Integrated Stewardship Strategy for the Stuart TSBs (A, B, C) in the Prince George TSA

Final Report

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1 Introduction

The British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development initiated an Integrated Stewardship Strategy (ISS) – sustainable forest management analysis – in the Stuart area Timber Supply Blocks (TSB) A, B, and C from the Prince George Timber Supply Area (TSA). This document is the sixth in a series of documents that succinctly summarizes results, key observations, and recommendations developed through this ISS iteration – including spatial and temporal protections and opportunities to mitigate identified issues. Detailed information can be found in the other six documents of the series, which include: Situation Analysis, Scenario Development, Data Package, Analysis Report, Tactical Plan, and Implementation Monitoring Plan.

2 Key Observations

ISS Objectives	Mitigate forest health impacts on mid-timber supply by facilitating 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 Stuart TSBs.
Land Base	The Stuart TSBs are situated in northern British Columbia, and consists of the three most northern supply blocks from the Prince George TSA. The project area was adjusted slightly to include all of the Fort St. James Natural Resource District. The gross area covers an area of 3.18 million ha, out of which 1.9 million ha is Crown Forested Land Base (CFLB) (59.7%) and 1.19 million ha is Timber Harvesting Land Base (THLB) (37.5%). These area estimates are based on the best known land base assumptions implemented throughout the ISS process.
Differences from the recent Timber Supply Review (TSR)	The major differences between the TSR Benchmark and ISS Base Case scenarios include land base definition, MPB yield assumptions, and non-timber objectives. The ISS Base Case THLB is 4.7% smaller than the TSR Benchmark because the ISS Base Case excluded from harvest significantly more area for wildlife habitat no-harvest zones, riparian reserves, and new tenure boundaries. The ISS Base Case included much more detail regarding MPB yield assumptions - including emergence of a regeneration layer - to portray more accurately, across time and space, the situation of damaged stands. Some of the new tenures and targets overlapped as well (i.e., grizzly habitat and new First Nation tenures), which lessened the overall impact on the THLB.
Non-Timber Objectives	The non-timber objectives include stand- and landscape-level biodiversity, maximum disturbances within watersheds (including MPB disturbances), and most recent established and proposed wildlife habitat areas and ungulate winter ranges. More stringent targets for Equivalent Clearcut Area, recommended by the Tl'azt'en First Nation, were applied to identified watersheds. A significant amount of time and resources were spent to understand the impacts of Caribou recovery strategies (provincial and federal) on harvest level. Due to the relatively large land base (i.e., nearly 1.9 million hectares CFLB of which 37.5% was identified as THLB), most non-timber objectives did not

	constrain the model. Only an additional 8,432 ha (<1%) of THLB was needed to meet landscape-level biodiversity and other objectives. These areas were used to develop the Reserve Plan.
Watershed Health	The model was configured to monitor and/or implement Equivalent Clearcut Areas (ECA) within identified watersheds (proposed FSWs, and LRMP). In this case, full ECA requirements were typically far from being compromised so the overall harvest flow was not impacted since alternative harvest patterns were available. The tactical plan incorporated even higher ECA thresholds defined by the Tl'azt'en First Nation. While these targets were not constraining, they shifted pressure onto other areas within the Stuart TSBs.
Caribou Habitat	Implementing the Federal Caribou Recovery Strategy target to maintain at least 65% undisturbed habitat for the Chase and Wolverine herds – while not quite achieving this – would reduce the harvest level by 28% in the short-term and 20% in the long-term.
Forest Health	The MPB mortality was simulated using a complex and detailed approach to incorporate mortality, estimate volume decline (for 22 years following MPB attack), and consider stand regeneration of unsalvaged stands. Significant impacts from spruce beetle have been observed in adjacent TSAs but is not as extensive throughout the Stuart TSBs, thus was not modelled at this time. The current forest inventory was used to develop a spatial assessment of potential salvage and rehabilitation opportunities by applying merchantability criteria and shelf-life assumptions. Applying these assumptions highlighted stands that are no longer merchantable since attack and those that will no longer be merchantable after the salvage period – within the THLB and non-harvestable land base. To offset large areas of salvaged pine stands, salvage zones were implemented and wildlife tree retention levels were adjusted based on (patch) opening size (i.e., conservation uplift) according to guidelines from the BC Chief Forester. This led to a significant area reduction in THLB (~88,500 ha); contributing to 1.5 times the area retained for wildlife tree retention and riparian reserves compared to the 12.1% aspatial reduction used in the latest Timber Supply Review.
Timber Objectives	The timber objectives include two partitions: ➢ Deciduous-leading stands (maximum 5.56% of the volume of the harvest flow), and ➢ Harvest volume from TSBs A and B (maximum 1.5 million m^3/year over the next 100 years). The deciduous partition proved to be constraining for most of the planning horizon. An exception was observed in the first decade as the model was configured to focus on wildfire management tactics (see below) that favoured conifer-leading stands. The harvest target set for TSBs A and B was not constraining. This partition was established to influence licensees to harvest further from the existing mills.
Harvest Flow	The harvest flow was developed such that it does not change by more than ±10%

	per decade and it reaches a sustainable level in the last 100 years of the 300-year planning horizon (i.e., harvest is constant and growing stock is non-declining). In addition, any harvest generated using rehabilitation tactic did not count towards the targeted harvest flow. The harvest level for the first 10 years was established at 2.70 million m^3/year which stabilized to the long term value of 3.64 million m^3/year by year 100 of the 300-year planning horizon. This harvest rate did not include additional salvage volume, which allowed for an extra 200,000 m^3/yr (for the first 20 years) to be harvested from MPB affected stands with between 100m^3/ha and 140m^3/ha.
Access timing constraints	As a proof of concept, spatial delineation areas potentially valued for wilderness and Grizzly Bear habitat were added to the resultant. Applying timing constraints to these areas did not significantly impact the harvest flow.
Tactical Plan	The tactical plan developed through this iteration integrates three separate plans: reserve, harvest, and silviculture. Ultimately, it provides operational direction and bridges strategic, forest-level analyses, and operational planning processes.
Candidate Reserves	To efficiently meet non-timber objectives while minimizing impacts on the working forest, candidate reserves were identified through an advanced modelling exercise that grouped reserved areas, as much as possible, to meet landscape-level requirements - including old interior forest. The candidate reserves determined in this exercise amounted to 8,432 ha of the THLB (<1%). These stands were later restricted from being harvested over the first 40 years of the planning horizon.
Harvest Opening Sizes	Harvest opening sizes were controlled in each 5-year planning period to develop openings accordingly: up to 10% between 5 and 20 hectares, 5% between 1 and 5 hectares, and altogether avoid openings less than 1 hectares. Meanwhile, openings greater than 100 hectares were favoured. These modest harvest opening size distributions were achieved as targeted, without a significant impact on the harvest level.
Cable Harvest	Over the planning horizon the forecasted harvest volume that comes from areas identified for cable harvest systems (i.e., ≥35% slope) averages 38% and ranges from 33% to 44%. Adjusting harvest performance to achieve this harvest profile is paramount to maintaining the mid- and long-term harvest rates.
Wildfire Management	Mitigating risk of loss due to wildfire was managed by influencing the forest estate model to focus harvesting, over the first 10 years, on stands identified with extreme risk of wildfire and conifer-leading stands within identified fuel breaks. The THLB area identified with extreme wildfire threat was estimated at 93,157 ha (7.8% of the total THLB), from which the Harvest Plan scheduled harvest of approximately 57,000 ha over the first 10 years (i.e., 37% of the total area harvested). The THLB area within fuel breaks and conifer-leading stands was estimated at 106,655 ha (8.9% of the total THLB), where the Harvest Plan scheduled harvest of approximately 40,000 ha over the first 10 years (i.e., 25% of the total area harvested).

Silviculture Tactics	Subject to a combined budget of $3 million per year, three silviculture tactics were implemented over the first 20 years of the planning horizon. Rehabilitation - Rehabilitation was modelled for mature-conifer-leading existing natural stands on slopes ≤35% and with inventory site index ≥11 that were heavily impacted by MPB and spruce beetle. The cost for rehabilitating marginally economic stands (i.e., standing live volume ≥50 m^3/ha) was $1,500/ha and for uneconomic stands (i.e., standing live volume <50 m^3/ha) was $2,000/ha. An additional distance cost of $50/ha was applied for each extra 2 hours (one way) from Fort St. James. Over the first 20 years, the eligible THLB area totalled 117,104 ha. Enhanced basic silviculture - Treatments were set-up for all existing natural and managed stands in the SBS and BWBS BEC zones, with site index ≥14. The enhanced basic silviculture cost was applied at $385/ha. Over the first 20 years, the eligible THLB area totalled 446,418 ha. Fertilization - Up to 2 applications (10-year apart) for existing natural (age 20-60 years) and managed stands (age ≤ 25 years), site index ≥14, on slopes <35%, pine and spruce component ≥80%, in SBS and ESSF BEC zones, and not impacted by MPB or spruce beetle. Following last application, stands were locked from harvesting for another 10 years. Cost of one application was $450/ha. An additional distance cost of $25/ha was applied for each extra 2 hours (one way) from Fort St. James. Over the first 20 years, the eligible THLB area totalled 169,798 ha. Including these silviculture tactics allowed the model to leverage the advantages of each tactic: rehabilitation (i.e., harvest stands that would otherwise not have been harvested and transition them to yields with higher productivity and younger minimum harvest ages), fertilization (i.e., growth increase), and stand growth enhancement (i.e., stands transition to higher productivity yields with younger minimum harvest ages). These advantages combined to allow stands to cycle (i.e., harvest, reforest, harvest, etc.) more often over the 300-year planning horizon and allow some stands to be harvested sooner to make more volume available during key periods (e.g., the mid-term trough). These silviculture tactics contributed to increasing the harvest level by 12% in the short-/mid-term and 8% in the long-term. Most of the $3 million per year budget was spent on fertilization and rehabilitation silviculture tactics. These were favoured because they contributed to making more volume available at critical periods along the planning horizon.
Implementation Monitoring Plan	While forest licensees are not legally required to follow the tactics proposed in the ISS planning exercise, these tactics provide important guidance for key activities that will be monitored relative to harvesting and other performance indicators. Monitoring will focus on the implementation of these tactics over the life of the Tactical Plan. Ultimately, implementation monitoring is intended inform future ISS iterations and other forest-level analyses.

3 Recommendations

Low Productivity	Exclude from the THLB, all low productivity stands that do not meet minimum harvest criteria. Accurately modelling standing volume and minimizing impacts on harvest flow in the long-term requires a robust definition of THLB.
Minimum Harvest Criteria	Refine the minimum harvest age criteria. Future stands that are likely more productive than existing ones can meet the minimum harvest criteria at ages under 60 years, especially when including silviculture tactics. Meanwhile, wood products sourced from younger stands can pose potential economic challenges.
Caribou Recovery Strategies	Refine the caribou assessment to more accurately determine the impact on harvest flows when maintaining the maximum 35% disturbance threshold. Ideally, a strategy would be developed that avoids post-processing of disturbances and groups mature/old stands into large, contiguous patches to promote old interior forest habitat.
	Include patch targets for harvest and fire disturbances within caribou assessment areas to reduce road construction and group blocks with different operability requirements.
	Examine alternative disturbance criteria. Road and harvest buffers contributed significantly to the anthropogenic disturbance level.
	Refine the anthropogenic disturbance layer to consider permanent and planned features (e.g., wind tenures, cabins, pipelines). The available anthropogenic disturbance data was not clearly defined. Some anthropogenic disturbance features can potentially cover large forested areas and should be considered disturbed when assessing Caribou habitat.
	Rehabilitate roads that are no longer in use and seek input from habitat biologists for planning these activities.
	Upgrade and expand the road network to access the entire THLB. This will help to reflect anthropogenic disturbance associated with road buffers.
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Excessive Haul Distance	Refine the haul cycle distance to reflect available road systems and other operational realities. This may be further explored as sensitivity analyses.
Candidate Reserves	Continue to refine the reserve scenario by influencing the model to stop selecting additional candidate reserves when anchors (i.e., no-harvest zones) have already met targets. In another scenario, develop candidate reserves without favouring stands within the non-harvestable land base.

	Conduct a post-processing GIS analysis to identify seral stage edges and verify that the interior old forest targets are met for each assessment unit.
	Utilize the candidate reserves to provide context for drafting spatial reserves for further analysis and review at tactical and eventually, operational-levels. This process should involve stakeholders that work collaboratively – for each landscape unit – to verify values are addressed appropriately.
Harvest Partitions	Reconsider harvest partitions to reduce the mid-term impact on harvest flows. While the current pine partition was intended to encourage MPB salvage and limit harvesting of non-pine stands, it has a dramatic negative impact on harvest flow, by limiting the harvest of deciduous and balsam volumes.
Silviculture Tactics	Consider adding more criteria to refine the identification of eligible stands for fertilization and rehabilitation (e.g., haul distance, low density threshold).
	Determine the most cost-effective treatment schedule to achieve the highest potential gains in harvest. This might be done by calculating and comparing the net present value for the incremental volume realized over the planning horizon and under increasingly higher funding levels (i.e., multiple runs).