 2016

5.5.2 Steep Slopes

Inoperable areas are not available for timber harvesting due to physical limitations or unsuitable economics related to steep slopes, road access, or yarding distance. As mentioned in section 5.3.3, the current TSR imposed a constraint of 50% on stands within the THLB from slopes greater than 40% based on harvest performance over the last 10 years. This constraint reduces the short-term harvest level by 17%.

Table 11 Description of Inoperable Areas

	Description	Class	Reduction (%)
Slope	<40% (ground skidding)	1	0
Slope	40% to 70% (cable yarding)	2	50
Slope	> 70% - inoperable	3	100
Operability		I,N	100

Note: Sensitivity analyses will examine the impact of assuming 100% and 0% reduction applied to Class 2.

Source: Invermere Timber Supply Area Timber Supply Review, Public Discussion Paper, September 2016

6 Timber Quality

High quality logs are a product of long growing periods in naturally grown stands forming consistently sized and straight logs yielding lumber with tight annual growth rings and small branches. Silviculture strategies are typically focused on exploring ways to maintain a desirable profile of products throughout the mid- and long-terms. Various treatment options are considered to manipulate species composition, stand densities, and minimum harvest criteria to influence wood properties such as specific gravity, knot sizes, fiber length, and stiffness. Since strategies to improve timber quality usually involve some compromise to timber quantity, an appropriate balance of these two opposed drivers is required.

Invermere Type 1 Silviculture Strategy (1999), had a working target to maintain the production of premium quality logs at or above 10% total harvest. The effects of silviculture on the future quality of timber are not analysed in TSR. The timber quality forecast suggested that the premium log content in the mid and long term harvest would most likely be significantly lower than today's (1999) level. A number of strategies that have potential to increase timber quality were presented but these are considered out of date at this time.

Harvesting of some stands are within the NDT4 occurs when market conditions for pulp and rig mat products increases. Problem forest types are typically not utilized.

7 Fish and Wildlife Habitat

In considering habitat supply, it is important to identify the environmental values potentially at risk from harvesting, roads, and forest health impacts.

7.1 Categories of Species and Orders Under FRPA

Under Section 13 of the GAR, the Minister responsible for the *Wildlife Act* may establish, by order, one or more categories identifying species of wildlife as: species at risk, regionally important wildlife, or ungulate species. Orders under the GAR S.9 to S.13 establish Wildlife Habitat Areas (WHA), Ungulate Winter Range (UWR), and General Wildlife Measures (GWM) for specific species.

7.1.1 Species at Risk

Species at risk, as defined by the Federal *Species at Risk Act* means an extirpated, endangered or threatened species or a species of special concern.

In BC, the Ministry of Environment utilizes their red and blue list system:

- Red listed ecological communities, species and subspecies are those that are extirpated, endangered or threatened in BC.
- Blue listed ecological communities, and indigenous species and subspecies are those of special concern in BC.

On May 3, 2004 the Ministry of Water, Land and Air Protection established a category of species at risk by order made under the GAR of the FRPA. The category represents species that may be affected by forest or range management, considered endangered, threatened or vulnerable, and also includes regionally important wildlife that rely on habitats not otherwise protected by FRPA. The order was amended in 2005 and 2006 to add species to category of species at risk.

There are currently a total of 223 species at risk within the Cranbrook and Invermere TSAs (Table 12). 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.

Table 12 Number of Species at Risk listed in the Cranbrook and Invermere TSAs

Animals	Habitat Types		Plants	Habitat Types	
	All	Forested		All	Forested
Fish	4		Moss	25	1
Amphibians	4	3	Ferns/Quillworts/Moonworts	4	1
Birds	26	13	Conifers	2	2
Molluscs/Gastropods	16	8	Monocots	20	4
Reptiles	3	1	Dicots	82	23
Insects	23	10			
Mammals	15	11			
Total	91	46	Total	133	31

Source: BC Species and Ecosystems Explorer, December 2016

7.1.2 Regionally Important wildlife

Under section 13(2) of the GAR the minister responsible for the *Wildlife Act* by order may establish categories identifying species of wildlife as regionally important wildlife. These species are considered important to a region of BC, rely of habitat that are not currently protected under FRPA and may be adversely impacted by forest or range practices. While there are currently no orders establishing the list of regionally important wildlife (under Sec 13(2) of FRPA) anywhere in the province, this work is ongoing.

7.1.3 Ungulate Species

Under section 13(3) of the GAR the minister responsible for the *Wildlife Act* by order may establish categories identifying ungulate species for which an UWR is required for the winter survival of the identified species. On May 3, 2004 the Ministry of Water, Land and Air Protection established a category of ungulate species by order. Currently there are 8 ungulate species included in this category. The following 7 ungulate species occur within the Invermere TSA: white-tailed deer, mule deer, moose, elk, bighorn sheep, mountain goat and woodland caribou.

7.1.4 Wildlife Habitat Areas

Wildlife Habitat Areas (WHA) are currently established under FRPA for a category of *Species at Risk* or *Regionally Important Wildlife*, also referred to as *Identified Wildlife Species*. WHAs are mapped areas aimed to conserve those habitats considered most limiting to a given identified wildlife species. They designate critical habitat where forest and range activities are managed to limit their impact on the intended species. Required harvest practices and constraints are described for each WHA as General Wildlife Measures (GWM), established by ministerial order. A total of 18 approved and one proposed WHA are located within the Invermere TSA, totalling 1,219 hectares (Table 13).

Table 13 Wildlife Habitat Areas within the Invermere TSA

Status	Species	# WHAs	GAR Order Number	Area (ha)
Approved	Antelope-brush/bluebunch wheatgrass	1	4-117	98
	Badger	3	4-102, 4-103, 4-106	105
	Flammulated Owl	5	4-081, 4-082, 4-083, 4-084, 4-085	136
	Lewis's Woodpecker	3	4-002, 4-134, 4-135	352
	Long-billed Curlew	6	4-065, 4-066, 4-067, 4-068, 4-069, 4-070	339
Proposed	Badger	1	4-146	189
Draft	None			
Total WHAs		19		1219

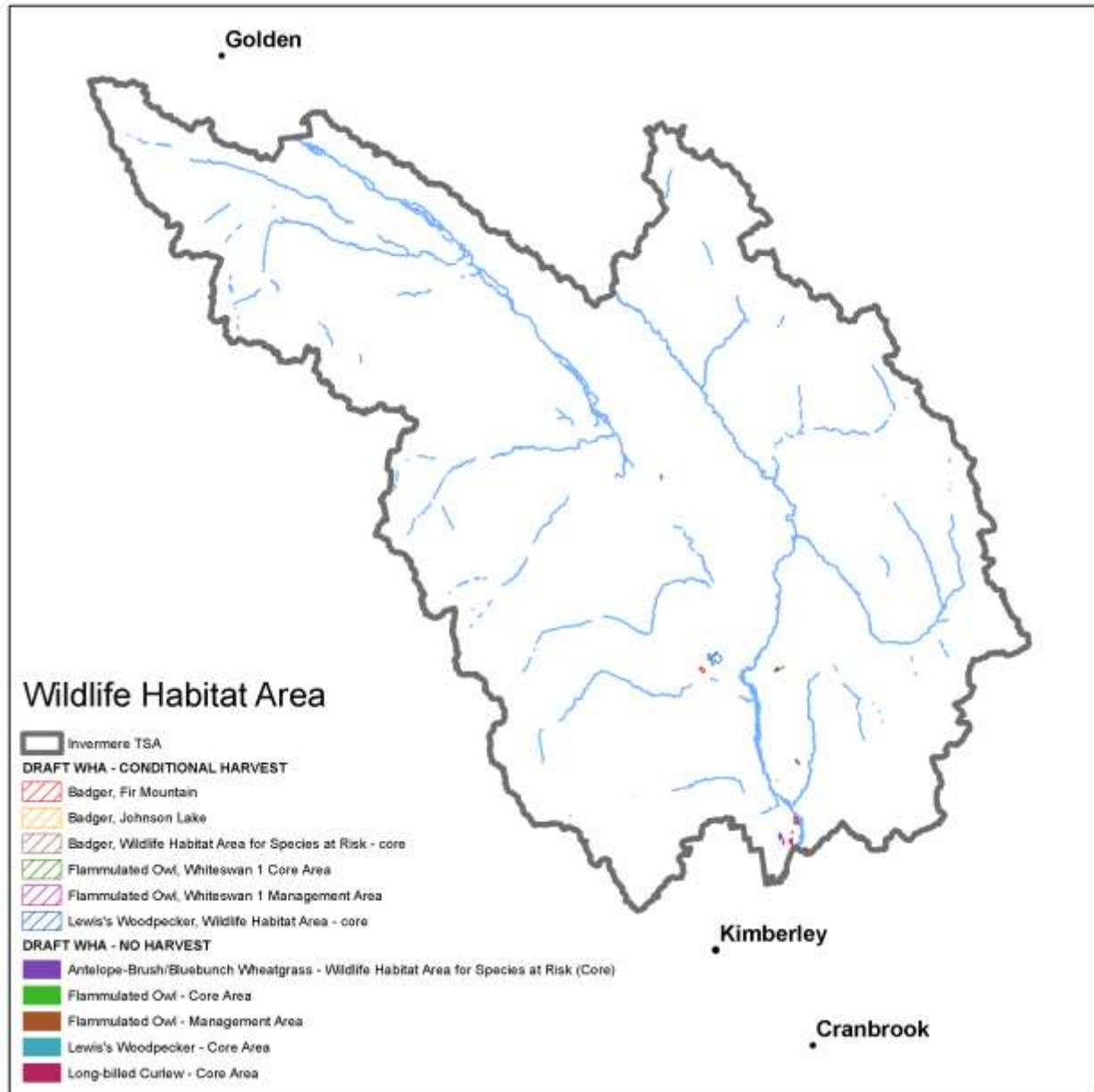


Figure 18 Wildlife Habitat Areas

Under FRPA, Section 7 notices are being used as an interim measure to manage for identified wildlife species without a legal order in place. Over time, WHAs are to be implemented within budgeted THLB impact levels and replace Section 7 notices. Projects to support the establishment of WHA's will be beneficial to non-timber values and will provide more certainty/clarity to forest planners attempting to establish harvest units on the landbase that are consistent with their FSP commitments.

Source: Forsite, Investment Report, 2006

7.1.5 Ungulate Winter Range

UWR are established under the FRPA as areas that contain habitat necessary to meet the winter requirements (i.e. mature forest cover, snow interception cover and early seral stage limits) for an

ungulate species and have corresponding General Wildlife Measures/or Objectives that provide legal management direction.

Timber supply impact assessments are based on the spatial overlap of the UWR units with the THLB and associated management direction in the General Wildlife Measures – it is policy that the THLB budget and resultant impacts of UWRs are calculated during Timber Supply Review.

[Section 9](#) and [Section 12](#) of the [Government Actions Regulation \(GAR\)](#) of the FRPA outline the regulatory authority for establishing UWRs. FLNRO may legislate GWMs to allow the UWR areas to be managed to maintain the winter habitat conditions needed by these animals.

GWMs specify the activities permitted within UWRs and may apply to mineral exploration activities if timber cutting or road-building is required. Oil and gas activities that may occur within UWRs are managed separately under the Oil and Gas Activities Act. While GWMs will restrict logging to some degree, they should not affect First Nation traditional activities such as hunting, trapping, or berry or plant collecting.

There are currently three UWR GAR Orders established within the Invermere TSA (Table 14). FLNRO is currently proposing an amendment that aims to consolidate existing UWR orders within the Invermere, Cranbrook, and Golden TSAs.

Table 14 *Ungulate Winter Ranges within the Invermere TSA*

Status	Species	# UWRs	GAR Order Number	Area (ha)
Approved	White-tailed Deer, Mule Deer, Moose, Elk, Bighorn Sheep, Mountain Goat	1	4-008	218,840
	Mountain caribou	1	4-013	67,406
	Mountain caribou	1	4-014	253,165
Proposed	None			
Draft	None			
<i>Total UWRs</i>		3		539,411

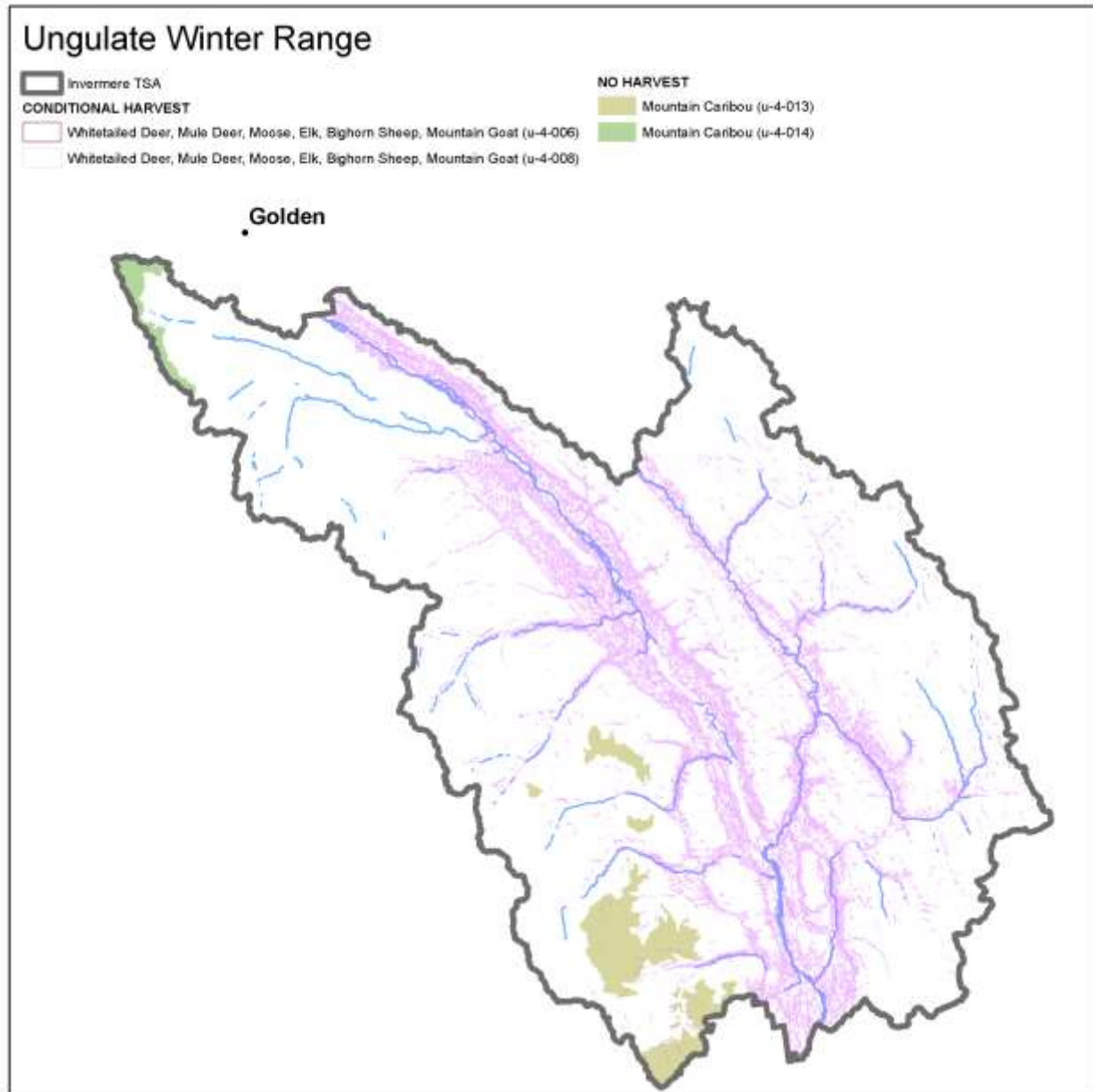


Figure 19 *Approved Ungulate Winter Ranges*

7.2 Species Information

Licensees manage for wildlife, other than those specified above, under their FSPs. Specifically the FPPR (S.7) objective set by government for wildlife is to conserve sufficient wildlife habitat in terms of area, distribution of areas and attributes of those areas of primary forest activities. Licensees provide their intended results and/or strategies that apply to primary forest activities for all the areas they operate.

Table 15 through Table 20 provide the listed species present in the Cranbrook and Invermere TSAs, as well it lists management strategies and/or legal requirements.

7.2.1 Mammals

Table 15 Mammals Species of Management Concern – Cranbrook and Invermere TSAs

Species	Conservation Status (SARA; BC CDC)	Present in East Kootenay and Location
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
Wolverine	Recommended Special Concern; Blue-listed	Confirmed
Marten	Not assessed; Yellow-listed	Confirmed widespread
Fisher	Not assessed; Blue-listed	Extirpated then re-introduced. Occasional sightings and trapping, mainly along Lost Dog, Ward, Bloom, Gold Cr.
Grizzly Bear	Recommended Special Concern; Blue-listed	Confirmed
Least Chipmunk, Oreocetes subspecies	Not assessed; Blue-listed	Confirmed
Least Chipmunk, Selkirk subspecies	Not assessed; Red Red-listed	Confirmed – Paradise Mine
Red-tailed Chipmunk, ruficaudus subspecies	Not assessed; Red-listed. Also endemic species to BC.	Confirmed on east side of Flathead valley from US border north to Middle Pass
Southern red-backed vole, galei subspecies	Not assessed, Blue-listed; Taxon questioned (G5TNRQ)	Confirmed, unknown locations, based on unknown studies. Sub-species designation not-confirmed.
Caribou Southern Mountain Population (S. Purcells, C. Selkirks)	Threatened (recommended Endangered by COSEWIC 2014); Red-listed	Confirmed
Mountain Goat	Not assessed; Blue-listed. BC has high responsibility for this species globally.	Confirmed
Bighorn Sheep	Not assessed; Blue-listed	Confirmed
Elk, Moose and Mule Deer	Species of regional importance	Confirmed

Source: Canfor SFMP, 2016

7.2.2 Fish

Table 16 Fish Species of Management Concern – Cranbrook and Invermere TSAs

Species	Conservation Status (SARA; BC CDC)	Present in East Kootenay and Location
Westslope Cutthroat Trout, lewisi subspecies	Special Concern; Blue-listed	Confirmed-Widespread
Bull Trout	Special concern; Blue-listed	Confirmed-Widespread
Rocky Mountain Sculpin, Cottus species	Special Concern; Blue-listed	Flathead drainage
White Sturgeon – Kootenay River Population	Endangered; Red-listed	In Kootenay River mainstem, including Kooacanusa
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).

Species	Conservation Status (SARA; BC CDC)	Present in East Kootenay and Location
Kokanee	Not listed or assessed, but a species of regional importance	Confirmed, Koocanusa and Kootenay and tribs for spawning

Source: Canfor SFMP, 2016

7.2.3 Birds

Table 17 Bird Species of Management Concern – Cranbrook and Invermere TSAs

Species	Conservation Status (SARA; BC CDC)	Present in East Kootenay and Location
Long billed Curlew	Special Concern; Blue-listed	Confirmed breeding from several locations
Western Screech Owl, macfarlani subspecies	Endangered (recommended threatened in 2012); Red-listed	Confirmed – systematic surveys
Flammulated Owl	Special Concern; Blue-listed	Confirmed – systematic surveys
Lewis's Woodpecker	Threatened; blue-listed	Confirmed - systematic surveys
Williamson's Sapsucker	Endangered; blue-listed	Confirmed; roughly 50 nest sites found in the East Kootenay to date
Great Blue Heron, Herodias subspecies	Not assessed; Blue-listed	Confirmed
Pileated Woodpecker	Yellow-listed (BC)	Confirmed
Olive-sided Flycatcher	Threatened; Blue-listed, rare (IUCN)	Confirmed; widespread
Common Nighthawk	Threatened; Yellow-listed	Confirmed from public sightings – no systematic surveys.
Northern Goshawk	Sensitive to forestry practices, Regional concern; BC – yellow	
Prairie Falcon	Not at Risk; Red-listed	Confirmed sightings in breeding season
Peregrine Falcon, anatum ssp.	Special Concern; Red-listed	Confirmed breeding sites in EK
Short-eared Owl	Special Concern; Blue-listed	Sighting at Bummers Flats. Could not be confirmed during systematic surveys in 2003.
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.
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 agricultural fields
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
American Bittern	Not assessed; Blue-listed	Confirmed. All areas with > 1-2 pairs are within Wildlife Management Areas.

Source: Canfor SFMP, 2016

7.2.4 Amphibian & Reptile Species

Table 18 Amphibian & Reptile Species of Management Concern – Cranbrook and Invermere TSAs

Species	Conservation Status (SARA; BC CDC)	Present in East Kootenay and Location
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)

Species	Conservation Status (SARA; BC CDC)	Present in East Kootenay and Location
Northern Leopard Frog	Endangered; Red	Was extirpated; reintroduced to Bummers 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

Source: Canfor SFMP, 2016

7.2.5 Invertebrates Species

Table 19 Invertebrates Species of Management Concern – Cranbrook and Invermere TSAs

Species	Conservation Status (SARA; BC CDC)	Present in East Kootenay and Location
Gillette's Checkerspot	Not assessed; Red-listed (BC)	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)

Source: Canfor SFMP, 2016

7.2.6 Plant Species

Table 20 Plant Species of Management Concern – Cranbrook and Invermere TSAs

Species	Conservation Status (SARA; BC CDC)	Present in East Kootenay and Location
Antelope-Brush / Bluebunch Wheatgrass		
Douglas-fir / Snowberry / Balsamroot		
Whitebark Pine	Endangered; Red-listed (BC)	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

Source: Canfor SFMP, 2016

8 Biodiversity

Biodiversity at the landscape-level is primarily managed through the retention of mature plus old- and old-seral forest categorized as OGMAs, whereas, wildlife tree retention (WTR) is one of the primary methods of addressing stand-level biodiversity objectives. Areas outside of the THLB also play a key role in maintaining biodiversity.

Licensees manage for landscape-level biodiversity under their FSPs. Specifically the FPPR (S.9) objective set by government for wildlife and landscape-level biodiversity is to design areas for timber harvesting to resemble, both spatially and temporally, the patterns of natural disturbance. Licensees identify the landscape units within which they operate, as well as provide the intended results and/or strategies that apply to primary forest activities for those areas. Included in those, the licensees is required to identify recruitment strategies to achieve the targets consistent with the requirements of Objective 2 of KBHLP Order.

8.1 Landscape-level Retention

Landscape-level biodiversity is primarily addressed through the KBHLP Order that assigns Biodiversity Emphasis Options to landscape units; each with specific old and mature retention targets. Biodiversity Emphasis Options are assigned as low, moderate, or high for each Landscape Unit. Each option has a different level of biodiversity and a different risk of losing elements of biodiversity. For example, 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 still managed. Many of the units ranked high contain habitat for species-at-risk such as those listed in Section 7. Further, Biodiversity Emphasis Options ranked as 'high' require both old and mature forests to be retained to account for recruitment.

The KBHLP Order establishes non-spatial objectives for Old and Mature Forests (Objective 2). OGMAs and Mature Management Areas (MMA) have since been delineated but are not legally established. These non-legal OGMAs identify areas to retain even if their size and location is modified in the future. Accordingly, they are excluded from the THLB to meet seral stage objectives for old forest.

Table 21 KBHLO Landscape-Level Biodiversity Objectives – Old & Old+Mature Seral Requirements

BEC sub-zone	NDT	Mature age (yrs)	Old Age (yrs)	Mature + Old Seral Requirements			Old Seral Requirements				
				Low	Inter	High	Low 1 st Rot	Low 2 nd Rot	Low 3 rd Rot	Inter	High
ESSFwm/wmu	2	>120	>250	14%	28%	42%	3.0%	6.0%	9%	9%	13%
ESSFdk/dku	3	>120	>140	14%	23%	34%	4.7%	9.3%	14%	14%	21%
ESSFdm/dmu											
ICHdm/mk1	3	>100	>140	14%	23%	34%	4.7%	9.3%	14%	14%	21%
IDFdm2	4	>100	>250	17%	34%	51%	4.3%	8.7%	13%	13%	19%
MSdk	3	>100	>140	14%	26%	39%	4.7%	9.3%	14%	14%	21%
PPdh2	4	>100	>250	17%	34%	51%	4.3%	8.7%	13%	13%	19%

Source: Invermere Timber Supply Area Timber Supply Review, Updated Data Package May 2016

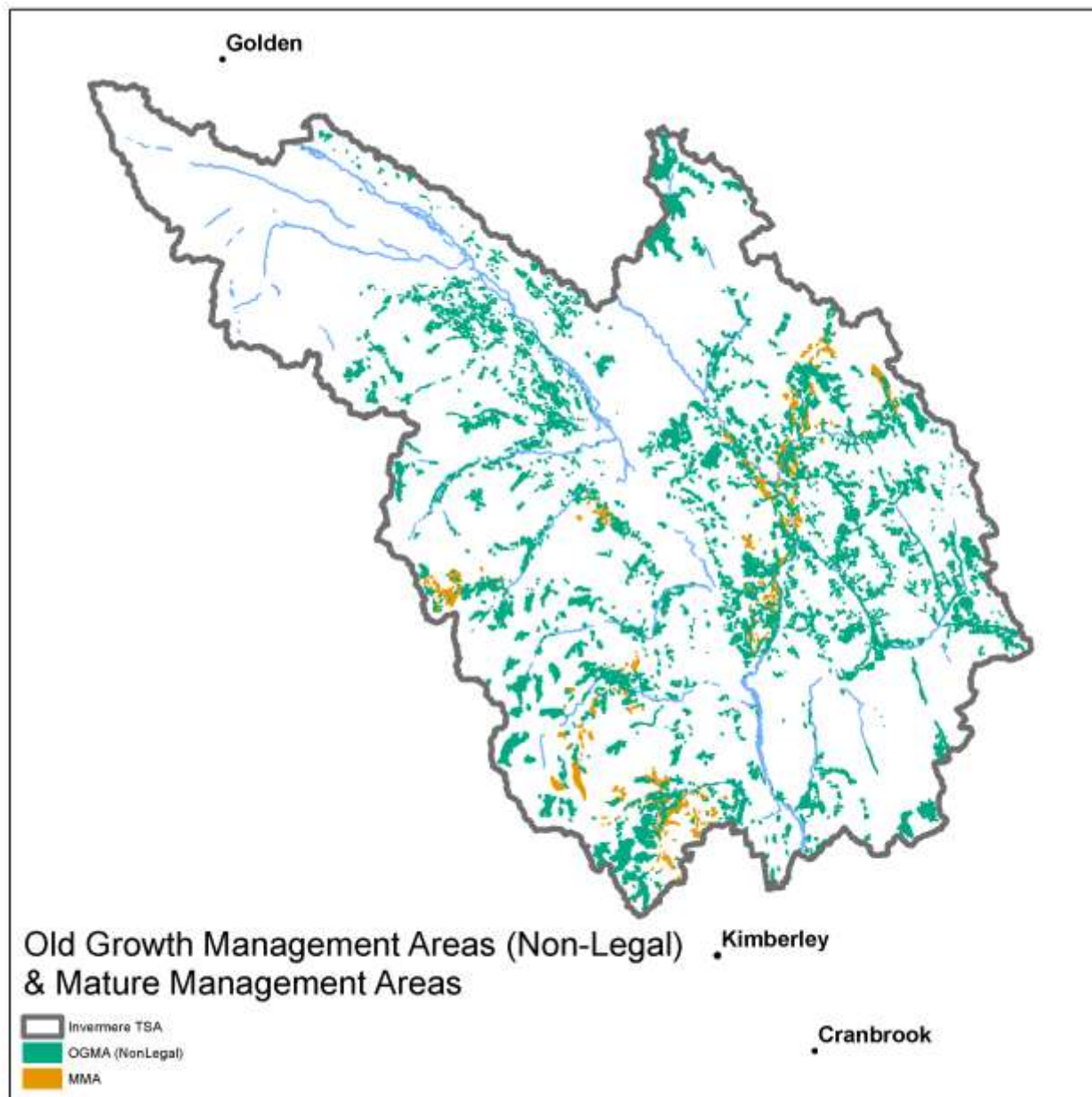


Figure 20 Old Growth Management Areas & Mature Management Areas

Source: Non-legal OGMA (https://catalogue.data.gov.bc.ca/dataset/old-growth-management-areas-non-legal-current)

Source: MMA – Kootenay Boundary Land Use Plan Implementation Strategy

The KBHLP Order (Sections 1 and 2) requires that landscape-level biodiversity be maintained by meeting or exceeding mature-plus-old and old forest objectives for each landscape unit (Table 21). These units are defined by the natural disturbance type (NDT) and biogeoclimatic ecosystem classification (BEC) subunit. It should be noted that disturbance in stands outside of the THLB contribute to the achievement of forest cover requirements and thereby affect the timber supply availability of stands within the THLB.

On low biodiversity emphasis areas, the KBHLP Order allows for 'old' requirements to be reduced to one-third; the full target for old forests must be met by the end of the third rotation.

8.2 Stand-Level Retention

One of the primary methods of addressing stand-level biodiversity objectives in managed stands (i.e. cutblocks) is by means of wildlife tree retention for both live and dead trees (snags). Wherever possible, retention patches should be anchored around ecological features (for wildlife and biodiversity) in consideration of timber impacts. WTRs could come from the non-contributing forest land base (i.e. riparian reserves, inoperable areas, unstable terrain, OGMA's, Whitebark pine leading stands, broadleaf trees/mixedwood patches, non-forested ecosystems, etc.) and thereby meet other functional needs such as visual management, archaeological sites, rare ecosystem protection, avalanche buffers, etc. Conversely, WTRs at high elevations and/or on steep slopes typically have lower ecological values than WTRs at lower elevations or on gentler slopes. In addition, WTRs, including deciduous, stub snags, contribute to future biodiversity through recruitment of coarse woody debris.

The MRVA (section 2.8) shows stand level biodiversity through retention has declined since the Forest Practices Code era. Within the MRVA report the Rocky Mountain District Manager's commentary addressed this for the Invermere TSA:

"Stand level biodiversity assessments show a declining trend as more blocks harvested post 2005 than pre 2005 have very low retention. If the decline was a short term effort to mitigate the very high levels of retention that were left in the mid to late 1990's, this may not be of great concern. However, I caution licensees to pay attention to retention quantity and quality by leaving at least low levels of retention on every block and leaving large trees for the site in densities similar to pre-harvest conditions. Licensees are also reminded of the value of coarse woody debris for habitat and soil stability functions."

While addressing stand-level biodiversity, WTR also represents a downward pressure on timber supply in those cases where there is no plan for a subsequent harvest entry, which can also result in an impact on the growth and yield of the next crop.

The 2016 Invermere TSR Data Package uses the FREP study data to develop a TSA-wide estimate of 'unconstrained' stand-level retention. FREP results indicate an average retention of 16.8% in the Invermere TSA. Of the total retention, an average of 6% was classed as 'unconstrained' (i.e., not related to riparian, visuals, OGMA's, or recreation, which also have specific netdowns applied to the THLB, in the analysis). This unconstrained or net value was applied as a best estimate of non-duplicated constraint netdown.

WTR objectives are set in the FPPR S.9.1 as 7% of the total area of cutblocks harvested and a minimum of 3.5% for each cutblock. Stand-level biodiversity requirements, which are achieved through WTRs, are described as strategies in the FSPs of major licensees and BCTS, that set out WTR targets by landscape unit and BEC variant.

8.3 Landscape Connectivity

The KBHLP Order gives legal status to Connectivity Corridors (Objective 5), as well as Biodiversity Emphasis Options with specific Old and Mature Retention targets, which provide for connectivity. In addition, within the Invermere TSA the Grizzly Bear GAR (#4-180) requires connectivity⁵ to be addressed. 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.

⁵ NOTE: Grizzly Bear mapping was not available at the time the OGMA's were selected in 2006/7

In some areas, stand structures that serve to connect habitats across a landscape have been adversely affected by: salvaging (fires or forest health), extensive harvesting in watersheds, limited retention, and large scale fires. The loss of landscape connectivity can cause disproportionate impacts to species at risk confined to isolated pockets of suitable habitat. Connectivity is provided through various mechanisms including strategies that prescribe retention for specific resource management zones, young seral forest representation levels, provisions for riparian management, avalanche tracks, OGMA, inoperable and/or unstable terrain. Wildlife habitat requirements for connectivity are currently being considered through caribou migration corridors and WHAs.

Licensees and BCTS manage for connectivity as results or strategies described in their FSPs.

8.4 Coarse Woody Debris

Coarse woody debris plays many critical roles in forested ecosystems and maintaining adequate amounts and sizes will positively impact forest productivity and biodiversity over the long-term.

Licensees and BCTS manage for coarse woody debris as results or strategies described in their FSPs.

The MRVA (section 2.8) shows sampled large coarse woody debris in harvested blocks and retention patches as part of their resource stewardship monitoring for stand-level biodiversity. In general, results indicated that the density (pieces/ha) of large coarse woody debris was much lower on harvested sites compared to natural areas within WTRs. This is an example of using natural forest stands as a baseline for harvested stands. As a long-term goal, FREP suggested that the coarse woody debris in the two places should be equal, with a short-term goal of 20% improvement in the median density of large coarse woody debris on harvested areas.

8.5 Rare, Uncommon & Under-represented Ecosystems

Managing rare, uncommon and under-represented ecosystems 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.*

“... 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). ... actual percent depends on many factors, including how the land outside the protected areas is being managed and the impacts to it."

As part of its FSC certification requirements, Canfor has developed an Ecosystem Representation strategy based on the East Kootenay Conservation Program project. The study area includes both crown and private land in the Rocky Mountain Forest District, plus TFL 14 and a portion of the Golden TSA (Figure 21) and operating areas currently managed by BCTS or Galloway. In total, the East Kootenay Conservation Program area was 3,018,368 ha.

Source: Forsite, 2008

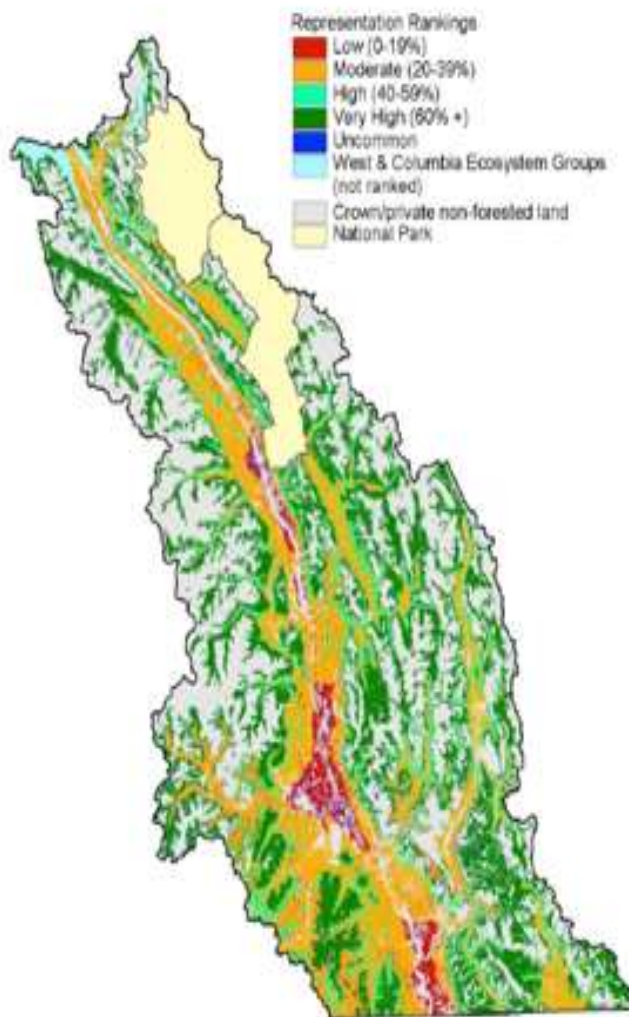


Figure 21 Representation within the East Kootenay Conservation Program Study Area

Source: Canfor SFMP, 2016

The Ecosystem Representation strategy identifies a number of at-risk habitat (eco-groups) that are to be reserved from harvesting (except for required road or trail crossings where no other practicable options exist). These are:

- Rare ecosystem types (Table 22), defined as <1000 hectares in the East Kootenay

Conservation Project,

- Uncommon, small and less represented ecosystem types (Table 23), defined as <2000 hectares in the East Kootenay Conservation Project and < 50% representation within the non-harvesting landbase. (Wells et al, 2004)

Table 22 Rare Ecosystem Groups (< 0.1% and < 2000 hectares in EKCP)

Eco-system Group #	Ecosystem Group Name	Site Series within the Ecosystem Group	Retention	Area (ha) in EKCP	NHLB Target (%)	Actual Percent in NHLB (%)
2	Submesic-mesic IDFun	IDFun-DP	100	949	100	24
5	Mesic IDFun2	IDFun2-FH	100	370	100	37
9	Subhygric IDFun2	IDFun2-SD	100	32	100	30
14	Hygric PPdh2 (fluvial mid-bench riparian)	PPdh2 04	100	1,645	100	26
15	Hygric IDF (fluvial mid-bench riparian)	IDF dm2 07 IDF dm2 XB	50	821	100	35
16	Hygric IDFun (fluvial mid-bench riparian)	IDFun-CD	100	368	100	35
19	Subhygric MS	MSdk 07 IDFdm2A-SB	100	1,542	100	74
24	Subhygric ESSFdm2	ESSFdm2/FS	100	1,750	100	76
30	Hygric ESSFdm1 (fluvial riparian)	ESSFdm1-FH	100	53	100	71

Source: Canfor SFMP, 2016 & Forsite East Kootenay Timber Supply Analysis, 2016

Table 23 Uncommon Ecosystem Groups (< 0.5% or 9000 hectares but > 2000 hectares in EKCP)

Eco-system Group	Ecosystem Group Name	Site Series in Ecosystem Group	Retention	Area (ha) in EKCP	NHLB Target (%)	Actual Percent in NHLB (%)
8	Subhygric PPdh2	PPdh2 03	100	4,402	90	18
10	Subhygric ICH mk1	ICH mk1 06	100	6,702	50	38
13	Subhygric-hygric ICH	ICHdm-XA	100	4,667	86	41
17	Hygric ICH (fluvial mid-bench riparian)	ICH mk1 07 ICH dm-SD	100	6,526	53	56
18	Hygric MS (fluvial mid-bench riparian)	MSdk 06 IDFdm2a-SH	100	8,813	31	52
29	Subhygric ESSFwm	ESSFwm 04	100	2,444	99	62
35	Subhygric upper ESSF (Se, BI)	ESSFdku-FH ESSFdmu1-FH ESSFwmu-WE ESSFdmu2-WE	100	3,611	83	93

Source: Canfor SFMP, 2016 & Forsite East Kootenay Timber Supply Analysis, 2016

9 Other Key Values and Issues

9.1 Climate Change Adaptation

The rate of change in climate over the last 100 years is equivalent to the rate of change of the preceding 1000 years. Rapid change in climate is an overarching pressure on the forests affecting both timber and environmental values (see Table 24 for predicted change by 2080).

Within BC, climate change is expected to include a general increase in temperature, change in precipitation patterns, and an increase in the magnitude, frequency and intensity of extreme weather events. While the trends are generally consistent, the specific magnitude of these changes, and their spatial and temporal distribution, are uncertain.

Based on a standard set of Global Climate Models to the 2080s, the East Kootenay Regional District, which aligns closely with Cranbrook and Invermere TSAs, projects changes in average temperature, precipitation, and derived climate variables as shown in Table 24:

Table 24 Summary of Climate Change for East Kootenay in the 2080s

Climate Variable	Season	Projected Change from 1961-1990 Baseline	
		Ensemble Median	Range (10th to 90th percentile)
Mean Temperature (°C)	Annual	+2.8 °C	+1.8 °C to +4.7 °C
Precipitation (%)	Annual	+5%	+1% to +12%
	Summer	-10%	-27% to +6%
	Winter	+15%	+2% to +25%
Snowfall (%)	Winter	-3%	-15% to +7%
	Spring	-69%	-87% to -20%
Growing Degree Days (degree days)	Annual	+446 degree days	+254 to +803 degree days
Frost-Free Days (days)	Annual	+35 days	+21 to +57 days

The table above shows projected changes in average (mean) temperature, precipitation and several derived climate variables from the baseline historical period (1961-1990) to the **2080s** for the **East Kootenay** region. The ensemble median is a mid-point value, chosen from a PCIC standard set of Global Climate Model (GCM) projections. The range values represent the lowest and highest results within the set.

Table 24 indicates a likelihood of increased temperature in all seasons; increased precipitation in spring, fall and winter, but decreased in summer; moderate reduction in annual snowfall and a large decrease in spring snowfall. More specific trends include:

1. The East Kootenay sub-region has varied terrain with the Rocky Mountain Trench bounded by the north-south trending mountain ranges of the Rockies and Purcells. Owing to the complex topography, sub-regional climate and ecosystems vary considerably over short distances.
2. It is expected that generally, climate envelopes (i.e., geographical extent) will expand for grassland ecosystems and decrease for subalpine/alpine zones (see Figure 22 below).
3. Ecosystems themselves will undergo unpredictable ecological shifts as communities disassemble and reassemble, as species decline, move or adapt.
4. Natural disturbances are expected to increase. It is expected that fires and drought will increase and there will be more frequent and extensive mortality due to bark beetles, defoliators and diseases.

5. It is highly uncertain whether or not tree productivity will increase. Although growth would generally be expected to increase with elevated CO₂ and warmer temperatures, this potential may not be realized because of limited moisture or nutrients and maladaptation to climatic events combined with increased susceptibility to insects and disease.
6. Tree species distribution shifts in response to changing climate are expected to have a large impact on ecosystems and the characteristics and potentially, quantity of timber supply. Generally, species shifts will follow a trend of northward and upward movement.
7. At low to mid elevations, drought resistant and fire tolerant species will likely be favored (Douglas-fir, Ponderosa pine, western larch) although many of these areas could become unsuitable for even these species and become grassland or open forest. Northern movement of Ponderosa pine may be limited by seed source. Potential increase in invasive weeds is a concern.
8. Various model scenarios project shifts from drier ICH or IDF to grassland-steppe envelopes
9. At high elevations, tree mortality is expected to increase due to fire, insects and disease. It is difficult to predict individual tree species response given the wide range of projected bioclimate envelopes for high elevation areas.
10. Results from climate change scenario modelling are more variable for higher elevation (with one outcome showing an upward shift of existing ICH; another trending towards more coastal transition systems and a third, showing a shift to drier Ponderosa pine dominated types).

In addition to the high level of uncertainty about the magnitude, pace and impacts of climate change (especially for the mid to upper elevation areas of the TSA's), there is also uncertainty about the extent to which adaptive responses could reduce potential negative impacts of climate change. For example, Ministry initiatives like Climate-Based Seed Transfer will help to ensure regenerating forests are better adapted to emerging climatic conditions, which could mitigate the negative climate change impacts.

While sensitivity analyses were not undertaken for TSR this does not mean that the importance of climate change is not recognized. It will be important to be aware of the findings of monitoring programs and of ongoing research, and to factor these into future determinations. There is also a need for the development of strategies to guide responses to climate change (e.g., salvage and reforest with better adapted species, or reduce activity to create a buffer).

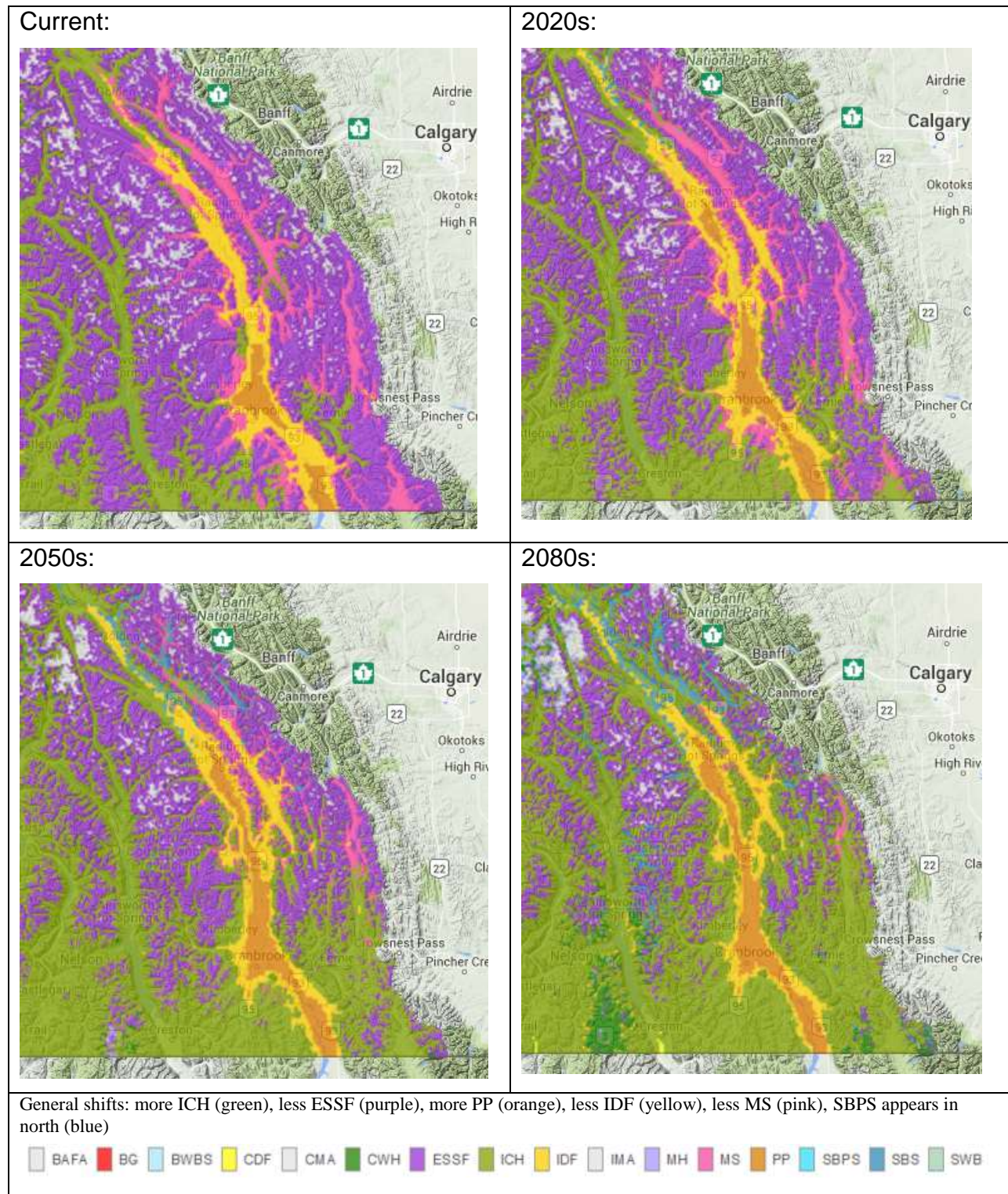


Figure 22 Shifts in BEC zones at periods: current, 2020s, 2050s, and 2080s

9.2 Watershed Health

The TSA also contains significant water resources. Numerous watersheds are classified as either domestic or community watersheds.

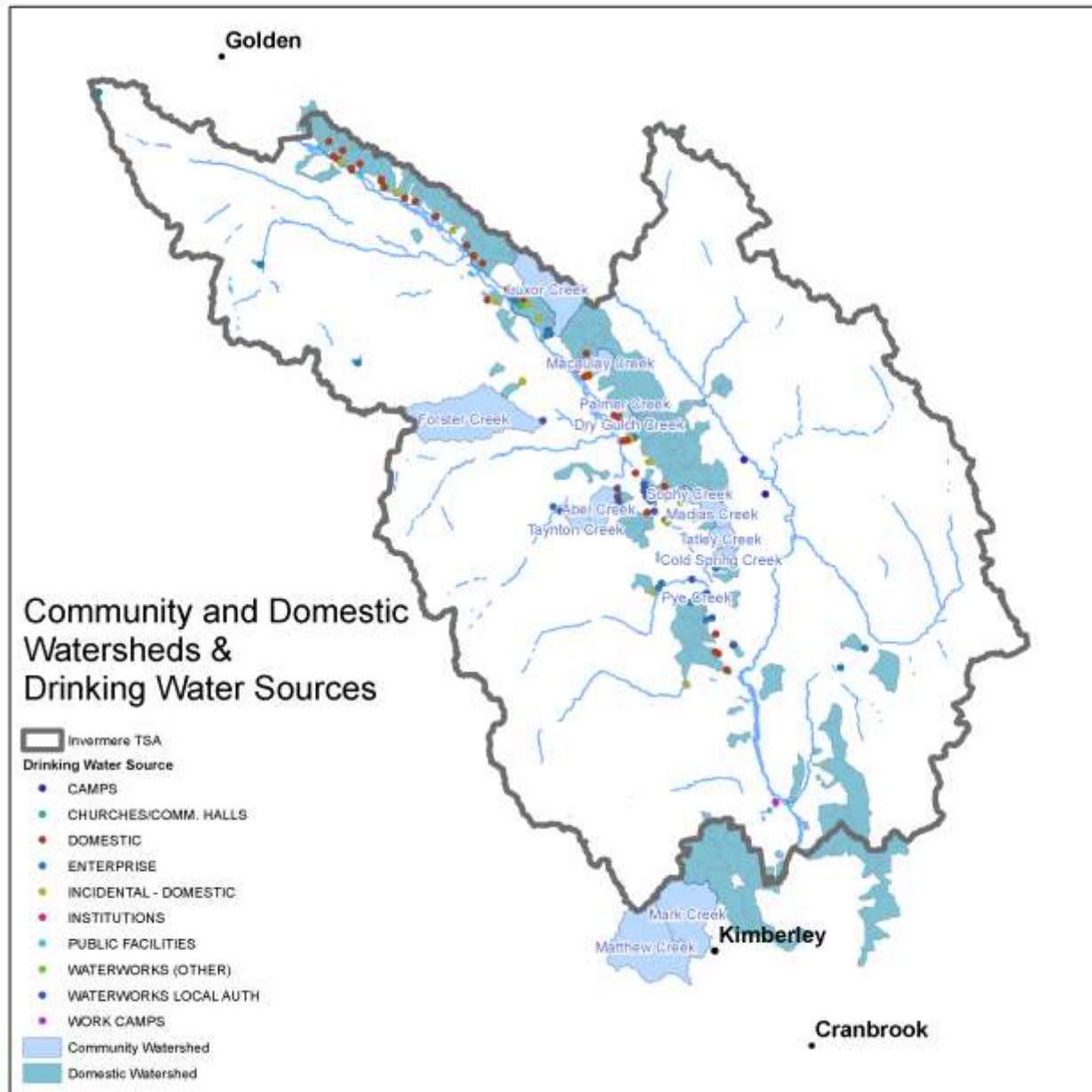


Figure 23 Community & Domestic Watersheds & Drinking Water Sources

Source: CWS / DWS Map

Watershed hydrological processes such as canopy interception, transpiration, soil moisture storage, groundwater levels and recharge, snowfall, snow melt, rain-on-snow effects, runoff and peak flow timing and duration, flood events, stream and stream bank stability, erosion, and sedimentation can be affected by harvesting. Changes in these hydrologic factors can increase the risk on a number of watershed values including aquatic ecosystems, species, and supply of domestic water use. In some cases the potential for hydrologic changes may be, to some degree, estimated by equivalent clear cut areas within specific drainages.

Accelerated rate of harvesting and associated road development poses an increased risk to water quality, as does an increased amount of road. Significant increases in road density and numbers of stream crossings can increase peak flows, sedimentation, and changes in channel morphology. This can

be reduced by accelerating hydrological green-up with an emphasis on maintaining vegetation within riparian ecosystems. This is especially important along fish-bearing streams and wetlands, as well as, within fishery-sensitive watersheds and community watersheds.

The MRVA (section 2.8) assessed: a) riparian management as affected by forest harvesting activities, including blowdown, and b) water quality as affected by road construction and ongoing maintenance. Together these assessments provide some indication of how well watersheds are faring today compared to past practices and also provide a baseline for comparing ongoing and future operations and the impacts of the harvesting. With Trends for both Riparian and Water quality being “insufficient data”, there is need to increase sample size which would provide more accurate results and/or stronger trends. There is room for improvement as acknowledged in the Rocky Mountain District manager’s commentary for Riparian and Water Quality in the MRVA report for the Invermere TSA:

“Riparian assessments potentially assess the cumulative effects of forestry and range practices, natural impacts, and any other past and present industrial uses that may have had impact upstream or within the reaches sampled. The stream reaches sampled to date were rated largely (92%) as having “low” or “very low” impact indicating that forest licensees are doing well in this category. Fine sediments are indicated as the predominant stream health issue and therefore, opportunities for continued improvement include road maintenance to minimize sediment entering streams.

The water quality protocol involves estimating the amount of potential sediment generation and delivery to watercourses as a result of forestry related activities. While the majority of road segments assessed indicate a “very low” and “low” impact, opportunities for continued improvement include road maintenance to minimize sediment entering streams.”

Source: FLNR, Invermere TSA MRVA December 2013

9.2.1 Community Watersheds

A total of 10 community watersheds are present in the Invermere TSA. These watersheds are those that have been continued under Section 180(e) of the FRPA.

Licensees manage for community watersheds under their FSPs. Specifically the FPPR (S.8.2) objective set by government for water quality and quantity objectives within community watersheds is to prevent the cumulative hydrologic effects of primary forest activities. Licensees identify the community watersheds within their operating areas, as well as provide the intended results and/or strategies.

TSR base case in the Invermere TSA will use the equivalent clearcut area within these watersheds to no more than 30% of the area being less than six metres height.

9.2.2 Domestic Watersheds

Under the KBHLP Order, guidance has been given to reduce the impact of forest development on streams licensed for human consumption by applying stream side management provisions to S5 and S6 streams. On each side of the stream, there is a minimum 30 metre streamside management zone. In this zone, specific measures to safeguard water licensed for human consumption must be described. These provisions apply to the segments between the water intake and the upstream point where the stream order is reduced; or if a first-order stream, the entire stream length above the intake.

Domestic watersheds exist in the Invermere TSA. In the past domestic watersheds have not been modelled. However, in the TSR Data Package (May 2106) it is suggested by the Regional Hydrologist to

model domestic watersheds as per community watersheds for this coming TSR. Suggested modeling is to use the equivalent clearcut area to a maximum of 30% forest cover, where forest cover is < 6m.

9.2.3 Fisheries Sensitive Watersheds

To qualify as a Fisheries Sensitive Watershed (FSW) candidate, watersheds must meet two criteria: they must have significant fisheries values and watershed sensitivity. Watersheds which meet the FSW test, and that have been designated by way of an order as an FSW by the Minister, require forest licensees to establish results and strategies in their FSP consistent with the objective(s) set by the Minister. In the Invermere TSA, only one FSW (F-4-001) has been approved (Dec. 2005) (Figure 24).

An FSW order established by the Minister sets out management direction to conserve important watershed level attributes protecting fisheries values. These attributes include the: natural stream bed dynamics; stream channel integrity; quality, quantity and timing of water flow; and natural, watershed level, hydrological conditions and integrity.

The objective for this FSW (Figure 24) is to provide, within the normal forest rotation, special management of the amount, timing and distribution of primary forest activities, in order to:

1. conserve the natural hydrological conditions, natural stream bed dynamics and integrity of stream channels in the FSW,
2. conserve the quality, quantity and timing of water flows required by fish in the FSW, and
3. prevent the cumulative hydrological effects of primary forest activities in the FSW from resulting in a material adverse impact on the fish habitat of the watershed.

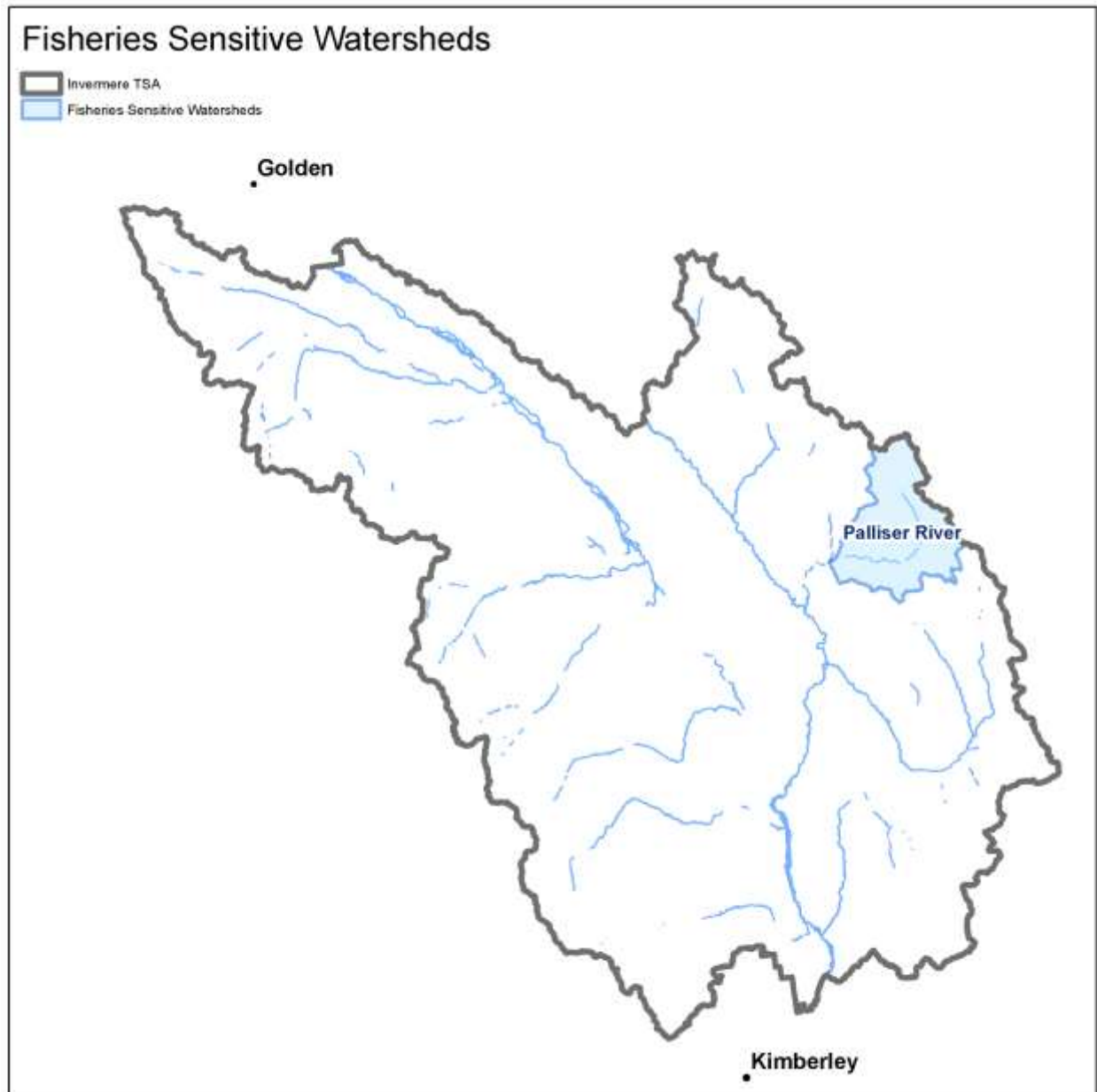


Figure 24 Fisheries Sensitive Watersheds

9.2.4 Riparian Buffers

While the KBHLP Order does not specify riparian area objectives, licensees manage for riparian areas under their FSPs. Specifically the FPPR (S.8) objective set by government to conserve, at the landscape level, water, fish, wildlife and biodiversity within riparian areas. Licensees provide their intended results and/or strategies that apply to primary forest activities for all the areas they operate.

9.3 Visual Quality

Scenic areas and visual quality objectives have been legally established, grand-parented under the FRPA, or, in accordance with the FPPR 9.2, set default objectives for known scenic areas. Specifically the objective set by government is to ensure that the altered forest landscape for the scenic area meets a

specific category (preservation through maximum modification) for the visual sensitivity class (1 – 5). Licensees manage for visuals under their Forest Stewardship Plans. Licensees identify the landscape units within which they operate, as well as provide the intended results and/or strategies that apply to primary forest activities for those areas. Harvesting constraints associated with visual quality objectives are shown in Figure 25.

The District Manager of the Rocky Mountain Natural Resource District established visual quality objectives that also required consideration of *Front-Country Visual Management Guidelines* outlined in the KBLUP Implementation Strategy.

Within the MRVA report the Rocky Mountain District Manager provided the following commentary for the Invermere TSA:

“Visual quality⁶, soils, and timber (stand development monitoring) values have had some monitoring conducted however, inadequate sampling has been done to include in this report. District staff should continue to monitor practices for all values with an emphasis on those related to stand-level biodiversity, visuals and timber.”

⁶ Currently only four Visual Quality samples in the Invermere TSA. Analysis will be completed in subsequent years when more samples are available

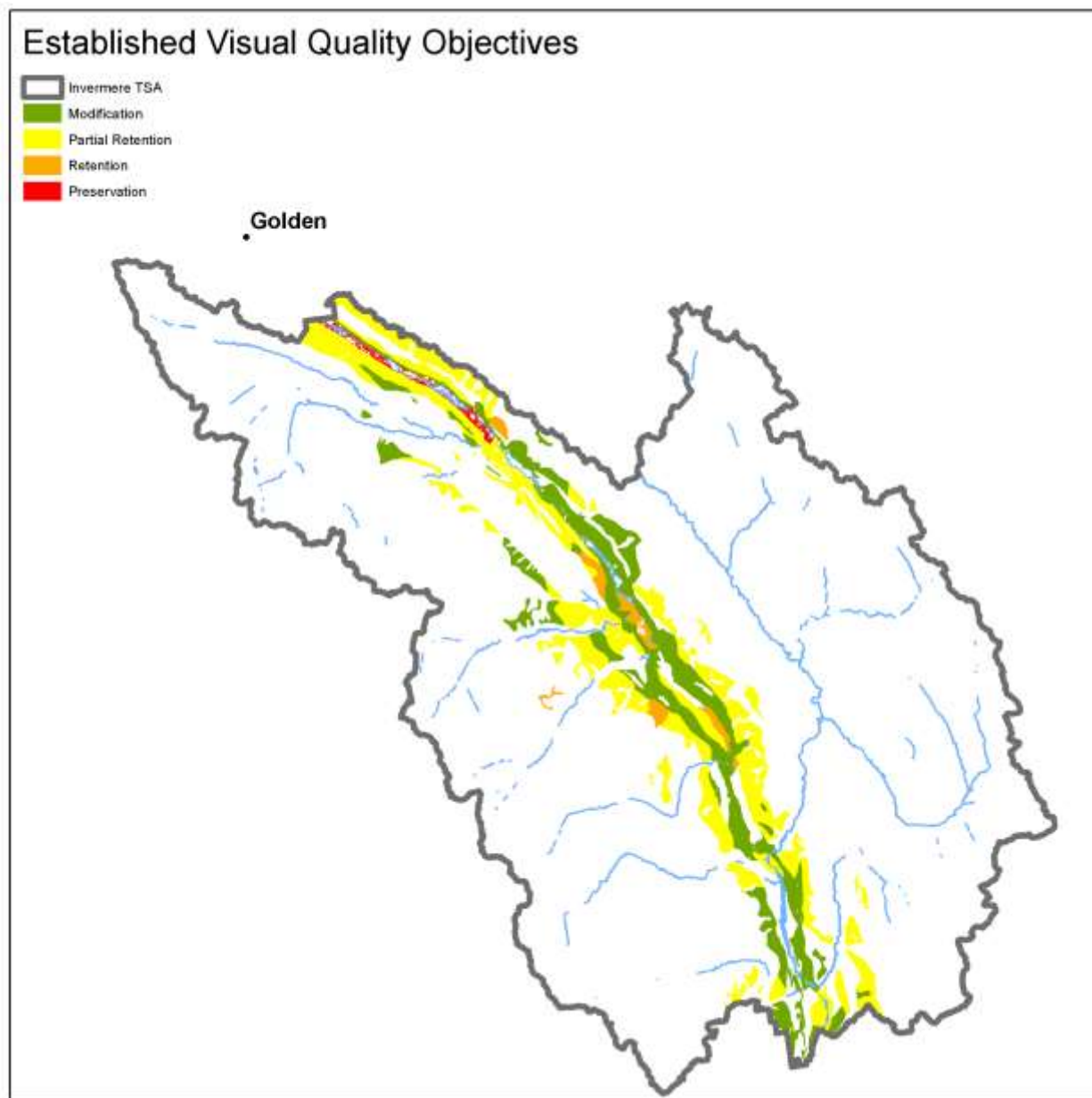


Figure 25 Visual quality objectives

9.4 Recreation Areas

The Invermere TSA offers many and varied opportunities for recreation and tourism, due to its lakes, parks and spectacular mountains. The area provides a wide range of front- and back-country recreational opportunities including mountain biking, hiking, climbing, fishing, camping, wildlife viewing, white-water boating, heli-skiing, snowmobiling, ski mountaineering, cross country skiing, and downhill skiing. The TSA also contains significant water resources.

Source: Invermere Timber Supply Area Timber Supply Analysis, Discussion Paper September 2016

Legal objectives for recreation sites and trails previously established under FPC continue under FRPA. These include designations such as: (i) an interpretive forest site; (ii) recreation site; (iii) recreation trail (Figure 26). Licensees manage for visuals under their Forest Stewardship Plans. Licensees identify the

established recreation site and trails within which they operating areas, as well as provide the intended results and/or strategies that apply to primary forest activities for those areas.

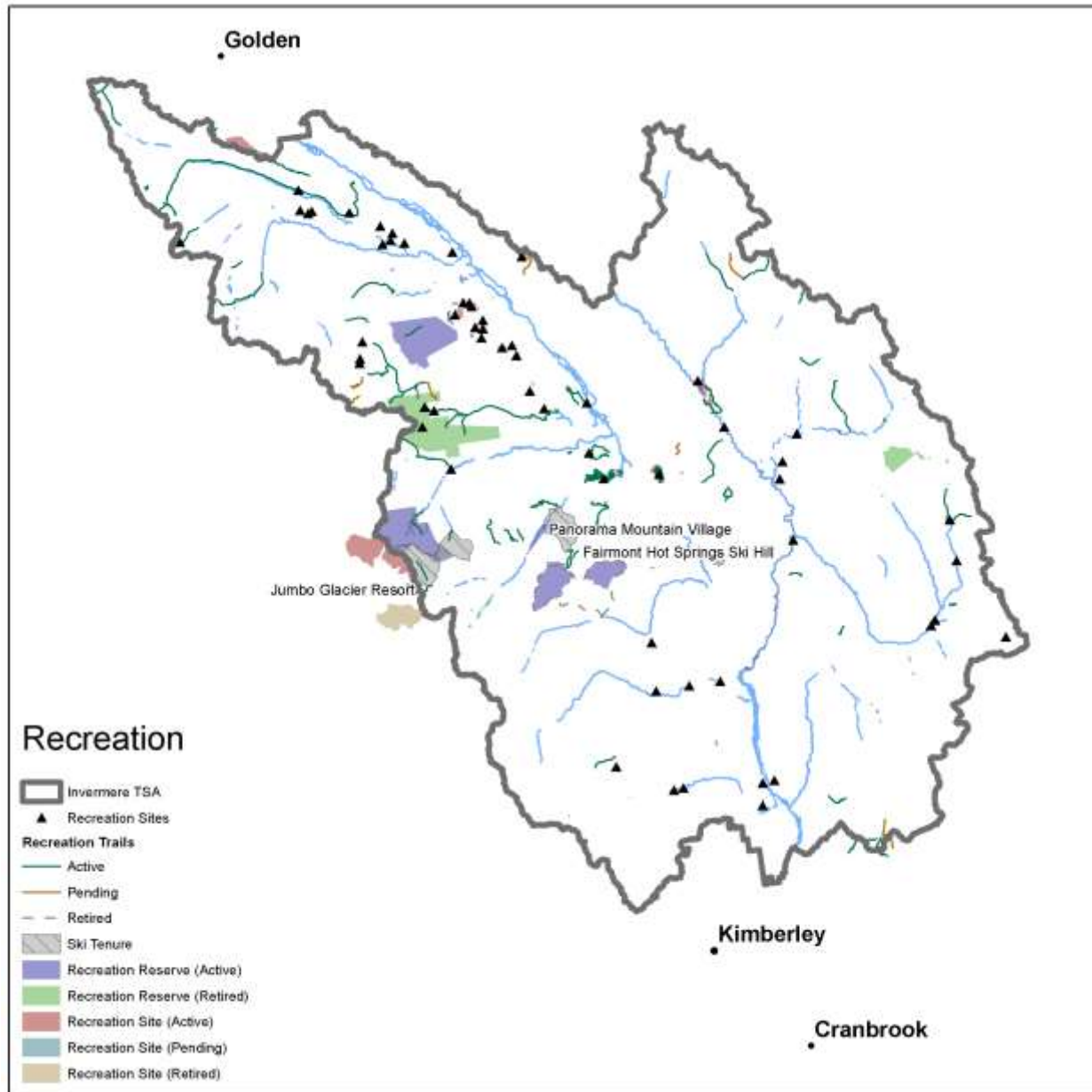


Figure 26 Recreation Map – Invermere TSA

9.5 Range Management

Livestock grazing has a long history in BC; dating back to the 1860s. BC is unique with the relatively small percentage of land that is privately owned. This means that access to provincial Crown land is necessary for both the beef cattle and forest industries. On Crown range, grazing is authorized under the Range Act and regulated by the Forest and Range Practices Act (FRPA). In much of BC, livestock are observed across the landscape with a legal right to be there.

While BC's Crown rangelands provide grazing forage for livestock and wildlife, they also provide multiple values including, but are not limited to: forage, habitat biodiversity, recreation, carbon sequestration, hunting, forestry, First Nations interests.

Sustainable livestock operations depend on healthy plant communities. The District Range Program has focused its efforts on aligning forage supply with forage demands. Over the last two decades, this forage supply balance has been complicated by forest ingrowth and invasive plants that have increased on grasslands, open range, and open forest areas; reducing the available forage and decreasing rangeland health.

9.6 Guide Outfitters and Trappers

In BC, all non-residents are required to be accompanied by a licenced guide while hunting big game (i.e., deer, mountain sheep, mountain goat, moose, caribou, elk, cougar, wolf, grizzly bear, black bear, lynx, bobcat, and wolverine). In 1926, to protect species from over harvesting, the Province was divided into registered trapline areas sold to a trapper so that he/she is the only person with the right to trap furbearing animals inside this area. Both trappers and guide outfitters rely on the maintenance of wilderness, wildlife and fisheries values and concerns has been expressed that salvage operations within areas that were previously untouched may adversely impact wildlife populations and, in the case of guide outfitters, their clients' experience.

Guide outfitting and trapping are growing contributors to the local economy, and important activities for First Nations. Invermere TSA has 56 traplines (Figure 27) and 17 guide outfitter (Figure 28) tenures. Some licensees rely on trapping for a portion of their income, while others participate for recreational or traditional purposes.

Source: Invermere Timber Supply Area Timber Supply Analysis, Discussion Paper September 2016

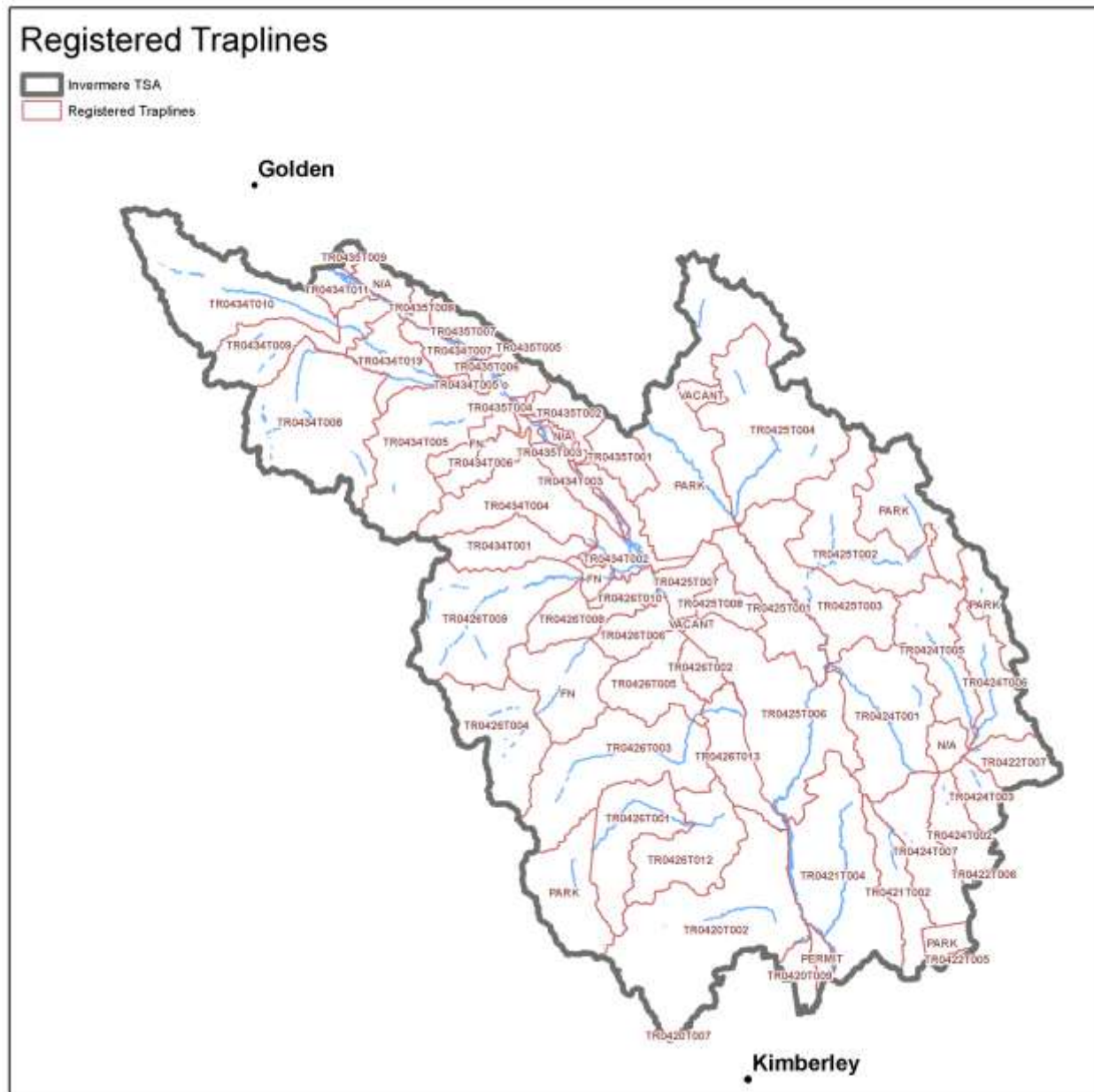


Figure 27 Registered traplines

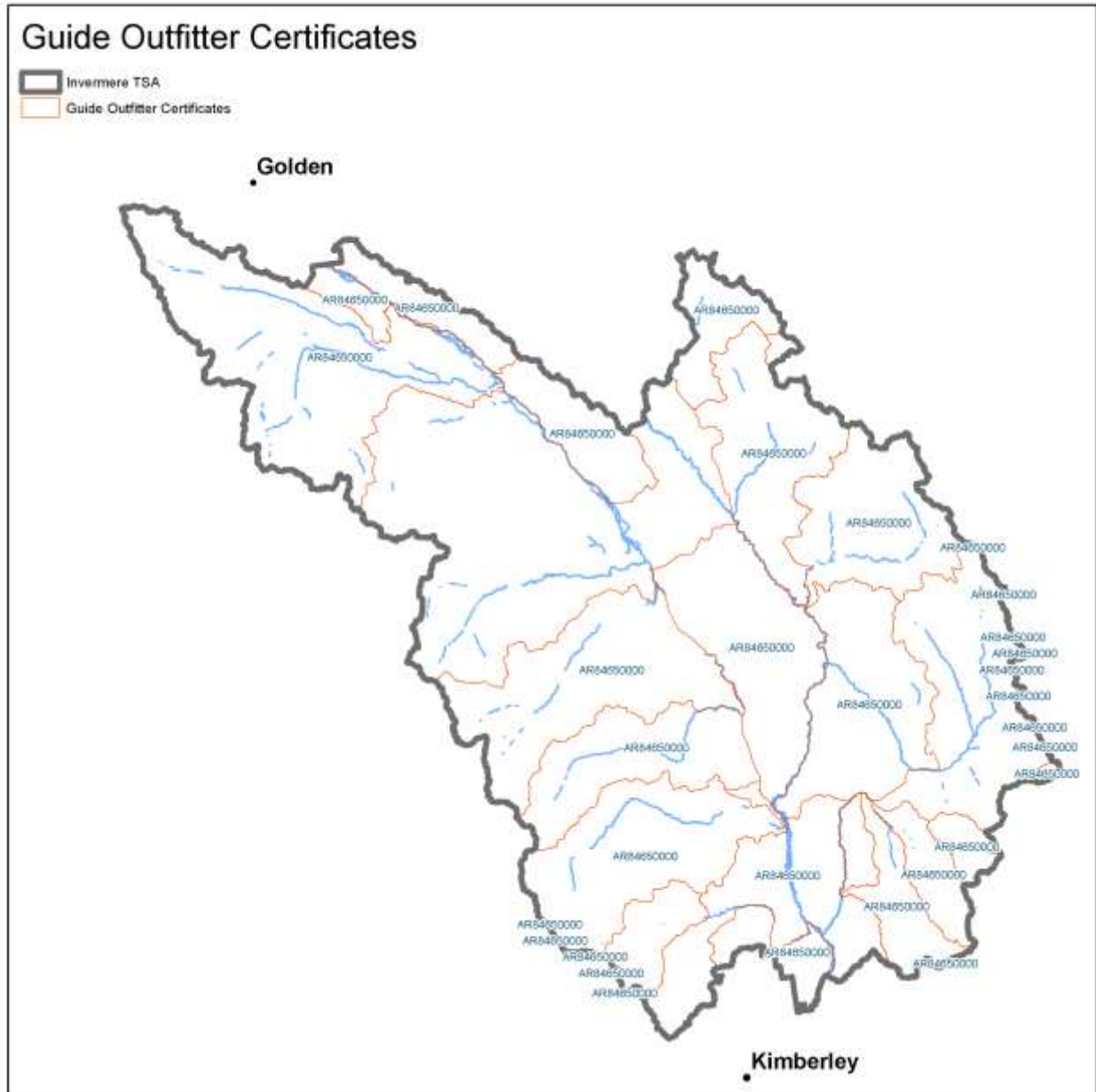


Figure 28 Guide outfitter certificates

9.7 Road Density and Access Issues

Roads, trails, and landings are permanent access structures that reduce the productive landbase. It is assumed that much of the road infrastructure already exists in the Invermere TSA (Figure 29), thus lowering the net loss associated with accessing future harvesting areas. This information was generated from a project completed in 2008, which may now be considered “dated”.

Source: Timberline Natural Resource Group. 2008. Roads, Trails and Landings Inventory Project within the Invermere Timber Supply.

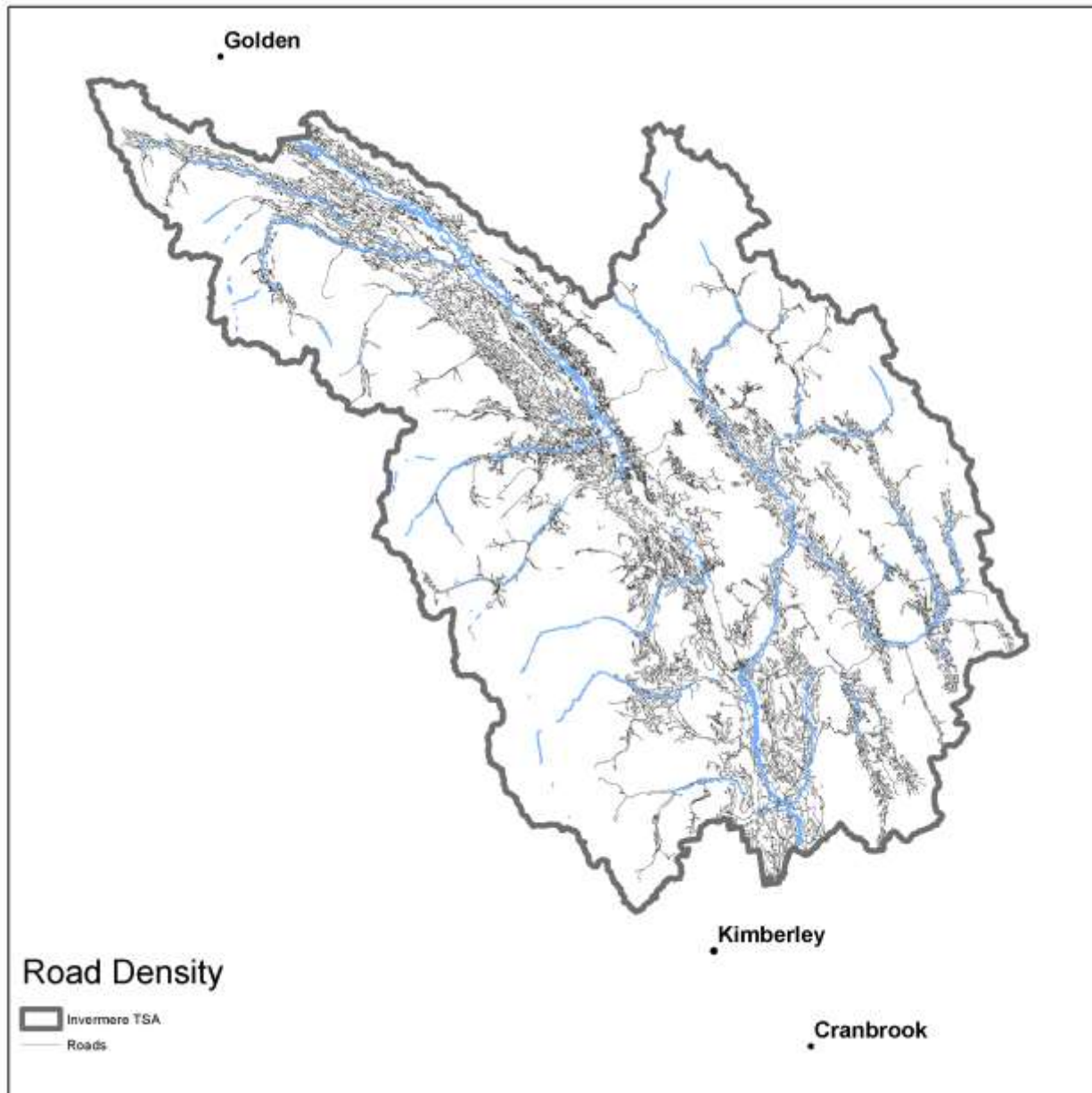


Figure 29 Road Density – Invermere TSA

A report completed in 2006 for the Invermere TSA states:

“that the density of roads in the TSA is expected to increase significantly in the near future because of harvesting/salvage pressures on the land base. It is desirable to reduce this density to any extent possible in order to improve habitat quality for wildlife and reduce predator interactions. Access planning is recommended to optimize the economic and environmental effects of active roads.”

Source: Forsite, A Guide for Investment Planning in the Invermere TSA, 2006

An increase in road density throughout the forest landbase can have negative effects on fish and wildlife populations, biodiversity, watershed health, and guide outfitters. As an example, roads have a negative effect on Grizzly bear habitat use when they reach a density of about 0.6 km/km². This effect is amplified

when road density increases over 1.0 km/km². New or improved roads typically bring people into contact with Grizzly bears more frequently which is sometimes lethal for bears.

Source: MoE. Environmental Reporting BC Grizzly Bear Populations Status in BC (2012)

Increased access to the far reaches of the Invermere TSA allows more recreational and hunting in those areas, and of particular concern is the increase in area accessible to snowmobiles and quads. These vehicles are potentially disturbing to wildlife in their critical winter habitat. Increases in hunting access may bring higher pressures on specific game populations and impact the unique opportunities offered by licenses guide outfitters.

The TSA has significant number of older roads/trails and the associated infrastructure. In 2013 several crossings were impacted during the 2013 floods. Many crossings have not been fixed and therefore removing these areas from being available for forest management activities. The restoration and rehabilitation of road and bridge infrastructure is needed to reduce the risk to the environment, water, fisheries and safety.

9.8 New Biogeoclimatic Ecosystem Classification (BEC) Mapping and Field Guides

Biogeoclimatic Ecosystem Classification (BEC) has been used to improve resource management in BC since the mid-1970s. The BEC system is a hierarchical classification system that integrates climate, site, and vegetation patterns across many scales. Forest professionals use BEC for site plan development, tree species selection, appraisals, timber supply review, ecosystem based management, wildlife habitat assessment, climate change adaptation, and many other management applications. Across most of the province, BEC field guides were last published in the 1990s. Newer information and knowledge have allowed for significant updates and improvements.

On September 1, 2016 a new Biogeoclimatic Ecosystem Classification (BEC) field guide, *Land Management Handbook 70 A Field Guide to Site Classification and Identification for Southeast British Columbia: The South-Central Columbia Mountains*, was released along with updates to BEC mapping. This new field guide replaces the former Nelson and Kamloops field guides (LMH 20 – Braumandl and Curran 1992 and LMH 23 – Lloyd et al. 1990) for the areas shown in Figure 1 (and described in the new guide). Field guides are available at: <https://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh70.htm>. LMH 70 covers large areas in the Cranbrook and Invermere TSAs (see Table X for BEC units).

Another new BEC field guide (*A field guide to Site Classification for the East Kootenay*) and corresponding BEC mapping layer will be released in 2017; this guide will cover most of the Rocky Mountain District. A final guide will be released in 2018 that will cover the remaining areas in the Invermere TSA (see Figure X).

New BEC includes completely new site series classification and subzone/variant mapping, including the introduction of new subzones/variants and adjustments to Natural Disturbance (NDT) classification.

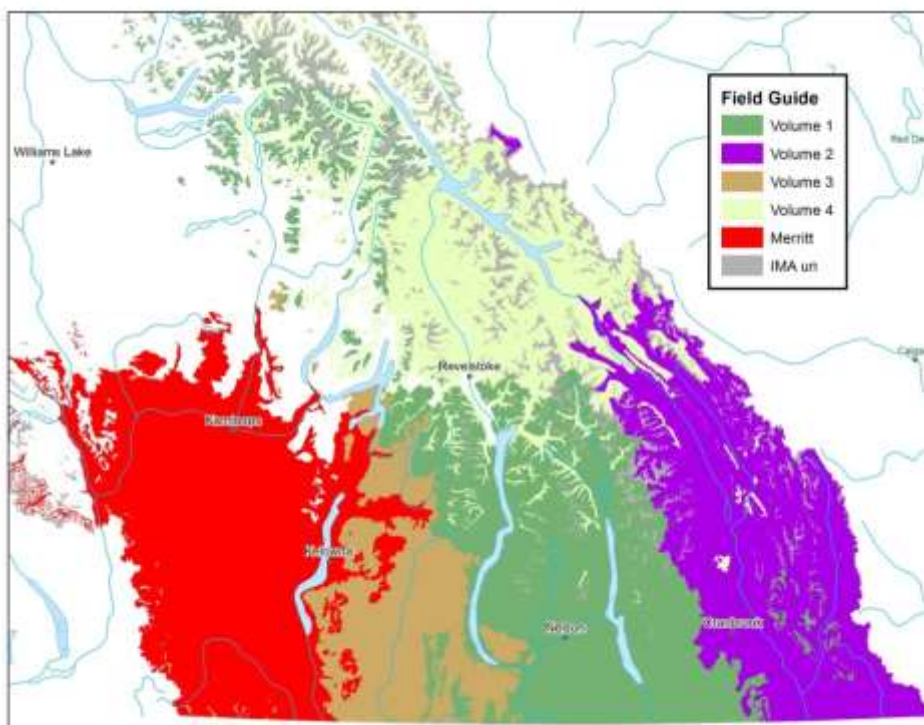


Figure 30 Areas covered by new BEC field guides. Volume 1 (LMH 70) covers a portion of the Rocky Mountain District in the Purcells as well as the ESSFwmw in the Fernie area. Volume 2 will cover most of the district and will be released in 2017. Volume 4 will include some areas in the Invermere TSA and TFL14.

Table 25 Summary of BEC changes in Rocky Mountain District

New BEC unit	Old BEC unit in Rocky Mountain	NDT	Field Guide	Notes
ICHdw1	ICHdw1	3	LMH 70	Small area
ICHdm	ICHdm	3	LMH 70	First mapped in 2003
ICHmw2	ICHdm	2	LMH 70	Small area; not previously mapped in RMNRD
ESSFwh2	ESSFwm	2	LMH 70	New unit
ESSFwm2	ESSFwm	1	LMH 70	New unit; NDT as per BGB (1995)
ESSFwm4	ESSFdm	2	LMH 70	Renamed; NDT as per BGB (1995)
ESSFwmw	ESSFwmu	2	LMH 70	
IDFxx2	PPdh2	4	Vol 2 – East Kootenay	
IDFdm2	IDFdm2	4	Vol 2 – East Kootenay	
IDFxxk	IDFun	4	Vol 2 – East Kootenay	
IDFdk5	IDFdm2	4	Vol 2 – East Kootenay	Extends to Canal Flats in new BEC
MSdw	MSdk1 (MSdk)	3	Vol 2 – East Kootenay	
MSdk	MSdk2 (MSdk)	3	Vol 2 – East Kootenay	
ESSFdk1	ESSFdk	3	Vol 2 – East Kootenay	
ESSFdk2	ESSFdk	3	Vol 2 – East Kootenay	
ESSFdkw	ESSFdku	3	Vol 2 – East Kootenay	

New BEC unit	Old BEC unit in Rocky Mountain	NDT	Field Guide	Notes
ESSFwm1	ESSFwm	2	Vol 2 – East Kootenay	
ICHmk4	ICHmk1	3	Vol 2 – East Kootenay	Cranbrook only
ICHmk5	ICHmk1	3	Vol 4	Invermere only
ICHmw1	ICHmw1	2	Vol 4	Invermere only
ESSFmm3	ESSFwm	2	Vol 4	Tentative name (to be confirmed shortly); area was a mix of NDT1 and NDT3 in old BEC
ESSFwmp	ESSFwmp	5	Alpine guide	
ESSFdkp	ESSFdkp	5	Alpine guide	
IMAun	AT	5	Alpine guide	

There are several management applications that are associated with new BEC:

Stocking Standards: The Chief Forester released an update to the *Reference Guide for FDP Stocking Standards* that is available for the LMH 70 area; it can be found under a new tab in the Microsoft excel file for the reference guide labeled “S. Central Columbia Mts. (2016)” and can be downloaded at: https://www.for.gov.bc.ca/hfp/silviculture/stocking_stds.htm.

Draft stocking standard defaults have been written for the East Kootenay. A process is planned to review and finalize these in May-August 2017 with extensive input from licensee, District, Regional, and HQ professionals.

Forest Stewardship Plans: In her BEC release memo, the Chief Forester says, “I encourage licensees to consider amending their plans to incorporate the new classification and standards”. To provide a transition period to review and adapt to new BEC, the Chief goes on to say, “After March 31, 2017, new standards proposed will be expected to use the new classifications”. This applies to the LMH 70 area in Rocky Mountain District; similar recommendations will be released once new BEC is officially released for the East Kootenay in 2017.

Log Cost Estimates in the Interior Appraisal Manual: Updated silviculture cost estimates for new and existing BEC subzones/variants were released in November 2016 and licenses are expected to submit log costs using new BEC. Several historic, expired BEC units that are no longer in use have been deleted from the table. The Interior Appraisal Manual, Amendment No. 2 is available online at: <http://www2.gov.bc.ca/gov/content/industry/forestry/competitive-forest-industry/timber-pricing/interior-timber-pricing/interior-appraisal-manual>. Timber Pricing Branch will continue to update the IAM as new BEC is released.

SIBEC–Site Index Estimates: new SIBEC (Site Index – BEC) values have been calculated based on collection and incorporation of new and existing field sample data; these cover all subzones/variants that occur in the Cranbrook TSA (including the areas of those BEC units in the Invermere TSA). Data for the additional units in the Invermere TSA are being evaluated for updates in 2017 or 2018 (ESSFmm3, ICHmk5, IDFdk5, IDFxk).

Predictive Ecosystem Mapping (PEM): A new PEM was developed in 2015 for the Cranbrook TSA using BECv10. The new PEM and SIBEC were used in the base case for the Cranbrook TSR. In Invermere, the most recent PEM was produced in 2004 using an interim draft BEC classification that was never released officially (but has been crosswalked to new BEC).

Kootenay-Boundary Higher Level Plan Order: The order (2002) states:

“Implementation of this higher level plan order is highly dependent upon technical inventory. The inventories are continually updated to incorporate new information and improve the level of accuracy. New information will be utilized as soon as practicable, for example, for meeting the targets referred to in this higher level plan order.” (p. 2)

New BEC is an “updated technical inventory” and is likely to be “utilized as soon as practicable” for meeting OGMA and mature forest targets. This has implications for the areal targets (ha) in each BECxLU, as well as the area in each BEO in landscape units with >1 BEO (usually delineated using old BEC lines). In some cases, NDT has changed, which affects %-based targets and areas (ha) required to meet targets.

Conservation Data Centre: new forested and non-forested ecosystems are being reviewed and ranked for at-risk status. This includes forested and non-forested ecosystems.

9.9 Sustainable Forest Certification

Various sustainable forest certification schemes are in use by licensees in the Invermere TSA (Table 4), and these have potential timber supply impacts, particularly where the certification standard calls for measure incremental to legislated requirements.

Management assumptions under the Forest Stewardship Council standard (Table 26) differ significantly from those applied in TSR (i.e., FRPA-based).

Table 26 Forest Stewardship Council Assumptions

Assumption	Potential Impact
Riparian Guidelines	FSC riparian reserves apply a significantly greater THLB reduction than the FRPA-based riparian reserves guidelines.
High Conservation Value Forests	No harvesting within the Endangered Forest class of High Conservation Value Forests results in landbase reductions. The remainder of the HCVF areas are assumed to be addressed through existing management guidelines and constraints for non-timber values.
Rare and/or Uncommon Ecosystems	Rare and/or uncommon ecosystems are managed as no harvesting and therefore 100% retention modeled as a THLB netdown. The 50% retention is applied at the time the block is harvested.
Equivalent Clearcut Area	FSC requires 25% maximum Equivalent Clearcut Area vs TSR-based assumptions.

10 Other Development

10.1 Mines

The Kootenay-Boundary Region (Figure 31) offers a variety of mining and exploration opportunities, and is accessible by well-developed infrastructure. Five operating coal mines produce most of Canada's coal exports. The historic lead-zinc-silver Sullivan Mine is in the region, and exploration for base metals and precious metals continues to be a focus. Several mines produce industrial minerals including silica, magnesite, gypsum, and graphite.

In 2014, total exploration spending and drilling increased relative to 2013, with about \$50.4 million spent on exploration. Exploration drilling (approximately 125,000 m) increased for metals projects relative to 2013, whereas coal exploration drilling was scaled back. With lower coal prices, drill programs in the coal mines were cut, and spending was focused on mine development and mine evaluation projects (Fig. 3), mainly on Environmental Assessment requirements for mine expansions. Coal production increased from 25.6 Mt in 2013, and is expected to be close to 27 Mt for 2014.

Highlights for 2014 include:

- the Kootenay West gypsum mine (CertainTeed Gypsum Canada Inc.) entered pre-application of Environmental Assessment
- base metal exploration in the Belt-Purcell Basin in the East Kootenays (Ptarmigan)

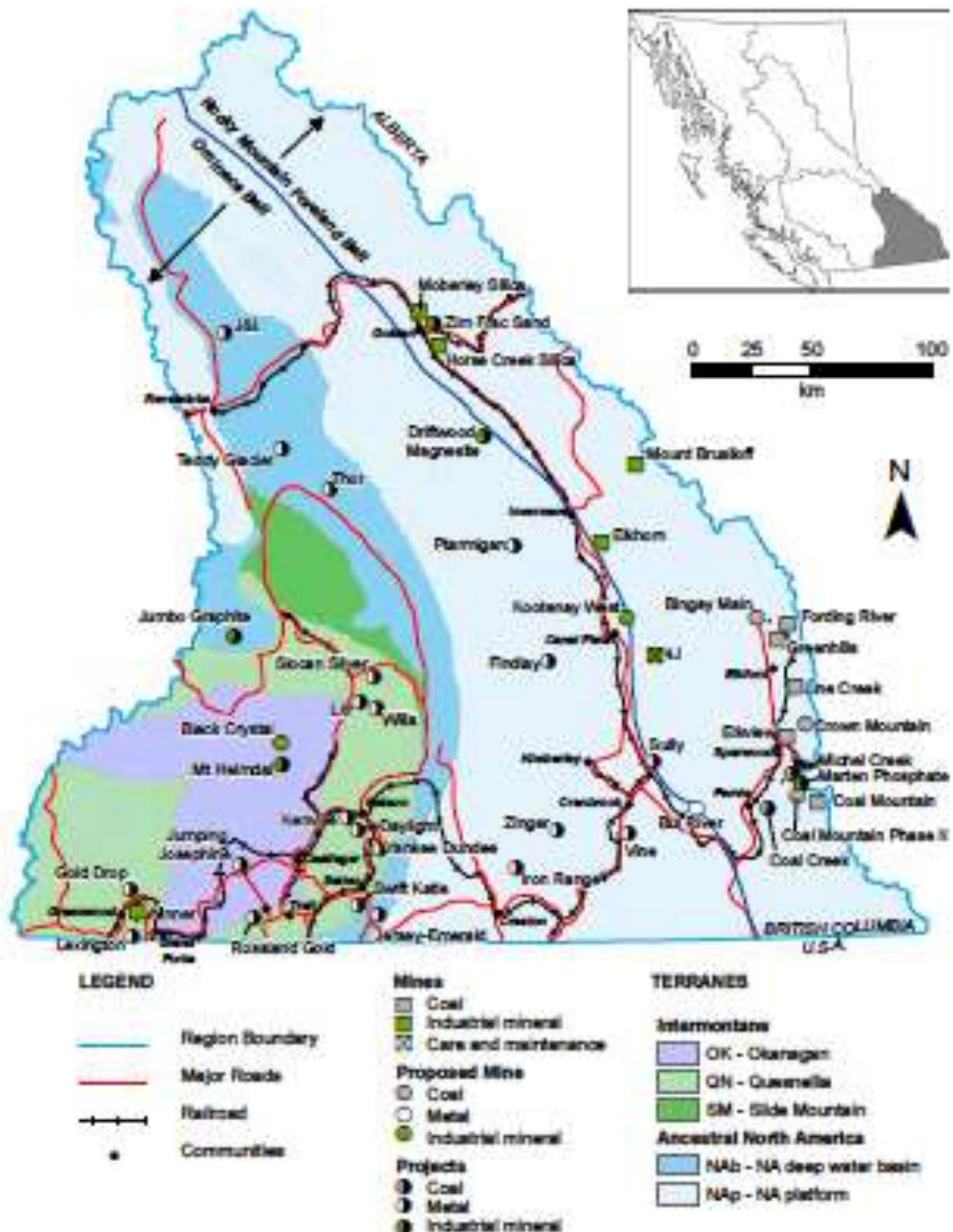


Fig. 1. Mines and selected exploration projects, Kootenay-Boundary Region, 2014. Thomas Born Nelson et al. (2013).

Figure 31 Mines and selected exploration projects

Source: Katay, F., 2015

11 Funding Mechanisms

Various funding mechanisms are available to support activities and tactics related to this Integrated Silviculture Strategy process. Outputs from this exercise should align with funding requirements for each of these programs.

11.1 Land Base Investment

Forests for Tomorrow is an investment category within the Land Based Investment program and the main Provincial funding source for investments in our Crown forests. Consistent with governments' investment decisions, the Forests for Tomorrow strategic objectives are to achieve the best return from investments and activities on the forest landbase.

Funding has recently focused on areas where catastrophic disturbance or constrained timber have caused drops in mid- and long-term timber supply. The annual budget for Current Reforestation is \$39.6M and the budget for Timber Supply Mitigation is \$9.25M.

11.2 Forest Enhancement Society

The BC Government recently announced the formation of the Forest Enhancement Society of BC. The Society is aimed to advocate for and advance environmental and resource stewardship in BC's forests by preventing and mitigating the impact of wildfires, improving damaged or low value forests, improving habitat for wildlife, supporting the use of fiber from damaged and low value forests, and treating forests to improve the management of greenhouse gases.

With \$85M of funding over a period of 3-5 years, the Society is currently focused on wildlife habitat restoration in concert with rehabilitation of stands damaged by wildfire or those aimed to reduce wildfire risk, as well as, wildfire hazard abatement in and around communities.

11.3 Forest Carbon Initiative

The Forest Carbon Initiative was established to help BC achieve some of its Climate Action Plan commitments through improving the carbon balance in our Crown forests. Much of this objective will be achieved by increasing the carbon stocks in forest damaged by insects and fires; over and above that which will come back naturally. At this time, the actual program budget is unknown.

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