Ecosystem Recovery -
What is it and how long does it really take?

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Introduction
In British Columbia, Ecosystem-Based Management (EBM) initiatives are being implemented for a variety of forest management and harvesting practices often without adequate data on how forests have responded to past disturbances. Provincial planning teams have attempted to model the future rates of second growth vs. old-growth forests and have used the results as a basis for "environmental risk assessment." Without quantitative data on the rates of ecosystem recovery, however, this modelling does not adequately portray the contribution second growth stands make to the ecological integrity and resilience of our managed forest landscape. This project was initiated to help re-examine the North Coast LRMP Risk Assessment and aid future EBM initiatives, however, the value of its further application was quickly realized and has since been expanded to other areas of the province.

The overall objective of this project is to quantify selected second growth forest ecosystem attributes in order to provide a field-based assessment of ecosystem recovery following disturbance. The intent is to characterize the ecological condition and level of ecosystem recovery toward 'old-growth' stand conditions. Ecosystem attributes being assessed include overstory and understory species composition and cover, forest growth, epiphytic lichen and bryophyte composition, soil properties, and stand structure including snags and CWD. These data provide a basis for comparison with the same attributes in old-growth plots that have been collected largely within the provincial Biogeoclimatic Ecosystem Classification Program over the past 30 years. The results of this study should aid in establishing future forest management practices including reforestation and harvesting methods that meet the challenges of climate change and ecosystem based management.

Ecosystem Recovery Project Objectives

- Quantify selected second growth forest ecosystem attributes in order to provide a field-based assessment of ecosystem recovery following disturbance.
- Compare stand attribute data with analogous data collected from old-growth stands of similar BEC units.

Ecosystem Recovery Predicted Means

![Graph showing ecosystem recovery predicted means over time.]

The north coast LRMP risk analysis models did not credit second growth forests with any recovery of ecosystem attributes or habitat value until these forests reached 250 years of age. This prompted us to carry out field studies in order to better quantify rates of ecosystem recovery following disturbance.

Project Status

- Field sampling planned for 2008 ICH and SBS (including mountain pine beetle impacted areas)
- Sampling is also planned for old growth attributes for which we have limited data: coarse woody debris, epiphytic communities, potential wildlife habitat and soil faunal diversity
- Field data currently being analyzed
- Journal Papers in progress
- Project funded to March 2008
Data Collection Methods

Initial Vegetation and Succession Results

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Species richness approximately doubles, while Simpson’s index of diversity increases from 0.81 to 0.91, from young to old forests. NMDS ordinations showed differentiation, with some overlap, of old-growth and second-growth forests and a fairly strong correlation of stand age with plot scores, driven by plant species presence and cover. Vegetation succession following logging disturbance is driven primarily by pre-disturbance species composition; most species found in the young forest are not present in old forests and the higher species richness typical of old-growth is largely due to the establishment of additional cryptogam and herb species of lower cover and constancy. Significantly higher cover of shrub, herb, and bryophyte species differentiates old forests from second-growth forests; 41-100 year old forests are, on average, 63 to 73 percent similar (depending on site type) to old-growth forests based on species presence/absence and 53 to 58 percent similar, based on species cover. The scarcity of Thuja plicata in second growth stands is of particular concern because of the high ecological, cultural, and economic importance of this tree species.

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Initial results indicate that at 81 to 140 years and 141 to 200 years after disturbance, vegetative characteristics have re-established with roughly 50% and 80% similarity, respectively, to that of old-growth stands (>200yrs). Second growth ICH stands (<40yrs) throughout the study area contain less western hemlock and true firs with higher levels of spruce and pine when compared to old-growth stands. In addition second growth stands in the ICHmc2 have decreased levels of western redcedar. With current management scenarios assuming rotation lengths of +/- 100 years this could result in decreased levels of species diversity and structural complexity, in turn limiting ecosystem integrity and resilience. The results of this study should aid in establishing future forest management practices including reforestation and harvesting methods that meet the challenges of climate change and ecosystem based management.