The Inland Northwest Growth and Yield Cooperative was established in 1984 to address mutual technical problems and concerns regarding the growth and yield of forests in the Inland Northwest. Membership consists of private timberland owners, government agencies, tribal ownerships, forest consulting groups, and research institutions throughout the Inland Northwest.

**Small Tree Growth: Effects of Understory Competition and Overstory Stocking**

Since 1998 INGY has been focused on refining the characterization of small tree growth rates under varying levels of understory competition, overstory retention, and site quality. Replicated tagged-tree experiments have been implemented across the Inland Northwest at 26 installations, including on clearcut, shelterwood, and overstory retention blocks (Fig. 1). Within each installation ground vegetation has been experimentally controlled, allowing for height increment to be observed across a range of understory competition levels (Fig. 2).

![Fig. 1. Overstory stocking of 26 installations.](image1)

![Fig. 2. Douglas-fir increment rates for 3 understory vegetation cover classes at one installation (LR; Washington).](image2)

Refined height growth increment equations are expected in 2013/2014. Interim results have been reported in:

- Salas, Stage, & Robinson (2007) *Forest Science* 54: 107

**Conifer Biomass: Validation and Development of Crown and Stem Equations**

Beginning in 2009 INGY has invested in data collection to support validation and development of stem and crown biomass equations for 7 of the Inland Northwest’s major commercial species (western larch, Douglas-fir, ponderosa pine, lodgepole pine, grand fir, subalpine fir, and Engelmann spruce). Over 275 trees have been sampled across public, tribal, and private lands, and over a range of diameter, height, and crown ratio classes (Fig. 3).

![Fig. 3. Size distribution of 40 western larch trees.](image3)

![Fig. 4. Observed and predicted western larch crown biomass.](image4)

Analysis to date has focused on scrutiny of existing crown biomass equations (Fig. 4), but validation and specification of equations for bole and crown biomass components will be reported in 2013. Interim results have been reported in:

Ponderosa Pine: Precommercial Thinning Response

In 2011 INGY re-measured 7 precommercial thinning trials on Nez Perce and Spokane tribal lands. These data will permit analysis of medium term (approx. 14 years) growth response rates to precommercial thinning on some of the driest sites in the range of ponderosa pine (Fig. 5).

Simultaneous models for tree basal area, height, and crown length increment will be developed in 2013 to permit assessment against FVS projections. The 5-year response to thinning was previously reported in

- Ferguson, Byrne, Wykoff, Kummet, & Hensold (2011) RMRS-RP-88

Forest Site Quality: Downscaled Climatic Controls on Productivity

In 2013 INGY initiated a project focused on site productivity and its associations with fine scale topographically-mediated climate and water-balance metrics. The latter will be developed using statistical downscaling and high resolution models of temperature, radiation, and wind budgets. The goal of the project is to provide methodologies and site productivity estimates to support forest inventory and growth projections over large spatial and temporal scales. Centering initially on Washington State forest lands, the project will consider sites east and west of the Cascades; linking the potential productivity of these sites to climate and derived water-balance metrics will permit mapping of productivity across the state and under alternative climate regimes.

A pilot project taking advantage of previously collected site index data (stratified by elevation and ecoregion) from the Bitterroot Valley, MT, is currently in progress.

Past Projects

Recently completed INGY projects include:

- Development of multi-point taper equations for Douglas-fir, western larch, grand fir, ponderosa pine, and lodgepole pine (plus 5 minor species) for subregions throughout the Interior Northwest
- Development of a ground surface vegetation model based on photosynthesis, transpiration, respiration and carbon allocation using standard inventory inputs
- Construction of FVS/Prognosis yield tables for plantations and naturally regenerated stands in the Inland Northwest arrayed by site index and age
- Evaluation of Monserud’s Douglas-fir site index and height growth curves in western Montana
- Prediction of Douglas-fir site index from soil characteristics
- Comparisons of SPS and FVS/Prognosis growth projections in thinned stands

Contact Information

Please contact David Affleck (david.affleck@umontana.edu; 406-243-4186) for further information about the Inland Northwest Growth & Yield Cooperative, its current and past projects, and its planned activities in 2013/2014. Also see our webpage at www.cfc.umt.edu/INGY