



ADAPTING TO CLIMATE CHANGE

Future Forest Ecosystems Initiative (FFEI) Technical Team

2008/09 WORK PLAN

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APPROVED:



Jim Snetsinger, Chief Forester

Prepared by:

FFEI Technical Team, Ministry of Forests and Range
Evelyn Hamilton, FFEI Technical Team Chair
Tom Niemann, Manager, Climate Change and Forest Carbon



Ministry of
Forests and Range

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1. Introduction

This document outlines the Future Forest Ecosystems Initiative (FFEI) technical team's 2008/09 work plan. It supports the delivery of the Ministry of Forests and Range (MFR) FFEI strategic plan and addresses the following priorities:

- ♦ To better predict the impacts of climate on forest and range ecosystems;
- ♦ To identify critical issues;
- ♦ To modify and develop new management practices and policies needed to ensure adaptation to climate change; and
- ♦ To ensure, to the extent possible, that:
 - ♦ Work undertaken by ministry programs and external partners supports highest priority needs,
 - ♦ Results are used to direct ministry activities, and
 - ♦ There is a strong FFEI communication effort to share emerging knowledge both within the ministry and with other stakeholders.

2. The Challenge – Adapting B.C.'s Forest and Range Management Framework to a Changing Climate

Climate change has already affected – and will increasingly affect – the ecology and management of British Columbia's forest and range lands. Future environments will be much different and the degree and rate of change is highly uncertain. The ministry must adapt its current programs, policies and practices to be able to manage in a rapidly changing environment.

Some of the issues that need to be addressed include:

- ♦ AAC – ensure that determinations adequately account for climate change;
- ♦ Seed Transfer – ensure that seed transfer regulations account for climate change;
- ♦ Reforestation – ensure that young stands established by the FFT (Forests For Tomorrow) will be adapted to future climate;
- ♦ Productivity – examine issues related to changes in soil structure or composition and unanticipated impacts of invasive species;
- ♦ Resilience – ensure the elements of the Forest and Range Practices Act (FRPA) framework will promote practices that enhance forest resilience to stress and climate change;
- ♦ Non-timber Values – consider issues associated with other values from fish and wildlife to sustainable sources of drinking water; and
- ♦ Research Coordination – ensure that research undertaken by external partners is directed to priority needs and used effectively to direct ministry policy and practices.

Although climate change poses significant challenges and uncertainties, the ministry and our partners can effectively respond by developing knowledge and understanding of:

- ♦ Anticipated ecological changes associated with climate change;
- ♦ Risks to forest and range ecosystem values; and
- ♦ Approaches for addressing high priority issues.

By applying the best available knowledge in these areas the ministry will be able to adapt the forest and range management framework to account for changing ecological conditions thus reducing risks to forest and range resources.

3. Overview of the Future Forest Ecosystem Initiative

The Future Forest Ecosystem Initiative originated at a symposium and workshop hosted by the Chief Forester in December 2005, entitled: *The Future Forest Ecosystems of B.C.: Exploring the Opportunities*.¹ This seminal event was attended by representatives of the federal and provincial governments, universities, First Nations, forest and range industries, environmental organizations and consulting resource professionals. The implications of climate change for forest and range ecosystems and their management were explored and a number of strategies were proposed. The central theme that arose from the symposium and workshop was that British Columbia's current forest management framework should be adapted to manage for ecological resilience.

As a result of these initial discussions the Chief Forester established the FFEI to adapt B.C.'s forest and range management framework to a changing climate. The FFEI includes a suite of activities designed to:

- ♦ Improve our knowledge of the ecological changes associated with climate change and consequent risks to forest and range goods and services (through research, forecasting and monitoring); and
- ♦ Use that knowledge to adapt the forest and range management framework to changing ecological conditions through evaluating existing management strategies, developing and testing new management approaches and improving/updating our stewardship policies.

These activities are being conducted by ministry staff and our partners in other ministries and agencies. A key FFEI challenge is communicating throughout the ministry our growing knowledge and understanding of the implications of climate change and appropriate or potential actions for adapting our practices to these changes.

The Chief Forester and FFEI management team make cross-program decisions regarding the management and delivery of FFEI. The FFEI technical team provides leadership and advice regarding technical priorities and coordination of cross-program activities to address identified objectives and outcomes – “facilitating where possible and doing only where necessary”. The FFEI provides a forum and tools for information generation, dialogue and resolution of climate change adaptation needs and actions for the Ministry.

Three overlapping phases of FFEI are anticipated:

- ♦ Phase One – Assessing the Available Knowledge -has focused on laying the groundwork for moving forward by identifying the best available knowledge about climate change and gaps in that knowledge.
- ♦ Phase Two – Developing the Knowledge Base – is focused on continuing to increase the depth and breadth of our knowledge about the implications of climate change with an expanded emphasis on understanding how it is likely to affect the ministry's business and ability to meet its stewardship mandate.

¹ Background materials at: www.for.gov.bc.ca/hts/Future_Forests

- ♦ Phase Three – Adapting and Implementing Policies and Practices – refocuses on adapting and implementing the policies and practices relevant to managing forest and range resources in an uncertain and rapidly changing environment.

The first phase produced: (i) the FFEI strategic plan, (ii) a provincial-level assessment of future climate scenarios, and (iii) a synthesis of the science underpinning a management model based on ecological resilience. The FFEI is currently moving into phases two and three. The work required includes a high-level analysis to understand where the province's ecosystems and ecological processes are most vulnerable and where the current forest and range management framework should be reconsidered. A provincial-level assessment will help identify and prioritize issues and risks requiring more detailed study, help frame policy questions and guide research, modelling and monitoring initiatives.

4. FFEI Technical Team

As part of the strategic planning process for FFEI, terms of reference for a FFEI technical team were established and the team met for the first time November 30, 2007. The team is tasked with serving as a cross program, interdisciplinary sounding board on technical matters, making recommendations to the FFEI management team on technical issues and priorities that cross programs, particularly regarding research, forecasting, monitoring and evaluation, and liaising with the climate change community of practice.

The technical team has established two sets of principles to guide their work. The first set is team operating principles that clarify expectations and how the team works together (see Appendix 1).

The second set is science-based principles for managing forest and range ecosystems (see Appendix 2). These are intended to frame the team's thinking and deliberations regarding technical issues. They are based on work of the team to establish a scientific foundation for understanding and adapting to climate change – and should be considered as “interim” pending review and completion of the team's work on this aspect of the climate change challenge.

5. Technical Team Theme and Work Areas

Work of the technical team was grouped into four themes, with two or more work areas under each theme. This work plan incorporates explicit efforts to move beyond Phase 1 (assessing available knowledge) into Phase 2 (developing the knowledge base) and Phase 3 (adapting and implementing policies and practices), with a new emphasis on policy development under Theme 3.

Theme 1² Forecasting, Monitoring and Measuring Change: Improved ability to forecast climate change and its impacts on ecosystem goods and services and to measure, over time, changes in the environment and ecosystems.

1.1 Modeling

1.2 Monitoring and Data Management – Identifying what should be monitored and developing a monitoring and data management plan for ensuring the data is available, is of high quality and is accessible.

Theme 2³ Identifying and Understanding Uncertainty: Improved understanding of the impacts of climate change and the associated risks from management practices on ecosystems, species and ecological goods and services.

2.1 Assessing vulnerability - Assessing where vulnerabilities lie, when ecological thresholds are likely to be reached and the complicating effects of management policies and practices.

2.2 Targeted research - Developing a program of research to better understand key controlling ecological processes/functions/structures, thresholds and management practices as they relate to ecological resilience.

Theme 3⁴ Managing in the Face of Uncertainty: Managing for ecological resilience and adapting to climate change.

3.1 Laying the scientific foundation for a resilience-based approach.

3.2 Policy analysis – Ensuring that the best available knowledge for managing for resilience and adapting to climate change is available for policy analysis (e.g., fire management and prescribed fire, ecosystem restoration, tree species selection).

3.3 Policy development - updating existing policies to:

- i. Reflect best available knowledge related to climate change and strategies for maintaining resilience, and
- ii. Ensure adequate flexibility to test and evaluate new approaches and practices.

Future work areas:

- ♦ Developing new forest and range management approaches and practices.

² Theme 1 links to the FFEI Strategic Plan Objectives 2 (Forecast how a range of climate change scenarios might alter key species and ecological processes over time) and 3 (Monitor key species and ecological processes to detect changes over time, and determine the agents of change).

³ Theme 2 links to the FFEI Strategic Plan Objective 1 (Understand the functional constraints for key species and ecological processes and to establish a baseline of information for forecasting and monitoring ecosystem changes).

⁴ Theme 3 links to the FFEI Strategic Plan Objectives 4 (Evaluate a range of existing and new approaches to forest and range management for their ability to maintain and enhance ecological resilience and ecosystem services, products and benefits under changing ecological conditions) and 5 (Adapt the forest and range management framework to maintain and enhance ecological resilience and ecosystem services, products and benefits under changing ecological conditions).

- ♦ Adaptive management and field-testing new forest and range management approaches and practices.
- ♦ Overall management framework policy analysis.
- ♦ Fostering stewardship.

Theme 4⁵ Moving Forward Together - A coordinated, collaborative and effective initiative.

4.1 Communications: extending and communicating information so that managers and practitioners understand the potential impacts and risks associated with climate change and best practices for adapting to it.

4.2 Building partnerships: establishing strong working partnerships to tackle interdisciplinary issues.

4.3 Targeted effort and continuous improvement – Coordinate initiatives and build adaptive management and continuous feedback approaches into work undertaken.

6. FFEI-Related Projects Underway

Existing budgeted projects related to FFEI include:

- ♦ Forest Investment Account – Forest Science Program (FIA-FSP) funding (\$360K) for collaborative research projects (led by MFR) in 2008/09 (including: development of a framework for operational assessment of resilience; upgrading of ClimateBC to improve calculation algorithms and user access; study of climate change effects on carbon balance; assisted migration adaptation trial).
- ♦ FIA-FSP Sustainability Program funding (\$549K) for competitive research projects (including species and biological communities' response to climate change, influence of climate change on wildland fire interactions, and effects of climate change related to impacts of invasive species).

In addition, it is anticipated that the newly established Future Forest Ecosystems Scientific Council (FFESC), with \$5.5M of funding to advance the knowledge of climate change effects on forest and range ecosystems, will fund projects that will assist in the achievement of FFEI goals. The portion of the \$100M (\$4-5M/year) endowment to Pacific Institute for Climate Solutions (PICS) to be used for adaptation related research may also support FFEI goals.

A summary of existing projects related to the objectives of FFEI (project tracking ledger) has been posted to the web site and will be updated as changes are made.

⁵ Theme 4 links to Strategic Plan Objective 6 (Communicate knowledge gained and changes to the forest and range management framework).

7. FFEI Technical Team Work Plan and Funded Projects 2008/09

Work Area	Project Title	Project Purpose	Project Leader	Tentative Deliverable*	Delivery Date	Budget (\$000)
<p>Theme 1 – Forecasting, Monitoring and Measuring Change: Improved ability to forecast climate change and its impacts on ecosystem goods and services and to measure, over time, changes in the environment and ecosystems.</p> <p>Links to FFEI Strategic Plan Objectives 2 and 3</p>						
1.1 Modeling	<p>Technical Team Notes – Modeling:</p> <ul style="list-style-type: none"> Review, evaluate & adapt existing models to B.C. conditions & needs (e.g., scale) (Do models incorporate resilience? If not, what is needed?) Develop understanding of variability in estimates of future climate & ecological response Consider both model-based & sampling-based change detection Improve local & regional level modeling Related projects underway include: Increasing the spatial range of ClimateBC – D. Spittlehouse (FIA); Improving access to high spatial-resolution climate data for climate change studies – D. Spittlehouse (FIA) Modeling Workgroup: D. Spittlehouse (Chair), E. Campbell, D. Morgan, C. Fletcher, MOE rep. (M. Fenger?) , R. Pike & supported by A. Nicholson 					
	1.1.1 Climate change modeling needs assessment	To review current approaches to climate change scenario modeling to identify strengths, limitations and gaps in relationship to FFEI objectives.	Dave Spittlehouse, MFR with FFEI Modeling Workgroup	Climate Change Modeling Needs Assessment Report	March 2009	\$13
	1.1.2 Modeling the implications of climate change on the Biogeoclimatic Ecosystem Classification (BEC) system and interpretations	To acquire information on species range scenarios under climate change that will help us in understanding changes to BEC. The project will attempt to model key understorey indicator species associated with important tree species. Key overstorey and understorey species will be selected - indicative of zonal change, subzonal change and certain edaphic conditions - as well as species common in the US but only peripheral in B.C. (e.g., grand fir).	Del Meidinger, MFR with Dan McKenney, CFS and Dave Spittlehouse, MFR	Implications of Climate Change on BEC and Interpretations: Modeling Assessment Report and Recommendations	March 2009	\$20
	1.1.3 Climate change and modeling watershed processes	To assess the suitability of selected watershed models for exploring potential climate change implications on future watershed processes and outputs relevant to forest management. This is an add-on to a broader review of hydrological models that will focus on determining model capabilities and validity in application. The project will identify: critical parameters/ elements in a hydro model for climate change applications, which models can be used for climate change and of these	Robin Pike, MFR with FORREX	Climate Change and Modeling Watershed Processes Assessment Report: Modeling Capabilities and Validity	March 2009	\$10

* To be confirmed in accordance with project plans

Adapting the Forest and Range Management Framework to a Changing Climate

Work Area	Project Title	Project Purpose	Project Leader	Tentative Deliverable*	Delivery Date	Budget (\$000)
		models, what can they reliably provide (process or outputs); improvements needed to existing models and (or) whether development of a new model is required; current barriers/ challenges to using hydro models for climate change in a forest management context; and current barriers/ challenges to using hydro models for climate change in a forest management context.				
	1.1.4 Climate change and timber supply modeling	To develop a detailed work plan for undertaking an analysis of potential impacts of climate change on timber supply under alternative tree species choices and rotations to inform development of broader conceptual models for assessing climate change impacts on timber supply.	Christine Fletcher, MFR	Climate Change and Timber Supply Modeling Work Plan	March 2009	\$5
	1.1.5 Habitat supply modeling in relation to climate change - wildlife "winners and losers"	To expand the interior habitat supply modeling work underway to include descriptions of the climate change implications on 13 wildlife species and to conduct some preliminary analysis on species range shifts.	Don Morgan, MFR with MOE & Nature Conservancy	Addressing Climate Change in Habitat Supply Modeling: Preliminary Analysis Report	March 2009	\$20
	1.1.6 Climate change modeling in support of the seed transfer framework	To develop climate-change projections, information, tools and recommendations to assist in the development of climate-based/assisted migration seed transfer standards.	Sally Aitken, UBC with Tongli Wang, UBC (Brian Barber, MFR contact)	Climate Change and Seed Transfer Modeling Report: Projections, Analysis and Recommendations	March 2009	\$50
Additional Actions/Projects – Modeling (no budgeted funds 2008/09)						
	1.1.7 Conceptual model re uncertainty	Managing under uncertainty – science foundation piece	D. Morgan & C. Fletcher			\$0
1.2 Monitoring and Data Management	<p>Identifying what should be monitored & developing a monitoring & data management plan for ensuring the data is available, is of high quality & is accessible.</p> <p>Technical Team Notes – Monitoring Monitoring framework needs to address:</p> <ul style="list-style-type: none"> • What to measure, e.g., key species/ecosystems/processes, locations to monitor • Key drivers of most vulnerable ecosystems • Indicators of resilience &/or vulnerability • Benchmarks & 'defensible' baseline • Gap analysis of existing monitoring • Partnerships in building/implementing framework • Filling gaps & maintenance/ validation over time • Linkages to national & other existing monitoring/reporting systems e.g., State of Forests/Environment.& FREP • Monitoring Workgroup A. Smith (Chair), K. Hopkins, F. Njenga, X. Yuan, MOE rep. (?), R. Pike & supported by C. Rankin 					
	1.2.1 FFEI Monitoring Strategy: Phase	To conduct the ground work in preparation for the development of a monitoring strategy that is focused	Alanya Smith with Monitoring	FFEI Monitoring Strategy – Preliminary	March 2009	\$50

Adapting the Forest and Range Management Framework to a Changing Climate

Work Area	Project Title	Project Purpose	Project Leader	Tentative Deliverable*	Delivery Date	Budget (\$000)
	1- Identifying what to monitor; and Phase 2 – Gap analysis of existing monitoring information	on tracking and measuring over time key indicators of the effects of climate change on ecosystems. Phase 1 will identify key species and ecological process indicators considered important to monitor and provide an assessment of baseline conditions against which to assess changes through modeling and periodic field data collection. (Note this work will be done in parallel and be informed by the provincial interdisciplinary assessment project (see 2.2.1). Phase 2 will review existing inventory and monitoring programs to identify synergies and gaps with respect to monitoring the key species and process indicators.	Workgroup	Identification and Gap Analysis Report		
Additional Actions/Projects – Monitoring (no budgeted funds 2008/09)						
	1.2.1 FFEI Monitoring Strategy Phase 3 - Design monitoring strategy (including data management)	Building on Phase 1 and 2 – 2008/09 work		2009/10		\$0
Theme 1 Subtotal						\$168
Theme 2 – Managing in the Face of Uncertainty: Managing for ecological resilience and adapting to climate change.						
Links to FFEI Strategic Plan Objective 1						
2.1 Assessing Vulnerability	Identifying risks to the province's forest and range resources associated with climate change and supporting the prioritization of adaptation and stewardship efforts					
	Technical Team Notes – Assessment (Managing in the face of uncertainty): <ul style="list-style-type: none"> Review, evaluate & adapt existing models to B.C. conditions & needs (e.g., scale) (Do models incorporate resilience? If not, what is needed?) Uncertainties associated with future/models Approach: 1) Prepare discipline specific summary reports (Current status, Trends & stressors); 2) Prepare discipline specific assessments (use same approach/ framework/scenarios) – Scenarios, Management risks & actions; 3) Interdisciplinary linkages/influences; 4) Roll up into provincial interdisciplinary assessment Assessment Workgroup: D. Morgan (Chair), plus MOE rep(s) and discipline leads (including: R. Pike, L. McAuley, M. Kranabetter, J. Burleigh, E. Campbell) & supported by A. Nicholson 					
	2.1.1 Phase 1 Interdisciplinary Assessment of the Implications of Climate Change on the Province's Forest and Range Ecosystems: Phase 1: Overview (high level)	To identify risks to the province's forest and range resources associated with climate change and support the prioritization of adaptation and stewardship efforts including: 1) the nature and degree of risks to sustaining the ecological integrity of the province's ecosystems; 2) where the greatest opportunities for taking advantage of changes in climate exist; and 3) the components of the province's forest	Don Morgan, MFR with FFEI Assessment Workgroup (discipline leads for ecology, wildlife, soils, genetics, hydrology/fish , etc.)	Implications of Climate Change for the Province's Forest and Range Ecosystems: Phase 1 Overview (high level) Assessment Report	March 2009	\$100

Adapting the Forest and Range Management Framework to a Changing Climate

Work Area	Project Title	Project Purpose	Project Leader	Tentative Deliverable*	Delivery Date	Budget (\$000)
	Assessment	and range management framework that should be reassessed to most effectively mitigate and adapt to climate change, as well as take advantage of potential opportunities. Phase 1 is a high-level, strategic assessment to identify priority issues and trends for consideration in FFEI policy discussions about future forest and range management in the province and to inform broad FFEI priority setting for forecasting, monitoring and research.				
Additional Actions/Projects – Assessment (no budgeted funds 2008/09)						
	2.1.1 Phase 2 Detailed assessment	Building on Phase 1– 2008/09 work detailed provincial assessment to address and drill down into identified priority issues, risks and specific policy implications for the forest and range management framework: <ul style="list-style-type: none"> - Where explicitly the main climate hazards will be - The consequences and ultimately the risks for stewardship - Priority issues, risks and specific policy implications to address for adapting the management framework 		2009/10		\$0
2.2 Targeted Research	Developing a program of research to better understand key controlling ecological processes/functions/structures, thresholds & management practices as they relate to resilience Technical Team Notes – Research: <ul style="list-style-type: none"> • Important information needed: Thresholds, variability, benchmarks • Gaps and priorities (for research strategy) identified through discipline specific assessment and results of 2008/09 related projects • Related projects: Multi-species adaptation trial – G. O'Neil; Towards a framework for the operational assessment of ecological resilience in temperate & boreal ecosystems – E. Campbell (FIA) • Research Workgroup: E. Hamilton (Chair), with participation of FFEI Technical Team members for discipline-specific needs, supported by C. Rankin 					
	2.2.1 Risks associated with possible increases in peak flows in Mt Pine Beetle impacted watersheds.	To assess the effects of accelerated harvesting and die off associated with Mountain Pine Beetle kill on watershed hydrological regimes (peak flows) to identify watersheds of concern.	Dave Maloney, MFR	Targeted Risk Assessment Report: Watersheds of Concern for Peak Flow Events Associated with Forest Cover Changes	July 2008	\$20
Additional Actions/Projects – Research (no budgeted funds 2008/09)						
	2.2.2 FFEI Research Strategy	Develop a research strategy to provide direction on FFEI needs & priorities (linked to 1.1, 1.2 & 2.1)	E. Hamilton	FFEI Research Strategy	2009	\$0
Theme 2 Subtotal						\$120

Adapting the Forest and Range Management Framework to a Changing Climate

Work Area	Project Title	Project Purpose	Project Leader	Tentative Deliverable*	Delivery Date	Budget (\$000)
Theme 3 – Managing in an Era of Rapid Climate Change: Managing for ecological resilience and adapting to climate change. <i>Links to FFEI Strategic Plan Objectives 4 and 5</i>						
3.1 Laying the scientific foundation for a resilience-based approach	Technical Team Notes – Science Foundation - Resilience: <ul style="list-style-type: none"> What are we managing for? Persistence, adaptability, transformation? Desirable & resilient? Is resilience the right concept? The right outcome? Define natural state Finalize/publish FFEI science foundation document: 1) Clarify definition of resilience and concept of desirable in context of resilience for FFEI; 2) Revise and send out for expert peer review (Aug.); 3) Review & finalize with technical team (Sept.); and 4) Finalize document for management team. Communicate more widely the concept of resilience (see 4.1 – communications plan implementation) 					
	3.1.1 Managing Forest and Range Ecosystems in an Era of Rapid Climate Change – A Scientific Foundation for FFEI	To provide for peer review and publication of a defensible scientific foundation and conceptual framework for forest management in an era rapid climate change. Based on the best available science, the report presents ecological concepts that could form the basis of future operational systems and procedures and illustrate the ways ecological knowledge could be linked to the development of new policy.	Elizabeth Campbell, MFR	Report - "Managing Forest and Range Ecosystems in an Era of Rapid Climate Change – A Scientific Foundation for the Future Forests Ecosystem Initiative of British Columbia"	November 2008	\$12
3.2 Policy analysis	Ensuring that the best available knowledge for managing for resilience and adapting to climate change is available for policy analysis					
	3.2.1 Tree species selection	To provide a General Business Requirements document for a tree species selection decision support system (including an interpretations database and a knowledge base) – to guide the next phase Design and Development; a review of the current state of knowledge on species relationships with ecological factors and management objectives/values; and begin Detailed Design Requirements	Tree Species Selection Working Group, Shirley Mah chair with Forest Practices Branch co-leader	Business Requirements Document	March 2009	\$50
3.3 Policy Development	Interpretation of current information and data to establish policies for identified policy areas. Updating existing policies to: <ul style="list-style-type: none"> Reflect best available knowledge related to climate change; Ensure adequate flexibility to test & evaluate new approaches & practices Technical Team Notes – Policy Analysis and Guidance: <ul style="list-style-type: none"> Build synergies between FFEI Technical Team & staff to develop policies: identifying mechanisms for building linkages; discussing with policy lead staff the opportunity to use the technical team for support & review & identify best option for building linkages; and exploring the development of an overall framework to assist in the assessment of how climate change issues affect policies. Our (FFEI Technical Team) job is to provide information used by program staff to update policies Determine acceptable & unacceptable risks; risks/liabilities – who accepts risks? 					

Adapting the Forest and Range Management Framework to a Changing Climate

Work Area	Project Title	Project Purpose	Project Leader	Tentative Deliverable*	Delivery Date	Budget (\$000)
	3.3.1 Incorporating carbon into TSR	To examine stand- and forest-level carbon management and make recommendations on how carbon accounting might be employed in evaluating forest policy and making decisions such as AACs	Christine Fletcher	Report	March 2009	\$0
	3.3.2 Climate change and VRI	To develop a strategy for adapting the Vegetation Resources Inventory and its implementation to climate change	Graham Hawkins	Strategy	December 2008	\$0
	3.3.3 Free growing policy	To develop a flexible policy around species deployment at the stand level and landscape level	Al Powelson	Interim guidance document	March 2009	\$0
	3.3.4 Elimination of NSR	Ensure planting of diverse, resilient forests on backlog, mountain pine beetle and wildfire NSR areas	John McClarnon	Application and development of policy	March 2009	\$0
	3.3.5 Tree species selection	To develop policy and a supportive reporting tool to assist in monitoring and assessing tree species selection at a landscape level. (Links to FFEI monitoring strategy project 1.2.1 and also 3.2.1)	Ralph Winter	New policy and draft Landscape Level Tree Species Selection Business Information Framework	March 2009	\$75
	3.3.6 Land deletions	To reduce land deletions from provincial forests and thereby reduce deforestation caused by development	Brian Raymer	New policy	March 2009	\$0
	3.3.7 Climate change seed transfer	To develop and support implementation of science-based Interim Policy Measures for Climate-Based Seed Transfer	Lee Charleson	New policy	Policy takes effect April 1, 2009	\$0
Theme 3 Subtotal						\$137
Theme 4 – Moving Forward Together: A coordinated, collaborative and effective initiative.						
Links to FFEI Strategic Plan Objective 6						
4.1 Communications	<p>Extending & communicating information so that managers & practitioners understand the potential impacts & risks associated with climate change & best practices for adapting.</p> <p>Technical Team Notes – Moving forward together – Communications:</p> <ul style="list-style-type: none"> • Recognize/acknowledge different world views (control vs adapt) • Feedback important • Get existing info out: extension notes (practitioners); domain reports; non-technical etc. • Partnership building important – links to NGOs, PICS, FFESC, others... • Cross disciplinary workshops • FFEI Communications Strategy: Communications Workgroup has prepared draft strategy combining both the FFEI “program” communications plan (i.e., ongoing general communication about FFEI) and a plan for addressing technical communication needs • T. Niemann and S. Lac have met w/ FORREX re services & partnership • Workgroup has confirmed communication objectives and established priorities for 2008/09 (budget availability permitting) • Work is underway to review & update general FFEI communication activities (e.g., web site, Chief Forester communiqué) • Communications Workgroup: K. Hopkins (Chair), MOE rep, R. Pike, T. DeCourcy, T. Niemann, S. Lac, C. Shirshac & supported by A. Nicholson 					

Adapting the Forest and Range Management Framework to a Changing Climate

Work Area	Project Title	Project Purpose	Project Leader	Tentative Deliverable*	Delivery Date	Budget (\$000)
	4.1.1 FFEI Climate Change Seminar Series	To provide ongoing technical information regarding the emerging science related to the implications of climate change for forest and range ecosystems. The seminar series will take advantage of video conferencing technology to enable staff and partners around the province to participate &/or access an edited file after the fact.	Kathy Hopkins with Communications workgroup	Web-accessible Seminars (at least 6)	Monthly beginning Oct 08	\$5
	4.1.2 FFEI Publications	To provide targeted print material summarizing climate change-related information for various audiences through: existing discipline specific publications; new FFEI science bulletin; MFR extension notes, newsletters etc.; and Journal articles.	Kathy Hopkins with Communications workgroup	Support for at least 5 publications (Note: additional publications may be supported, pending availability of additional funding)	March 2009	\$15 (Note: additional funds, as available, may be used)
4.2 Building partnerships	<p>Establishing strong working partnerships to tackle interdisciplinary issues</p> <p>Technical Team Notes – Moving forward together – Partnerships:</p> <ul style="list-style-type: none"> Consider inter-ministry coordination Focus on mutual interests Tackling interdisciplinary issues consider more formal structuring Recognize/acknowledge different world views (control vs adapt) Use assessment work to build interdisciplinary partnerships <p>Projects/actions (partnerships):</p> <ul style="list-style-type: none"> Conceptual mapping of interdisciplinary relationships – revise overarching map (C. Fletcher w/ input from team members); Message to FFEI management team about need to strengthen structural connections with partner ministries (i.e., MOE) (E. Hamilton with J. Feick); Develop & implement communication strategy that includes partnership building (see 4.1) (K. Hopkins with communications Workgroup); Develop research strategy to provide direction & influence external partners on FFEI needs & priorities – Liaise with Gerry Still (E. Hamilton); Monitor/strengthen policy dev. links to resilience (E. Hamilton, T. Niemann) 					
	4.2.1 FFEI Partnership Conference – Adapting B.C.'s forest and range management to a changing climate	To host a state-of-the-art conference to examine the current state of the science and the implications of climate change for British Columbia's forest and range ecosystems. A workshop session would be included during the conference to discuss critical knowledge gaps and partnership opportunities	K. Hopkins with Communications Workgroup	Some planning to take place in 2008/09	Conf. date to be confirmed 2009/10	\$0 (Note: additional funds, as available, may be used)
4.3 Targeted Effort & Continuous Improvement	<p>Coordinate initiatives & build adaptive management & continuous feedback approaches into work undertaken.</p> <p>Technical Team Notes – Moving forward together – Technical Team Support:</p> <ul style="list-style-type: none"> Build links to adaptive management work in Forest Practices Branch Develop target/evaluation measures (look to FFEI Strategic Plan and other documents) Support adaptive management training (2010) 					

Adapting the Forest and Range Management Framework to a Changing Climate

Work Area	Project Title	Project Purpose	Project Leader	Tentative Deliverable*	Delivery Date	Budget (\$000)
	4.3.1 FFEI Technical Team Support	To provide enhanced strategic technical planning and secretariat resources to support ongoing operations of the FFEI technical team and technical team working groups.	Evelyn Hamilton and Tom Niemann	Facilitation and secretariat support and reporting for 2 or 3 30-person workshops and the FFEI Working Groups	Mar-09	\$105
Theme 4 Subtotal						\$125
TOTAL						\$550

APPENDIX 1 - FFEI Technical Team Operating Principles

Role of the Technical Team:

Principle: The Team provides science-based information and recommendations relevant to the FFEI mandate.

Rationale: The Technical Team was established to provide recommendations to the FFEI Management Team regarding adapting B.C.'s forest and range management framework to a changing climate. Targeted research and clear communication are essential to the effectiveness of the team.

Membership:

Principle: Team members include 'sub-program' representatives and providers of specific expertise and membership will evolve as required to address emerging issues.

Rationale: As the work of the Team proceeds it is expected that gaps in expertise will be filled for specific short-term tasks and outside help will be solicited on a temporary basis recognizing that the effectiveness of the Team depends on keeping the group to a manageable size (i.e., maximum of 25). However, beyond 2010, the Team expects there will be ongoing issues that continue to emerge as a result of the inherent uncertainty associated with the impacts of climate change on ecosystems. For that reason, it is expected that ongoing technical advice will be required and that the team's Terms of Reference and membership will evolve as appropriate to address the emerging issues.

Meetings:

Principle: The Team's meetings are efficient and effective; travel is minimized.

Rationale: The Team will meet as a whole and preferably in-person, to set strategic direction, establish priorities and assess progress towards achieving FFEI objectives. Team members may participate to varying degrees on task groups for specific projects. Two "whole Team" meetings are anticipated in the first six months of the Team's mandate, with semi-annual meetings over the subsequent term. Adequate preparation time for meetings, clear meeting objectives and deliverables will help ensure they are effective. Additional meetings will use communication technologies (e.g., teleconferencing) where possible to minimize time and travel requirements.

Shared responsibility:

Principle: Team members recognize the importance and accept responsibility for making the Team's work a success.

Rationale: The Team will be most effective when all members are fully engaged. It is expected that:

- ♦ Each team member is a resource who shares ideas and perspectives and puts "issues" on the table.
- ♦ Tasks (i.e., projects and deliverables), project lead(s), project team roles and responsibilities (e.g., core, targeted input, review), timelines and desired outputs/outcomes are clearly identified.
- ♦ Decisions are based on the input of all members and decisions are consensus based. When the team can't reach consensus on a single recommendation, the Team will work to reach consensus on the set of options to be presented to the Management Team.

Corporate Interest:

Principle: The Team's work is focused at a corporate and strategic level.

Rationale: This is a corporate initiative and each Team member will set aside their program and discipline related interests to focus on how to best strengthen the whole resource management framework.

Integration:

Principle: The Team's work will link with, harmonize, build on and integrate other related initiatives.

Rationale: Building on existing responsibilities and efforts wherever possible will create synergies, maximize the use of resources, avoid duplication and enhance learning across the whole organization.

Practical and Creative Approaches:

Principle: The Team's work is innovative and provides practical advice with clear and demonstrable recommendations.

Rationale: Innovative and creative ideas and approaches that are practical and doable can help foster learning and the energy and excitement necessary to help move the ministry to adapt to managing for resilience.

Inclusive and collaborative:

Principle: The Team seeks to involve, collaborate and partner with organizations and individuals interested in contributing to FFEI.

Rationale: To successfully adapt B.C.'s forest and range management framework to a changing climate requires an inclusive approach to FFEI related projects where scientists, policy makers and field practitioners work together from the start to understand and address each others interests, needs and concerns. Learning will be strengthened through early and substantive awareness and participation of key interests in the work of the Technical Team. Therefore, the Team will work collectively and individually to:

- ♦ Represent and reflect the collective wisdom of the various disciplines/subprograms represented on the Team;
- ♦ Directly involve others working in the various disciplines/subprograms in the work of the Team;
- ♦ Identify and remove barriers to effective cross-program and cross-discipline collaboration and information sharing;
- ♦ Keep other organizations with an interest in FFEI informed; and
- ♦ Encourage the collaboration of other organizations in the work of FFEI.

Communication:

Principle: The Team focuses on promoting an ongoing dialogue about the work of FFEI both within the Ministry and with other stakeholders.

Rationale: From scientific studies to policy to on-the-ground management decisions – everyone must be engaged in understanding the impacts of climate change and management on ecosystems. Transparency and ongoing proactive communication will promote dialogue, understanding and support for the work being undertaken. Therefore, from the start, the Team will take a disciplined approach (individually and collectively) to:

- ♦ Keep the Team informed about relevant work undertaken in our subprogram/disciplines;
- ♦ Ensure that others working in the subprograms/disciplines represented on the Team are kept up-to-date about the work of the Team; and

- ♦ Plan and deliver communication/extension activities to support industry and other key stakeholders in developing an understanding of the work of FFEI and of the information and knowledge gained through the initiative.

APPENDIX 2 - Science-based Principles for Management of Forest and Range Ecosystems

A. Overarching Principle:

Ecological Resilience – Resilient ecosystems have an inherent capacity to withstand, recover from, or adapt to perturbations and changing environmental conditions so as to maintain key structures, processes and functions.

Rationale: Rapid climate change will significantly stress British Columbia's forest and range ecosystems. The magnitude of change that an ecosystem can absorb before the system changes into a qualitatively different state controlled by a different set of processes depends on its level of ecological resilience. Therefore, the Future Forests Ecosystems Initiative will focus its work on adapting our management framework to support the capacity of ecosystems to be resilient and able to continue to provide goods and services.

B. Supporting Principles:

Change and uncertainty – Ecosystems are not static; they are dynamic and change in response to the continuous interactions among the individual ecosystem components.

Rationale: Ecosystems are complex and their individual components, e.g. species, are continuously reacting to each other and to the environment resulting in the ongoing modification of these systems. We must shift from thinking of ecosystems (at all levels) as stable predictable entities to systems experiencing continual change in potentially new and unpredictable directions.

Adaptive Capacity – Adaptive capacity confers resilience.

Rationale: The key to resiliency is adaptive capacity i.e., the potential for a species or system to respond, recover from and adapt to perturbations and changing environmental conditions, including changes in variability and extremes.

Diversity – Diversity (e.g., biological diversity) contributes to resiliency by enabling a wider variety of responses and capacities to adapt and evolve.

Rationale: Natural variability at all levels – within species (genetic) diversity, diversity of species within guilds (functional groups), structural complexity, diversity of habitats and landscapes through time and space – contributes to the resiliency of ecosystems.

C. Resource Management Principles:

Process Focus – Focus on understanding the system as a whole, the system components and the relationships among the components, including:

- The processes (e.g., hydrological, natural disturbance regimes etc.) that connect system components at various scales across the landscape, and
- The effects of management practices on those processes.

Rationale: Ecological systems are complex. They are characterized by nonlinear feedback loops that operate at varying scales through time across the landscape. This makes it extremely difficult to identify when a system will cross a threshold that causes rapid transition to a new state. It also makes it difficult to predict what the new state will be. Managing to reduce the vulnerability of one specific system component (e.g., a single species) to climate change is likely to increase the vulnerability of other components or increase the future vulnerability of the system as a whole.

Cumulative Effects – Acknowledge that the condition of an ecosystem and its capacity to adapt declines with each successive disturbance.

Rationale: Human land-use activities have varying effects on ecosystem structure and function and can be expected to exacerbate the effects of climate change. In a time of rapid climate change it is prudent to minimize stress-inducing activities and focus on understanding the conditions under which thresholds are likely to be crossed causing a rapid shift in ecosystem state.

Continuous Learning and Responsive Management – Continuously learn about changing conditions and the effects on ecosystems and iteratively review, evaluate and adjust management strategies to reflect new knowledge and circumstances.

Rationale: Management during times of rapid change and uncertainty needs to include an iterative process whereby decisions and practices are regularly and frequently reviewed and adjusted in light of new information about the state of the system and the key processes and functions that confer resilience. An ongoing effort to develop models, monitor change, regularly and iteratively assess vulnerability, and study ecological processes, functions and the impacts of stress will provide the knowledge base to improve our ability to characterize uncertainty and predict and manage for the future