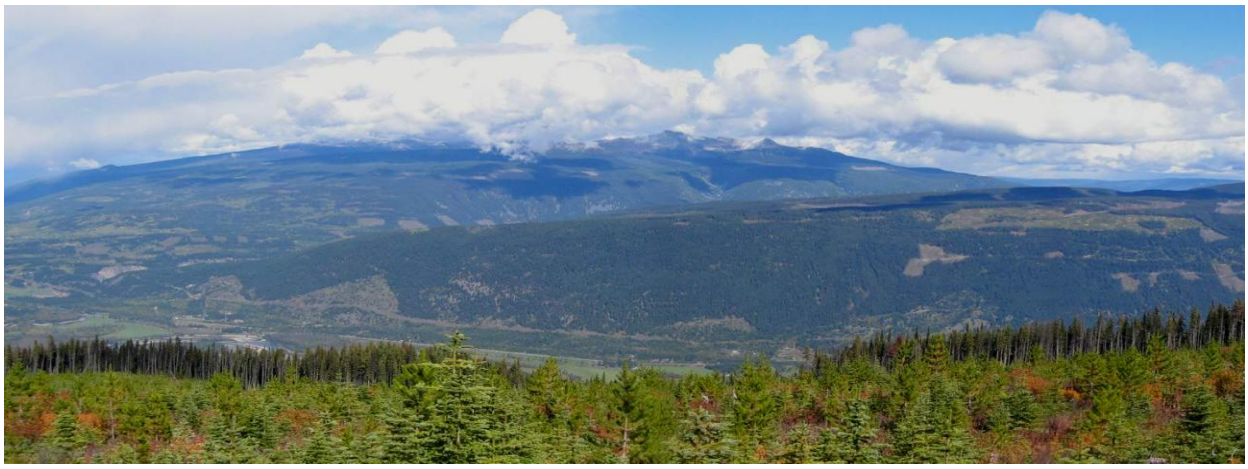
A Future Forest Strategy for the Kamloops TSA:

2007-08 Workplan Description

To March 31, 2008



Date: January 31, 2007

By: The Kamloops TSA Steering Committee

Table of Contents

KEY DELIVERABLES FROM THE KAMLOOPS FUTURE FORESTS STRATEGY IN FISCAL 2007-08 2

DETAILED EXPLANATION OF WORK-PLAN STEPS AND COSTING 2

STEP 1 – Explore Impact of climate change on ecosystems 4

STEP 2 – Identify case study area 6

STEP 3 – Identify key management regimes for the case study area 7

STEP 4 – Identify key ecological vulnerabilities or opportunities 8

PROJECT COSTING – SEE ACCOMPANYING SPREADSHEET 9

Key Deliverables from the Kamloops Future Forests Strategy in Fiscal 2007-08

1. **Climate BC Output** - The climate model, ClimateBC will be used to project changes in the Kamloops TSA using local climate gridpoints, at years 2020, 2050 and 2080 or equivalent time periods. The most likely climate change scenario will be run as a minimum, along with a worst case scenario (if funding and time permits).
2. **TSA BEC variant tables with climate change data** - After a discussion with local southern interior ecological specialists, description of how to characterize data – as changes in BEC variants and/or changes in key climate parameters within current variants.
3. **Map with corresponding spatial estimates of BEC variant or changes in climate variables for the TSA** (depending on the discussions with the local ecologists).
4. **A summary of likelihood / uncertainty classes with rationale for approach** – We are not sure if the uncertainty or likelihood of shifts in BEC variants will differ due to different parameters that may trigger such a shift. If so, we want to be able to characterize that uncertainty, if it is possible to do so.
5. **A map and description of the case study area** - with rationale for its choice.
6. **A synthesis table of management regimes for the case study area** – for various resource values (objectives/strategies/tactics) by BEC variant, groups or variants, or other subunit (to be determined).
7. **A summary progress report for 2007-08** – Explains what was accomplished and how it fits with next steps.

Detailed Explanation of Work-plan Steps and Costing

The following steps were designed to provide sufficient detail to clarify the original vision of the project developed under the December 20, 2007 Workplan and to allow for a rough estimate of project costs in 2007-2008. These "steps" are not intended to indicate a linear process where one step is completed before another begins. Some of these steps will be engaged concurrently or will be ongoing throughout the project. They are presented as a linear process here for ease of presentation and costing.

Table 1 – Overview of the steps and their role

The steps to be completed under funding in the 2007-08 fiscal year are shaded in green. The balance of tasks are anticipated to be completed in 2008-09.

STEP 1	Explore impact of climate change on ecosystems.	- Model climate change for the area to identify possible shifts in BEC units and environmental suitability – this forms the backdrop for the strategy
STEP 2	Identify case study area.	- Defines a case study area – this step is meant to narrow the scope of the project initially to a smaller area to fine-tune the process.
STEP 3	Identify key management regimes for the case study area.	- Identifies and organizes the intent and direction from the present plans and strategies in place. This may be done for the entire TSA at the same time. Regimes are sets or packages of objectives, strategies, tactics / practices.
STEP 4	Identify the key ecological vulnerabilities and opportunities	- Investigates ecological vulnerabilities or opportunities where projected climate will be different from the present, e.g., increased drought stress, lower likelihood of summer frost, etc.
STEP 5	Identify the key management vulnerabilities and opportunities	This step is broken down into three substeps – 5a, 5b, and 5c.
5a	A comparison of current management objectives with ecological vulnerabilities / opportunities.	- Organizes the information collected in step 3 to allow for assessment of management direction based on the identified vulnerabilities and opportunities identified in step 4.
5b	Determine vulnerabilities and opportunities for non-timber management.	- Takes the comparison of management regimes to ecological vulnerabilities one step further, by analysing those regimes for functional vulnerabilities (in strategies, tactics and practices), and exploring possible opportunities (based on the inter-relationship of management objectives and the changing ecological landscape).

5c	Determine vulnerabilities and opportunities for timber management.	- This step mirrors step 5b focussing now on timber objectives in light of the ecological vulnerabilities identified in step 4 and the inter-relationships with other management objectives.
STEP 6	Design integrated management regimes.	- Identifies management regimes (future forest conditions, strategies and practices/actions) to address the vulnerabilities and opportunities identified in step 5. These outputs will be in sufficient detail to provide direction, but also to realistically be developed for the entire TSA within the project budget, considering the uncertainty associated with climate and other influences
STEP 7	Explore the potential to reduce uncertainty and improve resolution.	- Explores the role added detail would provide in the management regimes identified.
STEP 8	Fine tune approach and design regimes for the rest of the TSA.	- Expands the analysis from the case study to the entire TSA
STEP 9	Complete Strategy.	- Creates a report identifying the outcomes and details the approach for use in other jurisdictions.

STEP 1 – Explore Impact of climate change on ecosystems

Although climate change is not the focus of this project, this first step is exclusively about climate forecasting because it will feed into step 2 – choosing a case study area.

Using the climate model, ClimateBC to project changes in Kamloops TSA BEC variants over time[1], variants will be mapped to show expected change at years 2020, 2050 and 2080 or equivalent time periods. The maps will show a revised landscape reflecting various climate change scenarios based on climate models determined to be most appropriate and their corresponding CO_2 emission scenarios. Model assumptions will be explored and explained. Tables will be created to show how individual climate parameters change by variant as a result of the climate change scenarios. This information will help define the new growing environment for trees, other plant species, and wildlife. For the various

[1] The final approach will be closely discussed with MFR climate change specialists (Dave Spittlehouse and Del Meidinger)

climate data, the intention is to assign a rough probability (likelihood) / uncertainty class, based on the climate change models and assumptions.

STEP 1 TASKS:

1. CLIMATEBC – With a local GIS/modeling specialist, run the model using a grid overlay on the 52 BEC variants (or portions thereof) that occur in the Kamloops TSA to produce climate variable tables (mean, range and degree of variation). This may include a number of runs to try to tease out temporal (annual) and not just spatial variability in the data for the BEC variants.
2. These model runs will also include output discussions with those familiar with the model to ensure the data variation is properly characterized (e.g., the gridpoint data anomalies that may need to be ignored). NOTE: Even though there is a existing spreadsheet of mean values for BEC variants across the province the model will be rerun in this step across the Kamloops TSA to localize the information, which may be important for those BEC variants that have only a small proportion within the Kamloops TSA.
3. Initially these model runs will produce tables showing average and ranges for all climate variables in the 52 BEC variants within the Kamloops TSA. Model assumptions and other key information will be documented.
4. Next an estimate of the extent of future spatial change in BEC Variants will be made based on the following steps:
    - Local project ecologist to evaluate/define climatic thresholds/ranges for each existing variant. Consultation to occur with the Southern Interior Regional Ecologist to confirm approach and methods. The proposal is to create lookup tables to identify conditions when areas should shift BEC variants (i.e. outside normal range for existing variant) and where they would shift to. Variant shifts will be mapped where the zonal and adjacent sites are expected to no longer fit within the current variant.
    - Evaluate each of the grid points against lookup tables developed by ecologist to determine if there has been a shift in variant. Note: this may require exploration of climatic thresholds for ecosystems outside of BC.

STEP 1 - continued

- Produce maps of projected BEC variants for 2020, 2050, and 2080.
- Reviewed by project ecologist and Regional Ecologist (if possible) for reasonableness (QA) – rework if necessary.
- Provide a report summarizing methodology/rationale and results. This would include a short text summary of the trends identified for each BEC variant over time (e.g. elevation shifts, geographic shifts, change in hectares).

5. Design an approach to likelihood /uncertainty classes. If possible, this will be discussed initially with provincial specialist Dave Spittlehouse, and then include other specialists, to explore the most effective approach to this. For example, temperature changes over time may be more certain than precipitation changes, and that may depend on geographic influences. (REFINEMENT EXPECTED DURING EXPLORATION OF THE NEXT STEPS).

STEP 2 – Identify case study area

This step is an important part of the project, as it will provide a backdrop for scenario testing, for both vulnerabilities (and adaptive capacity) as well as management options (adaptive actions). The intent is to use the outcomes from the prototype study area to provide guidance for wider use.

Choice of the case study area will be based on the output from step one to consider inherent ecosystem stability and resilience with preference for inclusion of some BEC variants that show potential for significant and profound changes. This approach will allow for key discussion to occur regarding a variety of impacts and options. The area should have a significant range of age classes and stand types, which again will touch on an assortment of vulnerabilities and potential management options. As well, to facilitate future management options, an area will be targeted with intent for future harvesting and management. To ensure the area will incorporate key non-timber management vulnerabilities, the area should have a range of non-timber issues, across a number of scales (preferred) - for example identified critical Caribou habitat with recreation and/or visual values. The final choice will be checked with a range of specialists and the KFFS Team.

STEP 2 TASKS:

1. Analyze the climate change data for the array of BEC Variants. With the KFFS team along with chosen subject matter experts, chose a suitable case study area to develop the initial (prototype) methodology for the strategy. Choice of the area will likely include consideration of the following criteria: the portions of the TSA that will be the focus for harvesting and management over the next 50 years; portions of the TSA that are climatically transitional and therefore more sensitive to changes; portions of the TSA that encompass areas with management considerations for non-timber objectives such as critical wildlife habitat, potential fire risks and hydrological concerns such that the cumulative effects of these influences can be considered at a number of scales.
2. This work will therefore involve:
    - Scoping of BEC data by area where most harvesting is expected in the next 50 years – using TSR 4, RESULTS or other data sources.
    - Identify from Step 1 portions of the TSA with the potential for significant BEC shifts.
    - Identify Landscape Units that have significant non-timber objectives.
    - Work with the KFFS team to choose the case study area, (e.g., LU, BEC variant or suite of BEC variants, to be determined).
    - Determining a maximum size to address for the prototype, e.g., (100,000 ha)

STEP 3 – Identify key management regimes for the case study area

The management regimes for all resource values, that could help shape the future forest in the case study area will be identified. This step may be most efficiently completed for the entire TSA at the same time, at least at a course level. These "regimes" are sets, or packages of objectives, strategies, tactics or practice guidelines. It is important at this stage that we try to drill down to the applicable stand / ecosystem types and the tactics / practices. These should be presented as regimes starting with management objectives. A matrix, or similar structure will be used to bring together the objectives and see how they overlap.

STEP 3 TASKS

1. Identify existing management regimes (objectives / strategies / tactics) for the full range of management objectives. This will involve a review of existing plans and strategies for the Kamloops TSA, with a possible requirement for interpretations from licensee staff or examination / analysis of GIS map layers.
2. Identify overlap between objectives. May require some GIS mapping within the case study area.

STEP 4 – Identify key ecological vulnerabilities or opportunities

A framework or matrix will be designed to identify ecological vulnerabilities (as best as we can with current knowledge and data) in the case study area based on: climate variables; such as – increasing drought stress or other factors such as added impacts from insects and disease; added abiotic damage – fire, snow, wind or other damaging agents. It may at times it may be useful to consider adaptive capacity of these ecosystems first to understand vulnerabilities. Once vulnerability indices or thresholds have been assigned, they will include (if possible) an indication of the range of probability (or uncertainty) associated with the forecast. Vulnerability classes will be estimated for:

a. Tree species persistence in common tree species mixtures for young, mid-seral (possibly old) stands in the variant. Vulnerability will be based on ecological suitability, general growth and health for common tree species mixtures of young and mid-seral stands (Possibly older stands – must check with ecologists). Note, age classes will need to be defined to address vulnerabilities.

b. Other vulnerabilities to plant assemblages and animals identified by the ecologists that will drive the associated management vulnerabilities in Step 5.

c. NOTE: Climate changes may provide ecological opportunities that will benefit specific management objectives – these will be identified where they occur.

Note: It may be necessary to consider ecological vulnerabilities on multiple spatial scales, over a range of time periods within the case study area. As well these vulnerabilities may at times be cumulative, building on one another to create an effect. These factors will be considered as much as practicable.

STEP 4 TASKS:

1. Create a matrix for potential vulnerabilities or opportunities by stand types. Break the vulnerabilities /opportunities into age classes, such as post harvest not yet regenerated, young stands (1 to 20 years), established stands (20 to 40 years), mid aged stands (40 – 120 yrs), older stands (120 yrs plus).

IN FISCAL 2008-09 (not part of this workplan)

2. *Work with regional ecologists and others to help interpret climate variable changes and implications for trees and other plants within the various ecosystems.*
3. *Using information from steps 3.1-3.2, work with regional and local specialists to explore potential vulnerabilities, perhaps at multiple scales and cumulative, from fire, snow, and the full range of insects and disease – by tree species for the various age groupings. Additionally explore management strategies or adaptive actions for STEP 5.*
4. *Utilize those familiar with the local tree and plant assemblages to explore vulnerability thresholds by species. Identify where these thresholds fit within the BEC framework to identify issues, e.g., Cw now out of its range due to moisture deficits. At this time also explore management strategies for STEP 5.*
5. *Rank ecological vulnerabilities and opportunities based on established classes and input from specialists. Explore potential probability or uncertainty classes associated with the vulnerabilities.*
6. *Provide rationale based on literature reviews and other information for vulnerabilities and likelihood of outcomes. Document results of 2-4 above.*

PROJECT COSTING – SEE ACCOMPANYING SPREADSHEET