

EXAMINING *PSEUDOTSUGA MENZIESII* BIOMASS CHANGE DYNAMICS THROUGH SUCCESSION USING A REGIONAL FOREST INVENTORY SYSTEM

David M. Bell¹, Andrew N. Gray²,

Abstract—Models of forest succession provide an appealing conceptual framework for understanding forest dynamics, but uncertainty in the degree to which patterns are regionally consistent might limit the application of successional theory in forest management. Remeasurements of forest inventory networks provide an opportunity to assess this consistency, improving our understanding of forest dynamics through succession at regional scales. In this study, we examined the responses of proportional *Pseudotsuga menziesii* biomass change to successional status, relative abundance, resource availability, and canopy cover change across an elevational and longitudinal gradient in the Cascade Mountains of Oregon and Washington, USA. Our objective was to assess the consistency (i.e., equivalence between climax vegetation types) of proportional biomass change responses in the dominant species, *P. menziesii*, across the region using repeated measurements of 9700 Current Vegetation Survey (CVS) forest inventory plots. Our results indicated that proportional biomass change for *P. menziesii* responses to successional status (i.e., stand age, mean tree biomass, and canopy cover), canopy cover change, and abiotic environmental conditions varied regionally. Biomass losses associated with reductions in canopy cover were mostly observed in drier regions. These results imply that individual mortality may be a particularly important driver of biomass loss in dry ecosystems while *P. menziesii* in wetter ecosystems may be more capable of taking advantage a competitor's death, offsetting ecosystem level biomass losses. Our analysis of proportional biomass change in a regionally dominant conifer tree species (*P. menziesii*) emphasizes the importance of forest successional status and small-scale changes in forest structure on ecosystem productivity.

¹ David M. Bell; Research Forester, USDA Forest Service Pacific Northwest Research Station, Corvallis, OR; dmbell@fs.fed.us; (541) 750-7298

² Andrew N. Gray; Research Ecologist, USDA Forest Service Pacific Northwest Research Station, Corvallis, OR; agray01@fs.fed.us; (541) 750-7252