

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

Implementation Monitoring Plan

Version 1.0

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Project 419-37

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Executive Summary

Implementation monitoring is intended to inform future ISS iterations and other forest-level analyses. At each reporting period, assessments will determine how well actual performance aligns with the key indicators from the tactical plans. Significant variances or new objectives (i.e., constraints) may suggest the need to update these forest-level analyses to produce new tactical plans that reflect actual performance.

This document describes an implementation monitoring plan that includes periodic assessments of how well various aspects of the tactical plans developed through the Integrated Stewardship Strategy (ISS) for the Stuart Timber Supply Blocks (ABC) of the Prince George TSA. The following monitoring details were developed for a total of eight indicators across three tactical plans (Reserve, Harvest, and Silviculture): planning indicators, objective, strategy, means of achieving objective, current status, target, and monitoring & reporting. Specific monitoring and reporting requirements are also listed for each plan.

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Document Revision History

Version	Date	Notes/Revisions
0.1	March 9, 2018	First version distributed to project team for review and comment prior to development of the tactical plan.
1.0	March 31, 2018	Included harvest plan targets for cable areas and stands with extreme fire risk (based on tactical plan results), as well as, silviculture plan targets.

1 Introduction

This document describes an Implementation Monitoring Plan for the Stuart Timber Supply Blocks (TSB) in the Prince George TSA – Integrated Stewardship Strategy (ISS) Tactical Plan¹. 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.

This monitoring plan reflects the outcomes generated through the Combined Scenario described in the Analysis Report² and used to develop the Tactical Plan: Reserve Plan and Harvest Plan. For each scenario an indicator table was developed that captures the concepts and tactics of each scenario and provides a structured process to monitor implementation of the tactical plan. Each table is organized with the following items³:

- Planning Indicator — a variable that measures or describes the state or condition of a value identified during the ISS process;
- Objective — a broad statement describing a desired future state or condition of a value;
- Strategy — a coordinated set of actions designed to meet established targets;
- Means of Achieving Objective – a statement describing the intended method(s) to achieve an objective;
- Current Status – description of the current status of the indicator(s);
- Target — a specific statement describing a desired future state or condition of an indicator; and,
- Monitoring & Reporting – description of procedures, timelines, and method to monitor and report on performance to achieving targets. Periodic assessment of the quality and meaningfulness of the targets and indicators is recommended.

This document also provides a table that details the ongoing data requirements to complete the monitoring and reporting components of the implementation monitoring plan.

¹ Forsite Consultants Ltd. 2018. Integrated Stewardship Strategy for the Stuart TSBs (A, B, C) in the Prince George TSA – Tactical Plan. Version 1.0. March 31, 2018.

² Forsite Consultants Ltd. 2018. Integrated Stewardship Strategy for the Stuart TSBs (A, B, C) in the Prince George TSA – Analysis Report. Version 1.1. March 31, 2018.

³ Structure of the indicator table has been informed by the CSA Z809-16 standard, <http://shop.csa.ca/content/ebiz/shopcsa/resources/documents/codes-and-standards/2424363.pdf>

2 Implementation Monitoring Plan

Various approaches⁴ were considered for the focus of a monitoring plan.

- *Effectiveness monitoring* is meant to assess whether the intent of the plan is being achieved. For example, if the plan is to trying to maintain a healthy population of wildlife species, then indicators to assess the population on the ground need to be developed for that. Because these measures can only be assessed on the ground, they are quite different than modeling indicators.
- *Validation monitoring* is meant to test the assumptions made in a modeling exercise, and is often more about pure research than monitoring. There is also the possibly of conducting a monitoring plan that *Supports Research* but this is not the current requirement of this monitoring plan.
- *Implementation monitoring* is designed to understand if tactics in a plan are being followed. Because the tactics in the ISS planning exercise for Mackenzie TSA are not legally binding, monitoring is considered the better approach in order to understand if the forest management activities within the Mackenzie TSA are moving key metrics towards the objectives and targets for each of the indicators.

Monitoring indicators will keep the focus on big questions associated with the ISS planning process - what are we most interested in? Why did we use the tactics that we did use for a certain value? The following monitoring plan focuses on the Reserve, Harvest and Silviculture Plans as described in the Analysis Report and Tactical Plan.

2.1 Reserve Plan

The Reserve Plan was designed to answer the question, “Where and how should we reserve forested stands to address landscape-level biodiversity and non-timber values while minimizing impacts to the working forest?” The underlying purpose of this scenario was to explore tactics aimed at maintaining the harvest area while providing a wide range of values on the land base (i.e. co-location).

Based on the above, the indicator table for this scenario was developed to establish a method to monitor progress towards targets and objectives.

Table 1 Reserve Plan indicator table.

Matrix Element	Description
Indicator(s)	1) The area and location of candidate reserves that remain intact (i.e., not harvested).
Objective	Maintain candidate reserves identified to address landscape-level biodiversity and non-timber values while minimizing impacts to the working forest.
Strategy	The Reserve Plan process indicated that in most assessment units (i.e., mBEC), there are large areas of non-THLB that can meet the old seral forest requirements. In some cases, old THLB or mature areas (non-THLB or THLB) were identified to meet the old seral requirements. Overall, the candidate reserves include 8,432 ha of THLB (<1% of total THLB). Note that there are large areas covered by mature stands that are just shy of being classified as old stands. The reserve strategy identifies areas that have not yet been field checked. Revisions to these candidate reserves are expected provided suitable replacements are identified (area-for-area) within the same mBEC assessment unit.
Means of Achieving Objective	Forested candidate reserves identified within the non-THLB nearly meet the landscape-level reserve requirements thereby limiting recruitment needed from the THLB and minimizing overlaps with forest harvesting activities.

⁴ Contributions from Ken Zielke, May 5, 2017

	Licensees will be informed of the candidate reserves identified in the tactical plan to potentially incorporate during operational planning.
Current Status	Landscape-level biodiversity objectives are addressed through non-spatial old growth orders. The current process impacts THLB and forest operations.
Target	Maintain at least the area identified as reserves within each mBEC unit throughout the 20 year tactical plan; with no more than 0.5% of the THLB identified as reserves at the end of the tactical plan.
Monitoring & Reporting	<p>Annual harvest information with five (5) year roll up.</p> <p>Within each mBEC unit, all harvest-related clearings (blocks and roads) will be spatially overlaid with candidate reserves (amended as required) to determine overlap. Report:</p> <ul style="list-style-type: none"> o area of candidate reserves by mBEC and contribution class (Non-THLB and THLB), o total block and road area within each mBEC, o area of blocks and roads overlapping with candidate reserves by mBEC, and o reserve area remaining by mBEC and contribution class. <p>Report will be in a table or graph and will identify if reserve area is above, at, or under the area of candidate reserves along with the % of THLB reserved.</p>

2.2 Harvest Plan

The Harvest Plan aimed to answer the question “Which stands should be prioritized for harvest/salvage in the short-term (and what are the mid/long-term consequences of not following this strategy)?” The underlying purpose of this plan was to improve timber harvesting opportunities while mitigating the risk of economic loss to natural disturbances like insects and fire.

Based on the above, the following indicator table was developed to establish a method to monitor progress towards targets and objectives.

Table 2 Harvest Plan indicator table.

Matrix Element	Description
Indicator(s)	<ol style="list-style-type: none"> 1) Harvested area by TSB (Cumulative variance of area summarized by TSB - planned vs. actual). 2) Harvested locations relative to the locations identified in the Harvest Plan (cumulative variance of overlapping areas - planned vs. actual). 3) Harvested area by designated harvest system (i.e., slope class). 4) Harvested area - over the first decade - from stands with extreme fire risk and conifer-leading stands within landscape-level fuel breaks. 5) Harvest opening sizes (min, mean, max).
Objective	Focus timber harvesting on stands that are forecasted to achieve the best balance of non-timber values and timber harvest levels into the long-term.
Strategy	<ol style="list-style-type: none"> 1) The combined scenario integrates a number of resource management tactics aimed to maintain values across the landbase. The areas identified for harvest over the short-term (3,989 ha/year on average) are key to achieving the harvest flow presented in the combined scenario. The spatial harvest pattern developed in the combined scenario over the first 20 years of the planning horizon was used to create the harvest plan. Deviating from the harvest plan could reduce the harvest flow over the mid- or long-term and possibly non-timber values over time. 2) The Harvest Plan showed that grouping blocks into larger harvest openings was possible without significantly impacting the harvest flow. Increasing block size can help to minimize impacts to other non-timber resources and improves efficiency of harvest operations leading to long-term use of the forest resource. 3) The 20 year plan shows the majority of the harvest is forecasted to come from ground harvest systems due to the focus of MPB-attacked stands. At least 41% of the harvest is forecasted to come from cable systems (132,000 ha).

	4) The wildfire management tactic aimed to incorporate stand- and landscape-level wildfire management strategies to mitigate wildfire risk. The forecasted harvest was prioritized for stands identified with 'extreme' risk through the 2015 Provincial Strategic Threat Analysis. These stands cover approximately 88,000 ha THLB. In addition, wildfire mitigation was addressed by prioritizing harvest of coniferous-leading stands within identified landscape-level fuel breaks. The coniferous-leading stands within identified fuel breaks cover approximately 101,000 ha THLB. This tactic comprised 96,923 ha (62%) of the total harvest over the first decade.																														
Means of Achieving Objective	<ol style="list-style-type: none"> 1) Continue to focus on salvaging MPB-attacked stands. 2) Create opening sizes similar to those developed in the Harvest Plan. 3) Continue to explore economically viable ways to harvest timber from steeper slopes using cable harvest systems. 4) Over the first decade, prioritize harvesting of stands identified with extreme wildfire risk and conifer-leading stands landscape-level fuel break. 																														
Current Status	A summary of the current status for each of the indicators listed above was not completed.																														
Target	<ol style="list-style-type: none"> 1) Harvest within the following Harvest Plan criteria (as described in the tactical plan): <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Plan Years</th> <th>Variance from Planned Harvest Locations¹/Areas²</th> <th>Variance from Planned Opening Size Levels³</th> <th>Area Identified as Cable</th> <th>Area with Extreme Fire Risk</th> <th>Area with Confer-Leading in Fuel Breaks</th> </tr> </thead> <tbody> <tr> <td>1-5</td> <td><25%</td> <td><25%</td> <td>≥38.9%</td> <td>≥24.9%</td> <td>≥38.5%</td> </tr> <tr> <td>6-10</td> <td><25%</td> <td><25%</td> <td>≥39.9%</td> <td>≥26.1%</td> <td>≥34.3%</td> </tr> <tr> <td>11-15</td> <td><20%</td> <td><20%</td> <td>≥44.4%</td> <td>n/a</td> <td>n/a</td> </tr> <tr> <td>16-20</td> <td><20%</td> <td><20%</td> <td>≥42.0%</td> <td>n/a</td> <td>n/a</td> </tr> </tbody> </table> <p>¹ Cumulative variance of overlapping areas (planned vs. actual) ² Cumulative variance of area summarized by TSB (planned vs. actual) ³ Cumulative variance of minimum, mean, maximum areas</p> 	Plan Years	Variance from Planned Harvest Locations ¹ /Areas ²	Variance from Planned Opening Size Levels ³	Area Identified as Cable	Area with Extreme Fire Risk	Area with Confer-Leading in Fuel Breaks	1-5	<25%	<25%	≥38.9%	≥24.9%	≥38.5%	6-10	<25%	<25%	≥39.9%	≥26.1%	≥34.3%	11-15	<20%	<20%	≥44.4%	n/a	n/a	16-20	<20%	<20%	≥42.0%	n/a	n/a
Plan Years	Variance from Planned Harvest Locations ¹ /Areas ²	Variance from Planned Opening Size Levels ³	Area Identified as Cable	Area with Extreme Fire Risk	Area with Confer-Leading in Fuel Breaks																										
1-5	<25%	<25%	≥38.9%	≥24.9%	≥38.5%																										
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16-20	<20%	<20%	≥42.0%	n/a	n/a																										
Monitoring & Reporting	<ol style="list-style-type: none"> 1) Summarize timber harvest data for the Harvest Plan criteria over each 5-year period. Reporting will include tables, graphs, and/or maps. 																														

2.3 Silviculture Plan

The Silviculture Plan aimed to enhance timber quantity and quality over the mid- and long-term, as well as, improve biodiversity, wildlife habitat, and cultural interests. The plan was developed from the combined scenario by integrating three key silviculture tactics: 1) fertilization, 2) enhanced basic silviculture, and 3) rehabilitating MPB impacted stands. The Silviculture Plan reflects the best combination of these treatments applied to stands within the Stuart TSBs, while assuming a steady funding level of \$3 million per year over the first 20 years of the planning horizon.

Table 3 Silviculture Plan indicator table.

Matrix Element	Description
Indicator(s)	<ol style="list-style-type: none"> 1) Annual funding available and spent to support silviculture investments. 2) Area treated by TSB for each tactic: fertilization, enhanced basic silviculture, and rehabilitation (Cumulative variance of area summarized by TSB - planned vs. actual).
Objective	Enhance timber quantity and quality over the mid- and long-term.
Strategy	The Silviculture Plan reflects an opportunity to mix of 3 tactics at an annual funding level of \$3 million that results in timber supply gains (approximately 5% over the short- and mid-term) that may be used to stabilize the harvest flow or to off-set future reductions associated with enhancing non-timber values. The actual future realized gains depend entirely on the area treated and, by extension, the investment level throughout the 20-year plan period. Tracking these investments and areas treated will provide the data needed to reflect actual gains into future analyses and plans.

	Note: funding for enhanced basic silviculture regimes, through an operational cost allowance, must be developed for this project area.																				
Means of Achieving Objective	<ol style="list-style-type: none"> 1) Rehabilitate eligible MPB-impacted stands to capture the economic benefit of any remaining timber from the stand and to quickly reforest these areas so that they will contribute to mitigating wildfire risk, ameliorating watershed health, improving habitat, and increasing the amount of harvestable timber sooner. 2) To increase the amount of harvestable timber, apply fertilizer on eligible stands at least 10 years prior to harvest. Where possible, undertake multiple applications of fertilizer at least 10 years apart. 3) Incorporate enhanced basic silviculture treatments that increase stocking levels of the best trees available on eligible stands. This aims to mitigate forest health issues, reduce the time to crown closure and ultimately increase the amount of available timber at harvest. 																				
Current Status	A summary of the current status for each of the indicators listed above was not completed. These silviculture investments are expected to be supported through various funding sources (e.g., Land Based Investment, Forest Enhancement Society, and Operational Cost Allowance). Factors involved to allocate funds are outside the scope of this Silviculture Plan.																				
Target	<p>There are no requirements or funding commitments established towards the opportunities presented in the silviculture plan. Accordingly, targets – and associated benefits – described under this plan only relate to the \$3 million funding level for all activities, which is uncertain.</p> <p>1) Treat within the following Silviculture Plan criteria (as described in the tactical plan):</p> <table border="1"> <thead> <tr> <th>Plan Years</th> <th>Variance from Areas¹ Planned for Rehabilitation</th> <th>Variance from Areas¹ Planned for Fertilization</th> <th>Variance from Areas¹ Planned for Enhanced Basic Silviculture</th> </tr> </thead> <tbody> <tr> <td>1-5</td> <td><25% (at least 6,392 ha)</td> <td><25% (at least 1,776 ha)</td> <td><25% (at least 916 ha)</td> </tr> <tr> <td>6-10</td> <td><25% (at least 4,194 ha)</td> <td><25% (at least 8,737 ha)</td> <td><25% (at least 2,369 ha)</td> </tr> <tr> <td>11-15</td> <td><25% (at least 1,026 ha)</td> <td><25% (at least 20,357 ha)</td> <td><25% (at least 820 ha)</td> </tr> <tr> <td>16-20</td> <td><25% (at least 305 ha)</td> <td><25% (at least 22,551 ha)</td> <td><25% (at least 1,994 ha)</td> </tr> </tbody> </table> <p>¹ Cumulative variance of area summarized by TSB (planned vs. actual)</p>	Plan Years	Variance from Areas ¹ Planned for Rehabilitation	Variance from Areas ¹ Planned for Fertilization	Variance from Areas ¹ Planned for Enhanced Basic Silviculture	1-5	<25% (at least 6,392 ha)	<25% (at least 1,776 ha)	<25% (at least 916 ha)	6-10	<25% (at least 4,194 ha)	<25% (at least 8,737 ha)	<25% (at least 2,369 ha)	11-15	<25% (at least 1,026 ha)	<25% (at least 20,357 ha)	<25% (at least 820 ha)	16-20	<25% (at least 305 ha)	<25% (at least 22,551 ha)	<25% (at least 1,994 ha)
Plan Years	Variance from Areas ¹ Planned for Rehabilitation	Variance from Areas ¹ Planned for Fertilization	Variance from Areas ¹ Planned for Enhanced Basic Silviculture																		
1-5	<25% (at least 6,392 ha)	<25% (at least 1,776 ha)	<25% (at least 916 ha)																		
6-10	<25% (at least 4,194 ha)	<25% (at least 8,737 ha)	<25% (at least 2,369 ha)																		
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16-20	<25% (at least 305 ha)	<25% (at least 22,551 ha)	<25% (at least 1,994 ha)																		
Monitoring & Reporting	1) Summarize treated area data for the Silviculture Plan criteria over each 5-year period. Reporting will include tables, graphs, and/or maps.																				

3 Monitoring Requirements

The following table summarizes the data and reporting requirements for each indicator.

Table 4 Monitoring Requirements

Plan	Indicator #	Data	Reporting Period	Reporting Format
Reserve	1	Spatial layer(s) of the following: <ul style="list-style-type: none"> o TSB and mBEC o contribution class (Non-THLB and THLB) o candidate reserves developed in the Reserve Plan o cutblocks and buffered road widths (dissolved on opening id) harvested over the reporting period. 	5 year	Table and graph

Plan	Indicator #	Data	Reporting Period	Reporting Format
Harvest	1	Spatial layer(s) of the following: <ul style="list-style-type: none"> o TSB and mBEC used in the Harvest Plan o contribution class (Non-THLB and THLB) used in the Harvest Plan o harvested blocks and buffered road widths (dissolved on opening id). 	5 year	Table and graph
	2	Spatial layer(s) of the following: <ul style="list-style-type: none"> o openings developed in the Harvest Plan o cutblocks and buffered road widths (dissolved on opening id) harvested over the reporting period. 	5 year	Table, Graph, and Map
	3	Spatial layer(s) of the following: <ul style="list-style-type: none"> o slope classification (i.e., ground vs. cable) used in the Harvest Plan o harvested blocks and buffered road widths (dissolved on opening id). 	5 year	Table and graph
	4	Spatial layer(s) of the following: <ul style="list-style-type: none"> o stands identified in the Harvest Plan with extreme fire risk o stands identified in the Harvest Plan as conifer-leading within landscape-level fuel breaks o harvested blocks and buffered road widths (dissolved on opening id). 	5 year	Table and graph
	5	Spatial layer(s) of harvested blocks and buffered road widths (dissolved on opening id).	5 year	Table and graph
Silviculture	1	Summary data of the following: <ul style="list-style-type: none"> o annual funding allocated to the TSA by source o annual expenditures over the TSA by activity and funding source 	5 year	Table
	2	Spatial layer(s) of the following: <ul style="list-style-type: none"> o TSB and mBEC o areas rehabilitated o areas fertilized o areas reforested under an enhanced basic silviculture regime 	5 year	Table and graph

4 Discussion

As described above, implementation monitoring is intended to inform future ISS iterations and other forest-level analyses. At each reporting period, results are compiled and compared to determine how well actual performance aligns with the key indicators from the tactical plans. Similar results indicate that we are on track towards achieving the future forest conditions described in the Combined Scenario, while large deviations would suggest that we are not. In fact, significant variances or new objectives (i.e., constraints) may also suggest the need to update these forest-level analyses to produce new tactical plans that reflect actual performance. At each reporting period, the indicators, objectives, and targets should also be reviewed to ensure they continue to align with planned outputs and expectations.

Many of the indicators described above are designed to compare the current status against results from the tactical plans. This warrants a complete package of summaries and spatial datasets developed in these plans to help simplify the monitoring steps in future assessments.

To fully understand the key elements for the monitoring steps described above, a preliminary assessment of all indicators should be undertaken within the first year, rather than waiting until the first reporting period to undertake. This will help to identify new reporting and analysis needs that are unforeseen at this time. For example, reporting processes within government systems (e.g., RESULTS, Forest Tenure Administration, Harvest Billing System, and Stumpage Cost Allowances) may need to be clarified or revised. Similarly, new methods for tracking annual funding levels and treatment costs may be required.

While the Silviculture Plan focuses on three tactics (rehabilitation, fertilization, and enhanced basic silviculture), monitoring efforts should note other silviculture activities being conducted to enhance timber quantity and quality.

As noted above, funding for enhanced basic silviculture regimes, through an operational cost allowance, must be developed for this project area.