

FRDA Research Memo

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Miscellaneous

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Growth and Yield Research Update

INTRODUCTION

The \$200 million Canada-British Columbia Partnership Agreement on Forest Resource Development (1991-1995) — FRDA II — is jointly funded by the governments of Canada and British Columbia. The focus of this agreement is sustainable forest development through intensive forest management and integrated resource management. Also addressed are new initiatives in hardwood utilization, silviculture systems, and identification of product and market opportunities.

One of the key topic areas in the Research Program supporting the agreement is growth and yield and stand tending. Nearly all growth and yield installations in British Columbia are in pure even-aged stands of the five to six major commercial species. As a result, significant gaps exist in our understanding of growth and yield, and we need additional data to be able to predict more accurately the yields of all commercial species for the range of silvicultural treatments. As well, we need data on stands that have several species, multiple ages and more than one storey. The focus of the growth and yield Research Program is to fill gaps in the province's matrix of long-term field experiments (permanent sample plots) and to increase our basic understanding of biological processes through modelling.

Ten projects began in 1991-1992. The B.C. Ministry of Forests is implementing five of them (project numbers preceded by BC-) and Forestry Canada four (project numbers preceded by FC-). One project is being jointly implemented.

Brief project summaries incorporating progress to September 31, 1991, are presented in this memo. Project details are available from project leaders (whose addresses are included at the end of this memo) or from Elizabeth Easton, Growth and Yield Program Administrator, Ministry of Forests, Research Branch, 31 Bastion Square, Victoria, B.C. V8W 3E7 (387-8115).

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ROOT ROT IMPACTS

BC-GY01 *Construction of managed stand yield tables for root rot infected stands of coastal Douglas-fir, and interior white spruce and lodgepole pine*

Project leaders: Ken Mitchell and Bill Bloomberg

Objectives:

To develop managed stand yield tables designed to assess the impacts of laminated root rot (*Phellinus weirii*) and Tomentosus root rot (*Inonotus tomentosus*) on the timber productivity of coastal Douglas-fir, white spruce and lodgepole pine, when combined with a range of silvicultural regimes.

Progress:

A computer model that simulates the spread, occurrence and impact of laminated root rot (ROTSIM) has been linked to TASS, a computer model for the development of second-growth stands of coastal Douglas-fir. Preliminary yield tables have been generated, which combine mortality and growth losses from laminated root rot with initial stocking density, thinnings, stump removal, bridge tree removal and planting of naturally resistant seedlings. These preliminary tables are under review by the Forest Health Section, Silviculture Branch. To make the estimates operationally applicable, the results are now being extended from the stand level to the forest level.

Mention of trade names or products does not constitute endorsement by the authors, the B.C. Ministry of Forests, or Forestry Canada.

Benefits:

The managed stand yield tables produced will quantify the yield loss or recovery associated with the intensity of infection, silvicultural regime and site productivity. This will aid forest managers of root rot infected stands in assessing the cost of remedial silviculture treatments against the benefits of potential timber recovery.

MODELLING HABITAT IMPACTS

BC-GY08 *Predicting overstorey and understorey floristics, structure and grizzly bear habitat value following logging in the Khutzeymateen watershed*

Project leader: Tony Hamilton

Objectives:

To predict timber growth and yield from a variety of logging and silviculture regimes in the Khutzeymateen watershed; to develop a computer-based succession model for predicting future grizzly bear habitat and stand conditions for these scenarios; and to link this model and growth and yield predictions with the Khutzeymateen GIS to assess the impacts of the various logging and silvicultural regimes across the Khutzeymateen landscape and through time.

Progress:

Almost all model inputs including GIS data have been obtained. A prototype model has been developed and final data are being entered. To run the model, preliminary growth and yield data and information on silviculture costs have been obtained for the North Coast.

Benefits:

From the assessment of impacts, recommendations about future land uses in the Khutzeymateen will be made to the provincial government. The model and link with GIS will provide a template design that can be adapted to other integrated land use planning situations requiring growth and yield information.

NUTRITION AND FERTILIZATION EFFECTS

BC-GY04 (A) *Interior nutrition experiments*

Project leader: Rob Brockley

Objectives:

To identify potential sites for future nutrition experiments in the Interior.

Progress:

An extensive site reconnaissance has identified many potential candidate sites for future field experiments. Soil samples from existing fertilization research sites have been collected and analyzed for sulphur availability.

Benefits:

The established permanent sample plots will be used to quantify tree and stand response to fertilization treatments, develop operational fertilization prescriptions, and improve our understanding of forest nutrition in Interior stands.

FC-GY05 *Fertilization and thinning effect on a Douglas-fir ecosystem at Shawnigan Lake: a synthesis of projects results*

Project leader: Holger Brix

MOF Contact: Louise De Montigny

Location: Shawnigan Lake

Objectives:

To summarize results from an established research project on Douglas-fir fertilization and thinning, and from this to identify critical factors relevant to growth predictions and operational forest management.

Progress:

The review and summary of results from approximately 70 project reports is under way.

Benefits:

This analysis will help foresters identify critical factors for growth prediction and operational forest management.

SPACING AND SILVICULTURE SYSTEMS

BC-GY04 (B) *Interior stand management growth and yield experiments*

Project leader: Wayne Johnstone

Location: Vanderhoof Forest District, Vernon Forest District, Invermere Forest District

Objectives:

To establish Interior stand management experiments including: espacement trials of lodgepole pine in the SBS and hybrid spruce in the ESSF; a silvicultural systems trial for selection logging of interior Douglas-fir in the IDF; and a post-spacing ingress study of lodgepole pine in the MS zone.

Progress:

Espacement trials of lodgepole pine in the SBS at Tatuk Lake and hybrid spruce in the ESSF at Frank Lake were established in the Vanderhoof Forest District in spring 1991. A post-spacing ingress study of lodgepole pine in the MS zone was established at Lussier Road in the Invermere Forest District during fall 1991. Marking prior to cutting of a dry-belt Douglas-fir stand in the Vernon Forest District was completed in fall 1991; partial cutting of this stand will be carried out during winter 1991/92. An extensive, Interior-wide reconnaissance of sites for future experiments has been completed.

Benefits:

The established permanent sample plots will help foresters quantify tree and stand response to spacing treatments and different silvicultural systems, identify optimum treatment levels, validate site index curves, and calibrate growth models.

BC-GY04 (C) Coastal growth and yield field experiments

Project leader: Louise De Montigny

Location: Greater Victoria Watershed

Objectives:

To maintain and report on 20 coastal growth and yield field experiments (115 installations, 1500 plots) which study the effects of various silvicultural treatments (fertilization, thinning, spacings, and pruning) on tree and stand growth; and to establish new installations on the basis of the proposed B.C. Forest Productivity Council matrix, including pruning, mixed plantations at different spacings, and silvicultural systems trials.

Progress:

A working plan for the spacing trials of mixed Douglas-fir and western redcedar is complete, and the plots are presently being established. Working plans for a new western hemlock pruning experiment and a Sitka spruce and poplar spacing trial are currently under way.

Benefits:

The data will be summarized and analyzed to quantify tree and stand growth responses to treatments, to identify the best treatment levels, to calibrate and validate growth models, and to validate site index curves.

MIXED-SPECIES STANDS

BC-GY03 Reconstruction of mixed-species stands

Project leader: Ian Cameron

Locations: Woss, Port McNeill Forest District; Hazelton, Kispiox Forest District; Hunamilt Lake, Salmon Arm Forest District

Objectives:

To describe and quantify the natural patterns of stand development in mixed-species stand types in the ICHmc, ICHmw, CWHdm and CWHxm subzones; to make recommendations about silvicultural treatments for these stand types based on the natural patterns of stand development; and to collect data essential to the development of growth models for mixed-species stands.

Progress:

Preliminary field reconnaissances of stand extent, age and site quality have been completed at selected study sites. Establishment of stand structure plots on the ICH sites is currently under way, and size structure, species composition and disease indicators are being measured. Stand structure

plots and reconstruction plots are being established simultaneously on the CWH sites where measurement of the above factors, as well as stem mapping and stem analysis, are nearing completion.

Benefits:

Results will improve our understanding of stand dynamics in mixed-species stand types, and contribute to the development of growth and yield models for ICH and CWH mixed-species stands.

WESTERN HEMLOCK STANDS

BC-GY05/FC-GY03 Comprehensive value-based management of second-growth western hemlock forests: preparation of a major research proposal

Project leaders: Bob Kennedy and Bob Kellogg

Objectives:

To prepare a detailed working plan for the development of an inter-agency research program focussed on developing value-based growth and yield models for second-growth western hemlock.

Progress:

Information meetings have been held with forest companies and prospective participants from University of British Columbia, B.C. Ministry of Forests, Forestry Canada, Forintek and Paprican. One potential sampling site has been viewed.

Benefits:

This comprehensive program plan will direct and coordinate the development of value-based models for second-growth western hemlock.

FC-GY01 Growth modelling of important commercial species

Project leader: Mike Bonnor

Objectives:

To develop a growth model that is compatible with the provincial inventory and that will predict tree and stand growth at any stage of stand development, for natural and treated stands; and to implement the model for western hemlock.

Progress:

Following an evaluation of client needs, the contexts in which models are used, and existing models, the model architecture was designed and components identified. Western hemlock data have been obtained, edited, and used to develop specific equations for the model components.

Benefits:

An operational growth and yield model for natural and treated stands of western hemlock will be developed.

INTERIOR DOUGLAS-FIR STANDS

FC-GY02 *Growth processes of interior Douglas-fir stands*

Project leader: Mike Bonnor

Objectives:

To improve our knowledge and understanding of the growth processes and growth limiting factors in interior Douglas-fir stands.

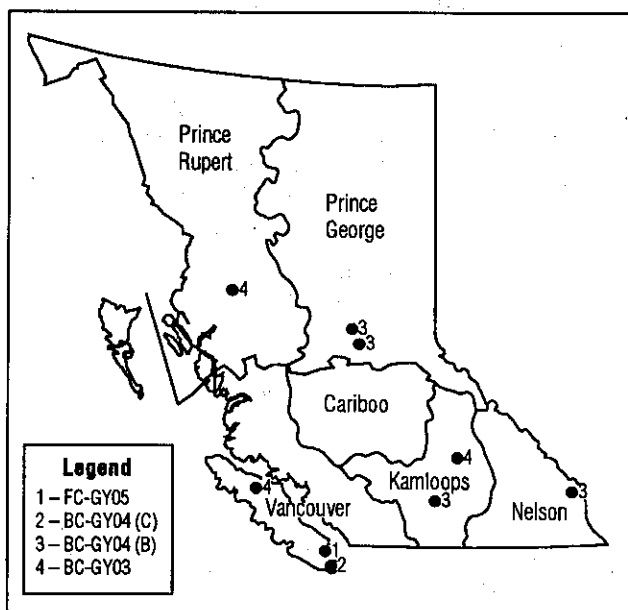
Progress:

Proposals have been requested.

Benefits:

The project is expected to result in better prediction and management of interior Douglas-fir growth.

PLOT LOCATIONS



ADDRESSES OF PROJECT LEADERS AND CONTACTS

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