

Assisted Migration Adaptation Trial (AMAT)

Climate is the primary determinant of ecosystem pattern (i.e., biogeoclimatic zones). Many years of genecology research in BC and elsewhere show that genetic diversity patterns of forest tree species are also strongly correlated with climate. In broad terms, seed transfer zones for tree planting in BC are aligned with climate patterns. As climates change, these seed transfer zones must also change to ensure that planted trees are genetically well adapted to the area in which they are planted. With some 240 million seedlings planted in BC each year, this is an important consideration with very long-term implications for forest health, timber supply, and the economic well-being of many communities across the province.

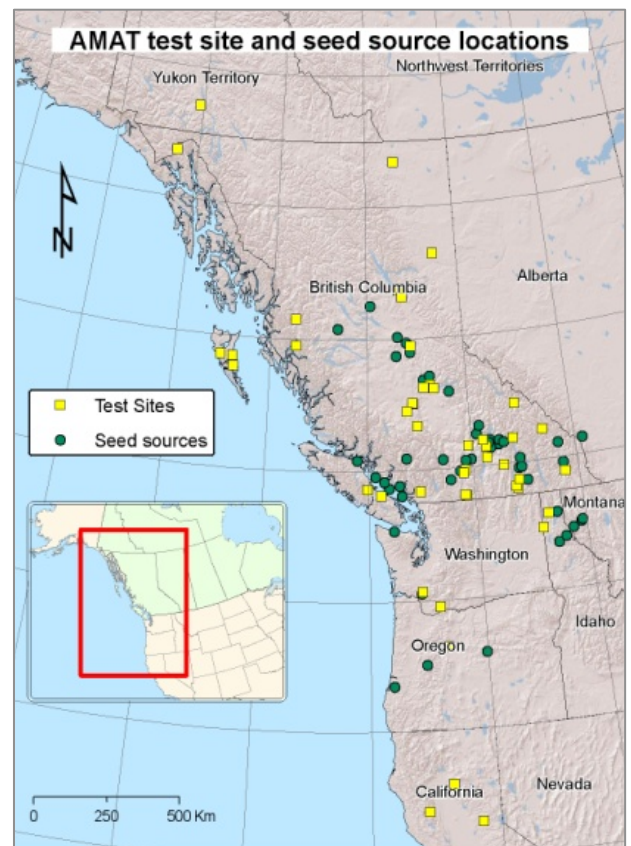
In response to the challenge of better understanding linkages between climate and tree genetic adaptation, scientists from the MFLNRO Tree Improvement Branch lead genecology research for a wide variety of tree species in BC. A new approach to this research was initiated by Dr. Greg O'Neill. He and others are testing multiple species planted on a large number and wide range of test sites. These tests will offer unprecedented ability to accurately predict growth in current and future climates for a wide range of species and genetic populations. Known as the Assisted Migration Adaptation Trial (AMAT), this ambitious research project has garnered significant media interest, including a feature by the Canadian Broadcasting Corporation's 'The National' and *Nature* magazine.

The objective of AMAT is to help maintain resilient and productive forests by better understanding the growth and health of reforestation seed sources used across a range of climates and latitudes in BC. Information from the trial will help identify the species and seed sources best adapted to present and future climates. With the overwhelming majority of climatologists predicting significant warming trends, it is important that planted trees are genetically suited not only to current climates, but also to climates they will experience 50-100 years from now. The AMAT will provide information on climate tolerances for commercially-planted tree species and for a wide range of genetic populations within each species.

The AMAT includes forty-eight seed sources from 15 tree species originating from BC and the north-west United States. They are being planted and monitored at 48 field-test locations between the southern Yukon and northern California. Twelve field-test sites are being planted in each of 4 years, starting in 2009. Growth and health will be assessed every 5 years, and these data will be analyzed to understand climate-genotype relationships. The ClimateBC model (developed by the UBC



Forests are adapted to the climates in which they grow. West Chilcotin, BC (Photo J. Woods)



M. Leroy

Centre for Forest Conservation Genetics and supported by funds through the FGC) will be used to support data analysis and to link tree growth and health with predicted future climates. Ultimately, the AMAT will be a strong contributor to the development of climate-based seed transfer in BC, an objective of the FGC. See <http://www.for.gov.bc.ca/hre/forgen/interior/AMAT.htm> for more information.

Author: Jack Woods. This article originally appeared in the *FGC Annual Report 2010/11*.



Lodgepole pine grown from seed collected at low (left), mid, and high elevation (right) sources and planted in a common garden at lower elevation. Growth differences reflect genetic adaptation of sources to climate (**Photo M. Carlson**)