



## FIA–FSP Forest Science Corner

Field sampling of regeneration after partial harvest near Invermere, BC.

# Prognosis<sup>BC</sup>: Forecasting and managing complex stands for climate, timber, fuels, and carbon



UBC Forest Biometrics Research Group photo

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**F**orest stands change over time, sometimes quite predictably, and sometimes with little warning. And any time forests are managed for their timber or non-timber assets, growth models are essential tools. Using a wide variety of approaches, growth models help foresters and forest ecologists understand and forecast changes from succession, management, disturbance, and climate change.

In its search for a model that could support the manage-

ment of complex (multi-age, multi-species) stands in southeastern British Columbia, the BC Ministry of Forests and Range (MFR) grafted Prognosis<sup>BC</sup> from the US Forest Service’s Forest Vegetation Simulator (FVS) model. Prognosis<sup>BC</sup> is the ideal tool for these challenging stands. It combines simplicity and complexity to simulate the growth and mortality of an inventory of sampled trees using only a non-spatial inventory and local site information. With this information, the model forecasts the individual responses of different tree species across the full range of stand conditions (understorey through to overstorey, from stand initiation to full stocking) and moreover, can simulate a wide variety of stand management and harvesting practices, such as thinning from above or below, including species retention preferences.

Since its introduction in 1994, model development has been funded through the MFR, FRDA-II, Forest Renewal BC, and most recently, the Forest Investment Account–Forest Science Program (FIA–FSP). This support has allowed testing of a number of models that simulate regeneration following partial harvest and other disturbances (FIA–FSP projects M075015, M086015). One recent branch of this development has seen Prognosis<sup>BC</sup> linked with SORTIE-ND to forecast regeneration beneath stands affected by mountain pine beetle (FIA–FSP proj-

ects Y081048, Y092048). In this hybrid modelling exercise, Prognosis<sup>BC</sup> simulates stand development and then passes detailed structural information to SORTIE-ND, which predicts regeneration and passes information about the young trees back to Prognosis<sup>BC</sup>.

Funding from all of these sources has also supported the improvement of the core growth and yield components of Prognosis<sup>BC</sup> and extended the model’s range to most of BC’s Central Interior, so that the most recent release (Version 4.0) now spans many subzones of the Interior Cedar–Hemlock, Interior Douglas-fir, Montane Spruce, and Engelmann Spruce–Subalpine Fir (FIA–FSP projects Y051022, Y051355, Y051356, Y061132, Y073022). Pending future funding, current research (FIA–FSP projects G095074, G106074) will add four major subzones of the Sub-boreal Spruce and Sub-Boreal Pine Spruce.

An important recent development has been the creation of a prototype climate-sensitive Prognosis<sup>BC</sup> model. The underlying approach to the climate-sensitive model—spearheaded by scientists with the US Forest Service—combines spatial modelling of each tree species’ realized niche as a function of climate variables (similar to work by **Tongli Wang** and **Sally Aitken** of UBC, supported by the Future Forest Ecosystems Science Council), the effects of local genetic adaptation and changes to site productivity, species mortality, and regeneration under climate change scenarios. Testing of this prototype is under way.

Using funding from FIA–FSP project Y071271, Prognosis<sup>BC</sup> is also expanding to include a Snag and Coarse Woody Debris model adapted from the FVS Fire and Fuels Effects model. When complete, the model will be used to simulate snag and coarse woody debris dynamics as well as carbon accounting of above- and below-ground C in live and dead pools. By April 2010, fuels management practices (e.g., removal and mastication) will also be added to the list of management actions that can be simulated (see also FIA–FSP project Y071030). 🌲

### Updates available

If you would like to be kept updated on Prognosis<sup>BC</sup> developments, send a note to **PrognosisBC.Help@essa.com** to receive periodic updates. Information about Prognosis<sup>BC</sup> is also available at these links:

[www.essa.com/tools/FVSprognosis/index.html](http://www.essa.com/tools/FVSprognosis/index.html)

[www.for.gov.bc.ca/hre/gymodels/progbc/](http://www.for.gov.bc.ca/hre/gymodels/progbc/)

[www.forestry.ubc.ca/prognosis/summary.html](http://www.forestry.ubc.ca/prognosis/summary.html)

[www.fs.fed.us/fmsc/fvs/](http://www.fs.fed.us/fmsc/fvs/)

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