



Ministry of
Forests, Lands and
Natural Resource Operations



Forest Stewardship Action Plan
for
Climate Change Adaptation
2012-2017

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Forest Stewardship Action Plan for Climate Change Adaptation 2012 – 2017

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Executive Summary

British Columbia's over-arching [Climate Change Adaptation Strategy](#) calls upon government to:

1. *Build a strong foundation of knowledge and tools to help public and private decision-makers across B.C. prepare for a changing climate;*
2. *Make adaptation a part of B.C. Government's business, ensuring that climate change impacts are considered in planning and decision-making across government; and,*
3. *Assess risks and implement priority adaptation actions in key climate sensitive sectors.*

This action plan by BC Ministry of Forests, Lands and Natural Resource Operations aligns with that strategy and signals an important new vision and policy direction for adaptation within the sphere of forest management in British Columbia. The vision and direction can be stated as:

Vision

Vision for BC's Forests	BC's forests provide a broad suite of goods and services that benefit society now and in a changing climate.
Management Goal	By 2017 BC's forest management policy framework will fully account for a changing climate.

The vision links our goals with broader socio-economic objectives, including healthy forest ecosystems, a sustainable renewable resource for future generations, and jobs for British Columbians across all regions of province.

This action plan sets up a basic structural model for adapting BC's forest management practices to foster resilient forests in a changing climate. By focussing first on a broad umbrella of resilient forests, many other values will be maintained and enhanced. However, additional attention will be necessary to address adaptation for other values where there are gaps. This action plan is designed to be modular, in that various components can be fit into the structure as science, tools, and policy evolve. Adapting to climate change is a long term proposition that will gradually become business as usual. This action plan will take some time to unfold in its entirety; hence it includes both short and longer term actions. It sets some clear goal posts to guide the process but also recognizes the need to provide some flexibility to account for uncertainties associated with impacts from climate change.

This action plan sends a signal to BC forest managers that the Province is moving to incorporate adaptation to climate change into forest stewardship practices, and that BC's forest policy and practices will henceforth seek to improve the ability of our forests to withstand the full amplitude of climate change and variability.

Introduction

Forest management in British Columbia is poised to reduce risks and take advantage of many opportunities to adapt to a changing climate. This Action Plan speaks to how we apply climate change information to our forest practices so that BC continues to have resilient¹, diverse, healthy and productive forest ecosystems. These forest ecosystems help support a strong economy, communities and families, and a multitude of other values.

This 2012-2017 Action Plan describes the Ministry of Forests, Lands, and Natural Resource Operations Stewardship Division and Tenures, Competitiveness and Innovation Division, and Wildfire Management Branch responses to adapt to the impacts of a changing climate on British Columbia's forests, particularly on the timber harvesting landbase. This action plan sets out a new and emerging policy direction and framework for which new policies, guidance and tools will be developed to support forest managers and decision makers in adapting their practices over the next five years and beyond. This document outlines the three goals and key actions for which strategies, plans and activities will be developed both now and as new science, knowledge, and decision support tools become available.

Context and Scope

This action plan arises in the context of a review of FRPA, BC's forest practices policy framework, for its ability to maintain forest ecosystems that are resilient to climate change. Finding few barriers and requirements for resilience in the legislation and regulations, we looked for what the opportunities were. Through a series of four workshops held around BC. Participants included operational people from government, industry and BC Timber Sales. The most promising opportunities were identified as:

1. Setting goalposts and providing clear direction for adapting to a changing climate
2. Developing broad scale forest management plans or silviculture strategies that are informed by climate change to guide operational planning
3. Reforestation with a broader mix of species adapted to a changing climate. (See actions under Goal 1)
4. Improving monitoring to support ecosystem resilience goals and objectives

Of these, setting goalposts and developing broad scale strategies were identified as immediate actions that can be taken, along with providing knowledge and tools; and initiating actions in multiple spheres.

Participants also identified **pivotal issues** that would need to be addressed in order for BC's forest adaptation actions to succeed. They are:

- 1) Strategic planning: setting direction and objectives, and linking all resource values sustainably over the long term (Action under Goal 2)
- 2) Address cost and risk (Action through TSA strategies – Goal 2)
- 3) Reconcile timber supply implications (Action under Goal 2)
- 4) Improve capacity (Action under Goal 3)
- 5) Monitoring to support the strategic framework (Action under Goal 3 and develop an annual reporting mechanism for the goals).

¹ Managing for resilience entails practices that maintain or enhance the ability of ecosystems to cope with change. (Campbell et al 2009)

Related Issues were those deemed to be out of scope of the FRPA policy assessment, but identified by participants as being of fundamental importance our ability to adapt. They are:

- Don't look at FRPA in isolation: broaden the review to consider all FRPA values, other administrative elements and the entire land base
- Volume based tenure provides no opportunity or incentive to manage for the entire rotation
- Fuel and fire concerns

Related issues will be brought forward to Executive for consideration.

Managing Expectations

This initiative began with an assessment of BC's *Forest and Range Practices Act* and regulatory framework to see whether this framework enabled those management practices that are aligned with resilient forest ecosystems in a changing climate. It went on to identify the most promising opportunities from an operational perspective. Recent organizational changes have combined responsibilities for forest with those for other resources such as mining under one umbrella ministry, the Ministry of Forests, Lands and Natural Resource Operations. This action plan speaks to adaptation actions for BC's managed forest (not including parks and conservation areas). Further work will be necessary to address aspects such as forage, water, and the broader resource stewardship arena.

This is a big undertaking and we can only do so much at once. Hence the decision was to be strategic, setting in place the key structural elements such as goals and objectives, while creating a modular structure that could be populated as the science and tools become available. The intention is to focus first on the near term items that are achievable, and build the mid- and long term components as science, knowledge and tools evolve. In this way, we can set realistic timelines and priorities based on risk/vulnerability, and over the longer term manage for a range of acceptable outcomes to deal with uncertainty.

Goals

The conceptual framework provided in the Discussion Paper and workshop materials included five goals. As a result of considerable overlap between them, for the purposes of this action plan they have been merged into three. The goals and objectives are:

Goal One	Foster Resilient Forests	
	Objective 1.1	Anticipate and manage for a changing climate
	Objective 1.2	Maintain and enhance diversity
Goal Two	Maintain Future Options and Benefits	
	Objective 2.1	Manage and protect resources and values
	Objective 2.2	Manage risks and capture opportunities
Goal Three	Build Adaptive Capacity	
	Objective 3.1	Develop adaptation information, knowledge and tools
	Objective 3.2	Increase extension and collaboration
	Objective 3.3	Ensure guidance and coordination.

In support of these goals and objectives are a set of sub-objectives that individually and collectively will lead toward resilient forests (see Appendix 1).

This conceptual framework is modular in design: additional objectives, actions and business areas can be introduced as the science and analysis work matures. The high level goals and objectives will not change each year. However the Actions are expected to be reviewed and updated periodically where necessary and incorporated into annual Service Plans and/or business plans.

Goal One Foster Resilient Forests

Actions under Goal 1 address one of the two main threats to resilient forests: the prospect of trees becoming poorly adapted to their changing environment.

Objective 1.1 Anticipate and manage for a changing climate:

Managed forest ecosystems that are suited to a changing climate. The desired outcome is managed forest ecosystems that are healthy, productive and resilient to a changing climate.

Actions

2012-2013

1. **Climate Based Seed Transfer:** Prepare a project charter and plan for development of a Climate-Based Seed Transfer (CBST) system. This work will provide direction and guidance on the phased approach for development of a foundation to adjust BC's forest regeneration framework (integrating silviculture and seed use) to be appropriate for a changing climate.

Three to Five Years

- a) Complete an analysis of business requirements and information management needs for a climate-based forest regeneration decision support system. Investigate the potential for integration of platforms for climate-based seed transfer, reforestation, stocking standards and forest health based on existing frameworks (such as the Biogeoclimatic Ecosystem Classification system) in conjunction with a standard suite of climate models, scenarios, and assumptions to define the range of potential futures and forest regeneration options for management over space and time.
- b) Implement the climate-based seed transfer strategy and plan(s) for transitioning over to a fully integrated climate-based forest regeneration decision support system within the next five to ten years.

Objective 1.2 Maintain and Enhance Diversity: Complex² and diverse³ forest ecosystems and landscapes that are resilient to impacts of climate change and other stressors.

Actions

2012-2013

2. Develop communicate and implement Chief Forester Policy on tree species diversity objectives. Work with the Tree Species Selection project to communicate diversity objectives and status reports on our current diversity levels. Include tree species diversity objectives and forest health strategies in TSA level strategies. Clarify the types and measures for diversity that are desired. Show leadership in Ministry operations by incorporating diversity objectives into all areas where the Ministry has leverage (e.g., Forests for Tomorrow (FFT), small scale salvage areas under section 46 of the *Forest Planning and Practices Regulation*, etc.). Set diversity targets in for small scale salvage and FFT areas. (See also Action 5)

Actions

Three to Five Years

- c) **Assess the mid and long term timber supply impacts and opportunities** associated with adaptation actions, including, e.g. assisted migration and changes in tree species diversity and stocking densities.
- d) **Assess socio-economic costs and benefits** of increased tree species diversity and complementary silviculture practices for an array of forest values. Consider how to measure ecological costs and benefits, for example by developing monitoring and modelling approaches to evaluate the success of enhanced diversity on increased forest resilience.

² Complexity and diversity at multiple scales are both important aspects of resilient forest ecosystems. Complexity refers to complex interactions between multiple components with potentially non-linear feedback loops, open boundaries, ecological memory, and multiple scales of organization.

³ Diversity refers to variety in structure, composition and function across levels of ecological organization. Diversity can be of many types, for example diversity in tree species within a stand, diversity of genetic stock or provenance, or diversity of ages within a stand or across a landscape.

Goal Two Maintain Future Options and Benefits

Actions under Goal 2 address the second of two main threats to resilient forests: the prospect of increasing disturbance due to fire, insects and disease.

Objective 2.1 Manage and Protect Resources and Values: A full suite of forest resources and values are maintained to safeguard future management options and benefits in a changing climate.

Actions

2012-2013

3. Develop strategies at the TSA level to address climate change considerations at scales broader than the stand. Include landscape level species strategies that consider both the free growing stage and past free growing. Define what this diversity might look like. The expectation will be that the silviculture strategies will be subject to continual improvement and refinement to keep up with emerging science. Use revised or landscape level silviculture strategies to engage licensees in defining costs and risks with a view to altering the risks, rather than relieving obligations. Define expectations, responsibilities, and limitations for adaptive actions related to tree species diversity.
4. Strengthen the content of Forest Health Strategies at the district level by including stocking standards recommendations and other relevant information. Provide Chief Forester direction to District Managers to sign off an updated forest health strategy annually.
5. Demonstrate leadership by applying the best adaptation principles, goals, objective and tools through the Land Based Investment Strategy (LBIS) and its Forests for Tomorrow (FFT) program. Require LBIS projects to consider climate change risk to project outcomes, and opportunities for resilience and adaptation.
6. Investigate options and devise an approach to free growing that ensures all harvested stands are stocked with healthy crop trees at age 20.
7. Build fire-resilient landscapes: Conduct landscape wildfire risk assessments, and implement treatments for fire resilient landscapes on priority areas.
8. Employ analysis to assist in setting adaptation priorities, and to assess the bounds of uncertainty.
9. Incorporate diversity and ecosystem resilience principles into BC forest carbon project opportunities and help leverage investments into public forest lands.

Actions

Three to Five Years

- e) **Complete silviculture strategies for all timber supply areas in BC.** Develop goals jointly with licensees, empower conversation at the local level; assess management vulnerability –sponsor a workshop to take out to the districts. Use silviculture strategies to look beyond FRPA at the opportunities to address climate change (e.g. multiple values across the entire landbase).

- f) **Develop approaches for incorporating climate change into inputs for timber supply analysis** including potential implications for growth and yield, regeneration success, and disturbance (fire, disease, insects, mass wasting), as well as adaptation measures such as species selection and silviculture systems. Develop a timber supply analysis tool that reflects climate change impacts and adaptation options. Begin with a prototype for the Cranbrook area.

Objective 2.2 Manage Risks and Capture Opportunities:

Enhanced benefits and reduced climate change impacts and risks over the decision-making life cycle.

Actions

2012-2013

10. Work with partners to identify and catalogue tools to manage risks, prioritize actions, enhance forest resilience, and reduce cumulative effects.
11. Develop a biophysical and socio-economic risk management framework.
12. Continue to evolve the Forest Resource Evaluation Program (FREP) monitoring protocols and communication to foster resilient forests in a changing climate. Put a proactive monitoring plan in place for climate change adaptation measures. Do monitoring early (pre-free growing) to provide early feedback on establishment success or failure: establish protocols early, and re-measure periodically to assess enduring success. Use existing and planned monitoring programs⁴ to determine:
 - Completion of adaptation actions; and,
 - Effectiveness of outcomes.Use post- free growing monitoring to look at the above, and success of adaptation. Refine the Stand Development Monitoring strategy to focus on understanding and responding to climate change.
13. Continue work toward a fully integrated stand monitoring process from establishment to pre-harvest. This will include the regeneration to free growing (0-20 years), Stand Development Monitoring (15-40 years), and young stand monitoring (15-50 years). Implement young stand monitoring provincially, beginning with priority management units to track differences between expected and actual growth and yield.

⁴ (including FREP Stand Density management monitoring, FAIB's permanent sample plots in young stands, inventory attributes, etc.)

Goal Three *Build Adaptive Capacity*

Objective 3.1 Develop Adaptation Information, Knowledge, and Tools. The desired outcome is increased capacity to apply climate change information, knowledge and tools in BC forest management.

Actions

2012-2013

14. Develop a provincial performance measurement and reporting process such as a report and scorecard for reporting out on progress and accomplishments for Goals One through Three. Report these at annual and five-year intervals. Initiate an annual report card for silviculture strategies, and report on tree species diversity objectives annually.
15. Work with partners to provide forest managers with the science, data, methods and decision tools to enable consideration of climate change adaptation in forest management decisions. Begin with decision support tools that support climate based regeneration decisions. Where feasible, integrate the outputs from [Future Forest Ecosystems Scientific Council \(FFESC\) projects](#) into broadly applicable decision support tools and policy guidance. Incorporate all relevant information, guidance and tools in the silviculture strategies.
16. Create a 'knowledge and tools' website to provide easy access to all available information, guidance, and tools to support forestry professionals and decision-makers in addressing climate change in Forest Stewardship Plans. Put all the knowledge/guidance documents related to forestry adaptation to climate change (e.g. tree species vulnerability, forest health surveys) in one place, in a format that's condensed and usable. This includes objectives, scenarios and scenario tools, spatial climate data, Plan2Adapt, forest health, stand development decision aids, climate based seed transfer, species diversity monitoring and reporting, forest health issue maps, harvest impacts, stocking standards, free growing guidance, best management practices to foster resilience, and other tools developed through the FFESC. Promote the use of this information.
17. Coordinate and prioritize research needs for adaptation. Address priorities through funding and partnership mechanisms. Continue with climate based seed transfer research and the assisted migration adaptation trial; increase breeding for pest resistance; prioritize genecology and conservation research needs for adaptation.
18. Format and package tools for forestry applications using a standard range of scenarios.
19. Develop skilled technical expertise through climate change champions, and build climate change knowledge and adaptive capacity within the FREP resource value leads and MFLNR staff.

20. Undertake targeted climate change resilience policy and practices training for forest managers to accompany and implement policy shifts.

Actions

Three to Five Years

- g) Update decision support tools including the Biogeoclimatic Ecosystem Classification (BEC) system to align with a changing climate. Ensure continued operational applicability to support forest management decisions and policy implementation over the forest decision making life cycle.
- h) Find ways to ensure adaptation is built into management of other values such as riparian, streams, and water quality, and practices, such as road standards, slope stability, etc.

Objective 3.2 Increase Extension and Collaboration: Increase extension and collaboration among forest managers and natural resource agencies, universities, and other research organizations working towards climate change adaptation to leverage funds and resources.

Actions

2012-2013

21. Continue extension and collaboration on educational, training and extension tools for climate change adaptation. Aid in the incorporation of FFESC results into ministry adaptation practices. Support collaboration among Ministry staff in the natural resource sector research community in their work on climate change adaptation, and mutually beneficial partnerships including federal-provincial adaptation partnerships and [Landscape Conservation Cooperatives](#). Communicate relevant information on climate change to knowledge users (i.e., policy specialists, practitioners, researchers).

Three to Five Years

- i) Leverage resources across government and other institutions at national, regional and local levels.

Objective 3.3 Ensure Guidance and Coordination

Ensure that the Ministry's climate actions are appropriately guided and coordinated at the strategic level, and coordinated internally and externally.

Actions

2012-2013

22. Review organizational reporting structures and mechanisms to promote coordinated guidance for adaptation actions going forward. Consider how to coordinate across the ministry including headquarters, regions and BCTS.

Conclusion

Climate change is already affecting BC's forests and communities in a significant way through changes to dynamics of insects and fire. Adapting BC's forest practices to a changing climate is both an immediate imperative and long term proposition that must begin now. Many actions can be taken to tailor the existing framework in such a way that it will foster resilient forests and improve the sustainability of BC forests, communities and industries. By using a strategic, phased and incremental approach these changes can be made within the resourcing capacity of government and its partners.

Appendix 1: Goals and Objectives

Three overarching goals have been developed to guide activities for adapting BC forest management to a changing climate. They are designed to foster resilient forests, maintain future options and benefits; and, build adaptive capacity to address a changing climate. In support of these goals are a set of objectives and sub-objectives that individually and collectively will lead toward resilient forests. Some of the sub-objectives are in draft form (indicated by grey background). This conceptual framework is modular in design: additional objectives and actions can be introduced as the science and analysis work matures. The high level goals and objectives will not change each year. However the Key Actions are expected to be reviewed and updated periodically where necessary.

Climate Change Adaptation Goals and Objectives for Forest Stewardship

Forest Stewardship Climate Change Adaptation Goal		Forest Stewardship Climate Change Adaptation Objective		Sub-objectives
Goal One	Foster Resilient Forests	Objective 1.1	Anticipate and manage for a changing climate	1.1.1 Forests are planted with stock suitable for a changing climate.
		Objective 1.2	Maintain and enhance diversity	1.2.1 Unless otherwise specified in silviculture strategies, the diversity of tree species at free growing should be no less than the diversity of tree species prior to harvest. 1.2.2 Unless otherwise specified in a silviculture strategies, the proportion of monoculture stands at free growing should not exceed that prior to harvest.
Goal Two	Maintain Future Options and Benefits	Objective 2.1	Manage and protect resources and values	2.1.1 BC has a mechanism in place to ensure the adequacy of biological legacies to safeguard future management options and benefits.

		Objective 2.2	Manage risks and capture opportunities	<p>2.2.1 BC's forests are managed in a way that captures opportunities and addresses climate change risks and impacts.</p> <p>2.2.2 Cumulative impacts associated with climate change are considered in forest management decisions.</p> <p>2.2.3 BC has measures in place to assess the achievement and progress in sustaining ecosystem benefits in a changing climate.</p>
Goal Three	Build Adaptive Capacity	Objective 3.1	Develop adaptation information, knowledge and tools	<p>3.1.1 BC forest managers have the knowledge, tools and organizational capacity to adapt BC forest practices for a changing climate</p> <p>3.1.2 Research, extension, monitoring, and training supports the development of policy, administrative guidance and decision support tools that address climate change adaptation in BC forest management.</p>
		Objective 3.2	Increase extension and collaboration	<p>3.2.1 Collaboration between resource stewards and knowledge providers focuses on developing effective tools to address adaptation priorities.</p> <p>3.2.2 The results of research, policy and tool development for adaptation are rapidly and effectively deployed into the hands of users through effective extension.</p>
		Objective 3.3	Ensure guidance and coordination	<p>3.3.1 Ensure the Ministry's adaptation actions are appropriately guided and coordinated strategically both internally and externally</p>

