



# ALBERTA FOREST GENETIC RESOURCES COUNCIL

*Forest genetic resources:  
Conserving diversity, enhancing productivity*

## Adapting Forest Management

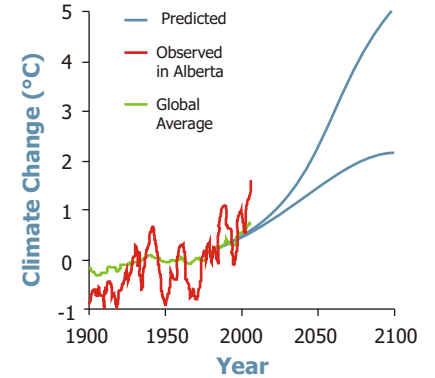
Tree populations can naturally "move," by way of seed dispersal, to more suitable regions and climates in times of stress - but these are slow processes. Careful and well-planned tree breeding and movement of planting stock (further north, and-or to higher elevations) during reforestation activities can assist in population adaptation. Trees that can withstand higher temperatures, changed precipitation patterns and additional threats from pests, diseases and other stress factors will help ensure healthy forests in the future.

Well established and carefully regulated tree-breeding work in Alberta is already providing data and seedlings to help forest managers prepare for these anticipated changes.

## Climate Change and Genetic Resources

### The Challenge

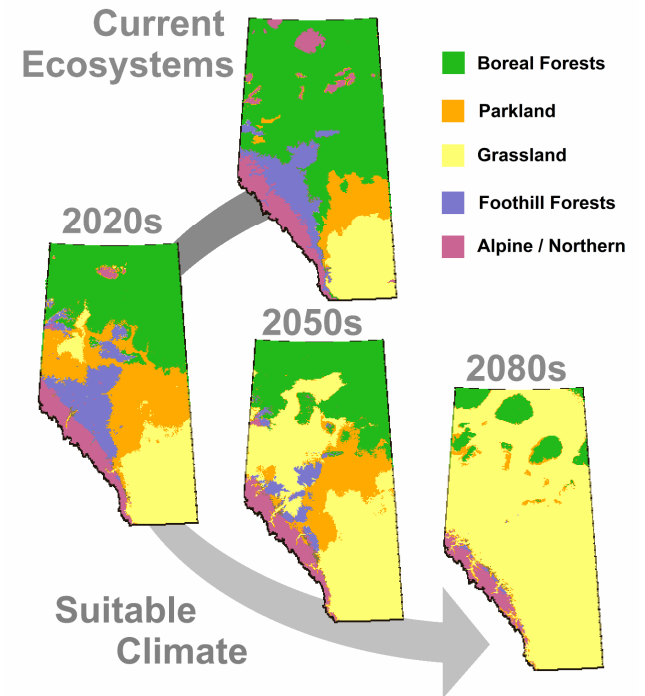
Climate change over the last half century has increased mean annual temperatures by almost 1°C across Alberta. This trend is expected to continue, resulting in warming by about 2 or 3 °C over the next 50 years. Regional and seasonal patterns of precipitation may also change substantially. Although there is some evidence for rapid climate oscillations during the transition from ice ages to warm periods, the rate and direction of projected warming due to greenhouse gases are unprecedented. Such changes create new challenges for forest management, and for forest-based communities which rely economically and socially on the resource.



Data from NASA and AHCCD ( <http://tinyurl.com/epy8o/> and <http://tinyurl.com/kpxus/> )

### Threats to Forests

Even though warming by 2-3°C does not sound very threatening, the effect on forests could be substantial. The following figure shows how the tree and plant communities of today might be located in order to be well adapted to the predicted climates of the 2020s, 2050s and 2080s. The forests we see today are the result of thousands of years of natural evolution and ecological processes. The anticipated change in climate may be too rapid and severe for successful adaptation by our current forest trees.

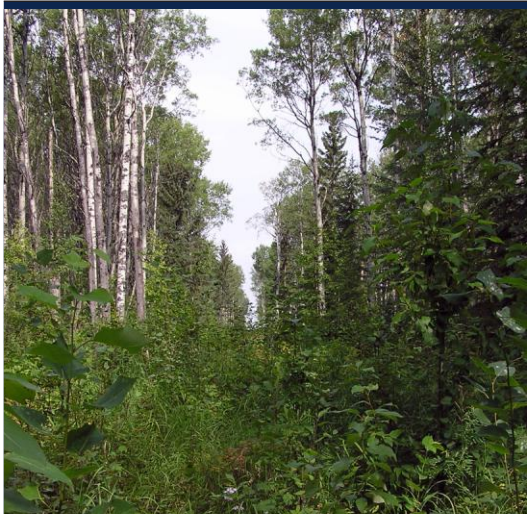


Methods described in: Hamann & Wang (2006) Ecology 87: 2773-2786

## What Work has been Done?

Researchers in government, academia and industry are working to better understand the response of forest trees and ecosystems to possible future climate change scenarios. Some species are likely to benefit from warmer climates with increased growth rates and an expanded range, whereas other species could disappear from some regions. Knowledge is key to making the right decisions about forest management today and in the next decade.

An important concern for forest managers is the choice of appropriate seed sources and tree species for use in reforestation today. Such choices will be supported by an understanding of the genetic composition and genetic diversity of the seed supplies, and of how these factors may need adjustment to decrease the risk of reforestation failure in future climates. Genetic field testing of planting stock has been done in Alberta for the past 25 years, which has allowed us to generate some preliminary information to guide these activities. Further tests specifically designed to address these issues are under development.



## Where does Council stand?

Believing appropriate actions are necessary to maintain forest presence and forest values for Albertans, the Alberta Forest Genetic Resources Council has adopted the following statements of principle:

- Council accepts that climate has changed in recent decades and scientific evidence indicates this trend will continue. Early impacts on forest ecosystems are now being detected. Therefore, Council believes that the risk of status quo forest management exceeds the risk of making changes to management practices.
- Council's primary concerns are loss of forest productivity due to inadequate adaptation of current commercial tree species, loss of genetic resources due to localized extinction of populations, and impacts on forest ecosystems such as increased pest and disease outbreaks, extreme climate events and increased forest fire frequency and intensity.
- Because of the long-term nature of forestry, Council believes that adaptation strategies for forest resource management should be implemented as soon as possible to mitigate anticipated impacts of climate change. Council recommends the use of research and pilot projects to adapt current reforestation practices to climate-informed resource management strategies.



## Next Steps

Council will advise the Government of Alberta on potential adaptation strategies, as well as on research and resource needs. Council will develop an education plan for the public and inform other researchers and decision-makers about the issue of climate change and genetic adaptation. It will work to promote development of adaptation

strategies with non-governmental sectors and industry. Industry's focus will be on promoting adaptation strategies for commercially important and vulnerable tree species, with an emphasis on genetic resource management, tree breeding and reforestation.

## The Council

The Alberta Forest Genetic Resources Council advises the Alberta government, provides input on standards and policies, and helps set directions for research on conservation, biodiversity and productivity of forest genetic resources.

## For more information

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