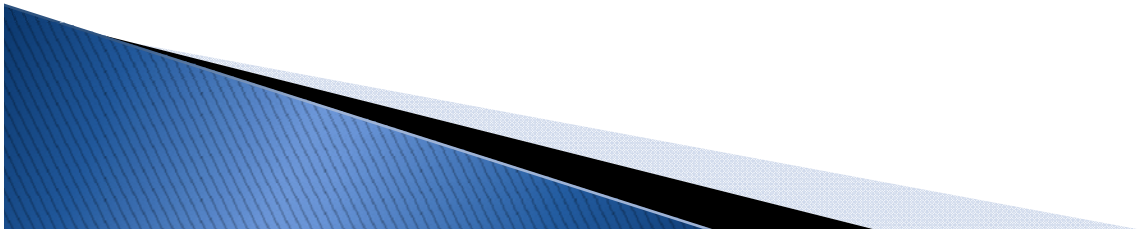
Ecology and Earth Sciences Section

An overview of recent accomplishments

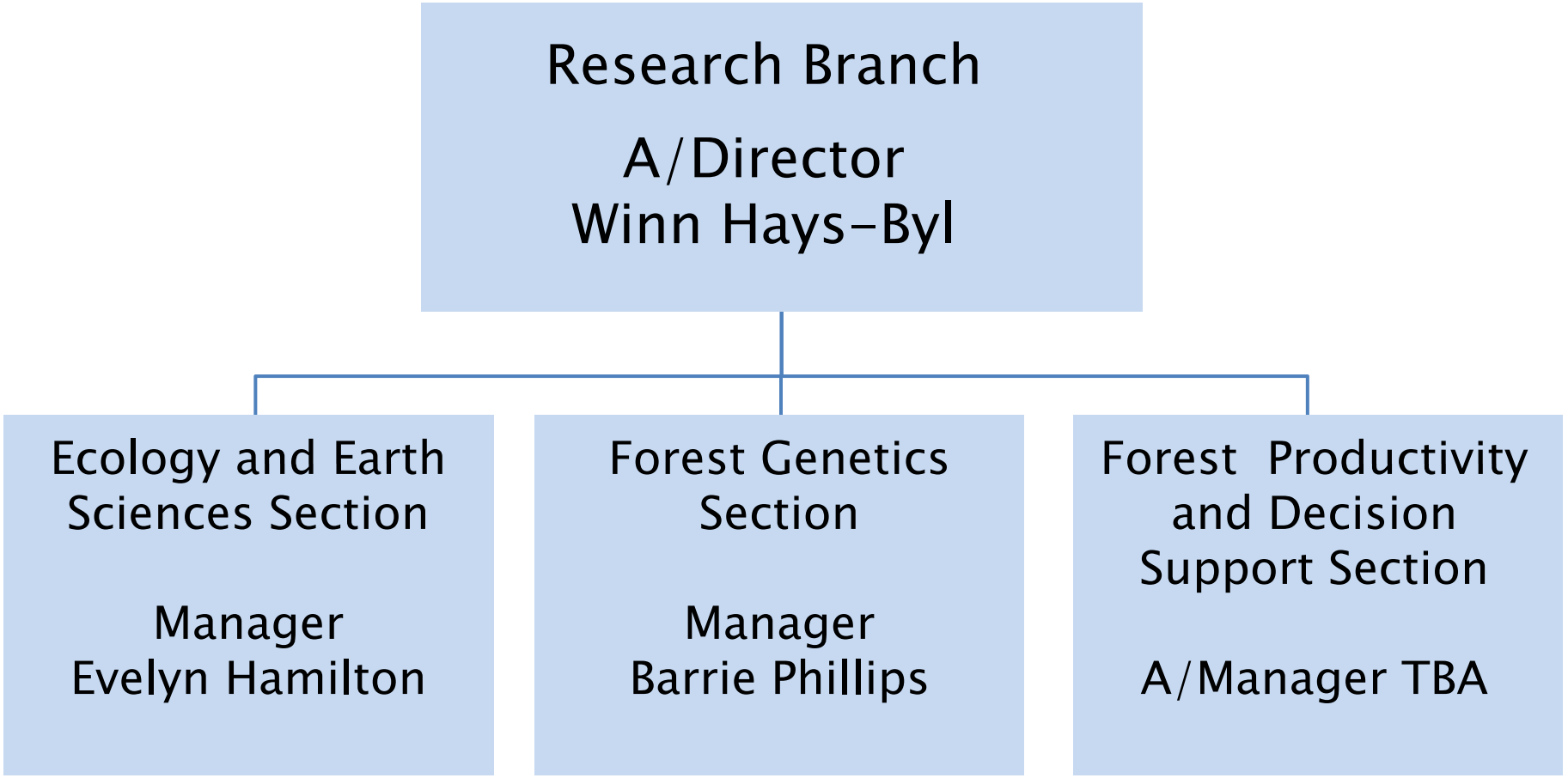
Evelyn Hamilton, MSc, RPBio
Manager, Ecology and Earth Science Section,
Research Branch
BC Ministry of Forests and Range

Outline

- Overview of Research Branch
- Ecology and Earth Sciences Section
- EES Program Highlights
  - Ecology
  - Watershed Science
  - Soils
  - Climatology and Carbon
  - Range Ecology
  - Landscape Ecology
  - Wildlife Habitat
- Summary

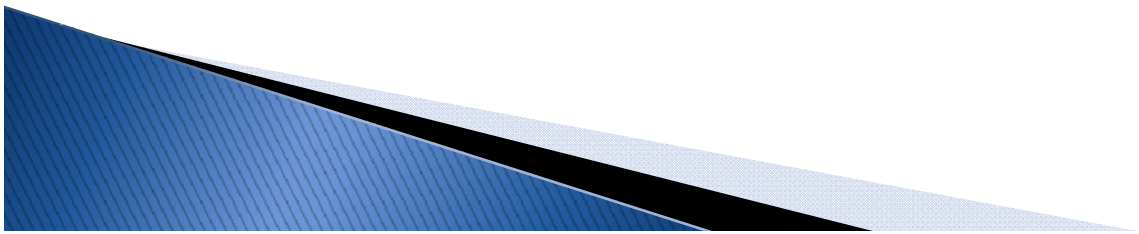


Overview of Research Branch



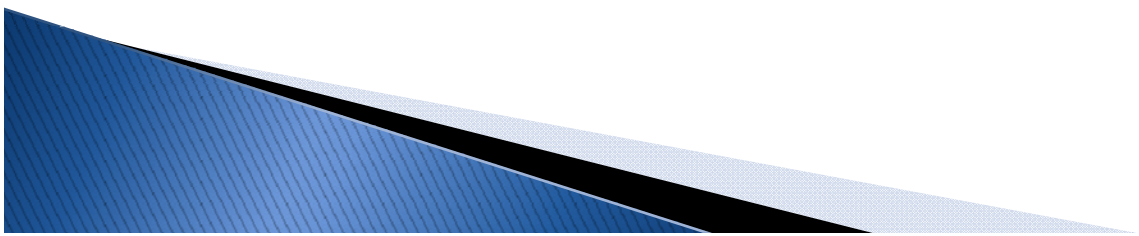
Ecology and Earth Science Section

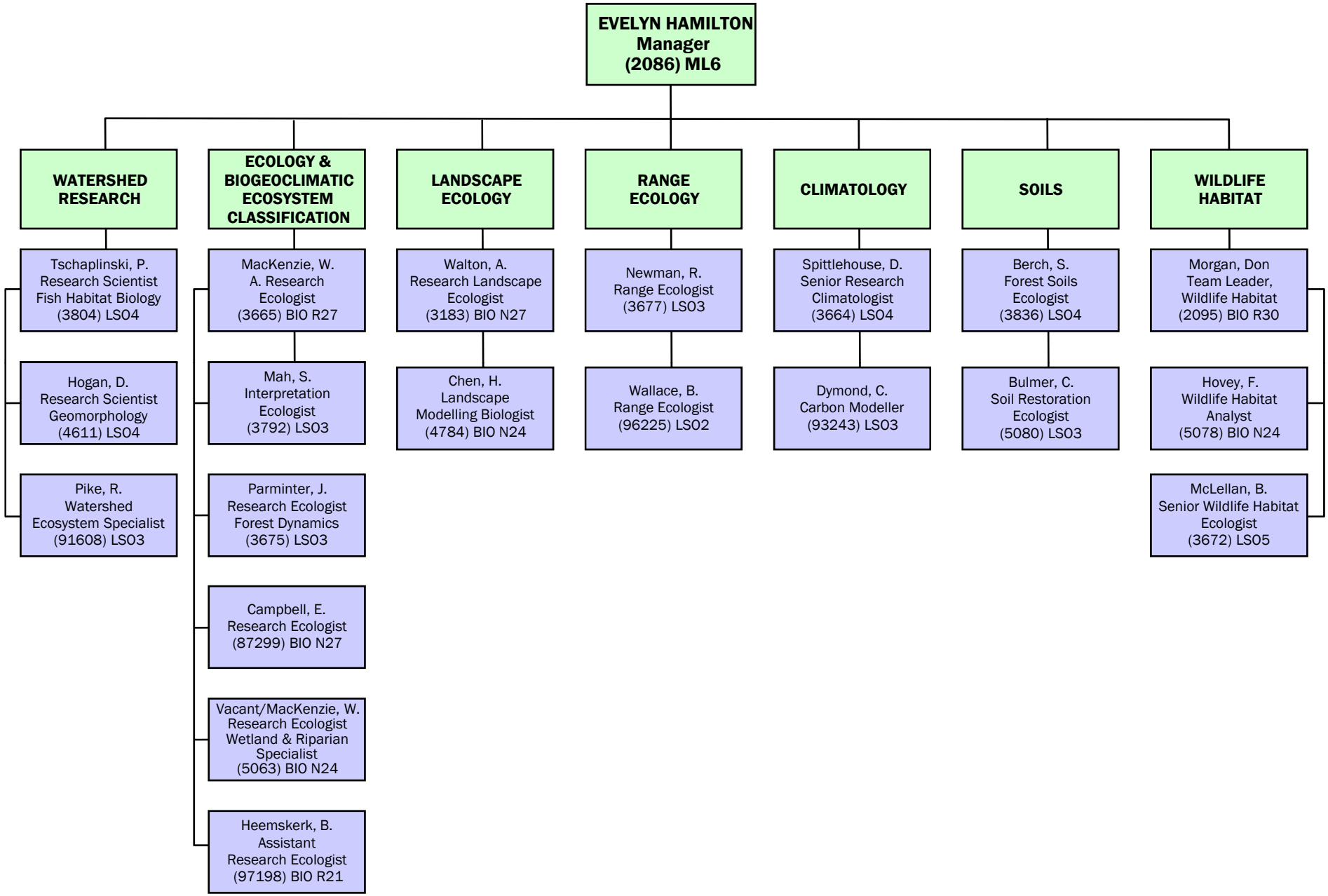
- Organization chart
- Main activities
- Key drivers
- Key clients and collaborators



Description of EES Section

- Organization chart
- Locations – Victoria, Smithers, Kamloops
- Allocation of effort
- Strengths




EVELYN HAMILTON
Manager
(2086) ML6
WATERSHED RESEARCH
Tschaplinski, P.
Research Scientist
Fish Habitat Biology
(3804) LS04
Hogan, D.
Research Scientist
Geomorphology
(4611) LS04
Pike, R.
Watershed
Ecosystem Specialist
(91608) LS03
ECOLOGY & BIOGEOCLIMATIC ECOSYSTEM CLASSIFICATION
MacKenzie, W.
A. Research
Ecologist
(3665) BIO R27
Mah, S.
Interpretation
Ecologist
(3792) LS03
Parminter, J.
Research Ecologist
Forest Dynamics
(3675) LS03
Campbell, E.
Research Ecologist
(87299) BIO N27
Vacant/MacKenzie, W.
Research Ecologist
Wetland & Riparian
Specialist
(5063) BIO N24
Heemskerk, B.
Assistant
Research Ecologist
(97198) BIO R21
LANDSCAPE ECOLOGY
Walton, A.
Research Landscape
Ecologist
(3183) BIO N27
Chen, H.
Landscape
Modelling Biologist
(4784) BIO N24
RANGE ECOLOGY
Newman, R.
Range Ecologist
(3677) LS03
Wallace, B.
Range Ecologist
(96225) LS02
CLIMATOLOGY
Spittlehouse, D.
Senior Research
Climatologist
(3664) LS04
Dymond, C.
Carbon Modeller
(93243) LS03
SOILS
Berch, S.
Forest Soils
Ecologist
(3836) LS04
Bulmer, C.
Soil Restoration
Ecologist
(5080) LS03
WILDLIFE HABITAT
Morgan, Don
Team Leader,
Wildlife Habitat
(2095) BIO R30
Hovey, F.
Wildlife Habitat
Analyst
(5078) BIO N24
McLellan, B.
Senior Wildlife Habitat
Ecologist
(3672) LS05

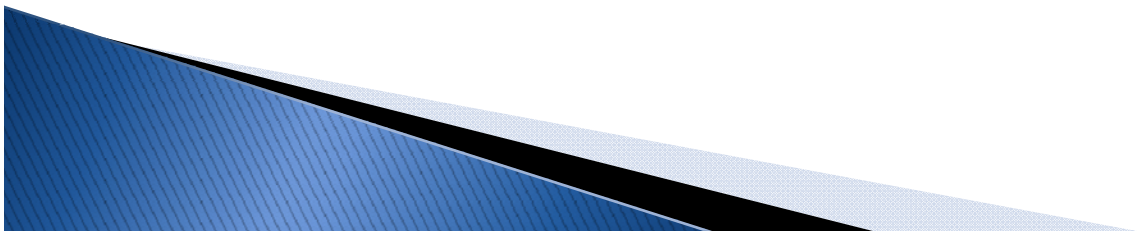
Main activities

- Provincial research program coordination.
- Research on long and short term projects
- Providing expert advice to decision makers
- Developing assessment procedures
- Analysis of implications of management actions
- Using existing info to address new issues (e.g., implications of climate change)
- Extension and consulting

Approx. 40% of time spent on research
Approx. 60% of time supporting clients through consulting and other activities

Key drivers

- MFR Act (S. 4) – Manage, protect, conserve and plan the use of forest and range resources, encourage maximum productivity and competitive forest and range industries
- Economics/industry competitiveness – green energy; carbon economy; supporting communities
- Balancing competition for forest resources
- Climate change and carbon economy
- First Nations partners in the new economy
- Maintaining public trust in resource management



Key clients and collaborators

Key clients

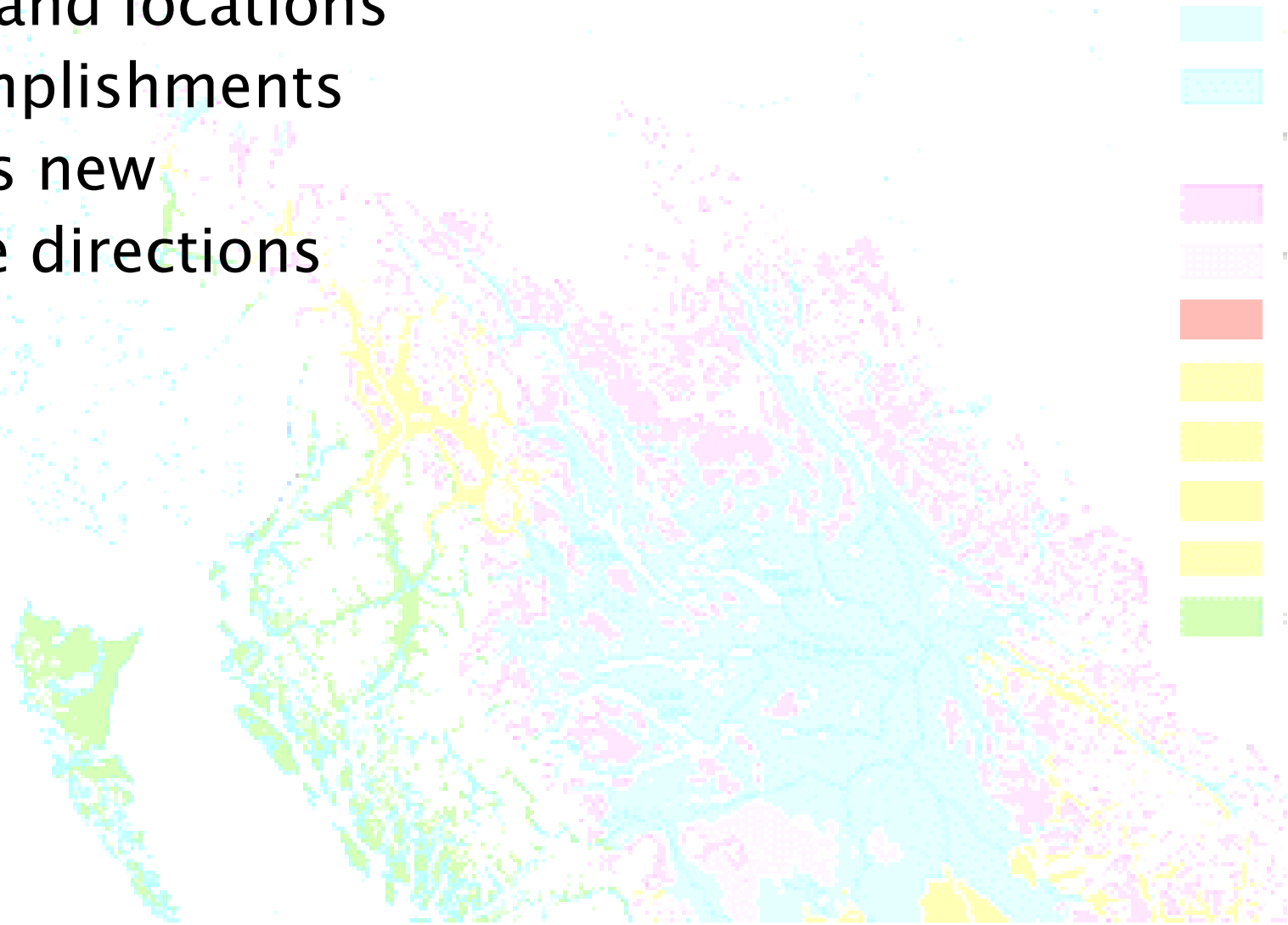
- Forest Stewardship Division
- Operations Division
- Tenure and Revenue Division
- BCTS
- Other agencies – MOE, MEMFR, DFO

Key collaborators

- Regional MFR scientists, UBC, UNBC, SFU, TRU, CFS, FP Innovations, BVC, FORREX

Ecology Program

- Staff and locations
- Accomplishments
- What's new
- Future directions



Shirley Mah
A/ Team Leader, Ecology Program and Interpretations Ecologist
Victoria

Biogeoclimatic Ecosystem Classification & Climate Change

Will Mackenzie
Research Ecologist- BEC system
Smithers

Elizabeth Campbell
Research Ecologist –
Ecosystem Processes
Victoria

Ben Heemskerk
Assistant Ecologist
Smithers

TECHNICAL REPORT 051

Ecosystem and Tree Attributes Affecting the Presence of Functional Wildlife Tree Types

2009

BRITISH COLUMBIA
The Best Place on Earth

Ministry of Forests and Range
Forest Science Program

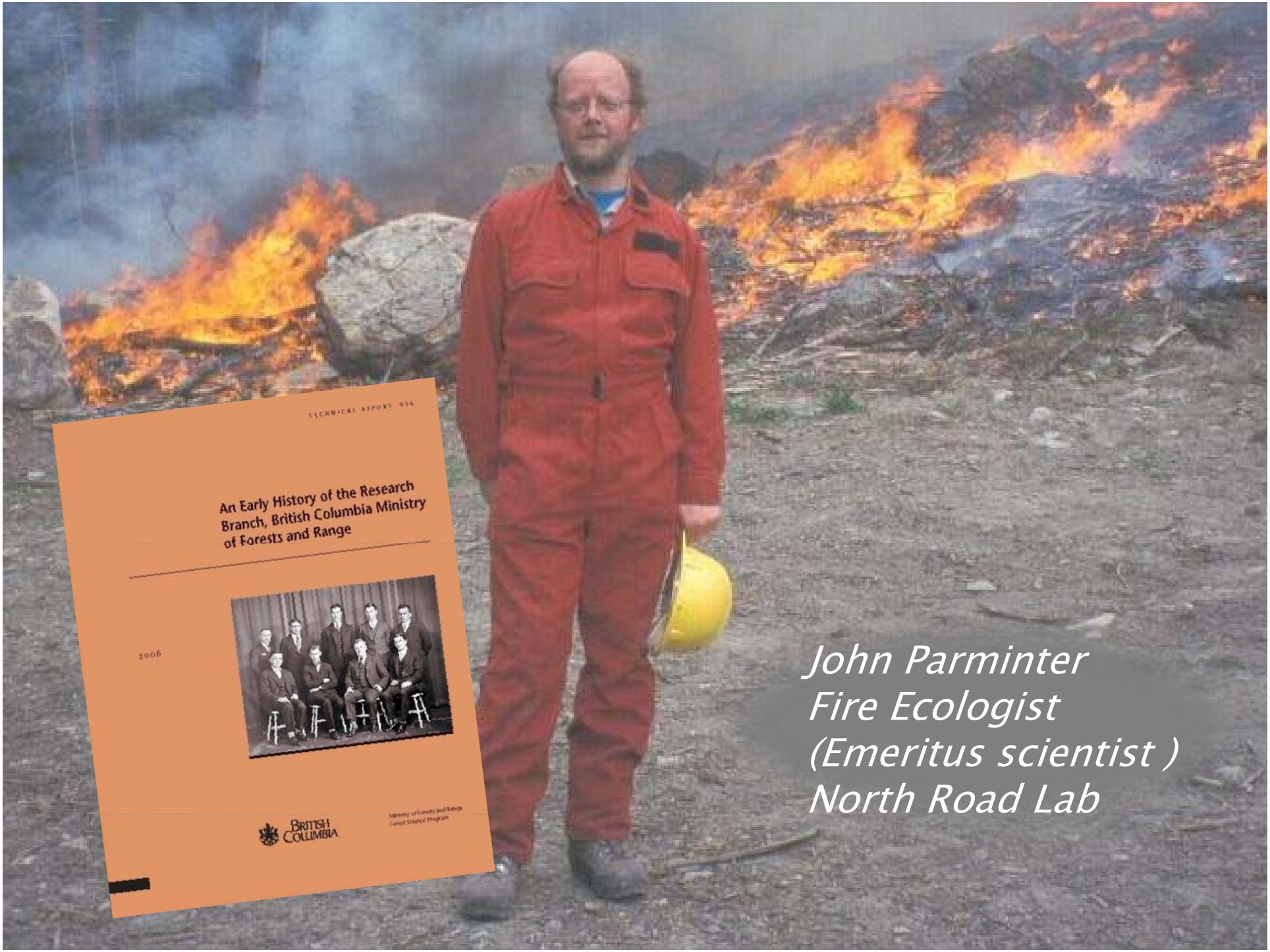
051

TECHNICAL REPORT 046

A Framework for Documenting the Effects of the Mountain Pine Beetle Outbreak in Sub-boreal Forests of Northern British Columbia (E.P. 1369): Establishment Report

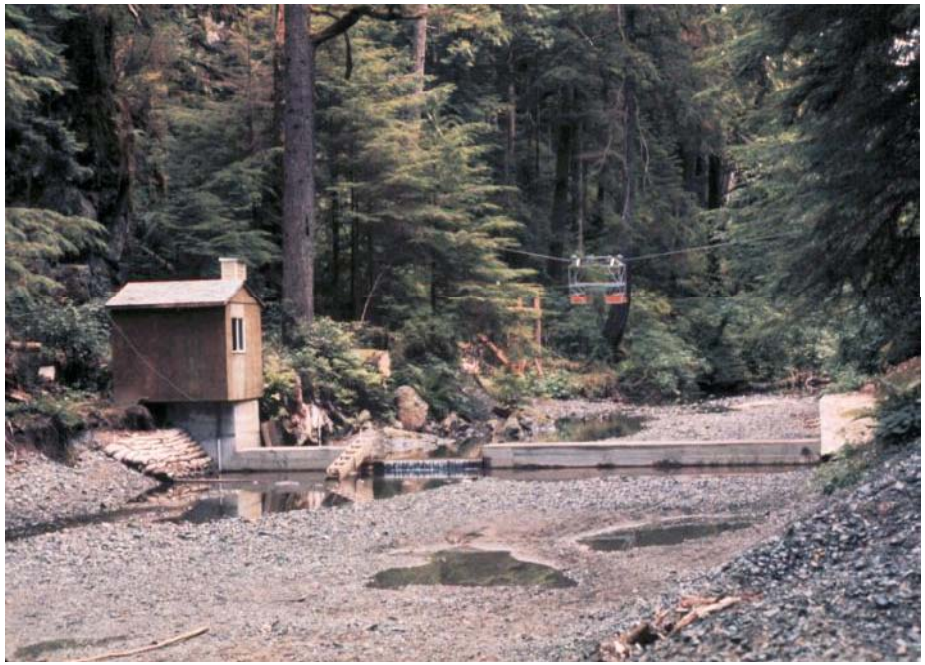
BRITISH COLUMBIA
The Best Place on Earth

Ministry of Forests and Range
Forest Science Program


TECHNICAL REPORT 036
An Early History of the Research Branch, British Columbia Ministry of Forests and Range
2006
BRITISH COLUMBIA
John Parminter
Fire Ecologist
(Emeritus scientist)
North Road Lab

Watershed Program

- Staff and locations
- Accomplishments
- What's new
- Future directions



Peter Tschaplinski
Manager Watershed Research Program, Victoria office

Dan Hogan
Research Scientist ,Geomorphology , UBC office

Robin Pike
Watershed Ecosystem Specialist
Victoria office

86 Extension Note

March 2008

Lisa Nordin, Hydrology Research Associate

Ministry Contacts:
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87 Extension Note

March 2008

R.G. Pike, D.L. Spittlehouse, K.E. Bennett, V.N. Eggington, P.J. Tschaplinski, T.Q. Murdock, and A.T. Werner

88 Extension Note

May 2008

Rita Winkler
Southern Interior Region, B.C. Ministry of Forests and Range, Kamloops, BC

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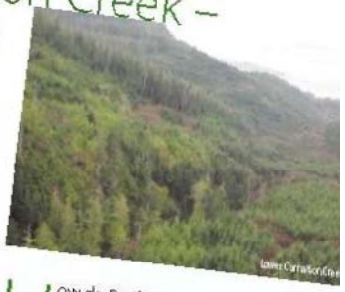
David Maloney
Northern Interior Region, B.C. Ministry of Forests and Range, Prince George, BC

Todd Redding
FORREX Forest Research Extension Partnership, Nanaimo, BC

Creek

Carnation Creek – The World's Longest Continuous Study of Fish-Forestry Interactions



How do Pacific coastal watersheds functio
ways do forestry practices affect these fu
Scientists have analyzed these complex
35 years at Carnation Creek, a small watershed in so
Vancouver Island. The Carnation Creek research pr
longest-running study of the effects of forestry pra
watershed processes and is responsible for much
present knowledge of fish-forestry interactions.
In the late 1960s, conflicts over approaches to fisher
forest resource management highlighted our lack o
British Columbia coastal watersheds. To fill this gap, F
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ih research at Carnation
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the scientific basis for s
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s a brief overview of the
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y of Forests Forest Science Progra

90 Extension Note

March 2009

Mountain Pine Beetle and Salvage Harvesting: Small Stream and Riparian Zone Response in the Sub-Boreal Spruce Zone

John Rex
Northern Interior Region
B.C. Ministry of Forests and Range
Prince George, BC

Phillip Krauskopf
Northern Interior Region
B.C. Ministry of Forests and Range
Prince George, BC

David Maloney
Southern Interior Region
B.C. Ministry of Forests and Range
Kamloops, BC

Peter Tschaplinski
Research Branch
B.C. Ministry of Forests and Range
Victoria, BC

Introduction

The mountain pine beetle (MPB) infestation and its related salvage harvesting activities adjacent to streams have the potential to influence small stream (< 2 m bankfull width) and riparian zone function by altering and removing riparian vegetation and causing other disturbances. These alterations are a significant management issue because small streams are the most predominant channel type on the landscape, comprising upwards of 80% of a watershed's total channel length (Shreve 1969). Accordingly, understanding the influence of these changes on small streams and their riparian zones is important to forest management.

The MPB infestation of riparian pine stands and/or subsequent riparian harvesting can alter riparian structure by changing microclim

influence of MPB and salvage harvesting on riparian zones and small streams. The initial studies described here were implemented in the Vanderhoof Forest District because it has been heavily affected by MPB and has correspondingly seen increased levels of salvage harvesting to recover some economic value from the forest. These studies aim to provide short-term answers to questions about the influence of the MPB and salvage harvesting on small streams, namely:

- What is the riparian stand structure of small streams in MPB-affected areas of the SBS within the Vanderhoof Forest District?
- How do the MPB infestation (grey attack stage) and salvage harvesting affect riparian zones and small streams, including shade?

Study

Soils Program

- Staff and locations
- Accomplishments
- What's new
- Future directions

Shannon Berch
Team Leader, Soils and
Research Scientist
North Road Lab, Victoria

Compatible Management of Timber and Pine Mushrooms

Ministry of Forests and Range, Research Branch

The Centre for Non-Timber Resources
Royal Roads University

March 2009

Shannon M. Berch and J. Marty Kranabetter
BC Ministry of Forests and Range
Research Branch, Victoria

40 Extension Note

September 1999

Forest Productivity and Soil Conditions on Rehabilitated Landings: Interior British Columbia

Matthew Plotnikoff and Margaret Schmidt
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Nelson Forest Region
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Introduction

In British Columbia, soil rehabilitation aims to restore productivity to forest roads, landings, and trails that are no longer needed for access, and to areas that have suffered unavoidable or accidental damage as a result of forestry operations. Soil rehabilitation is an important component of management strategies to maintain or enhance timber supply in the working forest. Restoring productivity to degraded soils can also enhance other environmental values, and contribute to successful ecosystem or watershed restoration.

Soil rehabilitation research was initiated in British Columbia over two decades ago (e.g., Vyse and Mitchell 1977), and numerous contributions since that time have been reviewed by Bulmer (1996) and Sanborn et al. (1999a). In addition, a network of new research sites has been established to test new approaches to soil rehabilitation and to improve cost-effectiveness (Beech and Xiao 1998; Dykstra and Curran 1998; Inland Timber Management Ltd. 1998; Bulmer and Curran 1999a; Sanborn et al. 1999b; Venter 1999).

Despite significant progress in the past, and new information expected in the future, there is a need for information to guide operational projects that are currently under way. In particular, information is needed on the long-term effectiveness of soil rehabilitation efforts, and the extent to which operational soil rehabilitation can contribute to the timber supply. We examined tree growth and soil conditions on sites that were rehabilitated in 1991 in the British Columbia interior. The objectives of the work were (1) to document a minimum of 5 year's growth of lodgepole pine on rehabilitated landings, and compare it to growth on sites that were simply harvested, and (2) to document soil conditions affecting site productivity on the rehabilitated areas.

Operational Rehabilitation Projects

Boundary

George Delisle, Forestry Supervisor for Pope and Talbot, began using brush blades to till landings in 1988. By the mid 1990s, the winged subsoiler was used extensively in Pope and Talbot's soil rehabilitation program,

British Columbia

Ministry of Forests Research Program

Chuck Bulmer
Research Soil Scientist
Kalamalka Lab
Vernon

Climatology and Carbon Program

- Staff and locations
- Accomplishments
- What's new
- Future directions

Dave Spittlehouse
Team Leader, Forest Climatology
and Carbon Research
Victoria office

PCIC Regional Analysis Tool (BETA): Help

Data Options

Experiment: CLIMATEBC HIST-run1 (HIST) | Variable: Mean Temperature
Timeslice: 1998 | Time of Year: Annual

Display Options

Window: BC Albers | Region: --Entire Window--

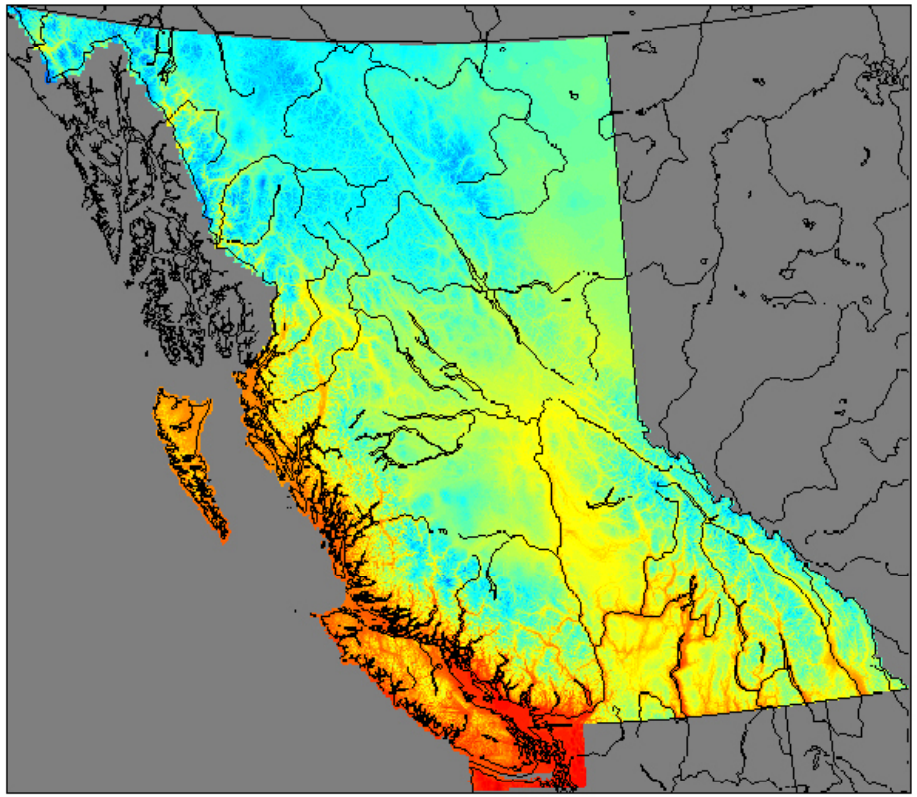
Update

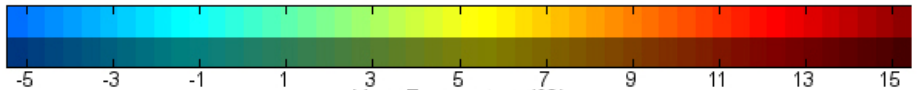
Plot Options

Region | Maps | Data | Scatter Plots

Maps | DiffMap

CLIMATEBC HIST-run1 (HIST) - Annual - Mean Temperature (°C) - 1998_1998





(BETA) Prepared by PCIC

CLIMATEBC HIST-run1 (HIST) - Annual - Mean Temperature (°C) - 1998_1998

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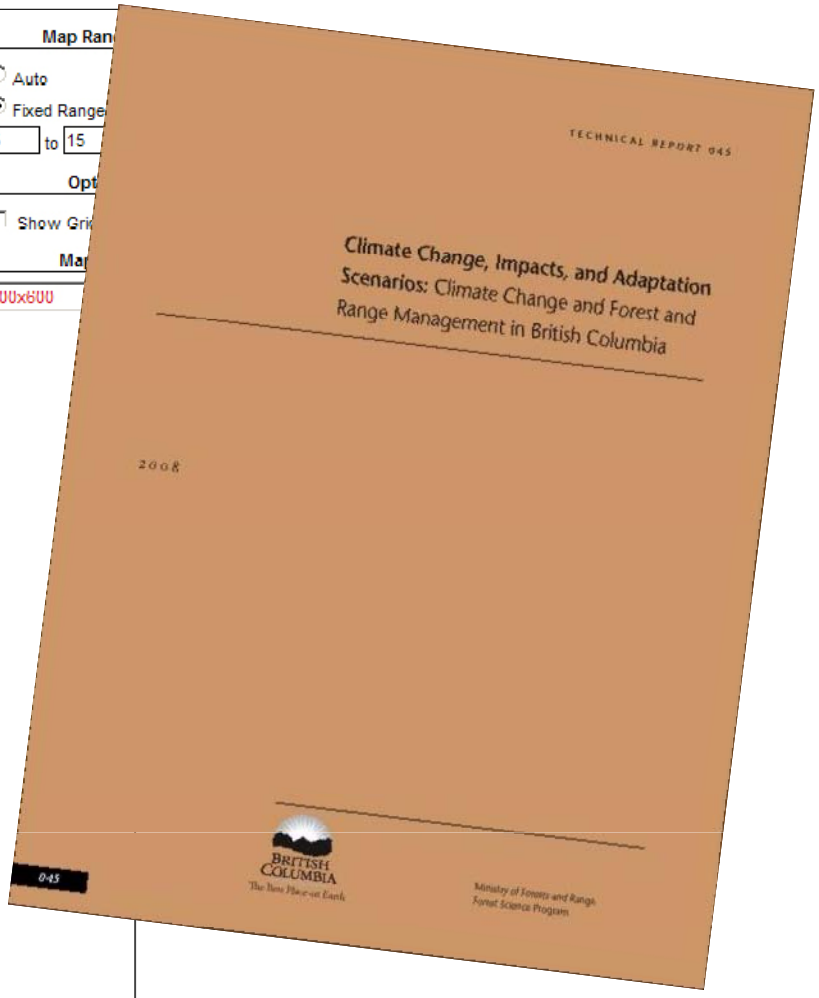
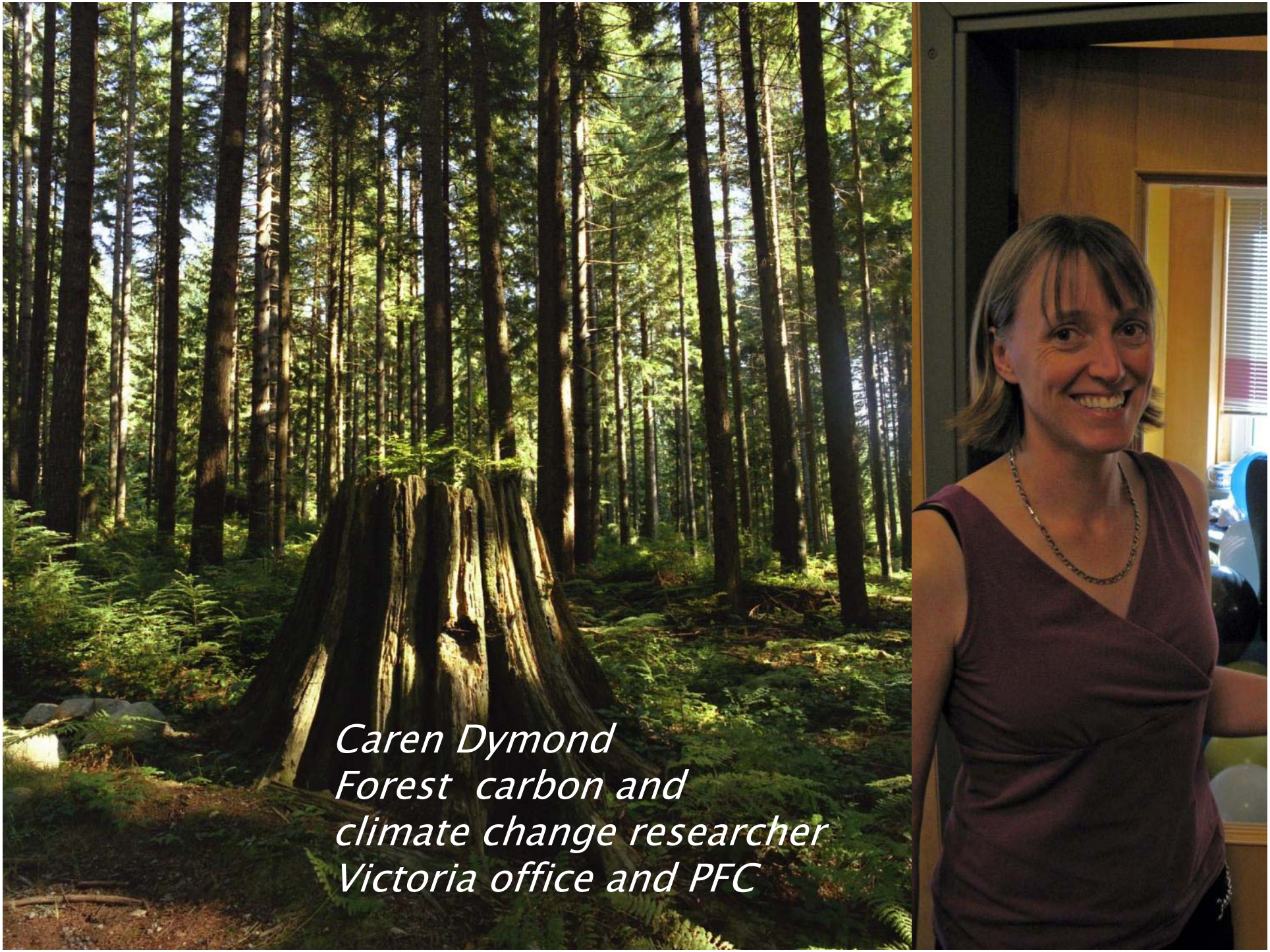
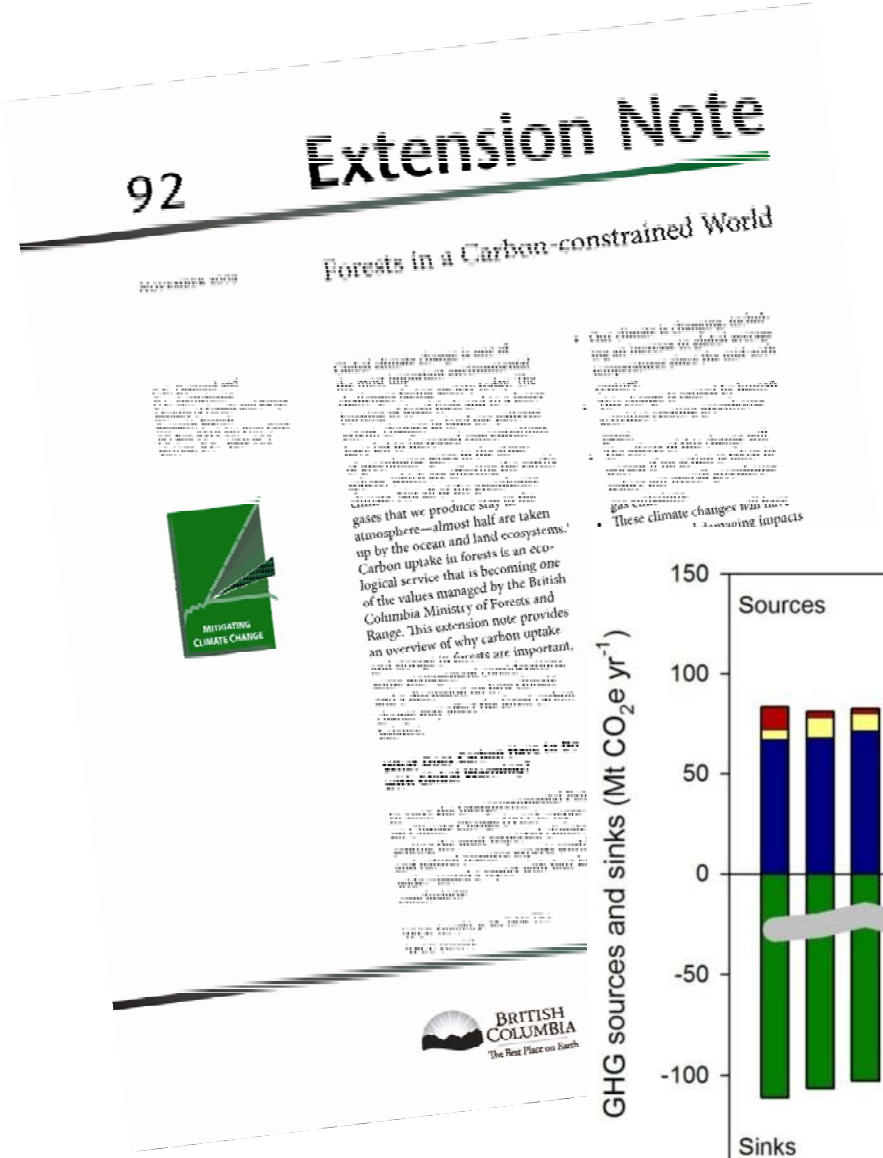
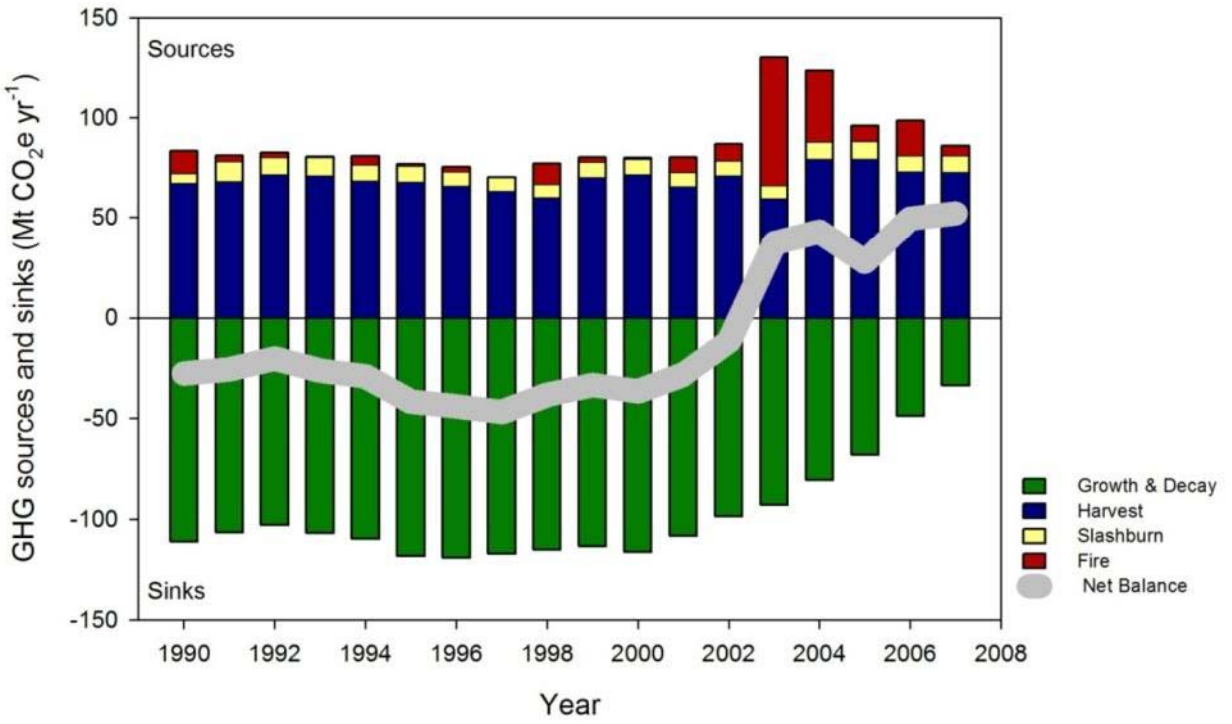



Caren Dymond
Forest carbon and
climate change researcher
Victoria office and PFC

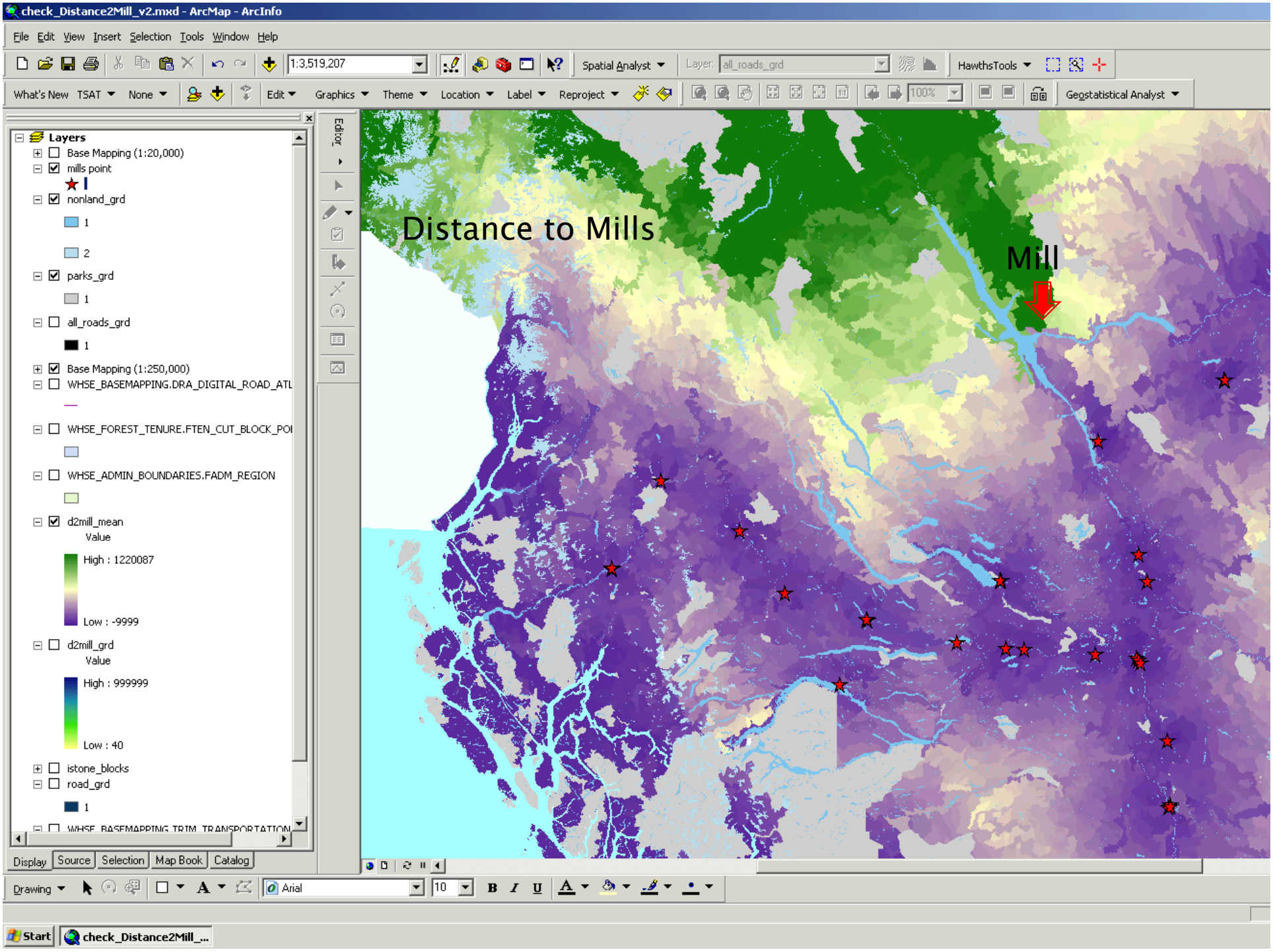

92
Extension Note
Forests in a Carbon-constrained World
MITIGATING CLIMATE CHANGE
BRITISH COLUMBIA
The Best Place on Earth


Sources
Sinks
GHG sources and sinks (Mt CO_2e yr^{-1})
150
100
50
0
-50
-100
-150
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
Year
Growth & Decay
Harvest
Slashburn
Fire
Net Balance

Landscape Ecology Program

- Staff and locations
- Accomplishments
- What's new
- Future directions

Adrian Walton
Team Leader,
Landscape Ecology
Victoria office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Spatial Analyst
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Layers
Base Mapping (1:20,000)
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Base Mapping (1:250,000)
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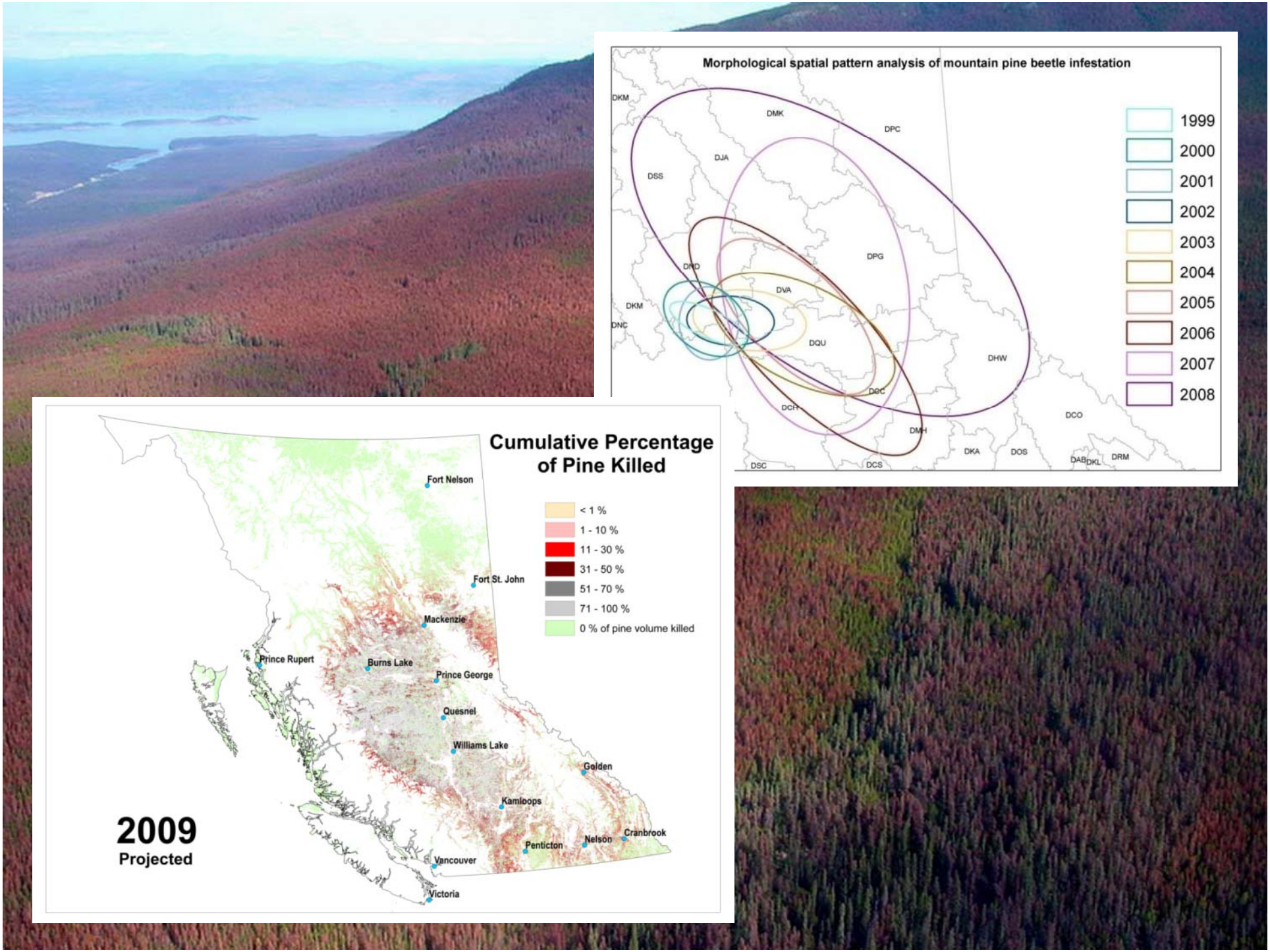
Huapeng Chen
Landscape Modelling
Biologist
Victoria office


Morphological spatial pattern analysis of mountain pine beetle infestation
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DMK
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DQC
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DCO
DMH
DKA
DOS
DSC
DCS
DAB
DKL
DRM
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Cumulative Percentage of Pine Killed
< 1 %
1 - 10 %
11 - 30 %
31 - 50 %
51 - 70 %
71 - 100 %
0 % of pine volume killed
Fort Nelson
Fort St. John
Mackenzie
Prince Rupert
Burns Lake
Prince George
Quesnel
Williams Lake
Golden
Kamloops
Cranbrook
Penticton
Nelson
Vancouver
Victoria
2009
Projected

Range Ecology Program

- Staff and locations
- Accomplishments
- What's new
- Future directions

Reg Newman, Team Leader, Range Ecology Research
Brian Wallace, Range Ecologist - Soils
Kamloops office

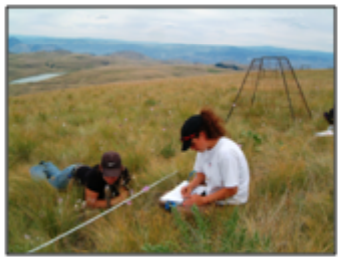
Linking Range Health Assessment Methodology with Science

Reg Newman[1], Rick Tucker[2], Francis Njenga[2], Graeme Hope[3], Maja Krzic[4] and Sheryl Wurtz[1]

The plant community approach to assessing range condition came into question in the 1990's. Range health assessments were proposed as replacements for the traditional system based on plant seral stage of the site. Range health assessment methods use a holistic approach to determine the state of rangelands, and include assessments of ecological functions in addition to plant community information.

Range health has been defined as:

- The ability of rangeland to perform certain key functions ... where all parts that make up the whole, are present and working together (Adamseral. 2002)
- The degree to which the integrity of the soil and the ecological processes of rangeland ecosystems are sustained (Busby 1994).



Grassland and open forest rangelands contains some of BC's most threatened habitats. There is an urgent need to scientifically validate and refine [illegible] methodologies to be used by range managers.

Relationships among Soil/Vegetation Properties and Rangeland Health Indicators

Sarah Lamagna[1], Maja Krzic[1], and Reg Newman[2]

[1]University of British Columbia, Faculty of Land & Food Systems, Vancouver, BC; [2]BC Ministry of Forests & Range, Kamloops, BC

Rationale and Study Objective

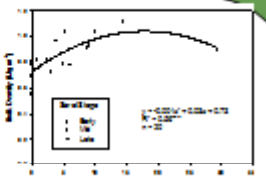
* Rangeland health assessment methods relay on qualitative, visual estimates and concerns have been raised regarding their reliability. Studies on development and application of criteria and indicators for forests and rangelands are often lacking, or have been done on a limited number of sites with relatively narrow ranges of climate and soil type.

* Development of unambiguous indicators of rangeland health should start with identification of vegetation and soil properties that integrate important ecological processes, followed by examination of linkages among these selected properties and rangeland health assessment indicators.

Regression Analysis

* Soil bulk density had a significant ($P = 0.001$), positive relationship with percentage cover of Junegrass. Bulk density increased with increasing Junegrass cover until 15% cover was reached (Fig. 3).

* Junegrass occurs at earlier seral stages and increases with grazing in the rough fescue grasslands of BC.



Understory Succession following Ecosystem Restoration Treatments in Ingrown Dry Forests

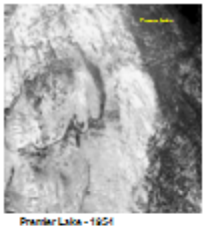
Reg Newman[1], Hillary Page[2], John Parminter[3], and Brian Wallace[1]

Dry forests of ponderosa pine (*Pinus ponderosa*) and interior Douglas-fir (*Pseudotsuga menziesii* var. *glauca*) occur along the valleys at low- to mid-elevations within the southern Interior of British Columbia.

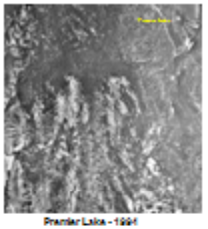
Fire suppression, overgrazing, and selective logging in these forests are believed to have caused forest encroachment on grasslands and ingrowth within open forests. Encroachment is tree establishment in previously treeless openings. Ingrowth is excessive tree recruitment, primarily by shade-tolerant species, such as interior Douglas-fir, within low-density, open forests.

Ingrown ponderosa pine stand near Clinton, BC.

Treated ponderosa pine stand near Clinton, BC.



Premier Lake - 1934



Premier Lake - 1994

The photo pair above illustrates forest cover changes during a 60 year period near Premier Lake. It has been estimated that 1500 to 3000 ha of open forest and grassland are lost

Ingrowth often results in the retrogression of understory plant communities, the loss of habitat for sensitive wildlife species, and an increased risk of catastrophic wildfires. Changes in forest structure within ingrown forests reduces forage availability for wildlife and livestock. For

Wildlife Habitat Program
Staff and locations
Accomplishments
What's new
Future directions

Don Morgan
Team Leader,
Wildlife Habitat
Smithers office

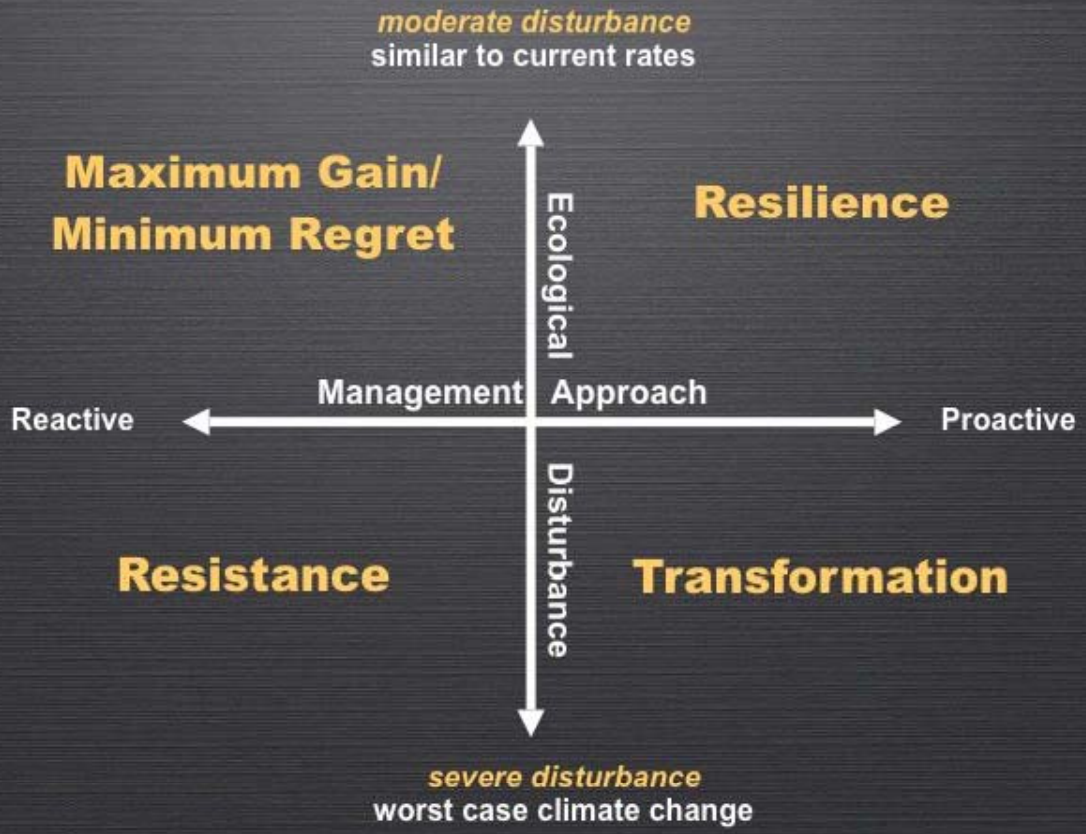
Habitat Supply Research Network

Select a research area...

Select a species...

The Habitat Supply Research Network is a member-maintained network of habitat researchers

Scenario Matrix



Bruce McLellan
Wildlife Habitat Biologist
Kamloops
Fred Hovey
Wildlife Habitat Modeller
Kamloops

Summary

- Ecology, Watershed, Soils, Climate, Carbon, Landscape, Range and Wildlife Habitat
- Support clients across MFR and other agencies thru research, assessments and expert advice to develop policy and practices
- Climate change and carbon, resiliency, vulnerability assessments, bioenergy, provincial soils map, HSMs, watershed science synthesis, TSSDST, MPB, ClimateWNA, GHC, offset protocols and scenarios

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