Integrated Stewardship Strategy for the Merritt TSA

Scenario Development

Version 1.0

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Project 419-36

FORSITE
Forest Management Specialists

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Overview

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

The Scenario Development document is the second of seven documents developed through the ISS process. In this phase, the ISS Project Team engaged with a wide array of individuals living and operating within the project area to seek input, information and ideas for developing assumptions and criteria to apply in four scenario analyses: ISS base case, reserve, harvest, and silviculture. This document describes the approach used to select tactics to analyze within each scenario. It also provides details and specific analysis instructions produced through the formation and deliberation of separate teams for each scenario.

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Acknowledgements

1 Introduction

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

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

Aligning these plans and strategies within a common process will better enable focused landbase investments, improved planning outcomes, and enhanced communications with First Nations and stakeholders – resulting in increased efficiency and effectiveness to stewardship planning relative to the status quo.

This document describes the approach used to select tactics to analyze within each scenario. It also provides details and specific analysis instructions produced through the formation and deliberation of separate teams for each scenario.

1.1 Integrated Stewardship Strategy Objectives

In support of government objectives to mitigate forest health impacts on mid-term timber supply, this ISS project aims to:

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

This improved certainty will be achieved through the creation of:

1. A common understanding among participants of the goals, values, issues, and challenges facing the Merritt TSA.

2. A well designed Landscape Reserve Strategy that addresses many stewardship issues, including identified habitat values and First Nation's interest, with an aim to minimize impacts to the timber harvesting land base (THLB). This will ultimately help to refine the landbase that is currently suitable for harvesting timber.

3. A coordinated Harvest Strategy that identifies approaches to harvest scheduling aimed at addressing common interests (MPB salvage, equitable access to green timber, landscape level fuel breaks, etc.).

4. A Silviculture Strategy that provides clear direction on how to achieve improved timber and habitat outcomes in the future through silviculture investments through funding from sources like Forests For Tomorrow, BC Forest Enhancement Society, and Carbon Initiative.

5. A plan for monitoring and evaluating progress and effectiveness towards meeting key goals and objectives that support future management decisions in the Merritt TSA.

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

1.2   Context

This Scenario Development document is the second of seven documents developed through the ISS process:

1. <u>Situation Analysis</u> – describes in general terms the situation for the unit.

2. **Scenario Development** – describes the development of a Combined Scenario through forest-level modelling and analysis. Elements of this are first explored through four separate scenarios:

   a) <u>Base Case Scenario</u> – provides a baseline for comparison against other scenarios. It is a more flexible that takes into account non legal 'status quo' resource management compared to TSR that can only consider legally-established objectives.

   b) <u>Reserve Scenario</u> – review and analyze existing and proposed management zonation and develop strategy options that provide for the sustainable management of non-timber values.

   c) <u>Harvest Scenario</u> – review and analyze current and planned timber harvesting plans, infrastructure, and capabilities in the context of the distribution of MPB-killed pine salvage opportunities and the reserve scenario. This must consider the current salvage period and the transition into the mid-term timber supply.

   d) <u>Silviculture Scenario</u> –provides treatment options, associated targets, timeframes and benefits to minimize the impact of the MPB infestation over the mid-term timber supply.

3. <u>Data Package</u> – describes the information that is material to the analysis including the model used, data inputs and assumptions.

4. <u>Analysis Report</u> –provides modeling outputs and rationale for choosing a preferred scenario.

5. <u>Operational plan</u> – direction for the implementation of the preferred scenario.

6. <u>Final Report</u> – summary of all project work completed.

7. <u>Monitoring Plan</u> – direction on monitoring the implementation of the ISS; establishing a list appropriate performance indicators, developing monitoring responsibilities and timeframe and a reporting format and schedule.

This particular document builds upon the Situation Analysis and incorporates input from participants – through various meetings and workshops – to list and describe the various modelling scenarios that will be explored in the upcoming phases of the project. This document also provides a record of the tactics that were not pursued in this iteration of the ISS project so that they may be considered again in developing future management strategies.

1.3   Planning Terms

Since planning terms are often misused, misunderstood, and misinterpreted, we have provided a brief description the planning terms that will be used throughout this document (Table 1).

Table 1   ISS Planning terms

Term	Answers the question…	Used to…
Objective	Where to go?	Describe what we want to achieve; values, issues, and opportunities to consider
Strategy	How do we get there?	Describe how we plan to achieve the objective(s); in this case by developing a Combined Scenario and tactical plan(s)
Scenario	What if?	Examine possible future outcomes by considering alternative tactics and modelling assumptions
Tactic	How to address what?	Describe specific actions or treatments that alone, or in combination with other tactics, address a strategic objective
Indicator	What to track?	Measures or describes the state or condition of a tactic
Target	On track?	Describe the desired state or condition of an indicator

1.4   Scenario Development Objectives

The objectives for this scenario development phase are to:

1. Actively seek input, information, and ideas from First Nations, forest licensees, stakeholders, and FLNRO staff through collaborative engagement;

2. Identify elements to analyze within four scenarios: ISS Base Case, Reserve, Harvest, and Silviculture scenarios;

3. Provide clear direction to the forest analyst for configuring the model; and

4. Identify knowledge gaps that would be beneficial to future analyses.

A fundamental component of this process is developing specific questions for what we are trying to answer through this analysis exercise. This helps to maintain focus on the original intent when considering potential assumptions.

Ultimately, elements from the analysis of these four scenarios (Figure 1) will be combined and applied to develop a Combined Scenario selected by the project team – also described as the Integrated Stewardship Strategy – and used to develop tactical plans to guide operational and monitoring activities over this first iteration of the ISS process.
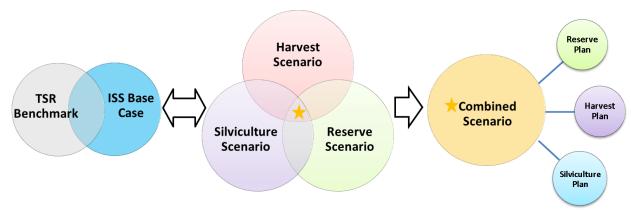

Figure 1   ISS Scenario Types

2   *Approach*

There is no single-way or correct approach for developing scenarios to model. It is not a linear or step-by-step process with a clear beginning and end. This phase of the ISS process involves identifying values, issues, and opportunities, then exploring which combination of tactics might best meet the objective(s). It can be organized into several exercises but planners typically work through these iteratively; starting from different perspectives each time. Finally, we are never really done. A more time-effective approach is to first consider the scope of tactics that can reasonably be analyzed in this first iteration of the ISS project and address the remaining ones in a future project (i.e., choose the most appropriate tactics that are within budget and list outstanding ones for later).

2.1   **Situation Analysis**

The Situation Analysis (Forsite 2016) briefly describes the current situation of timber supply, timber quality, fish and wildlife habitat, biodiversity, climate change adaptation, other development, and other key values and issues. It also summarizes current plans and strategies completed and underway.

The aim of the Situation Analysis document is to set the scene for all involved to think about the range of management issues facing the landbase – including their interest areas and values – and to encourage them to submit information and become engaged in the process. The background information and data gathered for this exercise also helps to identify some of the key values, issues, and opportunities that provide context to potential modelling scenarios being considered.

2.2   **Web Map Service**

To facilitate a clear understanding of the data and issues involved with these scenarios, a temporary web map service was created. This web-based application allows users to view spatial data as inputs to the modelling scenarios, as well as, results developed through these scenarios. The original plan was to make this accessible to everyone, however, the project team was unable to accommodate government's strict communication policies at this time. Currently, the web map service is only accessible to the project team while descriptions of the data and issues were shared with participants by other means (e.g., presentations, emails, pdf maps, shapefiles).

2.3   **Engagement**

Equipped with background information of the current situation, the ISS Project Team felt it was critical to reach out to First Nations, licensees, and other stakeholders, to: introduce the ISS process, gather input on key values and concerns, and solicit ideas and information on potential solutions or tactics to explore. The project team attempted to engage individuals and groups through: mailings, email correspondence and information exchange, phone calls, meetings with information sessions, and workshops.

The ISS Project Team first developed draft versions of a terms of reference (FLNRO 2016) and the Situation Analysis document to facilitate more meaningful and targeted discussions on the ISS process. It was later identified that First Nations, licensees, and stakeholders are typically very busy throughout spring/summer and the Merritt TSR process was already quite demanding on the available capacity. Accordingly, the period for engagement was extended.

Table 2 summarizes the various forms of engagement the ISS Project Team initiated to solicit ideas in developing and prioritizing scenarios to model.

Table 2   Summary of Engagement

When	How	Purpose	Who
Oct 6/15	F2F Meeting	Introduce ISS	TSA Licensee meeting (Licensees and FLNRO)
Feb 2/16	F2F Meeting	Introduce ISS outcomes and present Situation Analysis document	TSA Licensee meeting (Licensees and FLNRO)
Feb 2/16	Email	Thoughts on ISS priorities	Licensee (Tolko)
Feb 4/16	Email	Follow-up from meeting: distribution of the draft Situation Analysis	Licensees
Mar 3/16	Email Distribution	Letter introducing the ISS	First Nations
Apr 4/16	Email	Comments on draft Situation Analysis	FLNRO (Ecosystem Group)
Jun 7/16	F2F Meeting	Introduce ISS and present Situation Analysis document	First Nations and FLNRO
Jun 20/16	Email Distribution	Summary of action items from Jun 7 meeting and distribution of draft Situation Analysis	First Nations
Jul 25/16	Email Distribution	Distribution of the draft Terms of Reference and invitation to upcoming workshop	First Nations and Licensees
Aug 24/16	F2F Meeting	Overview of the ISS, discuss draft Terms of Reference, and [could not complete at this meeting] brainstorm Values, Issues and Opportunities with possible tactics	First Nations and FLNRO
Aug 25/16	F2F Meeting	Discuss draft Terms of Reference and brainstorm Values, Issues and Opportunities with possible tactics	Licensees and FLNRO
Oct 11/16	Email Distribution	Invitation to review and comment on the draft Terms of Reference (revised) and preliminary Matrix of Values, Issues and Opportunities with possible tactics	First Nations and Licensees
Oct 12/16 Nov 3/16	Emails	Concern with the draft Terms of Reference and general scope of the ISS; district response	First Nation (Nooaitch and FLNRO
Jan 16/17	F2F Meeting	Base Case and Reserve Scenario assumptions	2 Scenario Teams
Feb 6/17	F2F Meeting	Base Case and Reserve Scenario assumptions	2 Scenario Teams
Feb 15/17	F2F Meeting	Base Case and Reserve Scenario assumptions	2 Scenario Teams
Apr 20/17	Email Distribution	Latest version of scenario notes prior to modelling.	2 Scenario Teams
Oct 13/17	Email Distribution	Provided brief summary of observations for Base Case and Reserve Scenario results. Solicit interest to present these results and interest in helping to develop modelling assumptions for Silviculture/Harvest Scenarios.	Past workshop participants
Nov 11/17	Email Distribution	Invitation to review preliminary assumptions for Silviculture/Harvest scenarios	Selected licensees
Dec/17 – Jan/18	Phone Calls	Discuss and refine preliminary assumptions for Silviculture/Harvest Scenarios.	Selected licensees
Jan 23/18	F2F Meeting	Quick review of results for Base Case and Reserve Scenarios; summarize assumptions for Silviculture/Harvest Scenarios.	TSA Licensee meeting (Licensees and FLNRO)
Mar 13/18	Phone/Web Meeting	Discuss results for Silviculture/Harvest Scenarios, review all tactics examined so far and identify those for the Combined Scenario.	Project Team

Note: F2F means "Face-to-Face"

As this iteration of the ISS process continues to evolve, the ISS Project Team will continue to engage First Nations, licensees, and stakeholders.
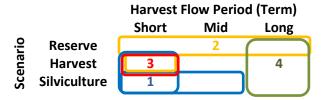
2.4   Identifying Tactics

Identifying and considering tactics or actions to address values, issues, and opportunities is a significant piece in developing appropriate scenarios. This helps to develop specific questions that we are trying to answer through the modelling exercise. A matrix of tactics was developed by using three techniques that consider: a) existing sources of information, b) general objectives, and c) existing and desired activities.

An obvious technique for identifying tactics is to review the material already presented through other processes. Ideas were readily available and assembled from the Situation Analysis (section 2.1), latest rationale for AAC determination, district manager guidance, and other existing sources of information.

For this iteration of the ISS, the Project Team discussed and settled on four general objectives. Much of the engagement described in section 2.2 aimed to produce ideas for tactics by asking individuals this question related to the four objectives, "How can we…"

1. MITIGATE fall-down in the mid-term
2. MAINTAIN non-timber values
3. MINIMIZE economic losses due to natural disturbance (e.g., MPB, Fire)
4. MAXIMIZE long-term timber productivity

For additional context, individuals were shown the table below where colours correspond to the list of objectives above to illustrate the associated scenario type and period along the timber harvest flow that each objective is expected to impact:

The third technique for identifying tactics was asking individuals to consider current activities occurring across the landscape, as well as, desired activities that could affect identified values.

At this time, a total of 53 original tactic ideas were forwarded to the ISS Project Team for consideration (Appendix 1). Collected from various venues and sources, these tactics span a wide range of values and issues – of which many are quite similar. The tactics were captured and managed in an Excel spreadsheet that made it easier to organize, group, and summarize.

2.5   Describe, Group, and Prioritize Tactics

Given the array of tactic ideas assembled, the ISS Project Team determined that the budget for this iteration would support analysis of approximately 5 scenarios. The challenge, then, was to prioritize and integrate as many of the original ideas received as possible. The process for doing this involved several steps.

First, the ISS Project Team and forest analyst assessed and expanded the description of each tactic into:

➢ several classifications (i.e., objective, value/issue/opportunity, tactic type);

➢ analysis potential (i.e., whether and how the tactic might be included in a forest-level analysis); and

➢ general priority class (ranging from low to very high).

These expanded definitions helped in grouping similar tactics and summarize results.

Each ISS Project Team member was then asked to select approximately 10 tactic types that they felt were most critical to this iteration of the ISS process. This step identified 11 tactic types for closer consideration. After further discussion and amalgamation as a group, the ISS Project Team narrowed down the list of tactic types (see Table 3) aimed to address the four objectives and numerous values, issues and opportunities that exist within the project area. This list was subsequently distributed among key FLNRO staff and attached to an invitation to potential scenario team participants.

Table 3   Tactics to be considered in each scenario

Tactics to be considered in the **Base Case Scenario:**	
"Which modelling assumptions best reflect the landscape-level management actions expected over the next 10 to 20 years?"	
Landscape-Level Biodiversity	Aims to maintain biodiversity values across each landscape unit. This tactic may be approached by modelling coarse-level indicators (e.g., seral stage, harvest patch size).
Watershed Health	Examines timber harvesting constraints to reduce the risk of impact on non-timber values within key watersheds highly sensitive to: a) peak flows, b) delivery of fine sediments, and c) loss of riparian function. This tactic may be approached by modelling maximum disturbance limits.
Wildlife Habitat and Access	Examines forest cover requirements and access timing constraints to maintain habitat supply for species at risk and regionally important species (i.e., Williamson's Sapsucker, Bull Trout, Moose, Mountain Goat, Mule Deer, Fisher, and Tailed Frog). This tactic may be approached by: • tracking critical habitat, • periodically deferring timber harvest within identified areas, and • minimizing identified road systems.
Tactics to be considered in the **Reserve Scenario:**	
"Where and how should we reserve forested stands to address landscape-level biodiversity and non-timber values while, wherever possible, minimizing impacts to the working forest?"	
Reserves	Explores ways to maintain the harvest area while providing for the full range of values on the landbase. This tactic may be approached by maximizing relative scores assigned across the landbase for: • riparian reserves; • old forests; • rare sites/ecosystems; • identified cultural interests; and • habitat for identified wildlife species.
Wildfire	Consider projected changes in temperature and precipitation and incorporate stand- and landscape-level management tactics to reduce wildfire risk. This tactic may be approached by maximizing relative scores assigned to the landbase that reduce the risk of loss due to wildfire and by modelling fire stocking standards (Silviculture Scenario).
Tactics to be considered in the **Harvest Scenario:**	
"What stands should be prioritized for harvest in the short term and what are the mid/long term consequences of not following this strategy?"	
Harvest Priority	Examine ways to identify and promote the most logical and cost-effective timber harvest opportunities by modelling key operational considerations. This tactic may be approached by developing physically and economically realistic assumptions that define the operable limits for timber harvesting.
Dry-Belt Fir	Explore treatment options to manage the IDF for timber, wildlife values, forest health, and fire risk. This tactic may be approached by modelling partial cutting silviculture systems and associated responses.
Ecosystem Restoration	Examine ways to restore identified ecosystems to their natural condition, prior to disturbance, condition. This tactic may be approached by modelling alternative treatments for candidate stands.
Timber Profile and Net Value	Examine the forest profile and integrate clear timber targets (e.g., MAI, piece size and value) to help drive stocking standards. This tactic may be approached by modelling soft harvest partitions, adjusting yield criteria, and implementing product targets.

Tactics to be considered in the **Silviculture Scenario:** *"Which alternative silviculture treatments can mitigate risk or benefit future outcomes (both timber and non-timber)?"*	
Enhanced Silviculture	Explore options to realize future gains based on an assessment of risk from climate change and forest health factors. This tactic may be approached by developing enhanced silviculture treatments options on identified stands (e.g., modified stocking and species with the lens of climate change), aimed to improve timber quantity and quality over the long-term.
Incremental Silviculture	Examine ways to stabilize or increase future timber harvest from existing stands. This tactic may be approached by modelling various incremental treatments (e.g., fertilization, thinning, pruning) to identified stands.

2.6   Scenario Teams

A scenario team was assembled to flesh out the details and information required to develop the ISS Base Case and Reserve modelling scenarios. Team members were made up of FLNRO staff, licensees, and First Nations, as either active or passive participants (see Appendix 2). Active team members attended calls and meetings, provided direction and input on scenario elements, and assisted in developing material and securing data/information for the scenarios. Passive team members attended calls and meetings whenever available but mainly reviewed and commented on material developed.

The team prepared notes for implementing these scenarios and sensitivities (Appendix 3, Appendix 4). These ideas were subsequently used by the forest analyst to prepare the data package and configure the model.

With looming budget and timing constraints, the project team elected to simplify the process of developing assumptions for the harvest and silviculture scenarios. A preliminary list of assumptions was prepared and circulated among licensees for review and comment. This was deemed acceptable as the approach and criteria for these scenarios are relatively straightforward and align well with forest licensees' activities. The project team attempted to contact each licensee individually to review the proposed modelling approaches and criteria. Their input was noted and incorporated into a final set of assumptions (Appendix 5 and Appendix 6).

The remaining schedule and budget did not allow further external engagement. Instead, members of the ISS project teams met over a conference call and web meeting on March 13, 2018 to identify the approach and assumptions for the Combined Scenario (Appendix 7). The following project team members participated: Andrew Snetsinger, Bruce Walter, Suzanne Shears, Rob Kennett, and Patrick Bryant.

3   References

FLNRO 2016   BC Ministry of Forests, Lands and Natural Resource Operations. *Draft (Version 1.2) Terms of Reference – Integrated Silviculture Strategy for the Merritt TSA.* September 2, 2016. 7p.

FLNRO 2015   BC Ministry of Forests, Lands and Natural Resource Operations. *Chief Forester Information Bulletin - Stewardship and Stabilizing the Timber Harvesting Land Base.* March 2015. 6p.
https://www.for.gov.bc.ca/ftp/rco/external/!publish/FMLT%20Publish/North%20Island%20Central%20Coast/April%2015%202015%20FMLT%20Meeting/Chief%20Forester%20Information%20Bulletin%20FINAL.docx

Forsite 2018   Forsite Consultants Ltd. *Integrated Stewardship Strategy for the Merritt Natural Resources District - Situation Analysis*. Version 1.4. March 31, 2018. 75p.
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Appendix 1   **Matrix of Tactics**

The following table lists all the tactic ideas gathered to date for the Merritt TSA. These ideas were used to develop a matrix of tactics for developing modelling scenarios.

ID	Description	Tactic/Action
1	Transition to a Fibre Economy vs. Sawlog	Investment and R&D; inoperable sites; reduce risk [Harvest profiles]
2	Shorter rotations on sites with the best site indices	Harvest sooner on these key stands [Economic operability] [Harvest profiles]
3	Analysis overlapping values/constraints [Which ones?]	Group where applicable
4	Mimic natural disturbance better	Move to an NDT-driven model (i.e., patch size) [Configure model with patch targets]
5	Use climate change to understand changes to NDT (if any)	[Apply climate change model (2025, 2050, or 2080) that shifts BEC zones; evaluate key indicators according to revised NDT(s)]
6	Increase forest resilience to pathogens	Genetic/species diversity in plantations [Enhanced Silviculture]
7	Range - loss of rangeland and encroachment; return to historic levels	Ecosystem restoration (thin and burn)
8	Limit impacts of future MPB	Limit continuous "patches" of mature Pl. [Alternative treatment options]
9	Increase resilience	Use climate based species direction [Enhanced Silviculture]
10	Reduce Fire risk	Risk mapping; promote actions to reduce risk (e.g., thinning; climate stocking standards) [Create fuel breaks; Wildland Urban Interface]
11	Habitat values through fire	Modify fire responses to benefit wildlife; promote ER fire; fire plans
12	Distribution/connectivity with mature seral habitats	Apply adjacency requirements; expand riparian buffers.
13	Access management for wildlife	[Apply access timing constraints to predefined 'zones'] [Link stands with roads and configure model to minimize road building]
14	Maintenance of thermal/snow interception cover for Moose and Mule Deer	[Apply forest cover requirements]
15	Rare ecosystems	Build better approach to identify locations and maintain as retention (access to information for licensees' SFM plan?)
16	Maintain forage	Modified silviculture treatment to support forage production (e.g., including deciduous trees) [Apply treatment targets]
17	Maintain cultural heritage resources	Stand/ecosystem types that maintain key medicinal &/or berry-picking areas
18	Retaining some areas (like VQOs) adds pressure to key FN interests	See what happens when VQO thresholds are relaxed [Adjust VQO targets; on/off]
19	Ranching impacts on stream temperature: how do we regulate private lands?	Scope; dialogue; similar to FireSmart program
20	TSR modelled 558 ha of archaeological sites; unable to estimate how much more will be identified	[Target similar levels of cultural retention throughout areas not surveyed]
21	Stoyoma area impact examined in TSR; unable to estimate impact of other spiritually sensitive areas that have not yet been shared by FN.	z
22	Ensure that First Nations' interests and important values are adequately accounted for	[Target similar levels of cultural retention throughout areas not surveyed]

ID	Description	Tactic/Action
23	Examine the cumulative impacts affecting First Nation values and cultural survival.	[Incorporate CE Protocols for Fish Stream, Moose, Mule Deer, Visual Quality, Grizzly, OGMA]
24	Some FN identified that TSR did not adequately address cultural heritage resource values	FN encourage the province to collaboratively establish procedures and principles when initiating new decision-making processes
25	FN communities have been working to: a) develop principles, policies, and approaches to forest management (grounded in respect and recognition title and Rights); b) advance a healthy forest economy (environmentally sustainable, respects culture and heritage, and provides predictability and stability for forestry with increased opportunities for FN people and communities)..	z
26	Timber supply impacts may be underestimated	Ensure that existing constraints are modelled correctly (e.g., visuals); possibly deeper investigation of 1 or 2 issues for each TSA (Merritt, Okanagan, Kamloops)
27	Government balancing jobs/economy vs. other values is more critical now than ever	z
28	Every cubic meter matters - relates directly to how many facilities survive	z
29	Looking for new direction that optimizes harvest volume while maintaining values.	Explore non-traditional strategies that increase timber availability (e.g., short rotations on best sites) [Economic operability] [Harvest profiles]
30	Explore issues identified through licensees' certification (CSA) processes.	z
31	Just as important to chase down downward pressures on Timber Supply as it is to find upward relief.	z
32	Maintaining watershed values (quality and quantity of water) for the fish and fish sensitive watersheds in the TSA including Temperature Sensitive Streams. A Watershed Risk Analysis should be ready shortly that will provide risk ratings by watershed.	[Apply forest cover requirements]
33	Lack of small stream management and buffers.	[Spatialize riparian buffers where possible]
34	Management for tailed frog streams and watersheds.	[Apply forest cover requirements]
35	Maintaining biodiversity values after pine beetle and over the rotation. Landscape level and stand level. Possible indicators – seral stage, habitat patch size, habitat supply for birds, bats and fur bearers, etc.	[Apply targets for seral stage, patch size, and identified habitat]
36	Road and access management impacts. Preliminary list of species that could be focus of access management: Moose, Mountain Goats, Mule Deer, Bull Trout systems.	[Apply access timing constraints to predefined 'zones'] [Link stands with roads and configure model to minimize road building]
37	Moose – road access and core areas buffers. Seral distribution?	[Apply access timing constraints to predefined 'zones'] [Link stands with roads and configure model to minimize road building]
38	Williamson's Sapsucker – management for habitat through BMPs across range.	[Apply forest cover requirements]
39	How to manage the IDF for timber, wildlife values, forest health and fire risk.	[Explore partial cutting systems with silviculture responses]

ID	Description	Tactic/Action
40	There may be a percentage of the land base that is contributing to the cut but is not economical to harvest resulting in a possible overharvest in some areas which may affect other values such as biodiversity. Also relates to understanding the 'forest profile' of the TSA including low volume stands, Py stands, IDF, growth and yield and the operational landbase and THLB.	[Economic operability] [Harvest profiles]
41	Reduce Fire risk	Risk mapping; promote actions to reduce risk (e.g., thinning; climate stocking standards) [Maintain fuel breaks]
42	Explore ways to incorporate stand- and landscape-level wildfire management strategies to address the potential benefits, impacts, and risks from fire.	Maximize relative scores assigned to reduce the risk of loss due to wildfire and by applying fire stocking standards
43	Explores ways to maintain the harvest area while providing for the full range of values on the landbase	Maximize relative scores assigned across the landbase for: old forests; rare sites/ecosystems; identified First Nations cultural heritage interests; trapping opportunities; and habitat and identified connectivity for identified wildlife species.
44	Incorporate the challenges associated with re-establishing Douglas-fir stands within IDF forest types and the utility of evolving technologies like LiDAR to address this complex issue.	[Explore partial cutting systems with silviculture responses]
45	Examine implications that projected changes in temperature and precipitation might have on identified values and explore potential adaptation strategies.	Alternative enhanced silviculture treatments/costs for candidate stands; track/target max budget
46	Integrate clear timber targets (e.g., MAI, piece size and value) to help drive stocking standards and properly reflect enhanced activities within the appraisal system.	Alternative enhanced silviculture treatments/costs for candidate stands; track/target max budget
47	Examine the effects of restoring identified ecosystems to their natural condition prior to disturbance.	Alternative restoration treatments/costs for candidate stands; track/target max budget
48	Explore modifications in road construction and timber harvesting to reduce the impact on non-timber values within key watersheds highly sensitive to: a) peak flows, b) delivery of fine sediments, and c) loss of riparian function.	Apply forest cover requirements over identified areas within identified watersheds
49	increased hunting with declining salmon, impact on wildlife	
50	Fire management	
51	Recreation and access	
52	Transmission lines / pipelines	
53	Water quality	

Appendix 2   **Scenario Teams**

The following table lists the various participants who participated on each scenario team.

Scenario Team	Type	Participant	Organization
ISS Base Case & Reserve	Active	Andrew Snetsinger	FLNRO DCS
		Bruce Walter	FLNRO DCS
		Patrick Bryant	Forsite
		Rob Kennett	Forsite
		Jason Carmichael	Weyerhaeuser
		Ian Black	BCTS
		Brent Turmel	Aspen Planers
		Shaun Hales	Tolko
		Pete Stroes	FLNRO DCS
		Martin Ponsioen	FLNRO DCS
		Alycia Fennings	FLNRO DCS
		Nina Sigloch	FLNRO TOR
		Bevan Ernst	FLNRO TOR
		John Surgenor	FLNRO TOR
		Rich McCleary	FLNRO TOR
	Passive	Paul Rehsler	FLNRO RPB
		Bryce Bancroft	Symmetree
		Karlee Snetsinger	FLNRO DCS
		Jennifer Reid	FLNRO DCS
		Tracy Coombes	FLNRO DCS
		Pat Farmer	FLNRO DCS
		Ted Moore	FLNRO DCS
Harvest & Silviculture	Active	Patrick Bryant	Forsite
		Andrew Snetsinger	FLNRO
		Jason Carmichael	Weyerhaeuser
		Rob Kennett	Forsite
		Lenard Joe	Stuwix
		Shawn Hales	Tolko
		Zoran Boskovic	BCTS
		Shaun Kuzio	Stuwix
		Brent Turmel	Aspen Planner
		Trenna MacLeod	Weyerhaeuser
	Passive	Paul Rehsler	FLNRO
		Bryce Bancroft	Symmetree

Appendix 3   **Base Case Scenario Notes**

Appendix 4   Reserve Scenario Notes

Appendix 5 **Summary of Harvest Scenario Assumptions**

Harvest Scenario 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)?

Tactic	Element	ISS Base Case Scenario		ISS Harvest Scenario	
		Description	Criteria	Description	Criteria
Minimum Harvest Criteria: How low are we prepared to go over a short period of time when options are limited?					
Minimum Harvest Criteria	Volume per Hectare	Even-aged Natural	Min 150 m3/ ha conifer; 0.2 m3/tree; No min age	Add lower classes over short-term	Min 75 m3/ ha; stratify 75-100 and 100-150 and 150-200
		Even-aged Managed	Min 150 m3/ ha conifer; 0.2 m3/tree; 60 yrs	Confirm: 60 yrs to approach potential maximum yield (tech rpt) Include criteria: 95% CMAI rather than minimum age of 60 yrs	Maintain higher MHC threshold with 60yrs Consider other criteria (e.g., piece size; dbh)
		Uneven-aged Dry-Belt fir	Min 120 m3/ ha conifer; 0.2 m3/tree; No min age		
Harvest Priority: Which stands should be prioritized for harvest in the short term?					
Harvest Priority	Low volume harvest partition	Confirm: level; max 10% from stands between 150 and 200 m3/ha (current performance tech rept & rationale; natural stand only or managed too?) not in ISS Base Case Scenario.		First run with limit above 200m3/ha; maintain this flow while adding MHC above (i.e., no proportional harvest constraint)	
	Product Profile	Not included			Report flow by species/age class
	Yellow Pine	~4k ha in THLB but do not meet MHC		Sensitivity that drops Py volume	
	Wildfire Risk			Target PSTA 'extreme' risk stands; plus operable stands within WUI; plus conifer-leading within landscape-level fuel breaks	
	Selection harvest	Selection harvest		Smooth selection harvest over time	
	Harvest system	Not included		Incorporate ground/cable (steeper slopes) account; control?	

Tactic	Element	ISS Base Case Scenario		ISS Harvest Scenario	
		Description	Criteria	Description	Criteria
Which reforestation regimes are appropriate within WUIs and how would these affect harvest flows?					
Wildland Urban Interface **(Sensitivity)**	Eligible Stands			All stands harvested (THLB) within WUI ~6850 ha identified for selection harvest (Dry-belt Fd); ideas for alternative treatment here???	
	Timing Windows			Future managed yields; following harvest	
	Treatment Costs			Not Required; only considering impact to harvest flow	
	Treatment Responses			Adjust yield curves (TIPSY) for treated stands: switch planting method to 'Clumped' and reduce planted establish densities to 600 sph; results in yield reductions of ~50%	
	Anticipated Issues			None.	

Preliminary Plan for Model Runs:

1. Apply harvest priority to Extreme fire risk, WUI, and fuel breaks; smooth selection harvest; incorporate slope and product profile criteria; determine harvest flow with 200 m3/ha min harvest criteria

2. Run # 1 and determine harvest flow with lower MHC volume classes

3. Run # 2 and remove yellow pine volume

4. Run # 2 or Base Case model/run; apply proposed Fire Management yields within WUIs.

Appendix 6   ***Summary of Silviculture Scenario Assumptions***

Silviculture Scenario Question: Are there alternative silviculture practices that would benefit future outcomes (both timber and non-timber)?

The silviculture scenario will be configured to maximize harvest flow while being constrained to an annual budget of $3 million.

Tactic	Element	ISS Silviculture Scenario	
		Description	**Criteria**
Rehabilitating MPB Impacted Stands: How can rehabilitation of unsalvaged, beetle-attacked stands improve timber quantity and quality over the mid- and long-terms?			
Rehabilitate MPB Impacted Stands	Eligible Stands	Unlogged MPB-impacted stands, min 40% dead, >40 yrs old at attack	<100m3/ha live volume IDF: Fd mSI >17.0; Pl mSI >17.8; Sx mSI >16.1 MS: Fd mSI >18.0; Pl mSI >17.39; Bl mSI >17.3; Sx mSI >17.3 ESSF: Fd mSI >15.0; Pl mSI >14.1; Bl mSI >15.8; Sx mSI >14.7
	Timing Windows	Stands unlikely to be salvaged/harvested	According to minimum harvest criteria that are less than 'low volume stands'; next 40 years only
	Treatment Costs	Marginally Economic (>= 50m3/ha) - Harvest/Knockdown/Site Prep/Plant	$1500/ha
		Uneconomic (<50m3/ha) - Knockdown/Site Prep/Plant	$2000/ha
		Rehab 'incentive' within WUI	Reduce treatment by $500/ha
	Treatment Responses	Transition stands onto future managed stands as if harvested	Regular future AUs, or enhanced future AU (where stand eligibility overlaps)
	Anticipated Issues	No Distance cost with access so good throughout TSA	
How can successive stand fertilization treatments on candidate stands mitigate harvest reductions over the mid-term while maintaining a positive return on investment?			
Fertilization	Eligible Stands	Young natural stands	Age 30 to 80
		Existing managed stands	Age 25 to 55
		Current/future managed stands	Age 25 to 55
		Species (model selects priority)	(Sx & Fdi & Pli) >=80%
		BEC Zones	MS, ESSF, IDF dk1, dk2 (non drybelt)
		Site Index (note thresholds correspond to existing AUs; not from FFT guidelines)	IDF: Sx 16.1, Fir 17.0, Pine 17.8 MS: Sx mSI >17.3; Fd mSI >18.0; Pl mSI >17.39 ESSF: Sx mSI >14.7; Fd mSI >15.0; Pl mSI >14.1
		Slope	<=45% (entire stand)
	Timing Windows	See Fert Response tables below; application every 10 years; progressively closest from harvesting; delay harvest eligibility 10yrs after last application	
	Treatment Costs	All stands	Each Fd, Pl treatment: $450/ha Single Sx treatment: $450/ha Multiple Sx treatments: $600/ha (blend)
	Treatment Responses	See Fert Response tables below	
	Anticipated Issues	First Nations' concerns	

Tactic	Element	ISS Silviculture Scenario	
		Description	**Criteria**
How can a combination of basic silviculture treatments improve timber quantity and quality over the long-term? E.g., higher stocking			
Enhanced Basic Silviculture	Eligible Stands	All	
	Timing Windows	Stands harvested in the model	future managed
	Treatment Costs	Incremental planting of trees sown with select seed	$450/ha
		Switch from natural to planted (where applicable)	$1000/ha
	Treatment Responses	Planting method	Natural to 100% planted (where possible)
		Regeneration delay	Decrease from 2 to 1 yrs (3 to 2 yrs)
		Planting density	Increase to 1800 with genetic gains applied
	Anticipated Issues	Currently lacks funding mechanism	

Preliminary Plan for Model Runs:

1. Combine Rehab, Fert and Enhanced treatment/cost options; volume from rehab to contributes towards harvest flow

2. Run #1 but volume from rehab does not contribute towards harvest flow

Fertilization Response Tables

Number of Applications Every 10 years	Stand Age Window (yrs)	Fd Response (gross m³/ha)	Pl Response (gross m³/ha)	Natural Stands (gross m³/ha)	Efficiency
1	30 - 80	15	12	10	100%
2	30 - 70	30	24	20	100%
3	30 - 60	45	36	30	100%
4	30 - 50	60	48	40	100%

Pl and Fd response are simple multiples of the single treatment response.

Number of Applications Every 5 years	Stand Age Window (yrs)	Sx Response (gross m³/ha)	Efficiency
1	30 - 80	15	100%
2	25 - 55	49	100%
3	25 - 50	89	100%
4	25 - 45	132	100%
5	25 - 40	155	100%
6	25 - 35	176	100%

Sx response was derived from information provided by the MFLNRO in the document "Intensive fertilization graphs.xlsx"
(Rob Brockley email June 14,, 2012, Mel Scott/Ralph Winter email June15, July 28, 2012).

Appendix 7   **Combined Scenario Notes**

The following table outlines the tactics from existing scenarios that will be included in the combined scenario for the Merritt ISS.

	Include	Adjustments	Scenario	Category	Tactic	Target	Description
1	Yes	No change	Base Case	Landscape-Level Biodiversity	Spatial OGMAs	Active	Only include spatial OGMAs as landbase netdown to address landscape-level biodiversity.
2	Yes	Report Only	Base Case Sensitivity	Landscape-Level Biodiversity	Old Seral	Active	Implement the hectare targets for old seral according to the Non-Spatial Old Growth Order.
3	Yes	Report Only	Base Case Sensitivity	Landscape-Level Biodiversity	Mature-Plus-Old Seral	Active	Implement mature-plus-old seral targets according to the biodiversity guidebook.
4	Yes	No change	Base Case	Landscape-Level Biodiversity	Early Seral	Inactive	Report (no targets) area as early seral stage (< 40 years) by NDT, as per the guidelines in the Biodiversity Guidebook.
5	Yes	No change	Base Case	Landscape-Level Biodiversity	Patch Size - Very Early Seral	Active	Implement target ranges for very early seral stage (< 20 years) patches by NDT, as per the guidelines in the Biodiversity Guidebook
6	Yes	No change	Base Case	Landscape-Level Biodiversity	Patch Size - Mature-Plus-Old Seral	Inactive	Report only (no targets) mature-plus-old seral stage patches by NDT relative to targets identified in the Biodiversity Guidebook.
7	No	Drop	Base Case Sensitivity	Landscape-Level Biodiversity	Contiguous Mature Pine	Inactive	Use patch targets to limit the amount of large contiguous mature pine-leading patches
8	Yes	No change	Base Case	Watershed Health	Community Watersheds	Active	Implement ECA targets within all CWS units.
9	No	Drop	Base Case	Watershed Health	Cumulative Effects	Inactive	Report only (no targets) the ECA above the H40 and H60 snowlines.
10	Yes	No change	Base Case	Watershed Health	Fisheries Sensitive Watersheds	Active	Implement ECA targets within all FSW units.
11	No	Drop	Base Case Sensitivity	Watershed Health	Fisheries Sensitive Watersheds	Active	Implement a sustainable rate of cut within all FSW units; maximum targets for CC/PC area
12	Yes	THLB reduction only; not watersheds	Base Case	Wildlife Habitat and Access	Coastal-Tailed Frog	Inactive	Reduce THLB for CTF wildlife habitat areas and point buffers and report only (no targets) the ECA within identified CTF watersheds.
13	Yes	No change	Base Case	Wildlife Habitat and Access	Moose	Active	Forage: Implement a minimum requirement to maintain early seral stands within Moose Winter Range. Cover: Report only on moose cover (stands >= 16 metres in height)
14	Yes	No change	Base Case	Wildlife Habitat and Access	Marten Habitat	Inactive	Report only (no targets) the amount of early seral in the MS and ESSF zones plus amount of old and very old within specific subzones.

	Include	Adjustments	Scenario	Category	Tactic	Target	Description
15	Yes	No change	Base Case	Other	Visuals	Active	Implement disturbance limits to individual visual polygons according to their recommended VQO.
16	Yes	No change	Base Case Sensitivity	Other	Adjacency Constraints	Active	Implement requirement to limit area below 3 m tall to a max 33% within a cumulative effects watershed (rather than implementing patch size targets).
17	Yes	'No Harvest' on candidate reserves for 40 years	Reserve	Candidate Reserves	Total Score	Active	Implement unachievable target to maximize the total score of for anchors, stand features, and constraints. Select candidate reserves that meet multiple criteria and thresholds and can provide a preliminary spatial result to work from.
18	Yes	No change	Harvest	Minimum Harvest Criteria	High Volume Partition	Active	Establish harvest flow for higher MHC (>200 m3/ha)
19	Yes	Drop 75-100, 100-150, 150-200 criterion on steep slopes	Harvest	Minimum Harvest Criteria	Low Volume Classes	Active	Establish harvest flow that includes three lower MHC classes: (75-100; 100-150; 150-200 m3/ha)
20	Yes	No change	Harvest	Minimum Harvest Criteria	CMAI Criterion	Active	Add criteria that requires **managed** stands to reach 95% CMAI and minimum age of 60 yrs.
21	Yes	Not on steep slopes	Harvest	Harvest Priority	Selection Harvest	Active	Smooth selection harvest over time
22	Yes	Report harvest by volume class for tactical plan	Harvest	Harvest Priority	Harvest Opening Size	Active	Implement harvest opening criteria as follows: 0% @ < 1 ha with hard weight; <5% @ ≥1 ha and <5 ha with moderate weight)
23	Yes	No change	Harvest	Harvest Priority	Harvest system profile	Active	Report flow by slope class (< & ≥45%) to show harvest system profile over time (ground/cable).
24	Yes	No change	Harvest	Harvest Priority	Product profile	Inactive	Report flow by species/age class to generate interactive report of product profile over time.
25	Yes	No change	Harvest	Harvest Priority	Wildfire Risk	Inactive	Target harvest to reduce fire risk: stands identified as 'extreme' risk through PSTA; operable stands within WUI; conifer-leading stands within landscape-level fuel breaks.
26	Yes	No change (prevent doing enhanced)	Harvest Sensitivity	Wildfire Mitigation	Treatments within WUI	Active	Examine harvest flow impacts associated with implementing draft Fire Management Stocking Standards considered within wildland urban interface areas.
27	No	Drop	Harvest Sensitivity	Species Preference	Yellow Pine	Active	Remove Py volume from harvest flow.

	Include	Adjustments	Scenario	Category	Tactic	Target	Description
28	Yes	No change	Silviculture	Combine Rehab and Fert Treatments	Maximize harvest flow with annual budget of $3 million for a combination of silviculture treatments	Active	Implement alternative treatment options for rehabilitating MPB-impacted stands, fertilization, and enhanced basic silviculture. Harvest request **includes** all volume from rehabilitation and reports recovered volume in harvest flow.
29	No	Drop	Silviculture	Combine Rehab and Fert Treatments	Maximize harvest flow with annual budget of $3 million for a combination of silviculture treatments	Active	Implement alternative treatment options for rehabilitating MPB-impacted stands, fertilization, and enhanced basic silviculture. Harvest request **excludes** all volume from rehabilitation but still reports recovered volume in harvest flow.
30	Yes	No change; step up similar to TSR (get to 1.5)	Silviculture	Harvest Flow	Increase short-/mid-term harvest level	Active	Adjust the harvest request to push the short/mid-term level while matching the long-term level from the Base Case
31	Yes	EBS on half the clearcut area; plus keep $3M if possible; only CMAI for EBS					