

## **Will Our Acadian Forest Tree Species Survive Climate Change?**

**By Dr. Colin Laroque and Ben Phillips, Mount Allison Dendrochronology Lab**

If we contemplate what future climates have in store for the Maritime region, we run up against a range of consequences for the forests. As the climate generally warms and weather patterns change, varying degrees of insect, fire, wind and other irregular weather disturbances are increasingly likely.

We can also expect to see the slow migration of many of the Acadian forest species out of the region and the immigration of many new species from other regions into ours. This has occurred during past climate changes, and it is almost certain to occur again. Species living in unique environments or those which cannot respond quickly enough could become extinct. According to the International Panel on Climate Change, a rise in temperature of 3.5°C will result in the global extinction of 40 – 70% of species. These potential impacts could have drastic consequences for the Acadian Forest.

Since we are stuck with some change of climate, we need to learn how we can adapt along with our environment. Understanding which forest species and systems are the most vulnerable, and understanding which will be the most robust, will help us prioritize our mitigation efforts for the future. This will help ensure a healthy forest to enjoy and derive resources from in both the short and long-term.

Enter Mount A

The Mount Allison University Dendrochronology Laboratory (MAD Lab) specializes in tree rings and more specifically how tree rings relate to climate. The annual rings grown by various tree species have a direct relationship to the amounts of precipitation and the temperatures received each year. This means that trees hold a record of our past climate and the lab is set up to exploit this information through non-destructive techniques, providing insight into past climates. With the relatively recent development of global climate models, insight into the future growth rates of trees can now also be provided.

This ability has prompted master's student Ben Phillips and his supervisor MAD Lab director Dr. Colin Laroque to try to answer the following question. Given the potential changes in climate, how will the radial growth rates of Acadian Forest tree species respond? By uncovering how trees will react to climate change they can better understand the potential future composition of the forest. As the climate warms some Acadian Forest tree species will be gradually culled, while other tree species will begin to enter into the shifting Maritime climate zone. This will lead to a different forest dynamic and will greatly alter the resources that can be continually extracted from the forest.

Project Results

To date, five forecasts have been produced. Our forecasts indicate that white pine will not be greatly affected by increases in temperature. Eastern hemlock should increase its

growth rate by up to 60% by the year 2100 as the growing season lengthens. Eastern white cedar reacts poorly to hotter drier July conditions and it should decrease its growth rate by as much as 75% by the year 2100. Meanwhile red and black spruces appear to hold their own or increase their growth rates slightly. What is not known exactly is if the potential for an increase in insect activity will limit their success.

### *Implementing the Results*

In this first phase of the project the surface has only just been scratched concerning the number of species that live in the Acadian Forest. Although these results are important for these species, major decisions regarding the management of the forest resource cannot be made without further research into more species of trees. Once many more forecasts are complete a better understanding of future forest species composition would be possible.

The other important aspect of this research is that it will be best used in conjunction with other climate change forecasting such as future insect populations, forest fire frequency, as well as other types of disturbance events that could establish better projections.

Researching the potential effects of climate change will lead to a more robust and more accurate vision of the forest we will leave for our children. It will also allow us the chance to better adapt to tomorrow's future before it becomes today's reality.

(Fundy Model Forest has helped fund this project.)

Read the full report at <http://www.mta.ca/madlab/2007-02.pdf> or [www.fundymodelforest.net](http://www.fundymodelforest.net).

Contact: Colin Laroque, [claroque@mta.ca](mailto:claroque@mta.ca)