Can red alder be used as an adaptation strategy to reduce environmental, social and economic risks of climate change?

Louise de Montigny
Ministry of Forests, Mines and Lands

Coastal Silviculture Committee Winter Workshop
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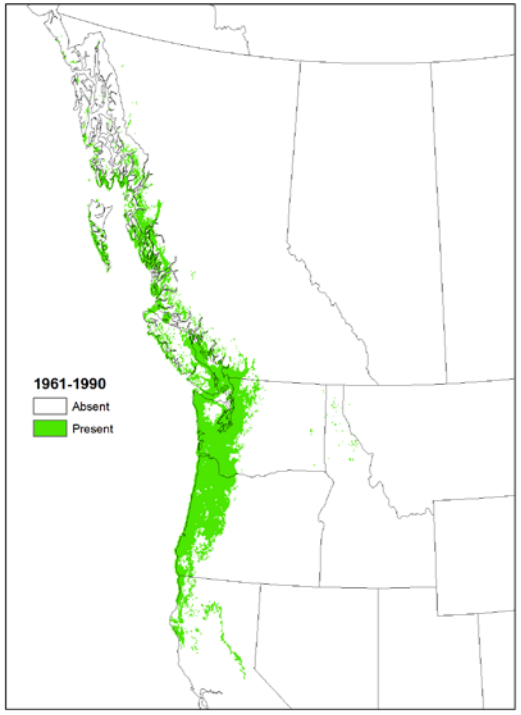
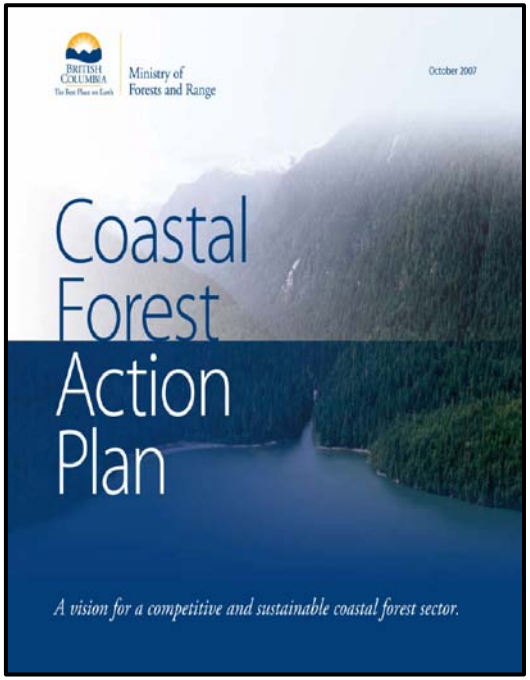
Alder is already viewed as an important coastal species

Climate envelopes for red alder



Inventory of red alder in B.C. are 91.9 million m^3 for all stand types



"...Encourage the utilization and management of deciduous species"

Hardwood Management in the Coast Forest Region

"...to actively manage up to 1200 ha/yr of hardwood species for sawlog production

Known Benefits of Alder

- Increases soil N availability by 20 to 85 kg/ha/yr
- Can mitigate the effects of conifer root disease

Known Benefits of Alder

Product Diversity:

- pulpwood/fibre - 10 to 12 years @ 21m^3/ha/yr
- sawlogs – 30 years @ 14 m^3/ha/yr
- mixed conifer/alder

Known Benefits of Alder

Contributes to diversity, health and resilience of forests at both the stand and landscape levels

Known Benefits of Alder

- Alder is used in the manufacture of value-added wood products where demand is secured by niche-product positions with little risk of substitutions
- Hardwood markets tend to be less cyclical than commodity-driven softwood markets

“Despite the known benefits of alder management, enthusiasm for actively managing alder in coastal British Columbia has been slow to develop outside of a small number of tenure holders...”

Aldern, 2010

FFESC Project:
Using red alder as an adaptation strategy to reduce environmental, social and economic risks of climate change in coastal British Columbia

Predicted Climate Envelopes for Alder

Principle Investigator: Dr. Tongli Wang

What is the predicted future geographic extent of red alder productivity with climate change?

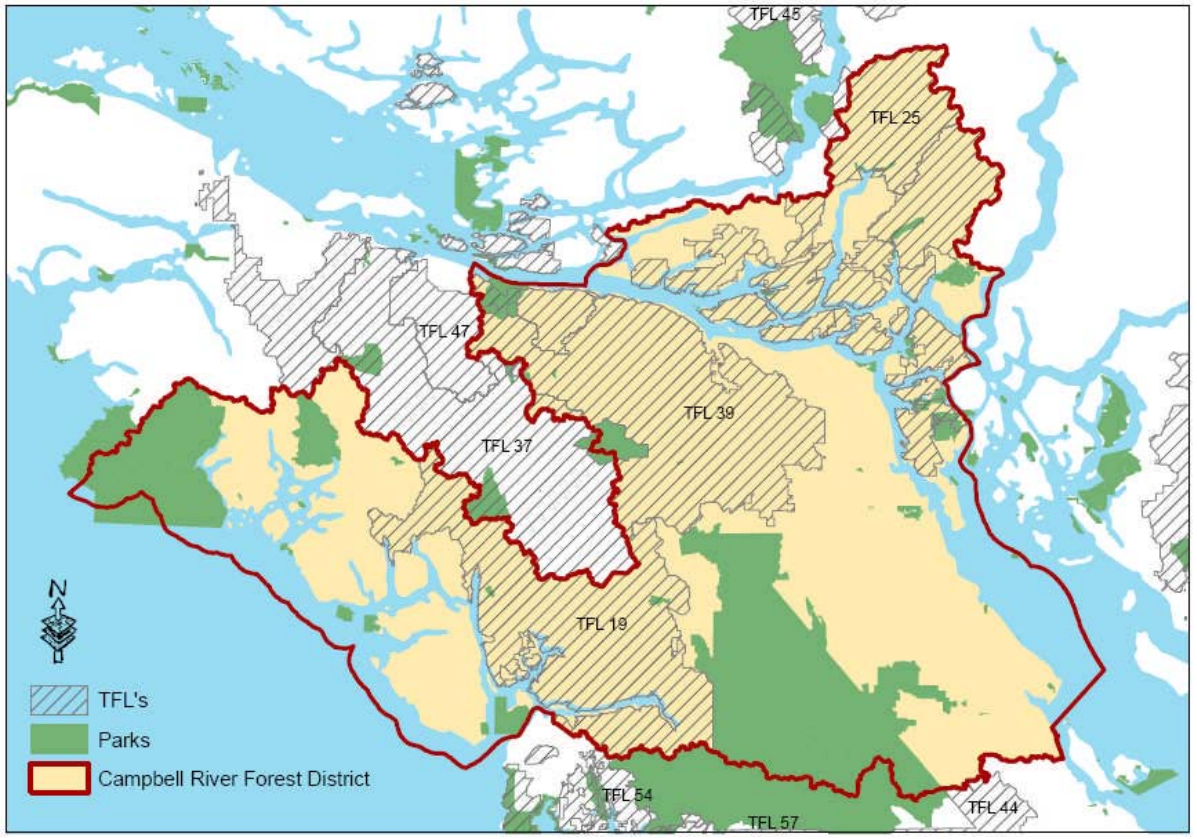
Outcome - Maps indicating where alder plantations should be targeted now for growth over the next 40 to 60 year period, based on future climate change scenarios

Predicted Climate Envelopes for Alder

Test Case: Campbell River Forest District

1.47 million ha including:

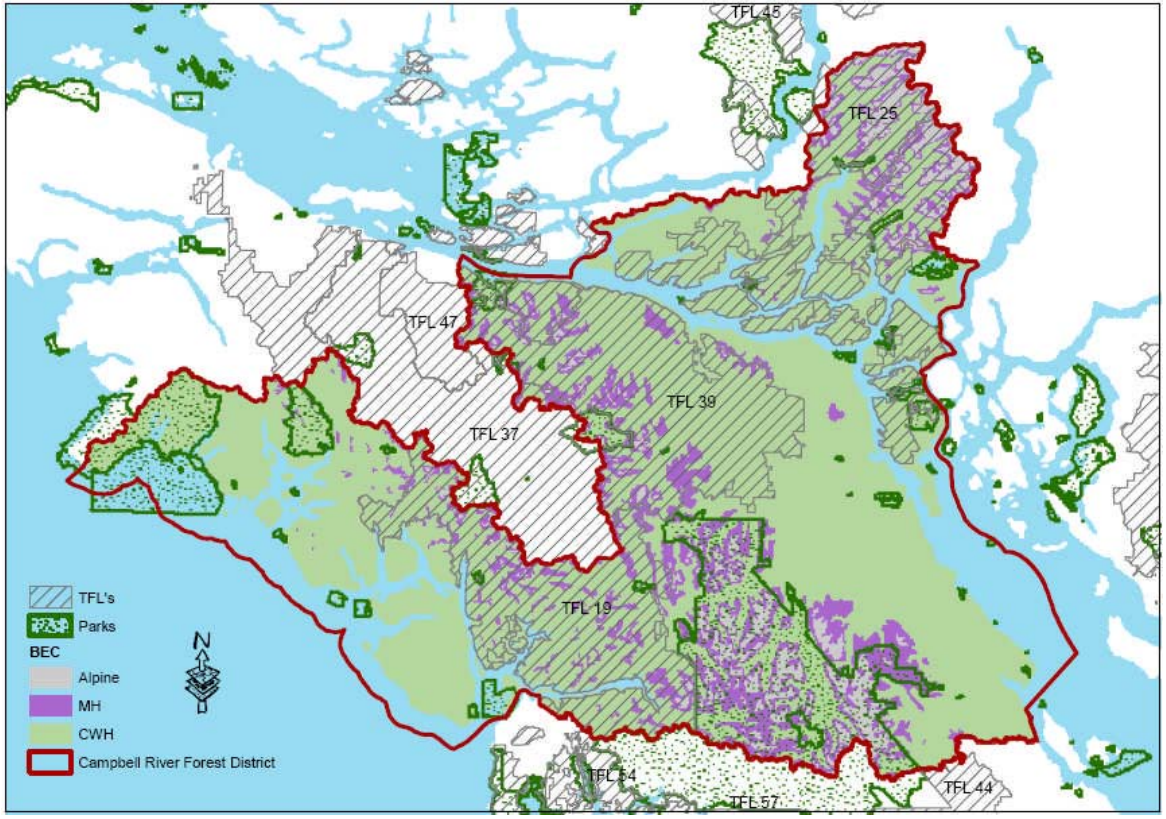
- Strathcona TSA
- TFL 19, 25 and 39
- Provincial Parks
- Private Lands



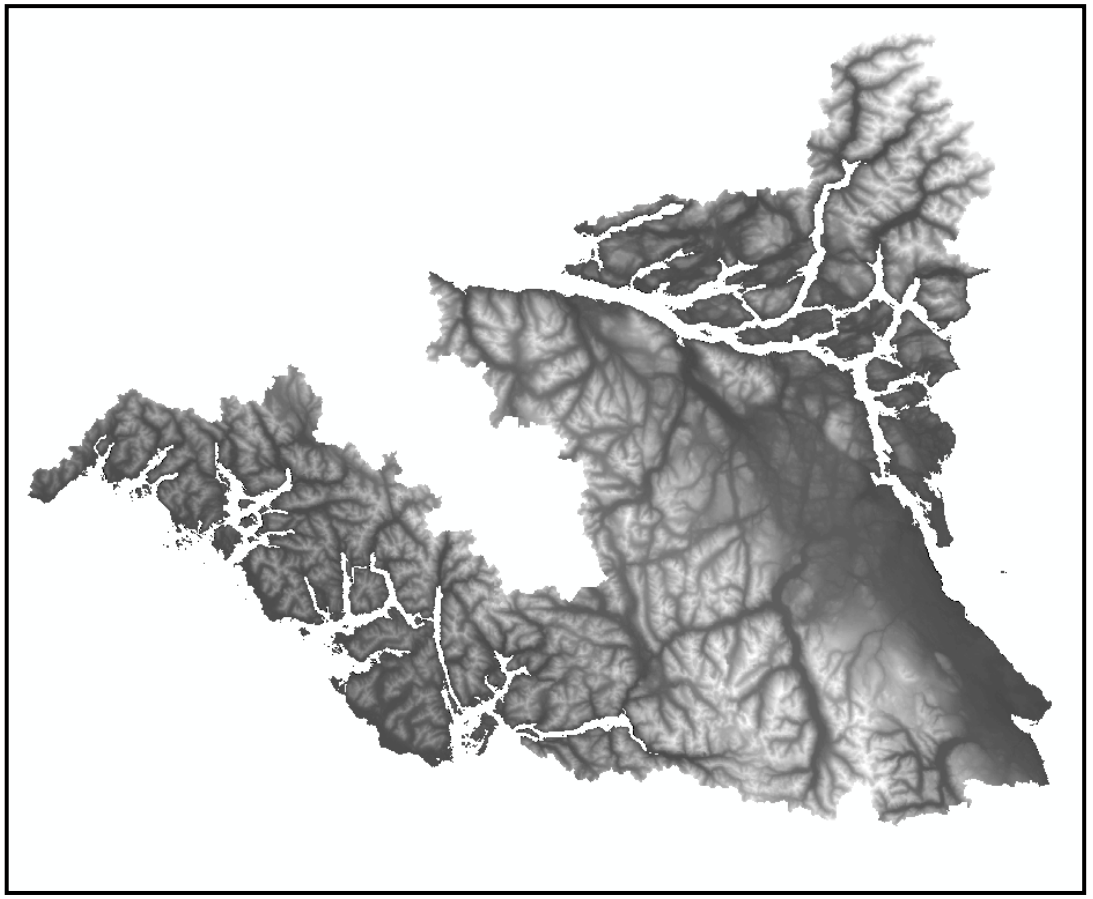
Predicted Climate Envelopes for Alder

Test Case: Campbell River Forest District

78% CWH
16% MH
6% Alpine

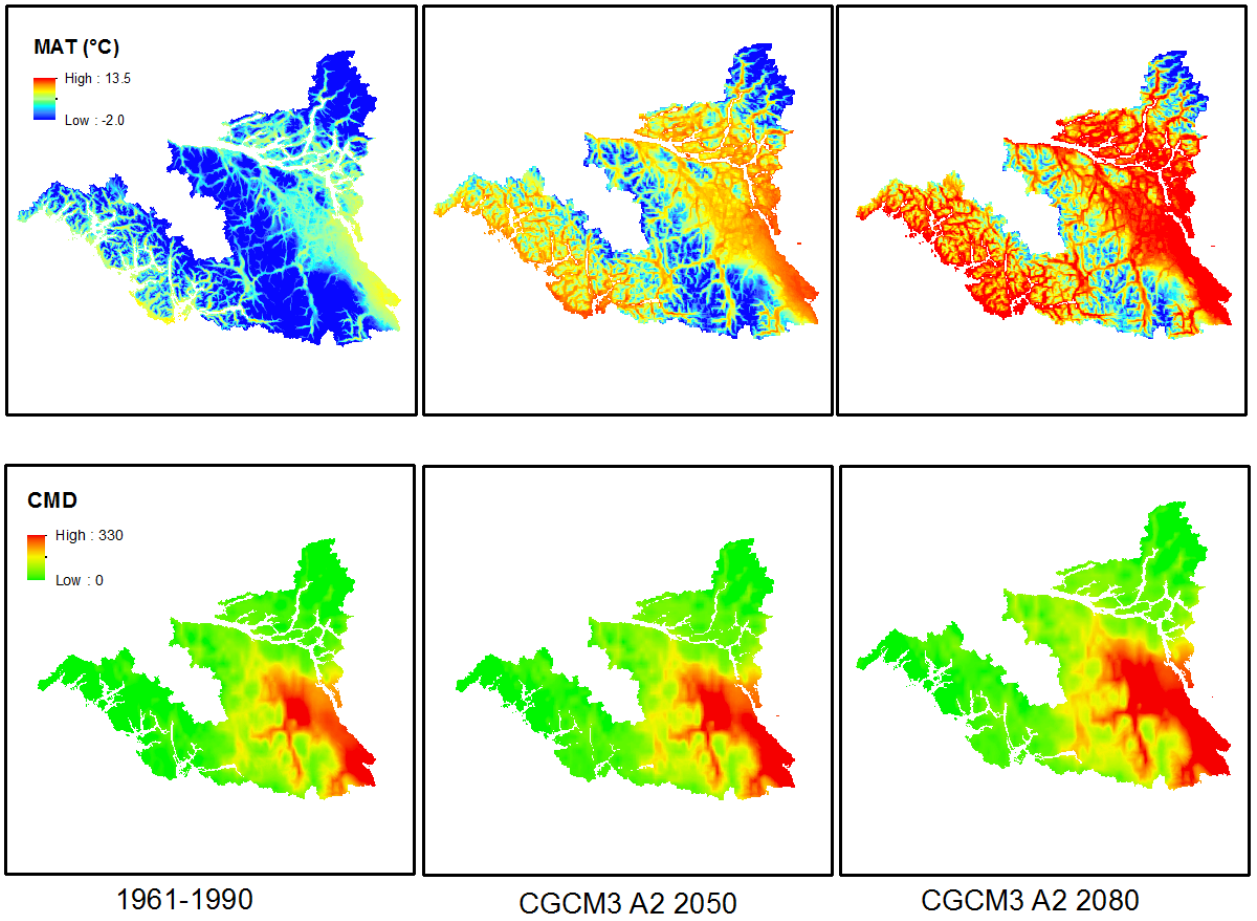


Predicted Climate Envelopes for Alder



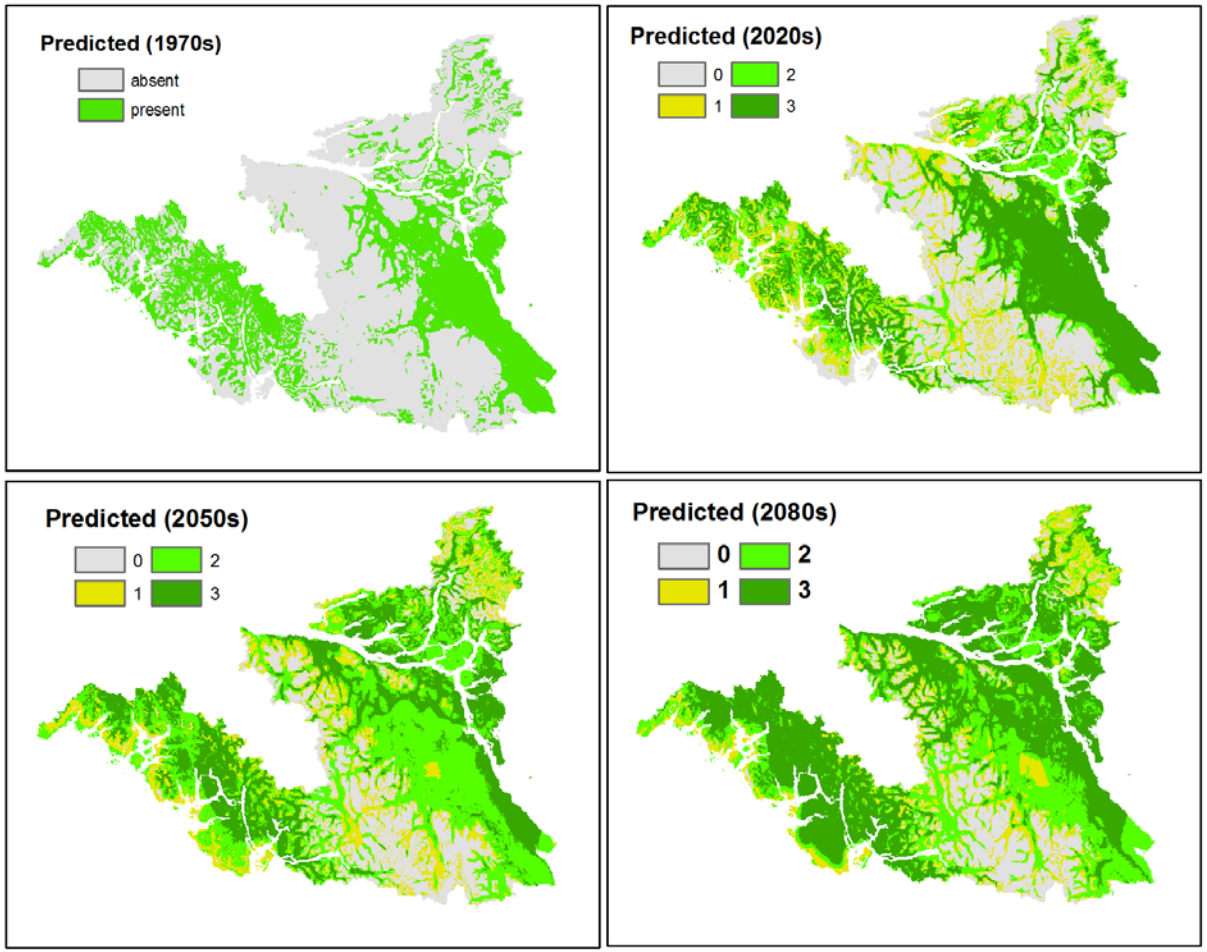
Digital Elevation Model at 90 m resolution

Predicted Climate Envelopes for Alder



Predicted climate using Canadian 3rd Generation General Circulation Climate Model

Predicted Climate Envelopes for Alder



Predicted climate envelopes for alder using the Random Forest Model

Alder Competition vs. Facilitation

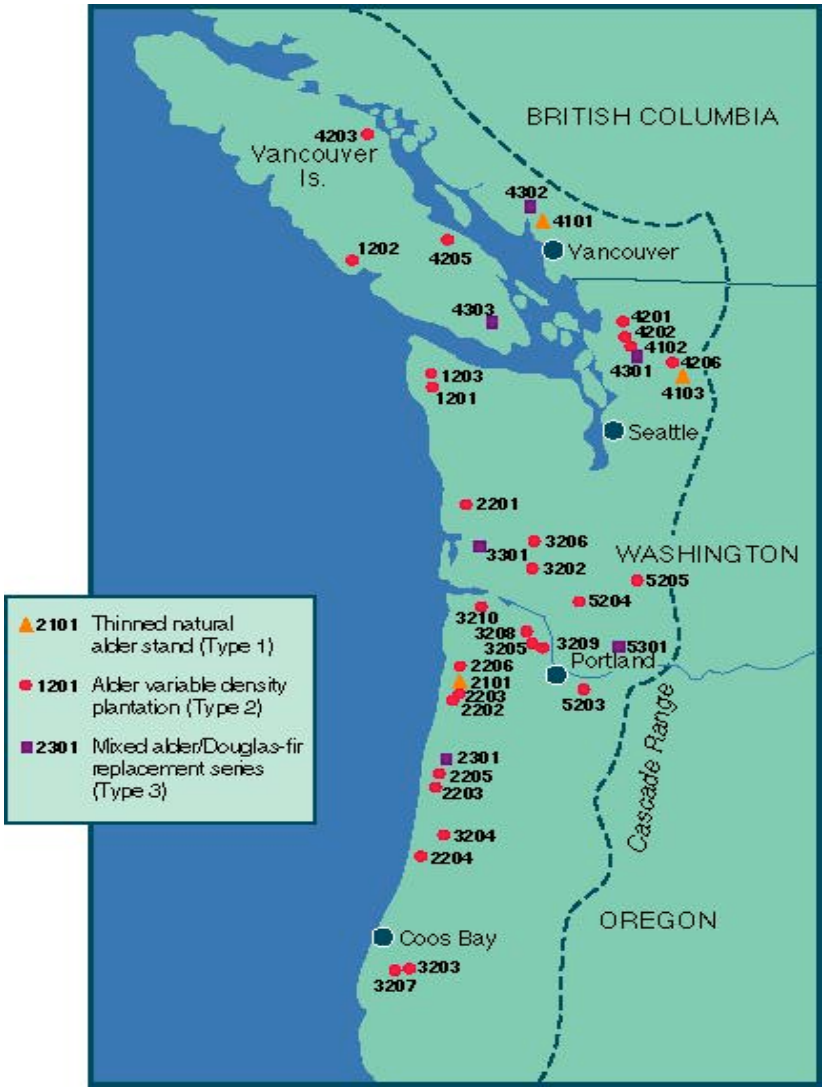
Principle Investigators: Dr. Phil Comeau, Dr. Francesco Cortini, Dr. David Hibbs

What are the effects of red alder densities on conifer growth in mixedwood stands and the influence of site factors and climate change on these interactions?

Outcome - Recommendations for best alder and mixedwood management practices under a changing climate

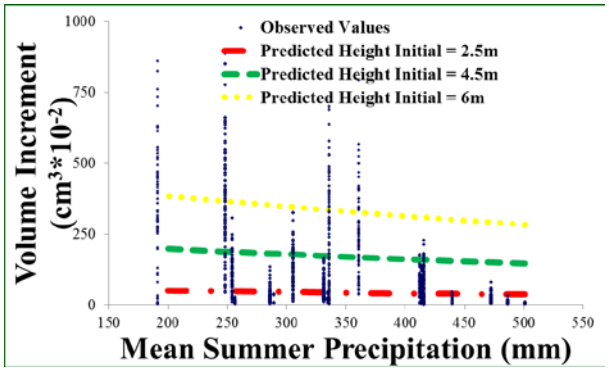
Alder Competition vs. Facilitation

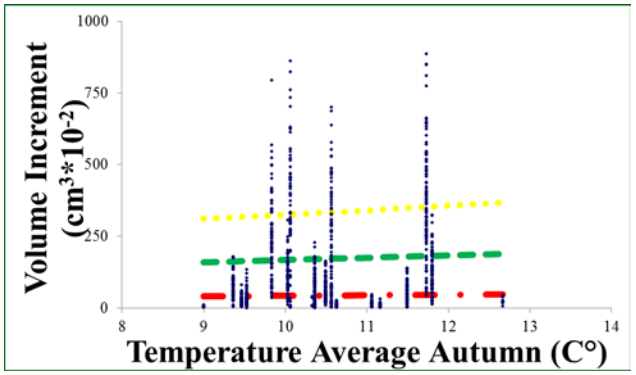
Using a network of 37 pure and mixed red alder installations from BC to Oregon from the Hardwood Silviculture Co-operative

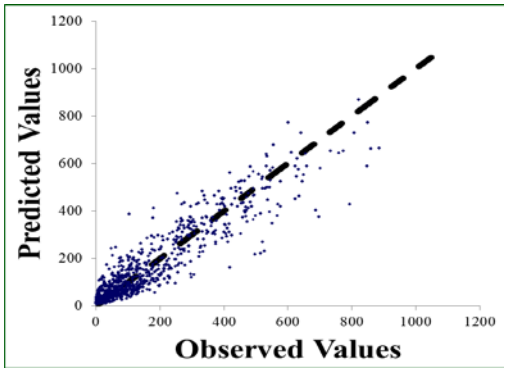


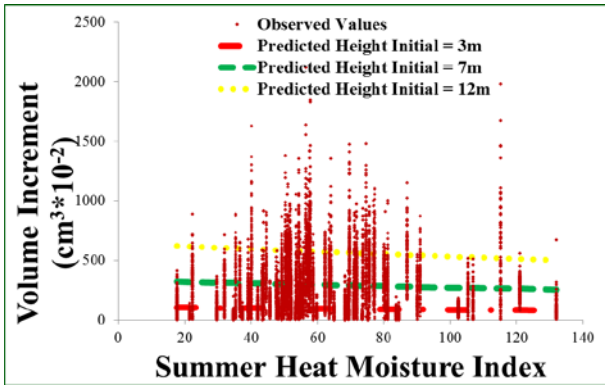
Alder Competition vs. Facilitation

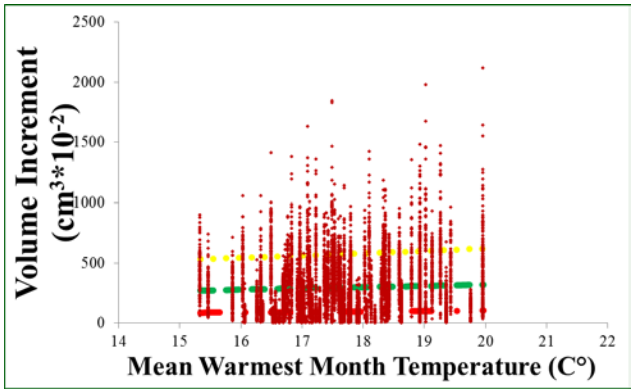
$$VolumeIncrement = b_0 + b_1 * e^{(b_2 * C\lim.Var. + b_3 * C\lim.Var.)} * HeightInitial^{b_4}$$

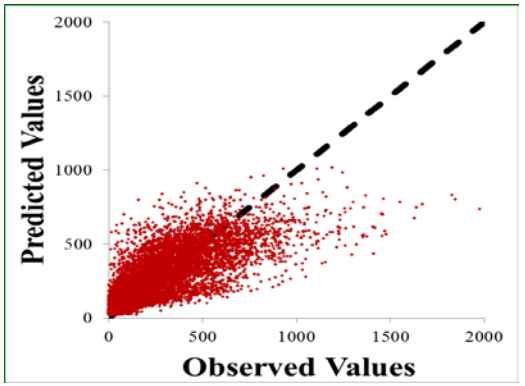




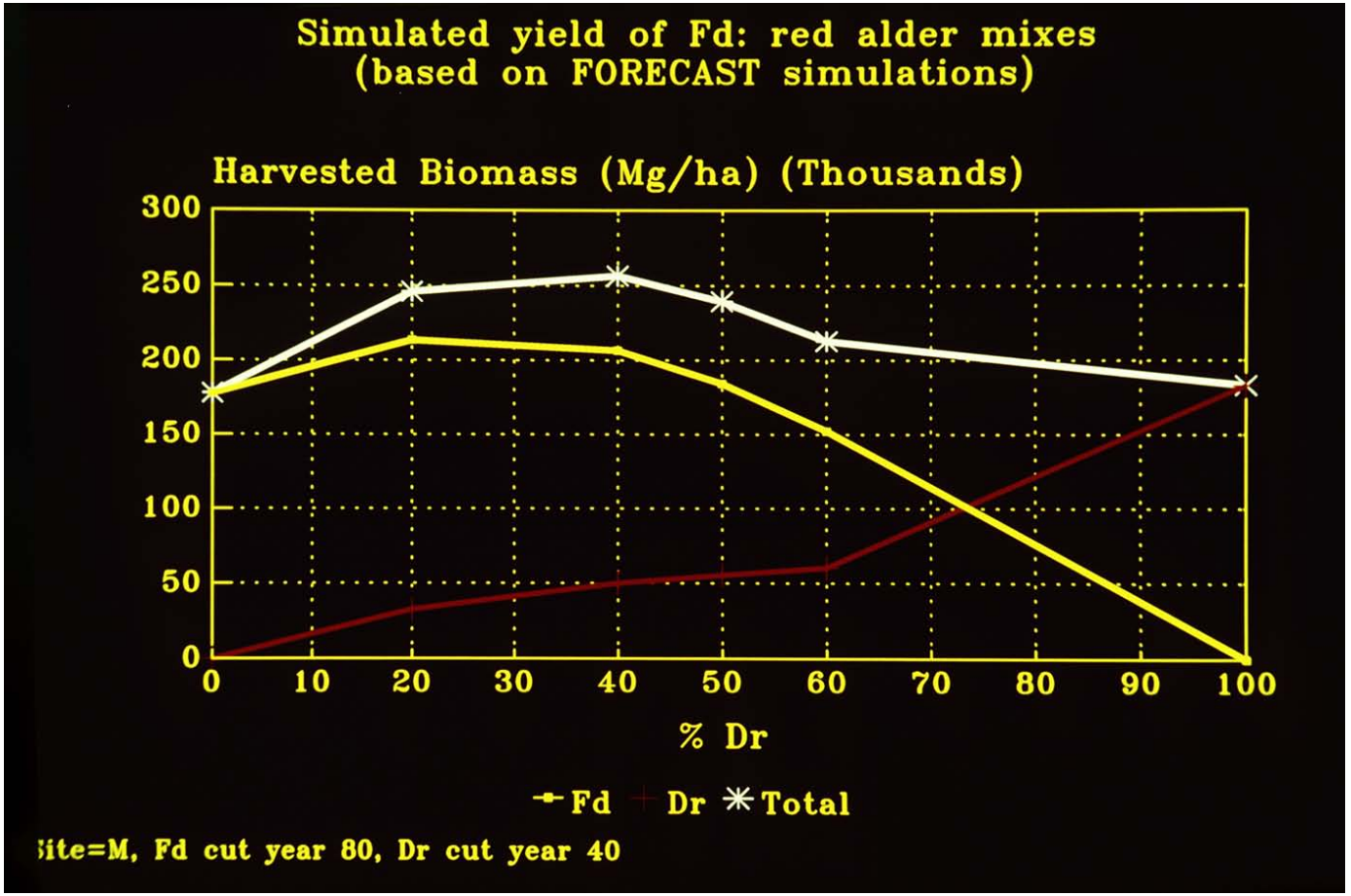








Alder Competition vs. Facilitation



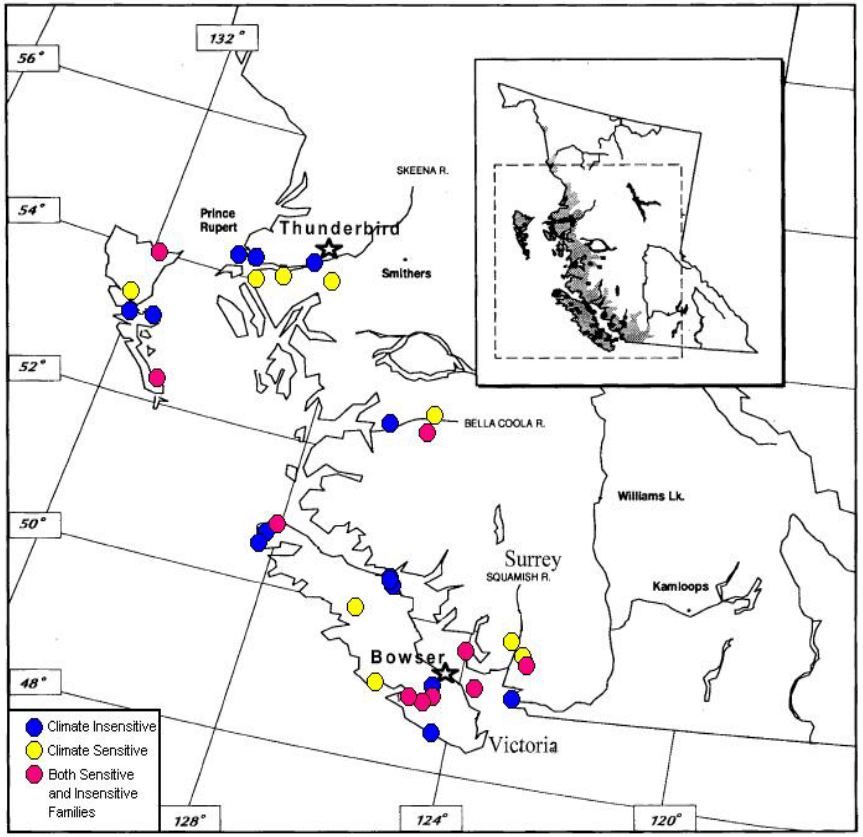
Alder Adaption vs. Acclimation

Principle Investigators:
Dr. Barbara Hawkins, Brendan Porter

What is the range in alder's ability to adapt vs. acclimate to changes in climate?

Outcome - Recommendations for family selection for red alder tree improvement and planting programs that will be acceptable over the next 40 to 60 year period.

Alder Adaptation vs. Acclimation



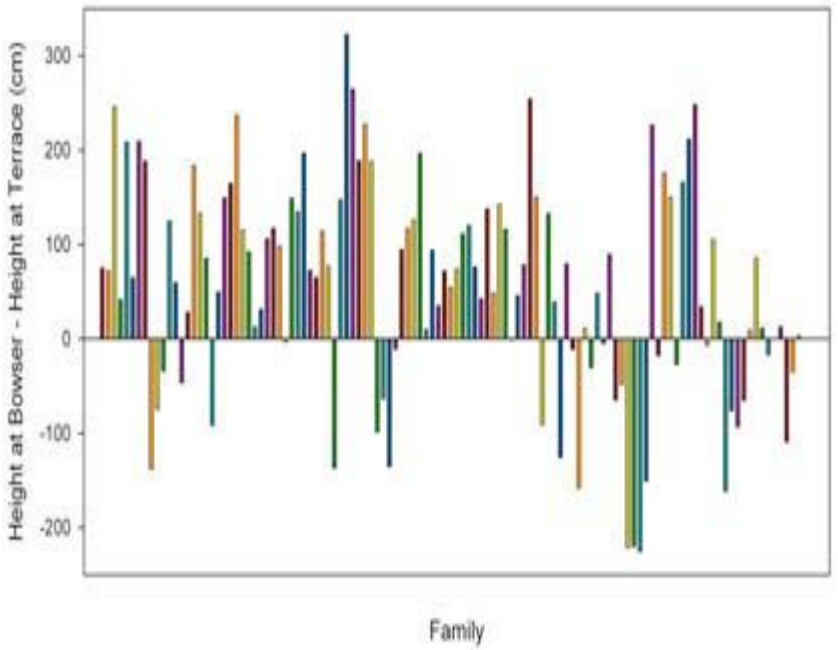
Alder provenance-progeny trials in B.C.

Using 2 sites:
Bowser (warmer, drier)
Terrace (colder, wetter)

130 families per site

Alder Adaptation vs. Acclimation

25 climate-sensitive and 25 insensitive families will be selected



Measurements

- Water use efficiency
- Cold hardiness
- Rates of N fixation
- Timing of bud flush and leaf senescence

Alder TEK and FN Opportunities

Principle Investigators:
Dr. Ron Trosper, Dan Nadir

What traditional knowledge can First Nations elders provide about the management and use of alder now and in the ancient past through oral histories?

Outcome - TEK and opportunities for future First Nation cooperative management of red alder

Alder TEK and FN Opportunities

Alder TEK and FN Opportunities

1. Community workshop
2. Semi-structured interviews between researchers, botanist and Elders regarding current and historical biological growth and cultural use characteristics
3. Discussions with FN natural resource departments regarding future cooperative management and current value to the community

Alder Business Case/Supply Chain

Principle Investigators:
Dr. Robert Kozak, Dan Nadir

What steps need to be taken to develop an integrated hardwood forest sector value chain industry on the coast?

Outcome - A business case to develop a viable supply chain for red alder with recommendations and socioeconomic implications of various scenarios for forest-based communities

Alder Business Case/Supply Chain

1. Fibre analysis – inventory, milling capacity, log sizes and quality
2. Regional focus groups and semi-structured interviews – current product uses, value to timber producers, constraints and challenges
3. Detailed business case analysis using different economic scenarios
4. Recommendations to develop a viable supply chain for red alder

Overall Synthesis

Principle Investigators:

Dr. Louise de Montigny, Dr. Craig Farnden,

Dr. Bruce Larson and the entire team

What do the decision-makers need to make informed decisions about whether alder can used as a climate change adaptation strategy to reduce environmental, social and economic risks of climate change in coastal B.C.?

Outcome – science-based guidance

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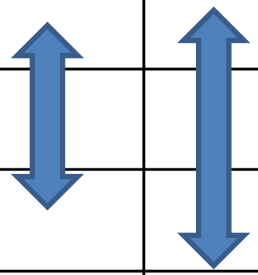
Overall Synthesis

Predicted changes under varying climate change and alder management scenarios

		Base Case As Is	Scenario A Cimate change with **NO CHANGE** in alder management	Scenario B Climate change with **INCREASED** alder management
Biological	**Expected volume (m3/ha)**			
Ecological Goods and Services	**Forest health, nitrogen, carbon, fire resistance...**			
Social	**Jobs Communities Mills**			
Economic	**Expected value (discounted $/m^3)**			



Overall Synthesis

"Since guidance is not binding, whether or not it really is useful will depend on its intrinsic merit. Guidance can and probably should be ignored if it is not compelling and persuasive."

Roberta Reader, 2006

Special Thanks to the Project Team

- UBC - Dr. Craig Farnden, Dr. Bruce Larson, Dr. Ron Trosper, Dr. Robert Kozak, Dan Nadir
- UVic - Dr. Barbara Hawkins, Brendan Porter
- U Alberta - Dr. Phil Comeau, Dr. Francesco Cortini
- Oregon State University - Dr. David Hibbs
- MFML - Dr. Louise de Montigny, George Harper
- MNRO - Dr. Rod Negrave

Questions?
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