

Integrated Silviculture Strategy Bulkley Timber Supply Area

Situational Analysis

V 2.2

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1 Introduction

The Resource Practices Branch (RPB) of the Ministry of Forests, Lands and Natural Resource Operations (FLNRO) is developing a new management unit planning framework; Integrated Silviculture Strategy (ISS). The ISS is a sustainable forest management planning framework with the objective to integrate all aspects of landscape-level and operational planning for each Timber Supply Area (TSA).

The ISS will integrate Type 4 Silviculture Strategies with timber supply review (TSR) to reduce duplication and redundancies where possible by sharing inventories, management zones, analysis units, Timber Harvesting Land Base (THLB) definitions and management assumptions. It is expected that the ISS process will improve the linkages to landscape level fire management, the Cumulative Effects Framework, the Forest and Range Evaluation Program's (FREP) multiple resource values assessments (MRVA) and other regional, management unit level or landscape level plans and strategies.

Provincial Timber Management Goals and Objectives (FLNR 2014) and the Chief Forester's Provincial Stewardship Optimization/Timber Harvesting Land Base (THLB) Stabilization Project (FLNR 2015) provide guidance to the ISS.

The ISS will consolidate all resource management related goals, objectives and strategies into one plan and then link these to a TSA wide tactical plan. The process includes a framework for monitoring and auditing, and continuous improvement.

The ISS aims to improve resource planning in British Columbia by addressing specific issues such as:

- ❖ Species at risk management and reserve allocation. Are the reserves placed where they provide the conditions most needed by species at risk?
- ❖ Ability to investigate options to co-locate reserves to provide required habitat benefits while preserving or increasing harvest opportunities;
- ❖ Current and predicted harvest levels – are the assumptions regarding the transition from old growth stands to second growth and managed stands accurate and, if not, what are the possible impacts on timber harvest and habitat values?
- ❖ What options are available to address habitat and timber supply using silviculture treatments?
- ❖ Effective use of public funds for new and existing funding initiatives;
- ❖ A feedback loop for adaptive management; ability to assess decision outcomes and modify behaviour based on new and better information; and,
- ❖ First Nations consultation; better understanding of the expected impacts of planned activities on First Nations' value.

1.1 Objectives

The project has the following objectives:

- ❖ Understanding and geospatial representation of existing and proposed legislation, regulations, and policy that conserve stewardship values;

- ❖ Seek information on ongoing monitoring and cumulative effect work, and collaborate to identify additional work needed;
- ❖ Collaborate with the intent to comprehend common landscape values;
- ❖ Develop decision support products for comprehensive and durable decisions based on scientific and traditional knowledge;
- ❖ Manage natural resources to continue providing the values that support traditional and modern day use;
- ❖ Work to identify the underlying issues and work towards solutions;
- ❖ Integration of the scenario based silviculture strategy process (Type 4) with the most recent Timber Supply Review (TSR);
- ❖ Prioritization of activities and treatments necessary to help with achievement of timber supply and habitat needs;
- ❖ Create a tactical plan documenting the strategies, targets, activities and treatments to improve or benefit other resource values; the targets would be agreed upon by those on the planning team; and,
- ❖ Incorporate climate change as a consideration into the resource management planning process including the identification of any associated risks (e.g. wildfire).

1.1 Context

This document is the first of four documents that make up an IRMP. The documents are:

- 1 Situational Analysis – describes in general terms the current situation for the unit. The Situational Analysis forms the starting point for the initial planning group meeting to identify opportunities.**
- 2 Data Package - describes the information that is material to the analysis including data inputs and assumptions.
- 3 Modeling and Analysis report –provides modeling outputs and rationale for choosing the selected scenario.
- 4 Integrated Silviculture Strategy – represents the selected management scenario which is the basis for the first iteration of the ISS. It includes an investment strategy and provides treatment options, associated targets, timeframes and expected benefits.

When the ISS is complete, a spatial operations schedule will provide direction for harvesting and a land base investment schedule will guide Forest for Tomorrow Annual Operating Plans.

2. Bulkley TSA

The Bulkley TSA (Figure 1) is located in north-western BC covering four main communities: Smithers, Telkwa, Moricetown, and Fort Babine. Smithers is the largest of these communities with a population of 5,350 according to BC Stats in 2011. The TSA is situated between the Hazelton Mountains in the west and Babine Lake in the east. The Telkwa River watershed forms the southern boundary of the TSA while its northern boundary extends to the headwaters of the Nilkitkwa River.

The Bulkley TSA is part of the FLNRO Skeena Region, North Area and is administered by the FLNRO Skeena Stikine Natural Resource District in Smithers.

The total area of the Bulkley TSA is 762 734 hectares, of which 500 034 hectares are classified as Crown forested land base (CFLB). The timber harvesting land base (THLB) – area available for timber harvesting - in the last timber supply review (2014) was 283,510 hectares.

First Nations whose traditional territories overlap the Bulkley TSA include: Gitksan Hereditary Chiefs; Kitselas First Nation; Lake Babine Nation; and Wet'suwet'en Nation (Moricetown Band; Skin Tyee Band; and Wet'suwet'en First Nation). The Yekooche First Nation recently expanded their territorial assertion, which now includes a portion of the Bulkley TSA.

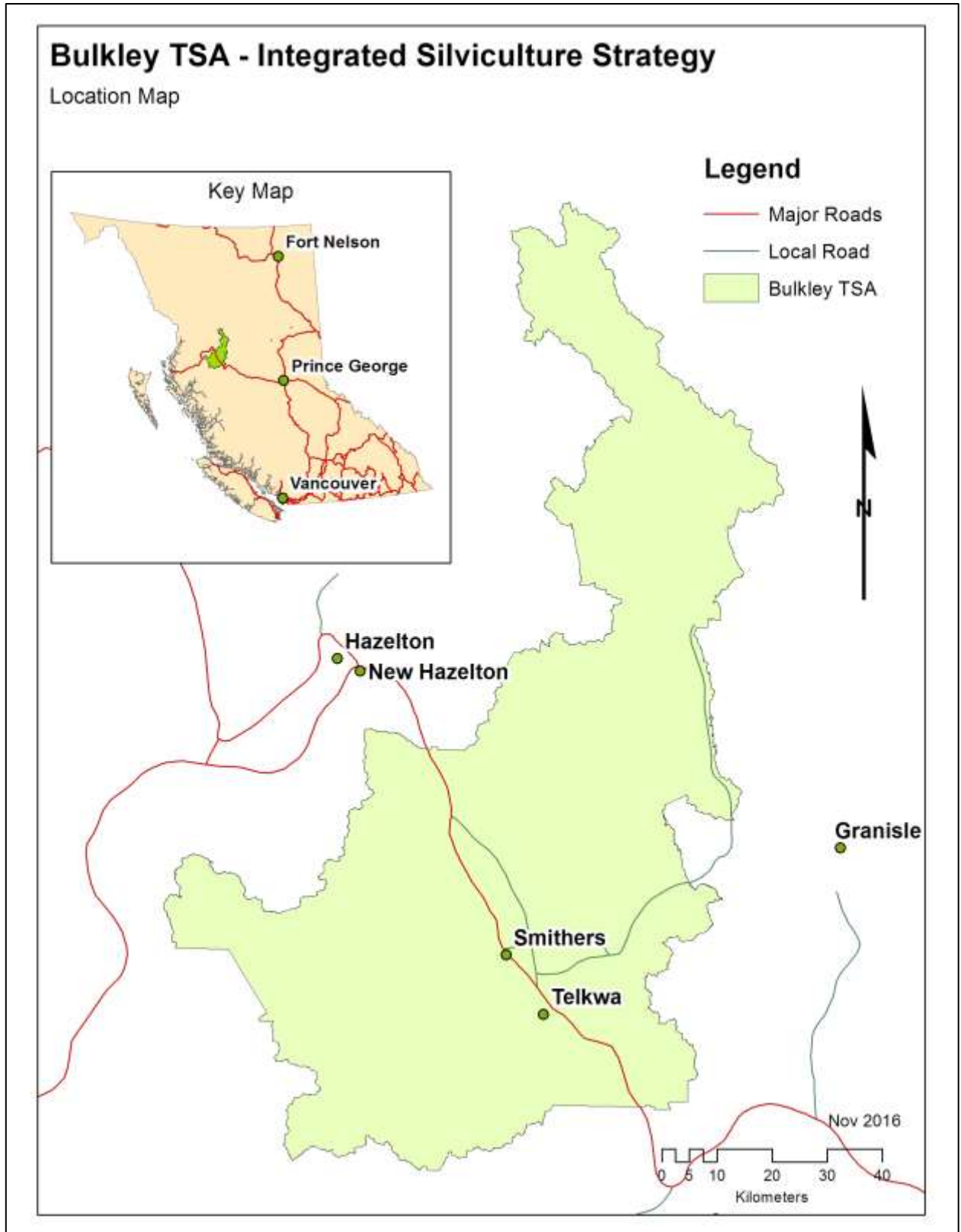


Figure 1: Bulkley TSA

3 Summary of Current Plans and Strategies

3.1 Provincial Timber Management Goals and Objectives

Provincial timber management goals and objectives are currently under development; they include working targets for the provincial timber supply. These targets need to be set for each TSA as well, which can be accomplished through the ISS process.

The Draft Provincial Timber Management Goals and Objectives (FLNR 2014) set high-level provincial timber management goals, objectives and targets and provide direction for planning across all management units

(<https://www.for.gov.bc.ca/hfp/silstrat/other%20docs/Timber%20Goals%20and%20Objectives%20May%2026%202014.pdf>). The goals are set for timber volume flow over time, timber quality, tree species composition, stand productivity and growing stock and inherent site capacity.

3.1.1 Timber volume flow over time

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

The objective is to ensure a reliable and consistent harvest of timber over time to support the economic and social objectives of the government. The management of timber volume flow will be integrated with the management of other key forest values, promoting resilient and diverse forest ecosystems. The ultimate goal is an internationally competitive timber processing industry, while the forests are managed in a sustainable manner based on the latest science and research.

The provincial targets for timber flow are currently expressed as the sum of all AACs from various management units. This will likely change as planning processes such as the Bulkley ISS may set management units targets which will potentially become provincial targets when summed up.

3.1.2 Timber quality

Goal: Maintain a diversity of timber related economic opportunities through time

The objective is to maintain options for the future by growing a range of timber products. This can be accomplished by maintaining the share of high-value tree species in all management units at pre-harvest levels and limiting the proportion of lower value species. New forests must be regenerated with high quality stock capable of producing high quality forest products.

Targets:

- ❖ No reduction in the proportion of provincial forest land of high-value tree species, and
- ❖ The production of a minimum of 10 % premium grades from B.C.s forests.

3.1.3 Tree Species Composition

Goal: To maintain or enhance timber and non-timber values, forest health, and resilience, through the management of tree species composition.

Timber and non-timber values, forest health, and resilience can be maintained or enhanced through the management of tree species composition. Where ecologically feasible, regenerated forests are expected to consist of a mix of species at both the stand and landscape level to reduce

pest and disease risks and to maintain options in the long term. Furthermore, climate change and future risk must be considered in reforestation by promoting species compositions that reduce susceptibility to ecological and economic risk and by avoiding species, the prevalence of which is disproportionately high.

The planting stock should be grown from known seed sources and the seeds are expected to be from genetically diverse trees, climatically suitable to various planting sites.

The strategy outlines the following targets:

- ❖ The proportion of monoculture stands at free growing in B.C. should not be greater than the proportion of monoculture stands prior to harvest.
- ❖ Within management units, the total number of tree species at free growing is expected to be no less than what was present prior to harvest.
- ❖ Within management units, the proportion of a specific tree species at free growing should be no more than 10 % greater than what was present prior to harvest, unless the increase in species proportion raises the proportion of higher value species or specific species diversity targets are approved for the management unit.
- ❖ 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.

3.1.4 Stand productivity and growing stock

Goal: Maintain or improve stand productivity.

Epidemics, such as the recent MPB infestation, require that strategies and options need to be developed for prompt management unit analysis and planning after significant and sudden changes to growing stock from natural disturbances and salvage harvesting. Reforestation and management should target full site occupancy of growing space with consideration for other values and risks. As with tree species selection, the proportion of high-risk species in management units should not be increased and, if the future risks are assessed high for such species, their share should be gradually reduced. Stand level management decisions should not be made only on the basis of return-on-investment, but should also consider risks and management unit objectives and targets. If seed for improved growth or pest tolerance is available, it should be used

Targets:

- ❖ Harvested areas will be reforested with tree species and stocking levels that meet or exceed growth and yield projections assumed in TSR.
- ❖ By 2020, 75 per cent of all trees planted will be grown from selected seed with an average genetic gain of 20 per cent.

3.1.5 Inherent site capacity

Goal: To maintain the inherent site capacity of B.C.'s forested ecosystems

It is expected that the permanent footprint of roads, trails, and landings will not exceed what is necessary for logical and efficient natural resource management, while road construction and maintenance should follow natural drainage patterns and flows without contributing to slope failures or chronic erosion over the long term.

Forest management activities must not result in significant soil compaction and/or erosion on areas that will be reforested, rather management activities should provide for maintenance or recovery of proper nutrient cycling and soil nutrition.

Targets:

- ❖ The province restricts soil disturbance to a maximum percentage of site disturbance within the net area to be reforested (Forest Planning and Practices Regulation (FPPR), s. 35).
- ❖ The province has incorporated explicit maximum percentage limits for site disturbance and construction of permanent access structures into the FPPR, s. 36. The target is to have the average site disturbance for the province at less than 5 %.
- ❖ The province directs the maintenance of natural drainage patterns for road construction and maintenance (FPPR, s. 37-39)

3.2 Bulkley Land and Resource Management Plan (LRMP) 1998

The *Bulkley Land and Resource Management Plan (LRMP)*, the *Bulkley Valley Sustainable Resource Management Plan (SRMP)* (2005) and associated higher level plan orders direct resource management on all Crown land within the Bulkley TSA. The LRMP was completed in 1998. Legal objectives for biodiversity were established at that time for each individual landscape unit with the exception of the Bulkley Landscape Unit, where the objectives were established as policy. The Bulkley Valley SRMP in 2005 was developed for the Bulkley Valley Landscape Unit similarly to the other landscape unit plans but the objectives were not formally established.

In 2000, components of the LRMP – in particular, the resource management zone (RMZ) objectives - were established as legal objectives through the *Bulkley Resource Management Zone Higher Level Plan Order (HLPO)* under the *Forest Practises Code Act*.

In 2006 the original order was amended by a *Government Order* under the *Land Act* establishing land use objectives for the Bulkley TSA. The 2006 order streamlined the original Bulkley LRMP's legal objectives and incorporated legal objectives from the *Bulkley LRMP Higher Level Plan Order*, Biodiversity Objectives, Landscape Unit Plans, and the Bulkley Valley SRMP. Several orders have been issued under the *Government Actions Regulation (GAR)* of the *Forest and Range Practises Act* and the *Land Use Objectives Regulation (LUOR)* of the *Land Act* to establish components of the LRMP as legal objectives. The following links provide access to the strategic land and resource planning in the Bulkley TSA:

LRMP: <https://www.for.gov.bc.ca/tasb/slrp/plan128.html>

SRMP: https://www.for.gov.bc.ca/tasb/SLRP/srmp/north/bulkley/cabinet/bulkley_srmp.pdf

3.2.1 LRMP Budget

Before the implementation of the Bulkley LRMP, the timber supply impact of the prospective plan was analyzed. The analysis (1996) indicated that the timber supply impact of the plan implementation in the Bulkley TSA would be no higher than 10 %. This 10% LRMP budget has been maintained as the guideline when establishing various plan objectives and landscape unit objectives in the TSA. Where implementation of an objective(s) causes a greater than 10% impact the TSA timber supply in one area, it is expected that objectives are modified elsewhere in the TSA to lessen timber supply impacts with the goal of maintaining the 10% LRMP budget.

3.2.2 Biodiversity Objectives

Biodiversity objectives consist of specific objectives for seral stage distributions, ecosystem representation, connectivity, tree species diversity and stand structure.

3.2.2.1 Seral Stage

Seral stage objectives are set to maintain biodiversity by sustaining a natural seral-stage distribution in each landscape unit (LU), natural disturbance type (NDT) and BEC variant. The targets are set for early seral (maximum), mature and old seral (minimum), and old seral (minimum).

The Bulkley HLPO also sets targets for patch size distributions as a resource objective. The intent of this objective is to allocate harvesting spatially in the landscape while maintaining block size limits.

3.2.2.2 Ecosystem Representation and Connectivity

The Ecosystem Network, consisting of Core Ecosystems (CE) and Landscape Riparian Corridors (LRC) facilitate ecosystem representation and connectivity in the Bulkley TSA. CEs are established to maintain biodiversity, represent a cross section of naturally occurring ecosystems, maintain some areas with interior forest conditions, and retain representative examples of rare and endangered plant communities. LRCs are designed to provide habitat connectivity and reduce fragmentation by maintaining landscape corridors dominated by mature tree cover and containing most of the structure and function associated with old forest.

CEs are protected from range use and timber harvest with some exceptions. Timber harvesting may be allowed, if it is necessary to protect the integrity and function of the ecosystem or provide access for forest health control activities or timber harvesting of isolated timber outside of the core ecosystem. Timber harvesting for mineral and energy exploration and development is allowed.

The guideline for management within landscape corridors is to maintain 70 percent of the existing structure and function of the forest within these corridors. Industrial, agricultural, recreational and tourism activities are permitted as long as they are compatible with the objectives of the landscape corridor.

3.2.2.3 Tree Species Diversity

The objective is to maintain a diversity of coniferous and deciduous species that represent the natural species composition for each biogeoclimatic subzone. The Chief Forester has provided direction on tree species diversity as well (Section 3.11).

3.2.2.4 Stand Structure

It is expected that a variety of old forest attributes, such as coarse woody debris and standing dead and live trees are maintained. This can be accomplished by many means including wildlife tree patch retention. The LRMP HLPO established legal objectives for wildlife tree patch retention with targets by landscape unit and BEC subzone. These targets are reflected in licensee forest stewardship plans (FSP).

3.2.3 Wildlife Objectives

Legal objectives are defined for moose, mountain goat, woodland caribou, grizzly bear and deer.

3.2.3.1 Moose and Deer

The plan requires that woody browse, visual screening, security, thermal and snow-interception cover are provided in identified moose and deer winter habitat. The habitat is managed through Forest Stewardship Plans (FSPs) and no additional land base exclusions or forest cover constraints are currently required.

3.2.3.2 Mountain Goat

The LRMP and HLPO identify mountain goat habitat and require that thermal and snow interception cover and forage are provided in these habitat areas. Disturbance to goats in these areas is to be limited. It is also expected that forested cover adjacent to escape terrain is maintained.

3.2.3.3 Woodland Caribou

The range of the Telkwa Woodland Caribou herd overlaps the Bulkley TSA south of Smithers. Telkwa Caribou are of the northern ecotype, which are characterized by their use of high-elevation, windswept ridges and low elevation pine-lichen forests in winter, and by their use of alpine and subalpine parkland forests in the summer. Historic population estimates varied between 60 and 250 animals, and more recently the population peaked at 114 in 2006 after transplants in the late 1990's (Cichowski 2014). The population has since declined to 18.

The Telkwa Caribou range falls within the federal Southern Mountain Ecological Area where caribou are a threatened species under the Species at Risk Act. A federal recovery strategy partially identifies Critical Habitat and related protection requirements (Environment Canada 2014). The Species at Risk Act does not apply directly to provincial crown land but the Provincial government is expected to demonstrate effective protection of federally designated Critical Habitat.

Provincially, strategic management direction for Telkwa caribou is addressed primarily through the Ministry of Environment's Identified Wildlife Management Strategy (MWLAP 2004) and the consequent legal order establishing a Wildlife Habitat Area (#6-333). This WHA consists of a core no-harvest area and a conditional harvest zone at lower elevations where LRMP legal objectives set by government apply. General Wildlife Measures in the conditional harvest zone specifies old and young seral stage retention thresholds by biogeoclimatic subzone variants. Retention levels do not apply if licensees or BCTS prepare an acceptable Caribou Management Plan that meets results-based objectives consistent with the WHA Order. Deactivation of in-block and operational roads is also required.

3.2.3.4 Grizzly Bear

Four of the Landscape Unit Plans (LUP) contain grizzly bear habitat objectives.

The Babine Landscape Unit (LU) plan defines high value grizzly bear habitat areas, mixed forest habitat grizzly bear areas, and moderate value grizzly bear habitat. It sets guidelines for the management of grizzly bears in all three habitat types. For example, road development and the number and duration of entries are limited within moderate value grizzly bear habitat.

The Babine LU contains three grizzly bear management units: Boucher Creek Wetlands management unit, the Nichyeskwa South management unit and the Nichyeskwa North management unit. The objectives of these units are primarily to allow for the movement of grizzly bear between important landscape features and to reduce the potential for human-bear contact.

The Serb Creek watershed is designated as a Special Management Zone 2 (SM2) in the Copper LUP. Objectives for the Serb watershed focus on lowering the harvest intensity, managing the viewscape from Serb Creek, maintaining the integrity of the wetland ecosystems and controlling the impact on grizzly bears. The grizzly bear related objective is to discourage interactions between grizzly bears and people in the Serb Watershed by restricting access and timber harvest timing.

The Nilkitkwa LUP designates Barbeau Creek as a Special Management Zone 1 (SM1) with objectives that include protecting grizzly bear habitat. Tree cutting is limited only to that required for approved mineral exploration, development, and related access purposes.

The Telkwa LUP designates the Telkwa River sub-unit as an SM2 with several objectives including maintaining grizzly bear habitat. The majority of this objective is managed through designated core ecosystems and landscape corridors, which with their harvesting restrictions provide forest cover for wildlife.

3.2.4 Fish Habitat

The LRMP requires that lakes containing high-value fish habitat are maintained in a full spectrum of settings including semi-primitive and primitive.

3.2.5 Timber Objectives

The LRMP defines potential areas where enhanced timber production can be considered. These were mapped as Enhanced Timber Development Areas which were generally on productive sites with gentle slopes having low conflict with other values or uses. These areas are well-distributed throughout the Bulkley Plan Area in small, non-contiguous sites, and were intended to be managed under intensive silviculture practices, with the objective of enhancing the available timber supply and improving timber quality.

3.2.6 Objectives for Outdoor Recreation

The LRMP required that a range of recreational values and opportunities are maintained and enhanced, while access to these values and opportunities is reasonably maintained.

3.3 Landscape Unit Plans

Landscape unit (LU) plans were developed in 1999 to implement operational practices to meet the Bulkley LRMP objectives. They continue to provide direction in the development of operational plans to meet the LRMP objectives for wildlife, fish, LRMP special management zones, timber, recreation, visual quality and range.

The LU plans can be found at:

<https://www.for.gov.bc.ca/ftp/DSS/external/!publish/Web/Landscape/>

3.4 Sustainable Forest Management Plans

Independent organizations that measure forestry operations against standards for sustainable forest management complete forest management certification in Canada. The certification offers supplementary assurance that forest lands are managed legally, sustainably and in compliance with internationally acknowledged standards for sustainable forest management.

Certification is acquired for various reasons; consumers may consider certification in their purchasing decisions, while forestry companies can demonstrate responsible resource management through certification.

The operations by West Fraser Mills Ltd and BCTS are certified by the Sustainable Forestry Initiative (SFI), an internationally-recognized sustainable forest management certification program.

BCTS has published a provincial plan for certification:

<https://www.for.gov.bc.ca/ftp/HBT/external/!publish/Web/EMS2/BCTS-Provincial-SFM-Plan.pds>

West Fraser’s plan is available upon request.

3.5 State of the Forest Report (2004)

The achievement of the LRMP and LUPs has been monitored in the Bulkley TSA through a monitoring and reporting program. The monitoring results were published in 2004 in the Bulkley State of the Forest Report (SOFR). The intent of the report is to present a formal accounting of how well the LUP objectives have been achieved.

The SOFR describes the status of forest-based values in the Bulkley Timber Supply Area in 2004 using a series of indicators. These indicators help quantify the current state (in 2004) of the forest.

It was the intent that this report be updated in five-year intervals incorporating changes in licensee operations due to sustainable forest management plans or certification initiatives which may identify new indicators. While no updated SOFR haven been published, the Integrated Land Management Bureau (ILMP) is currently working on a report (2017 draft) addressing a subset of LRMP objectives using indicators that are in many cases similar to those presented in the SOFR.

Table 1 shows the summary of the monitoring results for the Bulkley TSA as published in the SOFR.

Table 1: State of the forest report card (2004)

Value	Indicator	Indicator Achievement
Biodiversity	Ecosystem Representation	100%
	Old Seral in Cores	No Target
	Interior Forest in Cores	100%
	Seral Stage Distribution	93%
	Landscape Connectivity	81%
	Patch Size Distribution	96%
	Protection for Endangered Plant Communities	48%
	Stand Structure	100%
	Species composition	97%
Wildlife Habitat	Adherence to Forest mgt Objectives	99.9%
Watershed Integrity	Terrain Stability Mapping	92%
	Overview Watershed Assessments	80%
	Watershed Restoration	65%
	Co-ordinated Water Quality Monitoring	25%
Timber Management	Prompt Reforestation (reforested vs. denuded)	95%
	Prompt Reforestation (FG vs. denuded)	72%
	Maintenance of Forest Health	90%

	Sustained Flow of Timber	86%
	Harvest the Profile	64%
Visual Quality	Visual Quality of Timber Harvesting	100%
Cultural Heritage	Management of Cultural Heritage Features	75%
Access	Access to Facilitate Natural Resource Mgt. Extraction	84%
	Recreational Access	90%
	Wilderness Lakes	86%
	Circle Routes	88%
	Sensitive Terrain	84%
	Access per RAMP (summer)	90%
	Access per RAMP (winter)	79%
	Impact on Fish, Wildlife & Other Environmental Values	88%
	Access to Recreational Sites/Trails	100%
Range	Use of Existing Grazing Tenure Area	35%

3.6 Higher Level Plan Order Analysis, 2011 and 2017

Government and the Bulkley TSA licensees monitor the status of the various landscape-level objectives set in the Bulkley HLPO (2006). The monitoring extends to the objectives established in the Bulkley Valley SRMP and covers also the 2000 Bulkley LRMP and associated LU plans. Included in the monitoring are also fisheries sensitive watersheds established through a GAR and sensitive watersheds identified by the district manager and regional fish, wildlife and habitat manager. The monitoring results were first published in 2011 by Forsite Consultants (Bulkley Timber Supply Area, Higher Level Plan Order Analysis). The second round of monitoring was completed in 2016 and the analysis results are expected to be published in 2017. The results of the 2011 analysis are briefly summarized below.

The project analyzes the current state of key indicators and makes predictions of indicator trends into the future. The intent is to assist planning in the TSA by identifying areas where planned harvest activities may exceed or are about to exceed limits set by legislated government objectives. Strategies can then be developed to address the management of the values that may be under pressure.

The 2011 analysis considered 10 indicators and reported their current status and near future status.

3.6.1 Seral Stage Distribution

The Bulkley LRMP requires that a natural seral-stage distribution is maintained in forested areas of BEC variants. The plan also sets seral stage targets by LU and BEC variant.

The analysis found that 19% of the CFLB does not meet the set seral stage targets. Generally, the late seral stage targets were found to be the most difficult to meet.

3.6.2 Core Ecosystems

As per the Bulkley LRMP, range use and harvesting is to be avoided within core ecosystems. The key objective is to retain representative ecosystems, including rare and endangered plant communities.

The analysis found that limits specified in government objectives were not exceeded.

3.6.3 Landscape Riparian Corridors

The Bulkley LRMP requires that habitat connectivity be maintained across the landscape through landscape corridors as identified in the Bulkley TSA. The landscape corridors consist of predominantly mature seral stages with old forest structure and function.

The LRMP designated limits were exceeded on 14,000 ha or 16% of the CFLB.

3.6.4 Key Forested Caribou Habitat

The distribution of stands greater than 90 years of age within designated Key Forest Caribou Habitat (KFCH) was analyzed. The requirement is to have at least 50% of these areas in mature or old age classes. The target was met, as 89% of the area was found to meet the indicator criteria.

3.6.5 Telkwa Caribou Wildlife Habitat Area

Early seral stages within SBS mc and SBS dk BEC units within the now established (2011 draft) WHA are not expected to exceed the limits of 28% and 39% correspondingly. The analysis found that the share of early stage in SBS mc was at 28.0%, while the limit in SBS dk was at 39.7% of the CFLB slightly exceeding the constraint.

3.6.6 High-Value Grizzly Bear Habitat

The Bulkley LRMP requires that high-value grizzly bear habitat is provided in locations identified for security and bedding. It is expected that a minimum 80% of the forest is older than 50 years of age in each of the locations at all times.

The 2011 found that, while 93% of the CFLB area is currently made up of stands greater than 50 years of age, in several individual grizzly bear units the target is not met.

3.6.7 Mixed Forest Grizzly Bear Habitat

The Bulkley LRMP requires that a diverse understory within locations identified as mixed forest grizzly bear habitat is provided. In these locations it is expected that a maximum of 25% of the CFLB is less than 3 meters in height. The limit was slightly exceeded on 100 ha (5%) of mixed grizzly bear habitat.

3.6.8 Sensitive Watersheds

The analysis determined equivalent clear cut areas (ECA) for identified sensitive watersheds. The minimum threshold ECAs were not exceeded in any watersheds with targets; however the majority of the watersheds had not targets (53%).

In several watersheds the maximum road density and the maximum stream crossing density as determined by Interior Watershed Assessment Procedure (IWAP) was exceeded.

3.6.9 Patch Size Distribution

Patch size distributions were assessed against targets by natural disturbance type (NDT). The analysis found that 85,042 ha (96%) of the disturbed landbase exceeded the patch size targets. The targets are designed to be met at the end of the rotation (60 to 100 years); the trends found in

consecutive analyses over time will provide more conclusive information than a single snap shot analysis.

3.6.10 Combined Constraint Status

The 2011 analysis considered all indicators and related objectives simultaneously. It found that the cumulative effect of all those cases, where targets were not met was approximately 110,000 ha, or 21% of the CFLB. This may indicate that future harvests in the TSA is more constrained than previously anticipated. As the analysis considered CFLB, rather than THLB, the timber supply impact remains uncertain.

3.7 Silviculture Strategies

3.7.1 Type 1 Silviculture Strategy (2000)

Cortex Consultants Inc. completed a Type 1 Silviculture Strategy for the Bulkley TSA in 2000 (Cortex Consultants Inc. 2000). The objective of the strategy was to provide strategic guidance to the district staff for designing and implementing an incremental silviculture program.

The silviculture strategy addressed three key issues in the TSA:

- ❖ Backlog;
- ❖ Mitigating the projected reduction in harvest levels; and
- ❖ Increasing the size of the THLB.

Strategy elements:

1. Eliminate approximately 1,000 ha of backlog NSR by 2003;
2. Increase the growth of existing stands through commercial thinning of 2,200 ha of young stands and fertilizing 2,000 ha of spaced lodgepole pine;

Retain balsam advanced regeneration when harvesting balsam stands;

Expand the timber harvesting land base by:

- ✓ Harvesting (subject to markets) 24,000 ha of low site balsam/hemlock and about 15,000 ha of pine in stocking classes 2, 3 and 4;
- ✓ Rehabilitating roads and landings, and
- ✓ Reclassifying low sites.

Increase regenerated stand yields for poor (1,000 ha total), medium (1,500 ha/year) and good sites (500 ha/year) through planting improved and large stock, site preparation and microsite selection, fertilization at sowing and planting, brushing, spacing, fertilization after free-growing, and recognition of mixed species stands.

3. Treat high density stands (past wildfires) by thinning and fertilizing 3,000-4,000 ha of balsam, hemlock, spruce and lodgepole pine in old burns.
4. Expand the timber harvesting land base by using silvicultural systems that avoid adjacency constraints (partial cutting) and fine tuning landscape-unit zoning in sensitive zones.

5. Manage for a variety of timber products so that 50% of the area harvested in the Bulkley TSA produces defined sawlog products by juvenile spacing.

Produce clear sawlogs with a minimum 35 cm diameter from 10% of the THLB by juvenile spacing, pruning, and fertilizing.

Manage a further 25% of the THLB for increased net volume yields by controlling density, followed by commercial thinning.
6. Address biodiversity requirements by meeting the objectives of landscape unit plans and forest practices guidebooks in the implementation of the silviculture strategy.
7. Initiate habitat supply projections for grizzly bear, moose and caribou, to defined areas or the entire TSA depending on the species, to quantify habitat supply.
8. Assess the condition of riparian areas logged before the Forest Practices Code in the Chapman and Harold-Price Landscape Units, develop guidelines for appropriate stocking, and treat areas as required. These guidelines could eventually be adopted for application in other parts of the TSA.
9. Achieve VQOs by reducing the green-up age through planting at higher densities with improved, large-size stock and fertilizing at planting, increasing the component of lodgepole pine, retaining poles and saplings at harvest, and using deciduous species.
10. Maintain an even flow of labour-intensive silviculture activities (juvenile spacing, brushing, planting, pruning) to create stable employment in the Bulkley TSA. Involve the First Nations Economic Committee in determining ways to create employment opportunities for First Nations.
11. Address First Nations' concerns about forest practices through consultation by government and licensees and building constructive relationships with First Nations.
12. Address conflicts between range and timber management by enforcing tenure conditions, obstacle planting with large stock, proper cattle management and seeding of landings and in-block roads to increase available range away from plantations.
13. Continue to harvest old, slow-growing balsam/hemlock stands currently in the partitioned cut to replace them with managed, thriftier stands.
14. Address the five main forest health concerns – balsam bark beetle, mountain pine beetle, spruce beetle, tomentosus root rot and stem rust – through the Bulkley TSA forest health strategy.

This strategy was developed as a high-level strategy, and the elements of the strategy are considered to have good merit. However, very few of the specific treatments were carried out. After the development of this strategy, the local focus for silviculture planning moved to the 2001 Bulkley Silviculture Strategy.

The following link provides background information on silviculture strategies:

<https://www.for.gov.bc.ca/HFP/silstrat/index.htm>

3.7.2 Bulkley Silviculture Strategy 2nd Edition (2001)

In 2001 the Bulkley Silviculture Committee prepared the Bulkley Silviculture Strategy. The purpose of the strategy was to:

- ❖ Identify and provide strategies for product targets;
- ❖ Create a long-term timber supply that supports a steady wood flow in the Bulkley TSA;
- ❖ Guide preparation of silviculture and stand management prescriptions;
- ❖ Rank stands for silviculture investments;
- ❖ Decrease long-term timber supply fall down;
- ❖ Protect values identified in higher level plans;
- ❖ Achieve early green up of harvested areas and;
- ❖ Increase regenerated stand volumes.

The strategy developed a ranking system that helped silviculture practitioners prioritize silviculture treatments within the TSA. The ranking system considered landscape planning hierarchy (legislation, LRMP, LU planning objectives and policy), stand planning hierarchy (basic silviculture, backlog silviculture, fall-down mitigation and incremental silviculture) and forest health risk.

According to the area foresters, the strategy and the associated ranking system facilitated the elimination of all the backlog areas in the TSA. The strategy directed treatments to enhanced timber development areas first, and planned and budgeted silviculture treatments in case funding was available; it ensured efficient utilization of Forest Renewal BC (FRBC) funding.

3.7.3 Incremental Silviculture

No incremental silviculture activities have occurred in the TSA in the past 10 years.

3.8 Provincial Stewardship Optimization/THLB Stabilization

MPB infestation impacts, other resource industries and the need to establish habitat for Species at Risk (SAR) are constraining the available land base for timber harvesting. In 2015 the Chief Forester initiated the Provincial Stewardship Optimization/THLB Stabilization project.

The intent of the project is to optimize stewardship while minimizing its impacts and stabilizing the Timber Harvesting Land-base (THLB). In practical terms, the project attempts to find more efficient ways throughout the province to meet all the SAR requirements, and objectives for the 11 FRPA values. This can be done by investigating different combinations of locating the many constraints on timber harvesting. The primary objective of the project is to stabilize or increase the size of the THLB by optimizing the placement of spatial constraints, without changes in land use plans or legislation.

The Bulkley ISS can be used as a tool to investigate opportunities for THLB stabilization.

For more information on the Provincial Stewardship Optimization/THLB Stabilization:

<https://www.THLB stabilization CF memo>

3.9 Fire Management

The ISS planning team will set priorities for reducing fire hazards and risk for the Bulkley TSA. The focus is on reducing fire hazards and risk to protect life, properties and critical infrastructure, high environmental and cultural values and resource values. This can be accomplished through planning

of fire breaks, use of fire management stocking standards and providing recommendations for fuel management. The ISS will be informed by the Bulkley Zone Fire Management Plan (FMP) (draft, 2016).

3.10 Forest Health Strategy

The Skeena Stikine Natural Resource District is currently preparing an updated forest health strategy for the Bulkley, Kispiox and Cassiar TSAs. The Skeena Stikine District Forest Health Strategy and Bark Beetle Tactical Plan (DSS-HST) presents current forest health conditions, issues, management strategies and bark beetle management procedures. This strategy identifies and ranks the existing forest health issues and factors in the Bulkley TSA (Table 2). Ranking considers the potential for agent to cause significant mortality or loss of economic value to forest resources as influenced by lethality of agent; presence of susceptible forest type; and current distribution and intensity levels.

Table 2: Damage agents in the Bulkley TSA

Pests of Mature Stands (primarily)	Ranking	Comments
Mountain Pine Beetle	Very High	Incidence has slowed. Impact is severe.
Spruce Bark Beetle	Very High	Incidence is increasing.
Western Balsam Bark Beetle	Very High	Increasing, severe timber quality issue
Aspen Pest Complex (Venturia, Leaf Miner, Tortrix)	Medium	Increasing
Stem Decay	Low	
Pests of Young Stands (primarily)	Bulkley	Comments
Dothistroma Needle Blight	Very High	
Abiotic	High	
Tomentosus root disease	Medium	
Hard Pine Stem Rusts	Medium	
Mammal Damage	Medium	
Warren Root Collar Weevil	Low	
Spruce Weevil	Low	
Various Insect Defoliators	Low	
Other Foliar Diseases	Low	
Rhizina Root Disease	Very Low	
Northern Pitch Twig Moth		
Lodgepole Pine Dwarf Mistletoe	Very Low	
Pine Terminal Weevil	Very Low	
Black Army Cutworm	Very Low	
Ips	Very Low	
Hemlock Dwarf Mistletoe		
Eriophyid Mites		

3.10.1 Mountain Pine Beetle

Mountain Pine Beetle is a priority forest health agent for the Skeena Stikine Natural Resource District due to the large areas of susceptible pine forests within the all the TSAs making up the district. Approximately 20% of the productive forest in the Bulkley TSA consists of pine leading stands.

In British Columbia, the BC Mountain Pine Beetle Model (BCMPB) is used to forecast the annual volume of pine killed by the MPB. According to the 2015 BCMPB projection for the Bulkley TSA, the MPB peak occurred in 2011 and 53 % of pine will be killed by 2024 (Figure 2 and Figure 3). The current projection predicts a small increase in attack until 2024.

Actual attack levels in the province and the Bulkley TSA have been lower than projected by the BCMPB. The major licensees target all currently infested, red or dead sawlog potential Pli-leading stands for harvest as allowed by land base constraints.

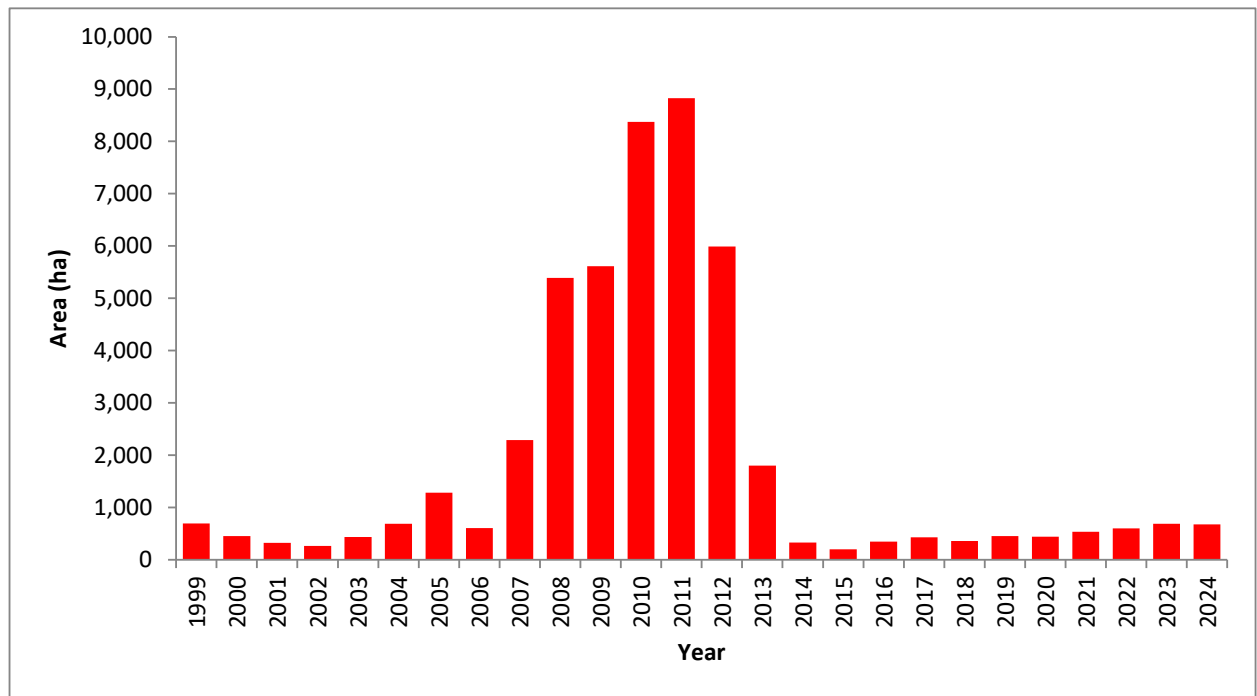


Figure 2: Area of killed pine in the Bulkley TSA

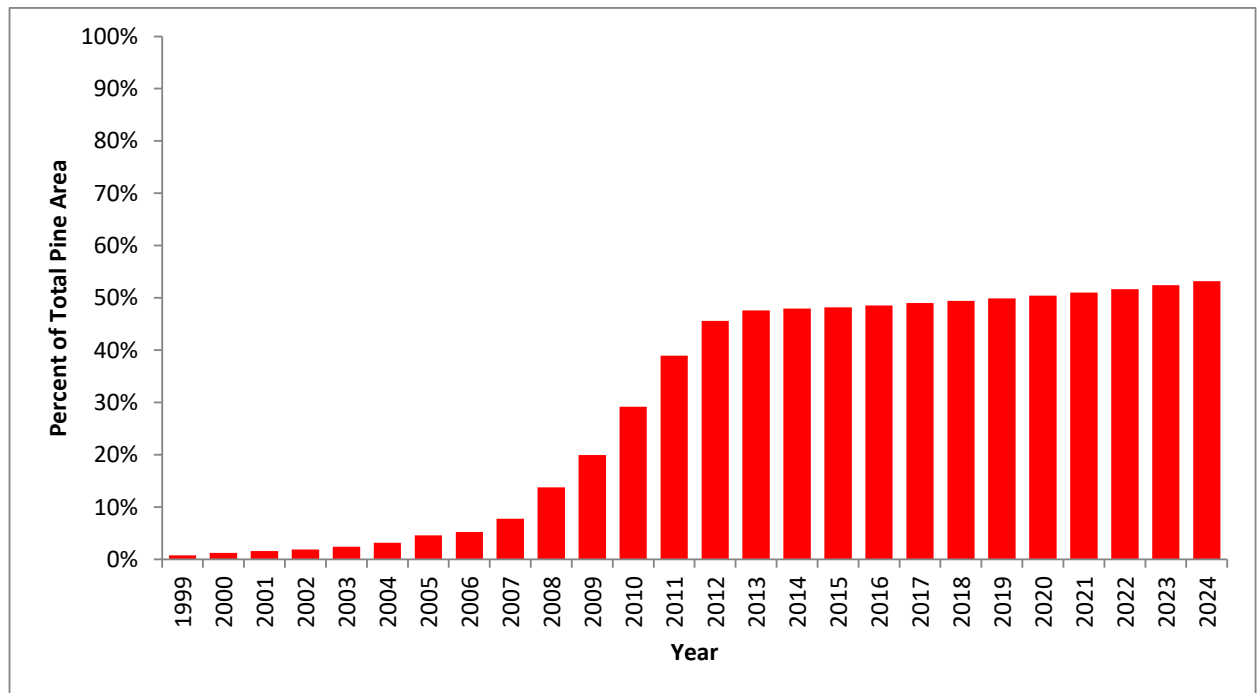


Figure 3: Pine area 100% dead (cumulative) in the Bulkley TSA

3.10.2 Spruce Bark Beetle

Spruce bark beetle causes significant damage in mature spruce forests in BC. It damages most species of spruce found in the Bulkley TSA.

Spruce bark beetle is comparable to other bark beetles such as the MPB directly impacting the tree through physical damage to the phloem and indirectly by introducing a fungus to the wood. As approximately 20% of the forests in the Bulkley TSA are spruce leading, the Spruce Bark Beetle is a priority health agent in the TSA.

The current status of the infestation is considered to be at a natural level; the latest TSR accounted for endemic levels of infestation and did not include any provisions for additional losses.

3.10.3 Western Balsam Bark Beetle

Approximately 60% of the forests in the Bulkley TSA are balsam leading and susceptible to the Western balsam bark beetle. As with other bark beetles, the western balsam bark beetle larvae boring damages the phloem physically and introduces a fungus; this can eventually girdle a tree and result in mortality.

Western balsam bark beetle is a persistent forest health agent estimated to cause approximately 5% stand level mortality. The beetle is prevalent throughout balsam-leading stands at higher elevations. The populations are considered to be at trace to low intensity levels. The latest TSR considered it an endemic pest and did not include any provisions for additional losses.

3.10.4 Dothistroma Needle Blight (DFS)

Dothistroma needle blight (DFS) attacks mostly young lodgepole pine with rare occurrences in mature pine stands. DFS causes loss of needles and consecutive attack often reduces growth significantly, or leads to mortality. In some cases whole plantations have been lost.

DFS affects plantations in the ICH biogeoclimatic variants. The latest TSR accounted for this disease through a special set of regeneration assumptions.

3.11 Ecosystem Restoration

Ecosystem Restoration (ER) 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 process (MFLNRO, 2014a). The provincial goals and potential strategies are outlined in a draft Ecosystem Restoration Provincial Strategic Plan (MOFR, 2009).

Whitebark pine (*Pinus albicaulis*) was declared an endangered species in Canada in 2012. In 2011 the Bulkley Valley Research Centre (BVRC) commenced a project to restore whitebark pine ecosystems in west central British Columbia in the vicinity of the communities of Smithers and Houston. The program has since grown and extends across northern BC. The restoration focuses on recently disturbed areas by wildfires, mountain pine beetle or salvage operations of dead lodgepole pine. Many restoration projects are located in high value grizzly and black bear habitat, where the pine seeds can contribute to the diet of both bear species.

The BVRC is an independent, non-profit society with a mission of providing the science required for sustainable resource management. The BVRC carries out research on natural and cultural resources. For further information, see: <http://bvcentre.ca/>

3.12 Species Monitoring

In 2009 the chief forester provided direction on the need to understand current trends in species selection, developing species selection criteria for sustainable future ecosystems and setting up a monitoring framework for updated data. A 2015 report from FLRNO provides an assessment of the species distribution for the Bulkley TSA. The percent share of harvest by species for the Bulkley TSA is illustrated in Figure 4, while Figure 5 and Figure 6 show the planted species and the species in regenerated stands (at year 7 or older) correspondingly.

Data indicate a trend of a significant increase in pine harvest from 2002 on. This is expected as the harvest has concentrated on MPB attacked and at risk pine stands for some time (Figure 4).

The share of pine in reforestation has increased over time (Figure 5); the increased harvest of pine has also increased its share in reforestation. The share of spruce has remained relatively constant over time.

Survey data indicates that while not generally planted in large quantities, the natural ingress of balsam tends to bring the balsam component in young stands closer to historic levels. This is illustrated in Figure 6 until around year 2001, after which there is a noted increase in pine percent in areas surveyed.

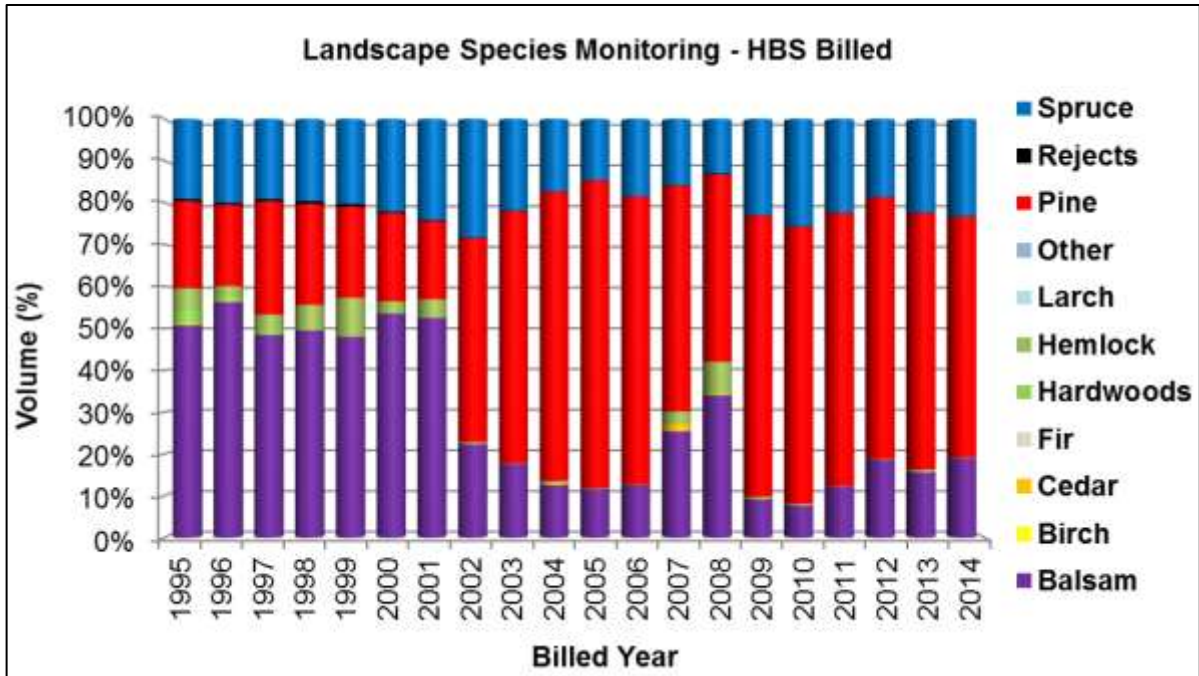


Figure 4: Percent share of harvest by species, Bulkley TSA (FNRO 2015)

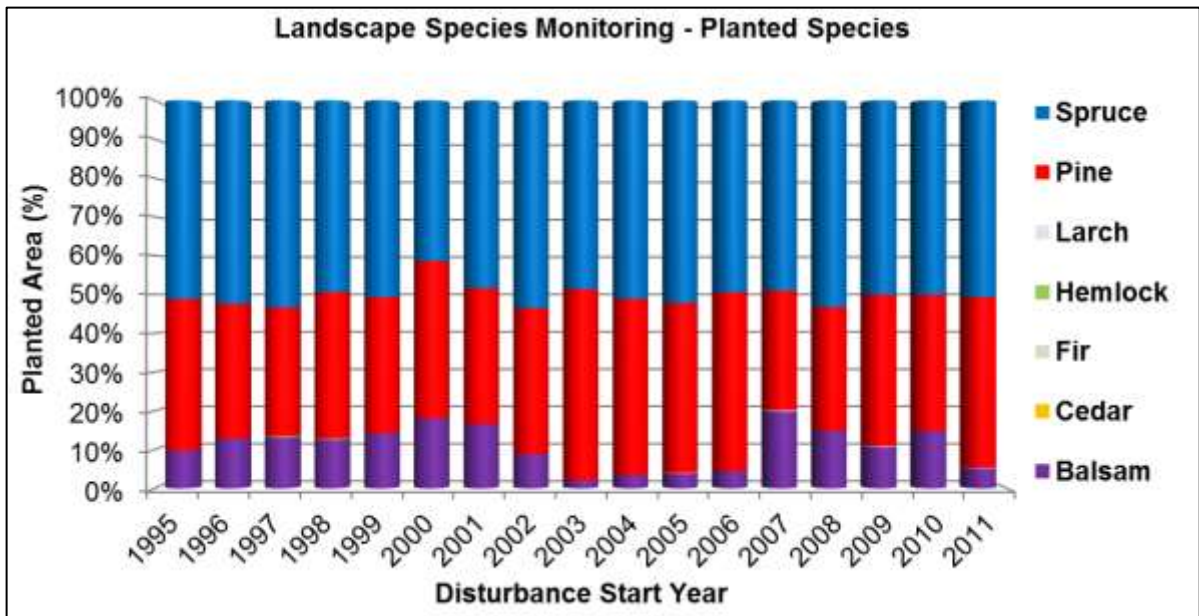


Figure 5: Planted species, Bulkley TSA (FLNRO 2015)

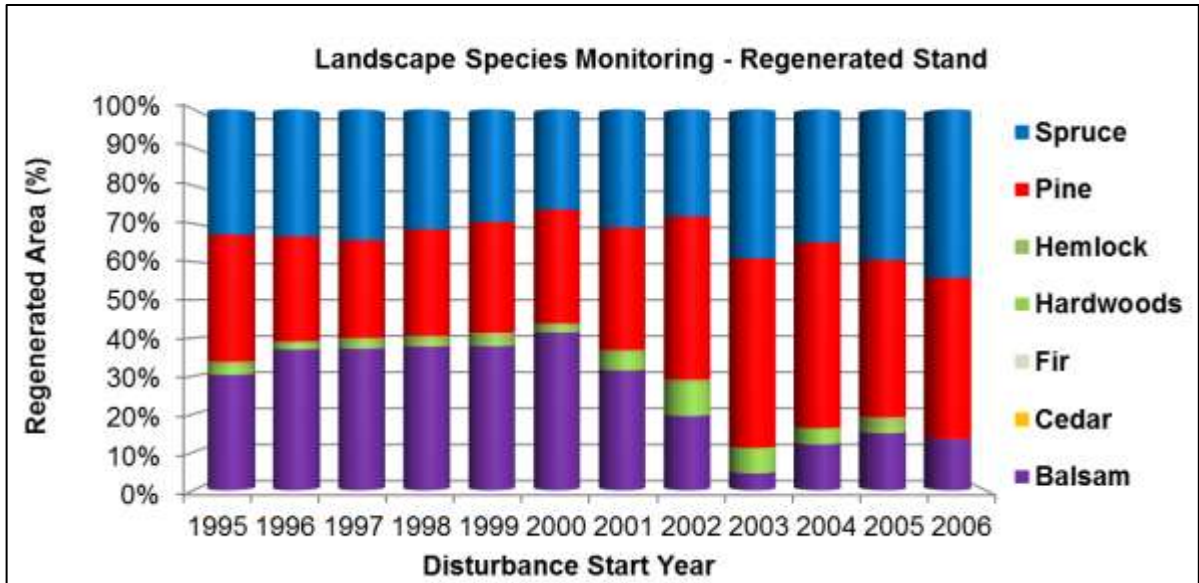


Figure 6: Regenerated species, Bulkley TSA (FNRO 2015)

4 Timber Supply

4.1 Forest Inventory

The Bulkley Vegetation Resource Inventory (VRI) Phase I was completed in 2008, while the Phase II ground and net volume adjustment factor sampling was concluded in 2010. An audit in 2012 uncovered a number of issues with Phase 1 VRI. The Phase 1 delineation and the species composition and stand age attribute decisions did not meet the ministry standard. Also, lack of confidence in balsam tree live / dead attribution was expressed.

The revised base case in the latest TSR used the Phase II adjustments for all stands except those in the ESSF immature and mature strata as discussed in section 4.5.1.1.

The district staff and the licensees feel that a new VRI Phase 1 inventory is needed for the Bulkley TSA.

Other discrepancies exist regarding the VRI information in relation to depletion coverages and the available silviculture information:

- ❖ There are VRI polygons that have a harvest history and date, but no stand height or stand age;
- ❖ There are VRI polygons where stand age is significantly different than silviculture history records indicate;
- ❖ There are VRI polygons that are incorrectly identified as having been harvested;
- ❖ There are VRI polygons that are incorrectly identified as having previous silviculture history;
- ❖ There are VRI polygons with standardized FMLB/CFLB VRI attributes that differ from those developed and used for the latest TSR (TSR3);
- ❖ There are silviculture openings where inventory label fields required for VDYP volume and yield projections are blank;
- ❖ There are harvested or other silviculture openings where the VRI assigned BCLCS code is vegetated, non-treed;
- ❖ There are harvested openings that have been mistakenly attributed as WTPs;
- ❖ Bulkley VRI BCLS level codes are inconsistent with generic VRI data dictionary BCLS level codes.

4.2 Historical and Current Annual Allowable Cut (AAC)

The current AAC in the Bulkley TSA is 852,000 m³ per year of which 502,700 m³ is attributable to sawlog stands. Sawlog stands are stands that are not classified as marginal sawlog or pulpwood stands. This AAC was set in 2014 and will remain in effect until a new AAC is determined, which must occur in 2024 or before. The historical and current AAC are shown in Table 3.

Table 3: Historical and current AAC

AAC (m ³)		1988	1995	2002	2008	Current (2014)
			895,000	895,00	882,000	852,000
Partition	Sawlog		528,000			502,700
	Marginal sawlog / pulpwood		367,000			349,300

Marginal sawlog stands are defined as follows:

1. Balsam-leading stands with greater than 80 percent subalpine fir with an average total tree height of less than 24 metres; or
2. Balsam-leading stands with an average total tree height of less than 24 metres and where more than 60 % of the net volume of the stand consists of subalpine fir and where the second species is not hemlock, western redcedar or yellow cedar; or
3. Geographically isolated stands (planning cell C7) in the forest cover inventory.

Pulpwood stands are defined as follows:

1. Hemlock or balsam-leading stands where the second species is hemlock, western redcedar or yellow cedar, and where more than 50 % of the net volume consists of hemlock and less than 20 % consists of spruce.
2. Balsam-leading stands where more than 50 % of the net volume of the stand consists of amabilis fir and less than 20 % of the net volume consists of spruce, and where the second species is not hemlock, western redcedar or yellow cedar; or
3. All types where the net volume of amabilis fir and hemlock combined is more than 50% and where the net volume of spruce is less than 20 percent.

4.3 Apportionment of the AAC and TSA Licensees

Table 4 shows the current apportionment of the AAC to various license types within the Bulkley TSA. Almost the entire AAC has been committed to the licensees operating within the TSA (Table 5). The two largest licensees within the Bulkley TSA are West Fraser Mills Ltd. and BCTS. The Wetzin'kwa Community Forest is located within the Bulkley TSA but is outside of the TSA AAC.

Table 4: Apportionment, Bulkley TSA¹

Tenure	Total (m ³)	Sawlog (m ³)	Marginal Sawlog / Pulpwood (m ³)
Forest Licenses Replaceable	409,393	332,146	77,247
Forest Licenses Non-Replaceable	100,683	0	100,683
First Nations Woodlands Tenure	127,050	43,109	83,941
BCTS Timber Sale License	208,976	123,296	85,680
Woodlot License	3,694	3,694	0
Forest Service Reserve	2,204	455	1,749
Total	852,000	502,700	349,300

¹ As of March 23, 2017

Table 5: Licence AAC commitments in the Bulkley TSA²

Tenure	Licensee	Total (m ³)	Sawlog (m ³)	Marginal Sawlog / Pulpwood (m ³)
Forest Licenses Replaceable	West Fraser Mills Ltd.	392,313	317,774	74,539
	Lowell A. Johnson Consultants Ltd	14,250	11,543	2,707
	Smaha	2,830	2,830	0
Sub Total		409,393	332,147	77,246
Forest Licenses Non-Replaceable	West Fraser Mills Ltd	185,000	0	185,000 ³
	Lowell A. Johnson Consultants Ltd.	25,287	20,482	4,805
Sub-Total		210,287	20,482	189,805
BCTS Timber Sale License	BCTS	208,976	123,296	85,680
Total		828,656	475,925	352,737

4.4 Species Profile and Age Class Distribution

The forest management land base (FMLB) in the Bulkley TSA is dominated by balsam, spruce, pine and hemlock. Balsam is the leading species on approximately 59% of the FMLB area. The share of spruce is 17% while pine is the dominant species on 19% of the land base (Figure 7). The FMLB is the portion of the TSA with forest cover. It contributes to Crown forest management objectives such as landscape-level biodiversity or visual quality objectives. The FMLB includes protected areas but does not include private land or non-forested land that is not capable of producing a commercial forest.

Pine-leading and spruce-leading stands are more plentiful in the THLB than outside of the THLB (Figure 8). While still most common, balsam-leading stands have less of a share in the THLB (Figure 8).

Older age classes dominate the THLB and FMLB in the TSA. Approximately 52% of the THLB is older than 140 years (Figure 9). Age classes 3 and 4 are not well represented.

Figure 10 depicts the THLB in the Bulkley TSA by BEC variant. Approximately 50% of the THLB is in the SBSmc2 variant, while almost 30% is in the ESSFmc variant.

² As of March 23, 2017

³ This license expires November 2017. Beyond 2017, distribution of this volume could be held by different licenses/licensees but will remain under the Marginal Sawlog/Pulpwood partition.

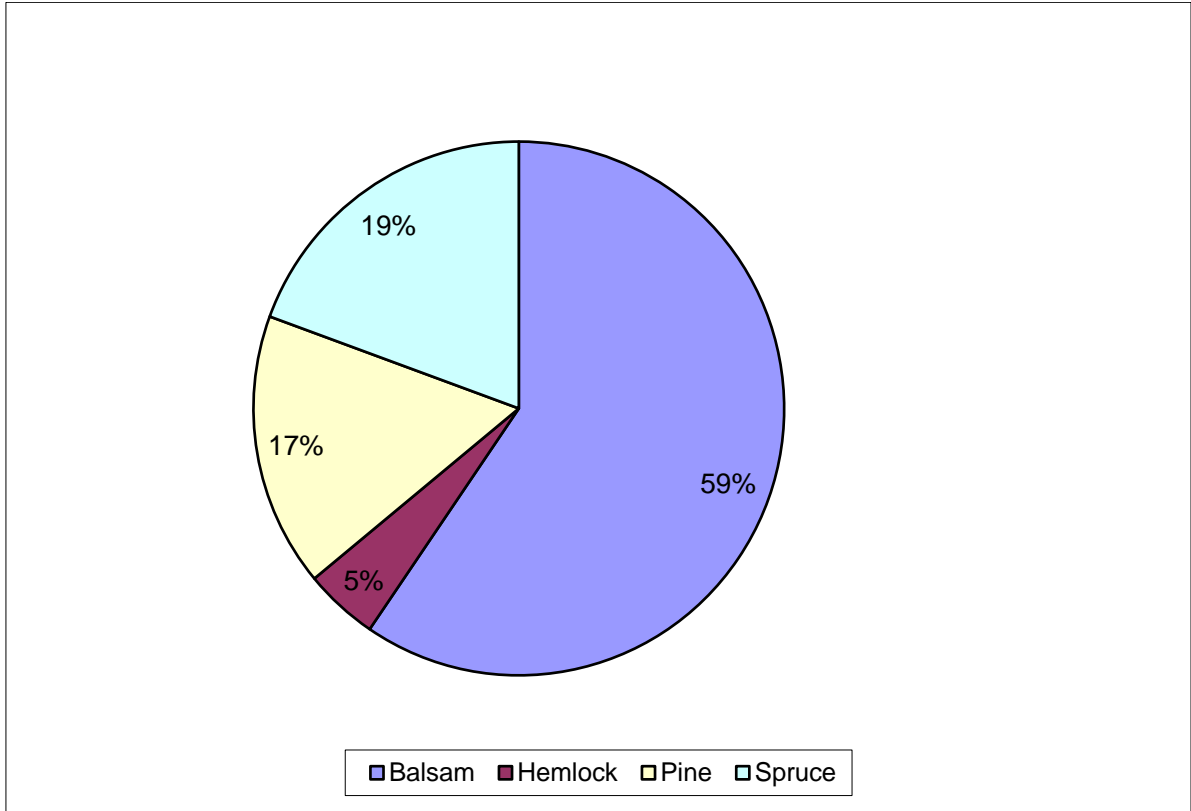


Figure 7: Leading species on the FMLB, Bulkley TSA

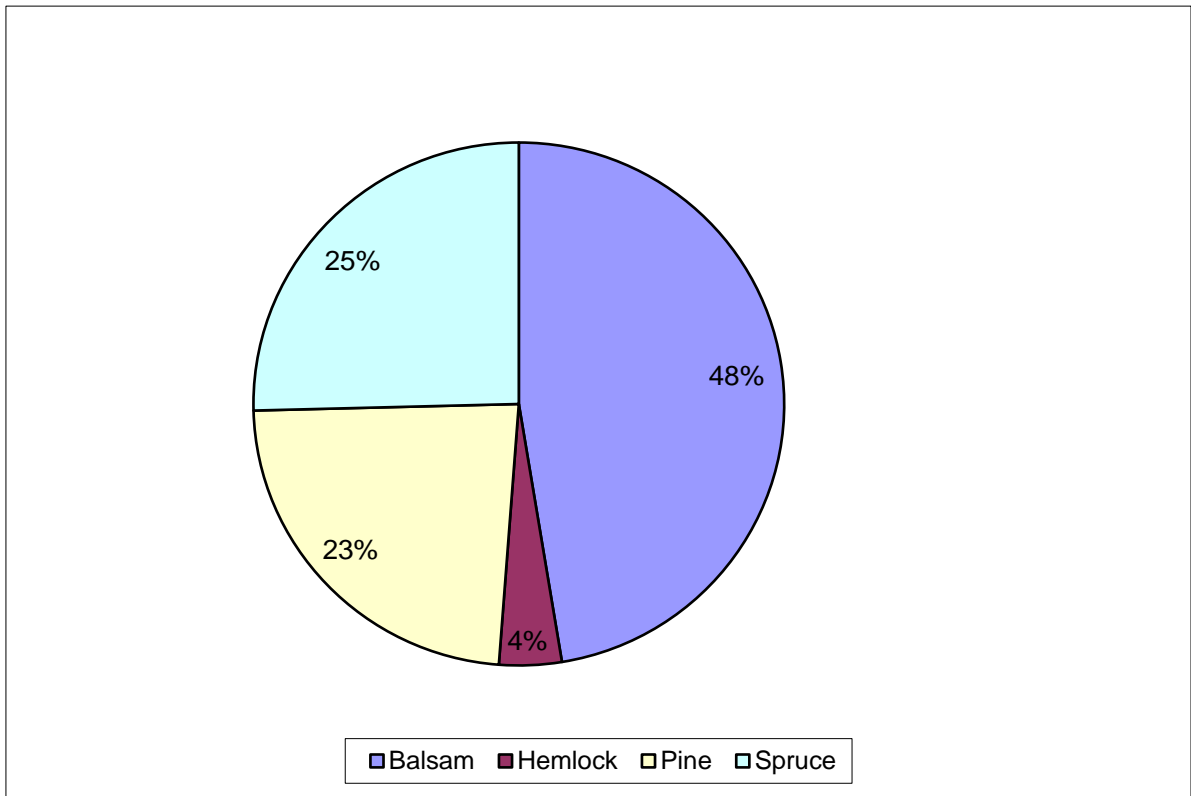


Figure 8: Leading species on the THLB, Bulkley TSA

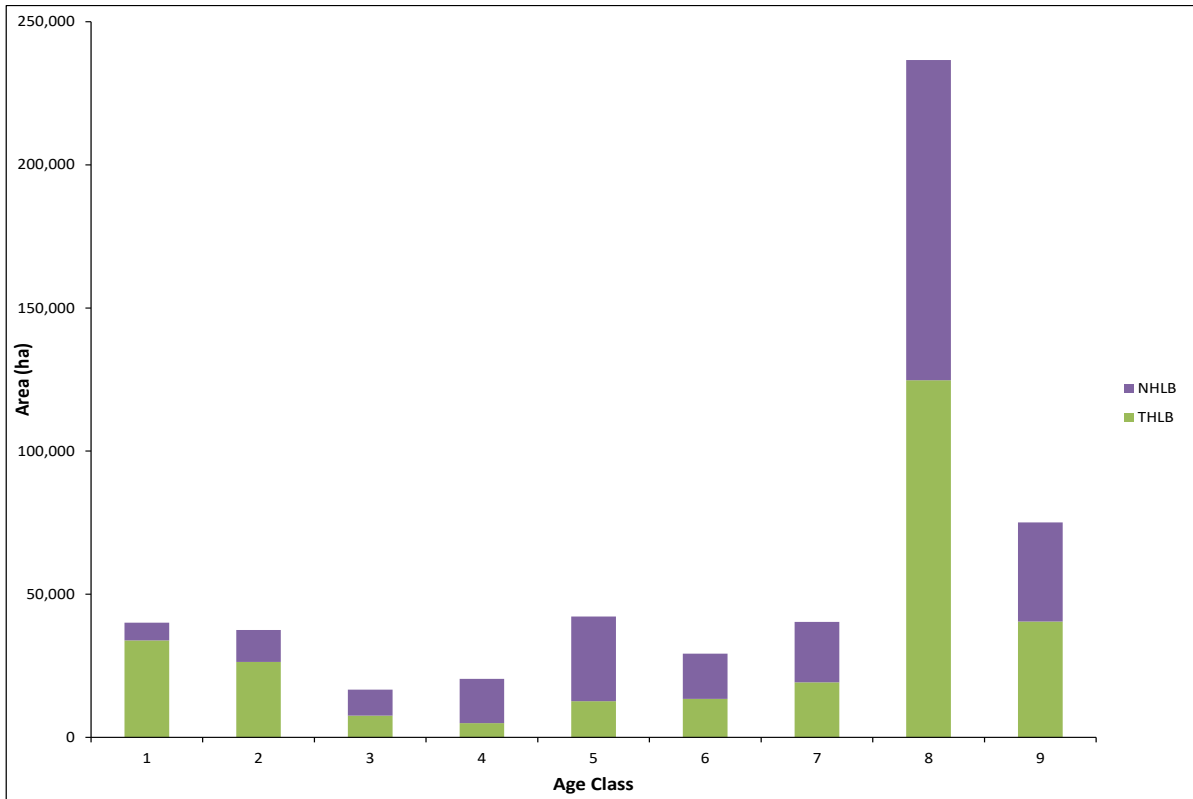


Figure 9: Age class distribution, Bulkley TSA

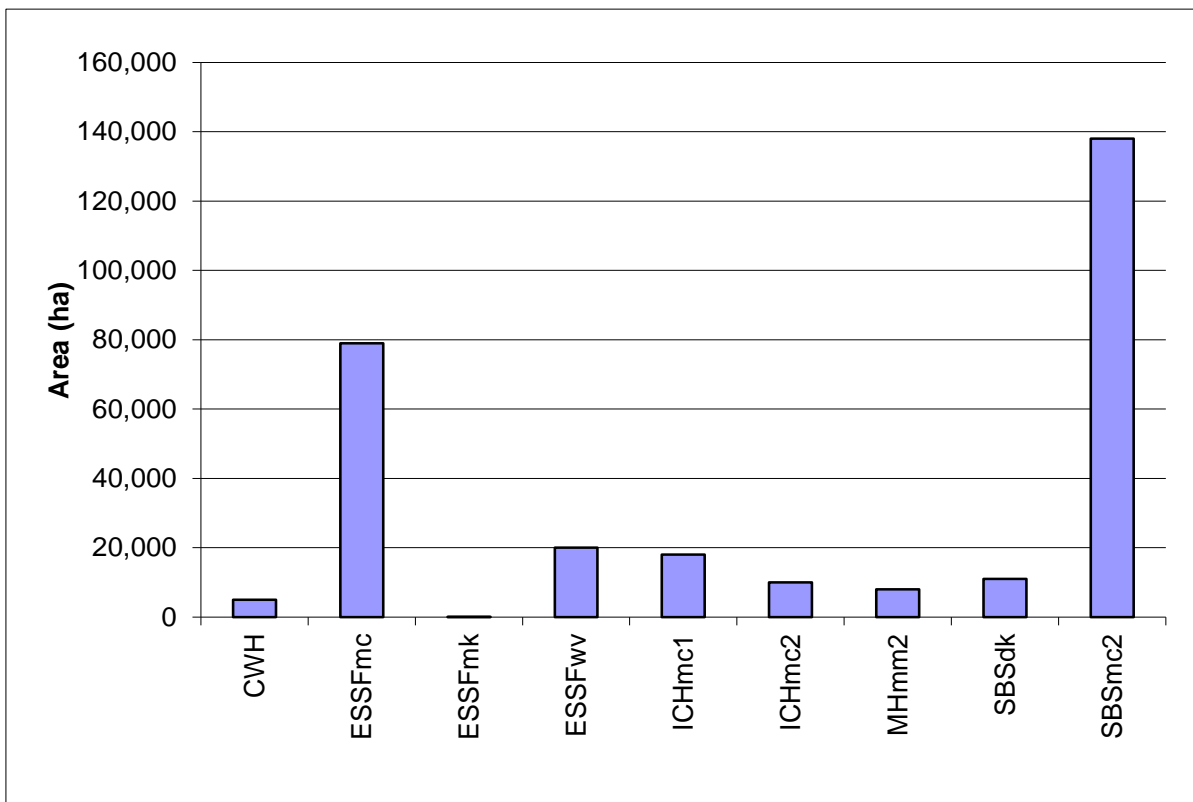


Figure 10: THLB by BEC variant in the Bulkley TSA

4.5 Current Timber Supply Situation

4.5.1 Initial Base Case

Figure 11 illustrates the harvest forecast for the Bulkley TSA from the latest timber supply review (TSR). In the forecast the initial harvest level of 802,470 m³ per year is maintained for 10 years. The mid-term harvest level is 6.2% lower at 752,400 m³ per year and stays at this level until year 120 when the long – term harvest level of 881,290 m³ per year is reached.

The timber supply forecast assumes a steady harvest of around 300,000 m³ per year of marginal sawlogs and pulpwood for 70 years.

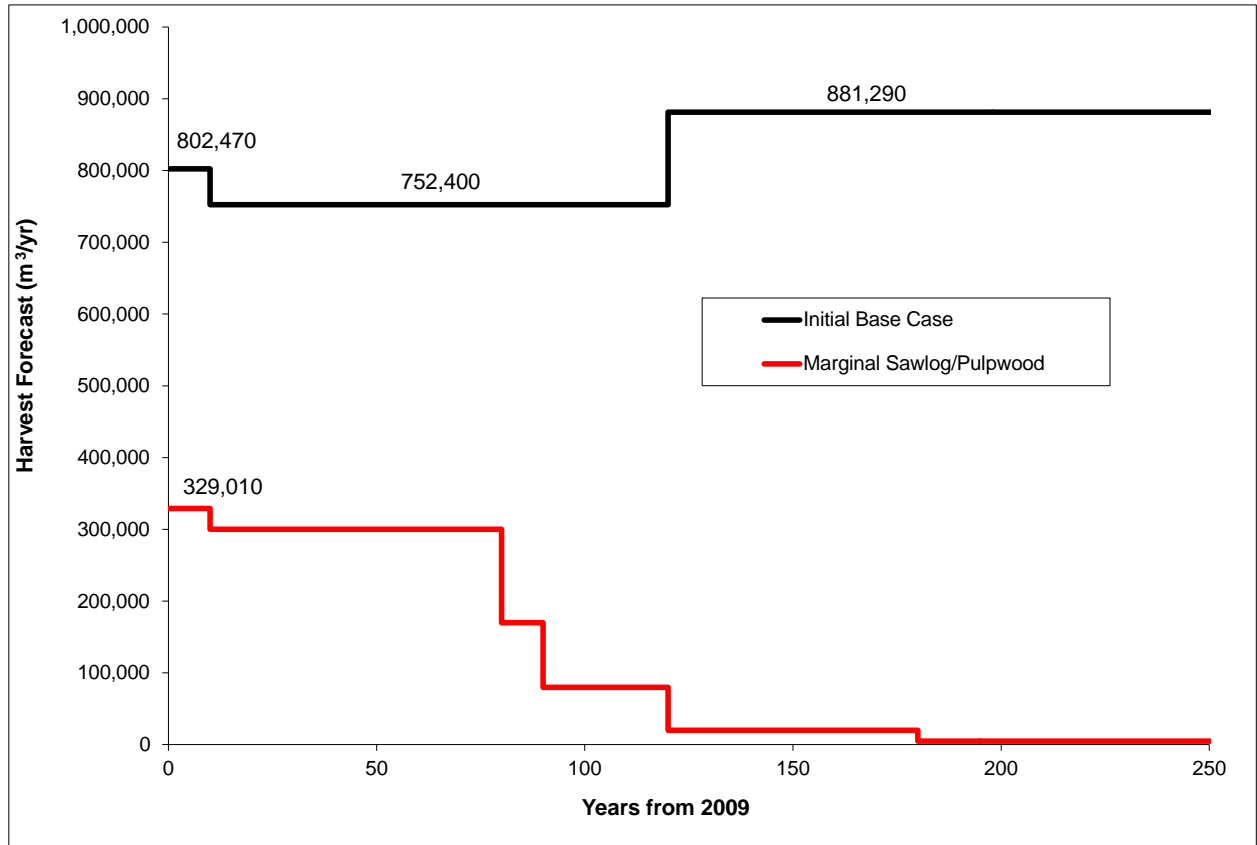


Figure 11: Initial Timber supply forecast for the Bulkley TSA; TSR 3 2013

4.5.1 Revised Base Case

4.5.1.1 Inventory Adjustment

The VRI Phase 2 adjustment information was available during the preparation of the initial base case. However, the Phase 2 adjustments were exceptionally large in some strata, which prompted a thorough review of the sample data and adjustment procedures. As the results of the review were not promptly available, the initial base case proceeded using VRI Phase 1 volumes for existing natural stands.

The review identified errors in the Phase 1 inventory, particularly in stand attributes of all stands and more so in the immature and mature stands in the ESSF biogeoclimatic zone. The review also made recommendation as to the use of Phase 2 adjusted volumes in the TSR. It was suggested that

VRI Phase 2 volumes be used for modelling expect for the ESSF immature and mature stands due to the large uncertainty associated with the adjustments in these stands. The recommended adjustments were incorporated in the revised base case.

4.5.1.2 Volume Estimates for Managed Stands

The initial base case review suggested that target densities used in the preparation of managed stand yield curves should be reduced somewhat to account for the incidence of pests and diseases leading to lower than expected free-growing stand densities as per stand development monitoring in the TSA. The revised base case followed these recommendations.

4.5.1.3 Operational Adjustment Factor 1 (OAF1)

Operational adjustment factors (OAF) are usually applied to the yields of managed stands to reflect average operational growing conditions.

OAF 1 allows for yield reductions associated with non-productive areas in the stand, uneven spacing of crop trees (clumping), and endemic and random loss. The standard OAF1 of 15 % is considered a province-wide approximation of the difference between research plots and actual yields.

In the initial base case an OAF 1 value of 5 % (instead of 15 %) was applied to about 80 % of stands based on a study “OAF 1 Sampling in the Bulkley, Lakes and Morice Forest Districts (2003)”. A later study (2013) by FAIB staff concluded that a modest reduction to the standard OAF 1 of 15 % may be appropriate due to stocking gaps; however, considerable uncertainty was suggested about the other OAF 1 components. The study concluded that the standard OAF 1 of 15 % should be used in in timber supply analysis.

4.5.1.4 Revised Harvest Forecast

Figure 12 illustrates the revised base case for the Bulkley TSA. The initial harvest level is about 6 % higher than that of the initial base case at 849 000 m³ per year and can be maintained for one decade. At year 11 the harvest level decreases to 813 480 m³ per year. This level is maintained for the rest of the planning horizon. The mid-term harvest level of the revised base case is approximately 8 % higher than the initial base case while the long-term harvest level around 8% lower.

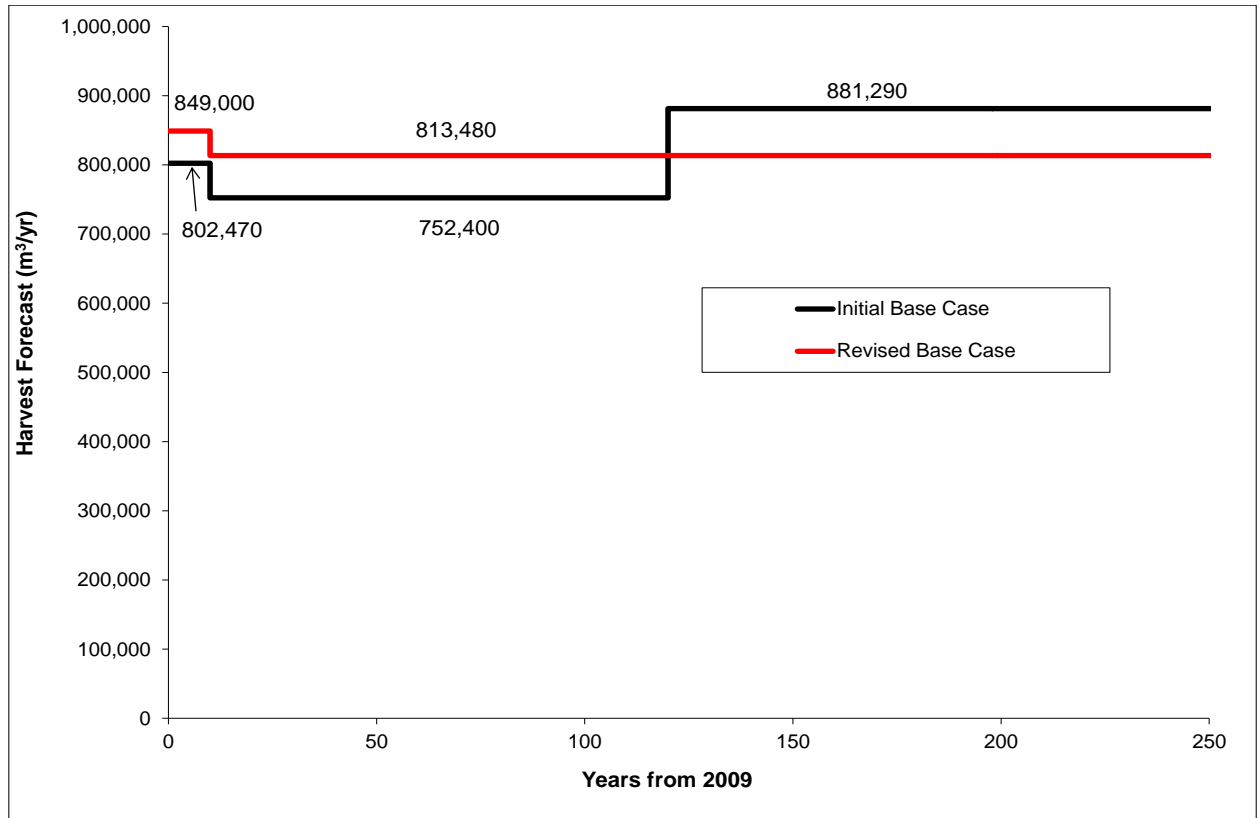


Figure 12: Timber supply forecast for the Bulkley TSA, revised base case

4.5.1.5 Harvest Age and Harvest Volume

The TSR set the minimum harvest criteria based on a combination of stand height, diameter at breast height and a minimum volume per ha as per Table 6.

Table 6: Minimum harvest criteria, TSR 3

Leading Species	Stand Quality	Height (m)	Diameter (cm)	Volume/ha (m³)
All	Pulpwood	21	21	150
Pine	Sawlog and Marginal Sawlog	18	18	150
Non-Pine	Sawlog and Marginal Sawlog	Not used	25	150

In the analysis, the stands were harvested on average at the age of 200 years in the first 4 decades. In the long term, the harvest consists mainly of managed stands with the average harvest age of around 100 years.

The minimum harvest criteria and land scape level retention of late seral stages are predicted to result in an unbalanced age class distribution on the THLB over time. In 250 years, the THLB is forecast to be mostly 100 years old or younger, with a large area also in age class 9 (>250 years old).

The TSR predicted an average harvest volume of about 275 m³ per ha for the first eight decades and an increase to about 350 m³ per ha in the long term when mostly the more productive second growth stands will be harvested.

4.5.1.6 Transition from Natural Stands to Managed Stands

For the next 40 years the timber supply is expected come from stands that are older than 140 years of age. After year 40, about 50% of the timber supply is expected to come from managed stands.

4.5.2 Chief Forester's AAC Determination

In his determination the Chief Forester noted factors that create upward pressure on the timber supply.

Log grade adjustments: the new interior log grade system charges both live and dead logs to the AAC provided that the logs meet the required grade specifications. The dead volume was not included in the base case harvest forecast, which may have underestimated the base case short- and mid-term harvest levels up to eight percent.

Mountain goat winter range: 2,350 ha of the THLB was inadvertently excluded from the THLB and the harvest forecast resulting in a one percent underestimation of the timber supply throughout the planning horizon.

4.5.2.1 Implementation

In his implementation notes the Chief Forester encouraged the FLNR staff and the licensees to:

1. Monitor the cable – marginal sawlog zone to improve data and information for subsequent TSRs.
2. Carry out stand development monitoring for better understanding of the stocking and viability of future managed stands; particularly those regenerated from Class A seed.
3. Monitor forest stewardship plans to conclude whether the Higher Level Plan Order objectives for patch size distribution are being met.
4. Monitor performance in the marginal sawlog/pulpwood partition. Are these stands harvested and converted to managed stands at a reasonable rate to protect future timber supply.

4.6 Harvest Performance and Trends

Figure 13 illustrates the past harvest in the Bulkley TSA. The harvest has not met the AAC between years 2006 and 2015; approximately 70% of the AAC was harvested during this time period (Table 7). Harvest levels in the Bulkley TSA have been reduced due to salvage operations in Lakes and Prince George TSAs to address the MPB infestation.

Harvesting of the MPB impacted stands within the Bulkley TSA contributes to the high share of pine harvest (Figure 13 and Table 7). Within the last 10 years approximately 60% of all harvest in the TSA has been pine, while the rest of the harvest is evenly distributed between spruce and balsam, around 20% for both.

Between 2006 and 2015, approximately 78 percent of the harvested volume scaled as sawlog with the remaining volume consisting of low grade and non-scaled cruise based dead and live volumes (Figure 14 and Table 8).

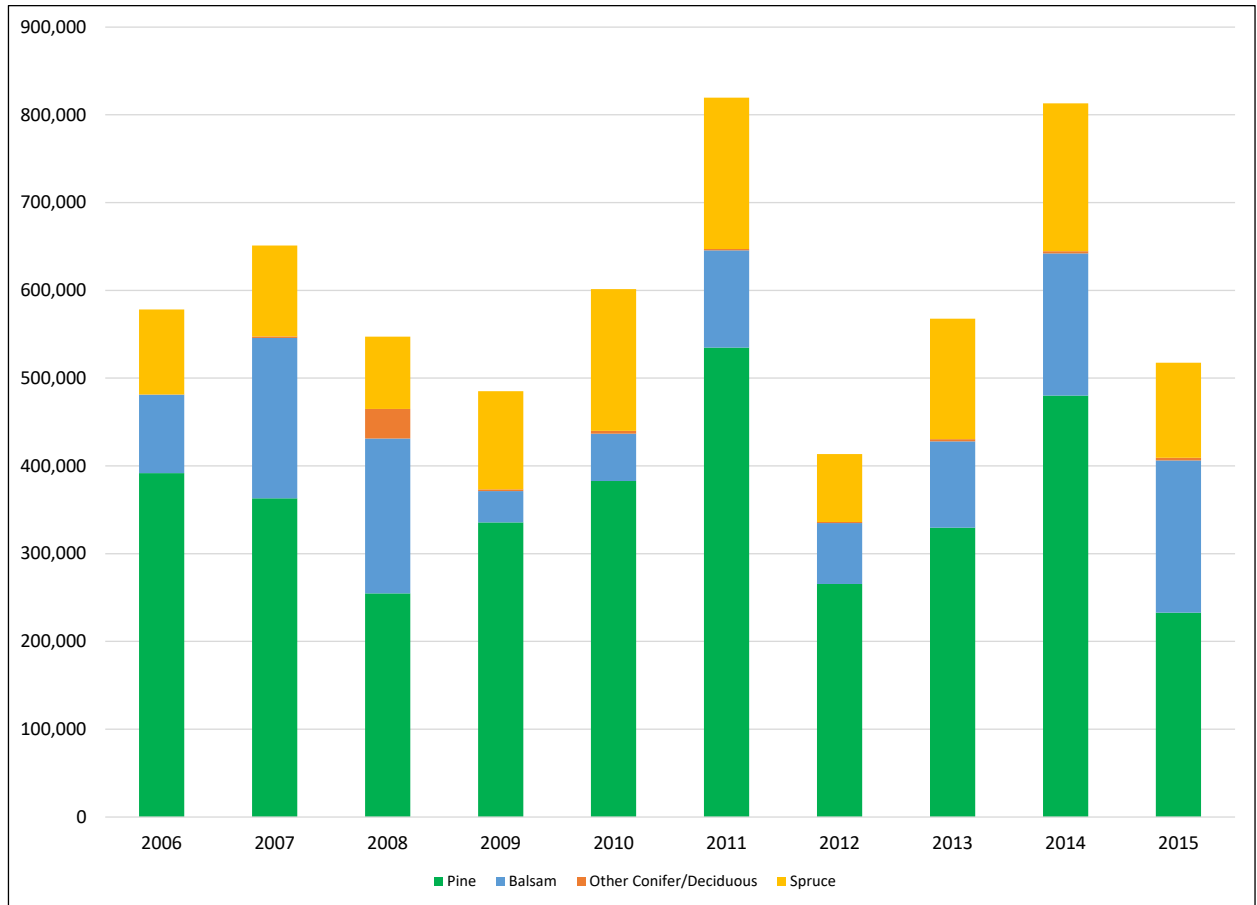


Figure 13: Harvest by species in the Bulkley TSA (m³)

Table 7: Billed volume by species 2006 – 2015, Bulkley TSA (m³)

Scale Year	Balsam	Other Conifer / Deciduous	Pine	Spruce	Total	AAC	% AAC
2006	89,153	425	391,863	96,837	578,279	882,000	65.6%
2007	182,621	1,643	363,165	103,684	651,113	882,000	73.8%
2008	176,450	33,690	254,731	82,414	547,284	852,000	64.2%
2009	35,795	2,126	335,484	111,757	485,162	852,000	56.9%
2010	53,968	3,115	382,726	161,636	601,445	852,000	70.6%
2011	110,753	1,564	534,849	172,390	819,557	852,000	96.2%
2012	69,398	1,167	265,502	77,392	413,459	852,000	48.5%
2013	98,377	2,527	329,626	137,108	567,637	852,000	66.6%
2014	162,062	2,472	480,120	168,412	813,067	852,000	95.4%
2015	173,426	2,909	232,826	108,491	517,652	852,000	60.8%
Total	1,152,004	51,636	3,570,892	1,220,122	5,994,654	8,580,000	69.9%

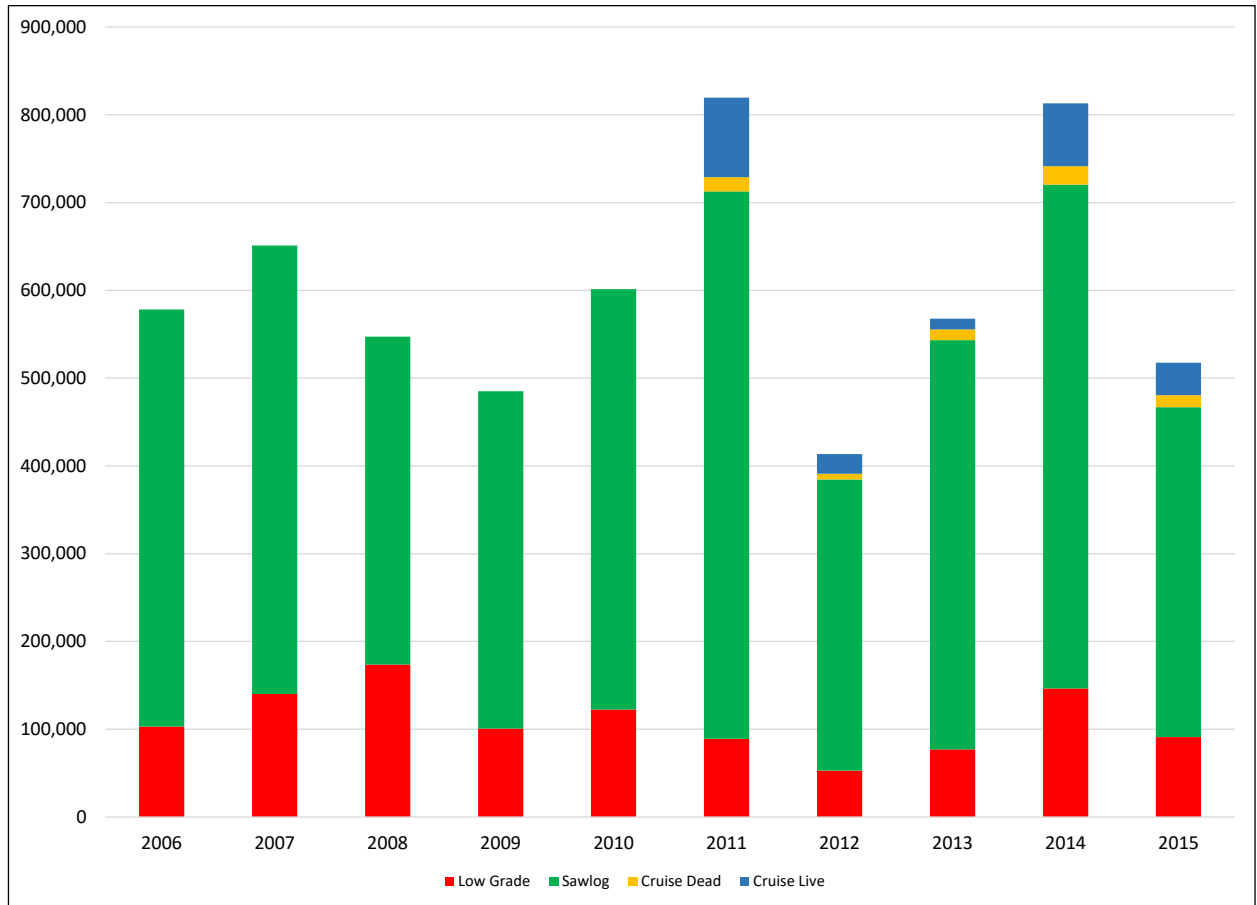


Figure 14: Harvest by grade class in the Bulkley TSA (m³)

Table 8: Billed volume by grade class 2006 – 2015, Bulkley TSA (m³)

Scale Year	Cruise Dead	Cruise Live	Low Grade	Sawlog	Total	% Sawlog
2006			102,964	475,314	578,279	82%
2007			140,065	511,048	651,113	78%
2008			173,647	373,637	547,284	68%
2009			100,647	384,515	485,162	79%
2010			122,554	478,891	601,445	80%
2011	16,295	90,525	89,109	623,627	819,557	76%
2012	6,508	22,479	52,736	331,736	413,459	80%
2013	12,359	12,075	76,960	466,243	567,637	82%
2014	20,988	71,575	146,500	574,004	813,067	71%
2015	13,841	36,997	91,067	375,747	517,652	73%
Total	69,991	233,651	1,096,250	4,594,761	5,994,654	77%

4.7 Silviculture

4.7.1 Basic Silviculture

The success of basic silviculture is crucial to future timber supply. Basic silviculture is also the basis for future incremental treatments. The following questions have been discussed throughout British Columbia in the silviculture strategy workshops:

- ❖ Are the initial stocking densities sufficient to ensure the production of a reasonable volume of timber on a given site?
- ❖ Are the initial densities sufficient to provide the quality of timber for future markets?
- ❖ Are the initial densities sufficient to buffer against future abiotic and biotic damaging agents?
- ❖ Should there be more of a mix of species, where ecologically feasible, to buffer against future abiotic and biotic damaging agents? This question applies to both block and landscape levels.
- ❖ What is the potential impact of climate change on species choices; should some species be demoted or promoted?

4.7.2 Incremental Silviculture

This ISS will investigate options to increase and/or maintain timber supply using incremental silviculture. It will contain stakeholder determined targets and strategies for timber quantity and form an effective vehicle to plan the use of public funds for new and existing initiatives.

5 Timber Quality

The current provincial target for premium logs is 10% of the AAC for each TSA. In the past, a premium log was frequently defined by such characteristics as: species, taper (lack of), tightness of grain, clear wood and size, and often diameter. Today many of the above-listed traits still signify quality; however, size tends to be less important. Also, different forestry companies may value different quality aspects in their operations.

Past analyses have demonstrated that the harvest volume of larger stems can be increased significantly by increasing the rotation ages past the mean annual increment (mai) culmination age, usually at the cost of total volume harvested, at least in the short and medium terms. Stem sizes can be increased through various incremental silviculture regimes as well.

This ISS will contain stakeholder determined definitions for timber quality. It may also recommend strategies to maintain or enhance the quality of current and future managed stands.

This project will also attempt to assess managed - stand values resulting from different regeneration and treatment regimes. These will include estimations of future stand value using varying establishment densities and species compositions. The value estimations will use industrial log sorts and prices and milling studies, where available.

6 Habitat Supply

Wildlife habitat is established and managed through various policy and legislative instruments including the Identified Wildlife Management Strategy (IWMS), approval of ungulate winter ranges (UWR) and wildlife habitat areas (WHA), and management practices identified in plans establishing legal objectives.

The Bulkley LRMP and the associated higher level plan orders set objectives for managing wildlife habitat in the Bulkley TSA. Legal objectives are defined for moose, mountain goat, woodland caribou, grizzly bear and deer as described in 3.2.3.

In 2015 a legal order established a Wildlife Habitat Area (#6-333) for the Telkwa caribou herd. This WHA consists of a core no-harvest area and a conditional harvest zone at lower elevations where LRMP legal objectives set by government apply.

Bulkley TSA has no legally established UWRs; however the Bulkley Valley Sustainable Resource Management Plan (BVSRRMP) identifies objectives for mapped Wildlife Habitat Management Areas (WHMAs). Some portions of WHMAs may be established as UWRs in the future.

Northern goshawk (NOGO) is an IWMS species previously provincially blue-listed. It is presently yellow-listed (not at risk); however due to significant decline in population, the NOGO is likely to be red-listed. The mapped nesting locations within the TSA are currently protected through scheduling operations around critical life cycle phases, by establishing wildlife tree patches and other reserves, or by avoiding nests during road and cutblock layout.

7 Biodiversity

The Bulkley LRMP and the associated higher level plan orders set objectives for biodiversity in the Bulkley TSA. The biodiversity objectives consist of specific objectives for seral stage distributions, ecosystem representation, connectivity, tree species diversity and stand structure. These are described in section 3.2.2.

8 Climate Change Adaptation

Climate change is projected to impact timber and environmental values and should be considered in long term plans and strategies. Table 9 shows the projected changes for the Skeena region from 1961 to 1990 base line to 2050 (Pacific Climate Impacts Consortium, 2012).

Table 9: Projected climate change for the Skeena Region

Climate Variable	Season	Projected Change from 1961-1990 Baseline	
		Ensemble Median	Range (10th to 90th percentile)
Mean Temperature (°C)	Annual	+1.8 °C	+1.1 °C to +2.5 °C
Precipitation (%)	Annual	+7%	+3% to +13%
	Summer	+2%	-5% to +11%
	Winter	+9%	-1% to +16%
Snowfall* (%)	Winter	-6%	-12% to +7%
	Spring	-56%	-68% to -10%
Growing Degree Days* (degree days)	Annual	+226 degree days	+142 to +353 degree days
Heating Degree Days* (degree days)	Annual	-645 degree days	-918 to -418 degree days
Frost-Free Days* (days)	Annual	+22 days	+12 to +34 days

The speed and the scope of climate change are unknown; however it is expected to impact natural disturbance patterns, hydrology, biodiversity, forests and range.

8.1 Hydrology

Hydrological adaptation requires limiting the increases in stream temperature, and sediment input from surface erosion, streambank collapse and landslides, and limiting increases in peak flows (Government of BC, 2015).

8.2 Biodiversity

Adaptation strategies for biodiversity are designed to achieve two objectives: minimize harvesting and road access in sensitive areas and promote resilient ecosystems at stand and landscape scales (Government of BC, 2015).

8.3 Forests and Trees

Climate change adaptation of forests relies on successful establishment, survival and growth. A potential exists to reduce the negative impacts of natural disturbance resulting from climate change through diversity of species selection and avoidance of monocultures. In disease prone areas higher planting densities will provide a buffer against potential losses.

Adaptation strategies can potentially shift overall climate-induced impacts on timber supply from negative to positive or neutral. Planting of genetically improved, climatically suitable stock may improve growth and yield.

9 First Nations and Cultural Heritage

The following First Nations have traditional territories in the Bulkley TSA: Gitksan Nation, Kitselas First Nation, Lake Babine Nation, and the Wet'suwet'en Nation (Morice town Band, Skin Tyee Band, and Wet'suwet'en First Nation). The Yekooche First Nation recently expanded their territorial assertion, which now includes a portion of the Bulkley TSA.

The Bulkley Cultural Heritage and Archaeological Resource Inventory (CHARI) contains the locations of cultural heritage resources (CHR) in the TSA. The CHARI is spatially explicit and it is used in operational planning by district staff and area licensees to protect CHR through modifications to plans and in some cases avoidance of sensitive areas. Historically CHR has not resulted in significant reductions to the THLB. The Bulkley CHARI is being incorporated into the Skeena SCHRIMP (Skeena Cultural Heritage Information Management Plan) data layer, which will ultimately house all cultural feature within one data layer.

The Gitksan Nation have asserted aboriginal title and aboriginal rights to at least some of the Gitksan House territories that fall within the Bulkley TSA.

The Gitksan First Nations completed a draft SRMP for the Gitsegukla Watershed in 2010. Approximately 40 % of the plan area is within the Bulkley TSA. The SRMP describes generic wildlife management practices that apply to all wildlife. Furthermore, specific practices are designated for six species including grizzly bear, moose, mountain goat, fur-bearers, goshawk and coastal tailed-frog.

Current management considers habitat objectives most of the above species (except for coastal tailed frog). Large areas are excluded from the THLB for habitat and other non-timber values, and harvesting is often constrained within the THLB to accommodate other values as well. The ISS may provide an opportunity to test the impacts of the draft Gitsegukla SRMP

Both the Gitksan and Wet'suwet'en Nations have interest in exploring sustainable harvest levels by First Nations House within their respective traditional territories.

The Morice town Band, Wet'suwet'en First Nation, Skin Tyee Band, Lake Babine Nation, and Kitselas First Nation all have Forestry Consultation and Revenue Sharing Agreements (FCRSAs) with the province. The FCRSAs offer opportunities for revenue sharing and acquisition of forest tenures. They also provide a framework for consultation on operational as well as administrative decisions such as AAC determinations.

10 Watersheds

10.1 Community Watersheds

Harvesting is allowed in community watersheds; however operations must be planned in such a way that no harmful substance may enter the water. There are three officially designated community watersheds in the Bulkley TSA (John Brown Creek, Corya Creek, and Canyon Creek).

One more is pending designation (Kathlyn Creek) and two are being managed as community watersheds in spite of their lack of designation (Tyhee Lake and Seymour Lake).

10.2 Fisheries Sensitive Watersheds

Government objectives for fisheries sensitive watersheds relate to the needs of fisheries values. Conserving hydrological condition, stream bed dynamics and channel integrity are all high priorities as are the quality, quantity and the timing of flow. Harvest is not allowed until a watershed assessment is completed. This assessment determines thresholds for indicators of watershed stability: equivalent clearcut area (ECA), peak flow index, road density, and stream crossing density.

There are five legally established fisheries sensitive watersheds (FSWs) in the Bulkley TSA: Cumming, Gramophone, West Babine, Jonas and Toboggan Creeks. In addition, four watersheds are under consideration for FSW designation: Five Mile Creek, Heal Creek, Nine Mile Creek, and Tsazakwa Creek.

11 Multiple Resource Value Assessment

The utilization of natural resources influences ecosystem conditions. The Multiple resource value assessments (MRVA) gauge how natural resources utilization impacts the state of public natural resource values. MRVAs show the results of stand and landscape-level monitoring carried out under the Forest and Range Evaluation Program (FREP). The MRVA may be carried out for all 11 FRPA values.

The MRVA helps to:

- ❖ Measure whether the impacts of resource development result are consistent with sustainable resource management;
- ❖ Provide transparency and accountability for the management of public resources;
- ❖ Support the balance in decision making between environmental, social, and economic factors;
- ❖ Advise on the improvement of resource management practices, policies, and legislation.

Most MRVAs focus on stand/site-level and are carried out on harvested areas and/or resource roads. However, some recent MRVAs have introduced landscape level monitoring into the process. This is expected to increase in the future.

Monitoring results are summarized using four impact ratings:

1. very low
2. low
3. medium
4. high

Very low and low impact ratings are desirable; they reflect the government's goal of sustainable resource management as per the Forest and Range Practices Act. The medium impact rating is considered marginal, while and the high rating is generally deemed unsustainable. If adequate data exists to compare site impacts over time, resource value trends are presented.

11.1 MRVA, Bulkley Timber Supply Area

The MRVA was completed for water quality, riparian, visual quality and stand level biodiversity.

11.1.1 Water

Data for water quality was collected between 2008 and 2015. A total 90 road segments were assessed and 83% of them were found to have very low or low impact on fine sediment generation potential. The remaining segments were classified as medium (10%) and high (7%). The sampling showed no trends.

11.1.2 Riparian

The data for riparian stream assessments was collected between 2006 and 2015 for blocks harvested between 1198 and 2014. Almost all the samples showed very low or low impact on the streams (91%). Of the remaining 9 % (medium or high) samples natural events caused 57% of the impact, while the rest was caused by logging and/or road building. The sampling showed no trends.

11.1.3 Visual Quality

The data for visual quality assessments was collected between 2011 and 2015. Twenty three cases were analyzed and 91% of them were rated as having very low or low harvest-related impacts.

11.1.4 Stand Level Biodiversity

The data for stand-level biodiversity assessments was collected between 2006 and 2015 from blocks harvested between 1997 and 2014. A total of 59 cutblocks were sampled and 39% of them were rated as very low or low harvest-related impact. The impact was assessed based on total retention, retention quality, and coarse woody debris quantity and quality. The high impact blocks were generally of smaller size. The sampling showed no trends.

11.2 MRVA2, Lake Babine Nation Asserted Territory

The MRVA2 is one of the four pilot projects in British Columbia. Monitoring was carried out for the Lake Babine Nation Asserted Territory. The majority of the monitoring data applies to the Forest and Range Evaluation Program (FREP) stand/site-level monitoring. Landscape-level monitoring of biodiversity, visual quality, and wildlife resource values are also included in this MRVA.

Results of the BC Forest Practices Board audits (14 audits) were summarized. Forest harvest practices that were included in the audit were operational planning, roads, bridges, harvesting, silviculture and fire protection.

No issues were discovered in 6 of the 14 audits. Significant non-compliance existed on FDPs, SPs and logging plans, mountain pine beetle management, and/or fish stream crossings in the older Forest Practises Code Act era audits. In the more recent audits (FRPA era) one had serious non-compliance issues while two had areas of concern. The issues were generally confined to excessive soil disturbance in cut blocks. No trends were found; the relative number of audits with no problems was similar in both the FPC audits and FRPA audits.

11.3 MRVA, Wet'suwet'en Hereditary Territory

The MRVA for the Wet'suwet'en Hereditary Territory is also one of the pilot projects. Monitoring was carried out for the Wet'suwet'en Hereditary Territory as defined by the asserted traditional boundaries of the Office of the Wet'suwet'en (Hereditary Chiefs) and the Wet'suwet'en First

Nation. As with the Lake Babine Nation Asserted Territory, the majority of the monitoring data applies to the Forest and Range Evaluation Program (FREP) stand/site-level monitoring. Landscape-level monitoring of biodiversity, visual quality, and wildlife resource values are also included in this MRVA.

The data for this MRVA was also collected through BC Forest Practices Board audits (13 audits). The audits were conducted under the FPC and FRPA.

Significant non-compliance existed on FDPs, SPs and logging plans, meeting free-growing requirements and planning and harvesting activities in riparian areas in the older Forest Practices Code Act era audits (3 audits). In the more recent audits (FRPA era) no serious non-compliance issues were found. As with the Lake Babine Nation area, the concerns were generally confined to excessive soil disturbance in cut blocks. The results indicated a general reduction in both the number of audits with issues as well as their significance from the FPC-era to the FRPA-era.

12 Bulkley TSA Core Values

Six core values have been identified for the Bulkley TSA: Water, Timber, Cumulative Effects, Wildlife, Climate Change Adaptation and First Nations Interests. The ISS will attempt to address issues acknowledged regarding the core values. The values and related issues may be revised and prioritized as the planning process evolves.

12.1 Water

Watershed hydrological integrity and fish habitat integrity may be at risk due to the recent MPB infestation, related salvage and other disturbances. This strategy will investigate and consider silviculture and harvest strategies to restore the hydrological integrity of sensitive watersheds.

12.2 Timber

Marginal stands - Lack of harvest performance in marginal stands may put stability of the future mid- to long-term sawlog timber supply at risk. Investigate ways to harvest these stands and convert them to productive managed stands.

TSR3 Managed Stand Analysis Units (AU) – Investigate reassigning AUs based on site index, rather than PEM types; test reliability of site index estimates.

Timber Quality – Spatial identification of areas with potential to be managed for premium-grade logs.

Incremental Silviculture - Explore opportunities to increase timber supply through silviculture investments.

Status of the current VRI - Explore ways to address issues with the current inventory. A quality assurance project by Scheithauer Forst Consultants Ltd. in 2013 suggests that ground volumes are significantly higher than inventory volumes in the “ESSF Immature & Old” stratum.

12.3 Cumulative Effects

Bulkley LRMP Zone Integrity – Do the LRMP zones fulfill their intended purpose based on current indicators? If not what are options are there to mitigate the shortfalls?

Timber Supply – What are the implications for timber supply if new indicators are adopted to strengthen LRMP zone integrity? What mitigation options are available (silviculture investments)?

Stand-Level Biodiversity - investigate timber supply implications of leaving higher levels of retention on all cut blocks.

12.4 Wildlife

Habitat Sustainability and Population Management – Management of key indicator species and species at risk such as grizzly, mountain goat, moose, deer, pine marten, and northern goshawk; explore of **co-location** possibilities.

Habitat Restoration - Investigation of strategies to restore habitat elements.

Proposed Wildlife Orders and Offset Measures - Timber supply impact analysis of pending or proposed wildlife orders, including any proposed offset measures for implementation of the Telkwa Caribou WHA Order.

Shifts to Legal Objective Boundaries - Investigations of shifts to legal objective boundaries to better correspond with improved knowledge and refined mapping within 10% Bulkley LRMP budget limitations.

12.5 Climate Change

Carbon Sequestration - Consider long-term carbon sequestration areas and their potential locations;

Local Stocking Standards - Consider adopting local stocking standards designed to address predicted climate change, test their implications on timber supply;

Bulkley Fire Management Plan - Consider the evolving Bulkley Fire Management Plan in the ISS and investigate any emerging landscape fire management planning concepts in terms of impacts on timber supply and habitat supply.

12.6 First Nations

House-Level Indicators - Investigate house-level sustainability of timber resources, seral stages; cultural and traditional use needs, including specific plant communities and use areas.

First Nations Values from Previous Plans - Incorporate First Nations values and management objectives from previous First Nations strategic planning processes (e.g.) late 1990's Wet'suwet'en Landscape Unit Planning and Gitsegukla SRMP.

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