

ECOLOGY

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I received my B.Sc. in Botany from UBC in 1977. My M.Sc. (1983 – UBC Forest Ecology) began as a contract with the BC Forest Service in 1979, studying the bogs and forests near Prince Rupert. Except for a brief diversion to Victoria for a couple of years in the early 1990s, I have been in the north ever since. I became the Regional Ecologist in 1987 working on many things, including forest, wetland, and riparian classification and interpretation, ecosystem function and response to management, ecosystem – site productivity relationships, and ecosystem mapping. My current major research interest is ecosystem recovery following natural and human-caused disturbances.



Our Regional Service Centre (RSC) Ecology Research Projects have benefited greatly from a cohesive team of co-workers including Karen McKeown, Erin Hall, Ben Heemskerk (now Research Branch), Phil LePage, Will MacKenzie (Research Branch), Ken White, Bill Borrett, Briana Schroeder and other Regional and District staff.

ECOLOGY RESEARCH PROJECTS

Biogeoclimatic Ecosystem Classification (BEC) – Related Research

We are currently preparing two technical field guides: one covering BC's boreal ecosystems throughout the Northern Interior Forest Region (in cooperation with Craig Delong in Prince George) and another covering the ecosystems of Haida Gwaii (in cooperation with staff from the Coast Forest Region). The guides, to be published as MFR Land Management Handbooks in 2009/2010, will assist resource managers in identifying ecosystems and applying ecologically based management guidelines. In addition we are refining and updating BEC mapping for the Region (the so-called BigBEC project) and making it better conform to the TRIM base mapping. Work is currently being carried out in the Kalum and Cassiar TSAs – the two remaining areas in the western portion of the NIFR to be updated.

For the past few years we have been conducting site index (SI) sampling of second-growth ICH and CWH stands in the Kispiox - Terrace area to improve SIBEC estimates. This SIBEC program provides a more refined estimate of site productivity, based on ecosystem classification. SIBEC results are applied in Timber Supply Reviews. Our staff have also been assisting industry (Canfor, West Fraser, Timberline Consultants, Highland Forestry) with additional SIBEC sampling

in the SBS as well as with the development of Predictive Ecosystem Mapping (PEM) and updated Vegetation Resource Inventory (VRI) for the Bulkley and other northern TSAs.

Our staff are also actively involved in the Provincial Tree Species Selection Project aimed at updating and improving the provincial BEC-based guidelines and incorporating a landscape species selection component that considers the implications of climate change.

Ecosystem Recovery Research

An integral part of implementing Ecosystem-based Management is understanding how quickly disturbed forests recover the rich biodiversity and structural diversity found in old-growth forests. So far, managers have had to rely on speculations about recovery rates, as very little is known about the ecology of second-growth forests. In response, an ecosystem recovery study was initiated to examine the ecological functioning of second-growth forests and to determine how quickly ecosystems recover from natural or human-caused disturbances.

The conventional assumption has been that coastal forests younger than 250-years-old do not contribute old-growth characteristics valued for maintaining habitat, biodiversity and ecosystem integrity. Now research results from ecological studies in second-growth stands aged 30 to 100 years located along BC 's north central coast are refining that assumption.

The ecosystem recovery investigations have since been expanded to other ecosystems in the Kispiox and Kalum areas (ICH) and in the SBS BEC zone near Takla Lake. The studies are examining various aspects of terrestrial vegetation, epiphytic communities, stand structure, soil characteristics including soil faunal communities, snags and coarse woody debris, along with growth and yield parameters in second-growth stands.

This research has provided detailed information on the ecological characteristics contained in second-growth stands. Our findings revealed that coastal stands of 40 to 100 years old have about 70% similarity in species composition and about 55% similarity in species cover with old growth stands. Results from ICH forests show that forests 80 to 140 years old have vegetation characteristics that are 50% similar to old-growth forests and reach 80% similarity by 200 years after disturbance.

Another outcome of the work is discovery of a scarcity of western red cedar in both coastal (CWH) and interior (ICH) second-growth forests compared with old-growth forests. The cedar regeneration deficit is of particular concern in light of the exceptional economic, ecological and cultural importance of this tree species.

The results on ecosystem recovery enable land managers to more precisely consider the ecological and habitat contributions of second-growth stands. The studies have revealed that second-growth stands do harbour considerable diversity and make substantial recovery towards old-growth levels of diversity within 100 years. Full recovery, however, takes much longer, and thus forest rotation ages of 100 years are unlikely to sustain on the landscape the degree of diversity contained in old-growth forests. We must now also consider the impact that a changing climate will have on ecosystem recovery throughout the province.

This year's field work involved sampling epiphytes in the ICH zone and initiating field work to extend the project to SBS ecosystems. Data analysis and write-up of the project included a journal article and conference presentation (NAFEW – June 2007) on the Coastal Western Hemlock zone, and a presentation on Interior Cedar-Hemlock forests for the Interior Rainforest Conference in Prince George, May 2008.

BCTS and forestry companies have expressed considerable interest in this ecosystem recovery research. As well, UBC forest ecology researchers are using data generated by the project to calibrate a forest dynamics model.

Our ecosystem recovery research has been carried out largely through transfer funding agreements managed by the Bulkley Valley Centre for Natural Resources Management.

Other Ecology Research

The HyP³ Project (“hip-cubed” - pattern process and productivity in hyper-maritime forests), initiated in 1997, developed guidelines for identifying and managing sites that are appropriate for harvesting and sustainable management of western red cedar in areas previously considered inoperable because of wet soils. Current work focuses on the maintenance and monitoring of two operational trials near Prince Rupert and further extension of research findings.

The Date Creek Silvicultural Systems Research Project was initiated in 1990, and includes an ecology component for examining vegetation succession following partial harvesting. We recently conducted the 15-year re-measurements of vegetation response to partial harvesting in the Date Creek watershed. By looking at the relative abundance and mix of plant communities, the project indicates how various harvesting intensities affect habitat values and biodiversity. It has identified a marked difference in plant community diversity between heavy and light canopy removal. The results are currently being analysed for write up in a journal paper.

EXTENSION ACTIVITIES

Extension and consulting activities comprise a significant amount of Ecology staff time. These activities include:

- Training (guest lecturing at UBC and UNBC, BEC and related training, including a recent course in Nadina District on vascular plant identification with an emphasis on invasive plants)
- Presentation of research results at conferences and to clients such as BCTS and the Chief Forester
- Contributing to technical teams such as the Coastal EBM Forest Ecology Technical Team
- Providing technical expertise and review of TEM and PEM projects, including those done as part of environmental assessments for mine development proposals (e.g., Galore and Klappan)
- Addressing Compliance and Enforcement issues raised by District staff
- Reviewing Forest Stewardship Plans
- Responding to routine requests from consultants and other clients regarding BEC, plant identification, and forest ecology

RECENT PUBLICATIONS AND EXTENSION PRODUCTS

Banner, A. and P. LePage. 2007. The HyP³ Project: Pattern, process, and productivity in hypermaritime forests of coastal British Columbia. (PowerPoint presentation to Chief Forester)

Banner, A. and P. LePage. 2008. Long-term recovery of vegetation communities after harvesting in the coastal temperate rainforests of northern British Columbia. *Canadian Journal of Forest Research*. 38(12): 3098–3111.

Banner, A., P. LePage, B. Heemskerk, K. McKeown, K. White, and E. Hall. 2007. Ecosystem Recovery -What is it and how long does it really take? (poster presentation)

Banner, A., P. LePage, J. Moran, and A. de Groot (compilers and editors). 2005. The Hyp³ Project: Pattern, process, and productivity in hypermaritime forests of coastal British Columbia – a synthesis of 7-year results. B.C. Min. For., Res. Br., Victoria, B.C. Spec. Rep. 10. 142 pp. (PDF and weblink on SharePoint)

BBC World Service. 2006. Responsible Logging – One Planet – Programme 2 – Canada. Presented by Richard Black. Produced by Julian Siddle. Contains field interviews with A. Banner and A. MacKinnon re coastal Ecosystem Based Management. (radio interview)

Heemskerk, B., E. Hall, A. Banner, P. LePage, K. McKeown, and K. White. 2007. Ecosystem Recovery: How have forests of the north-western Interior Cedar Hemlock zone responded to past disturbances? for: BC's Inland Rainforest – Conservation and Community; Conference held at UNBC, May, 2008. (PowerPoint presentation and abstract)

McKeown, K. and A. Banner. 2008. Introduction to Flowering Plant Identification with emphasis on Invasive Species in BC: Outline and materials for a Forest District short course.