



Climate Change Adaptation Research

Project updates 2020

- Sx genecology/CC field trial
- Assisted Migration Adaptation Trial (AMAT)
- Climate Based Seed Transfer (CBST)
- Multiple seedlot study
- Extreme event frequency study
- Drought study (**new!**)
- Future plantation orphans (**new!**)
- Species transferability (**new!**)
- Remote sensing in genetics field trials (**new!**)

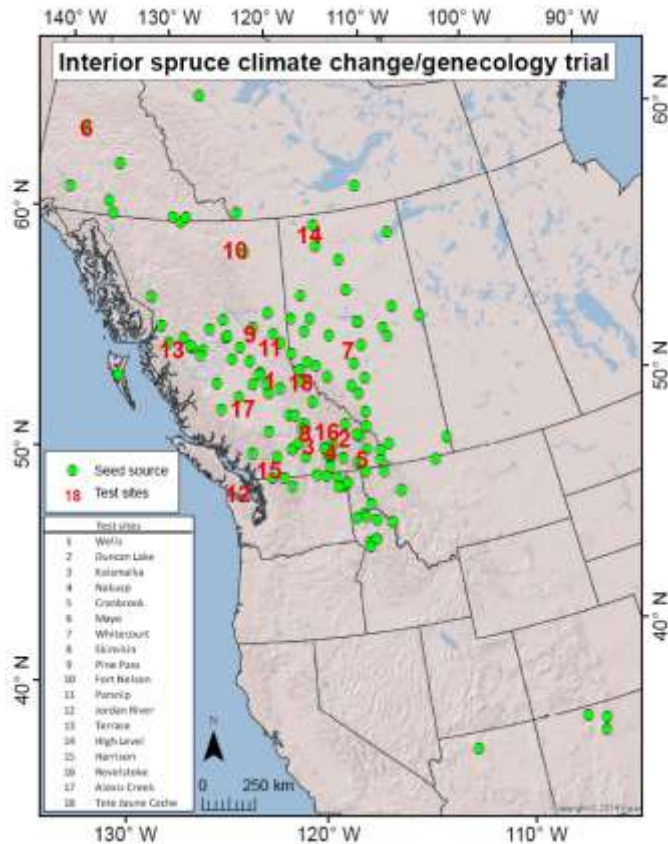




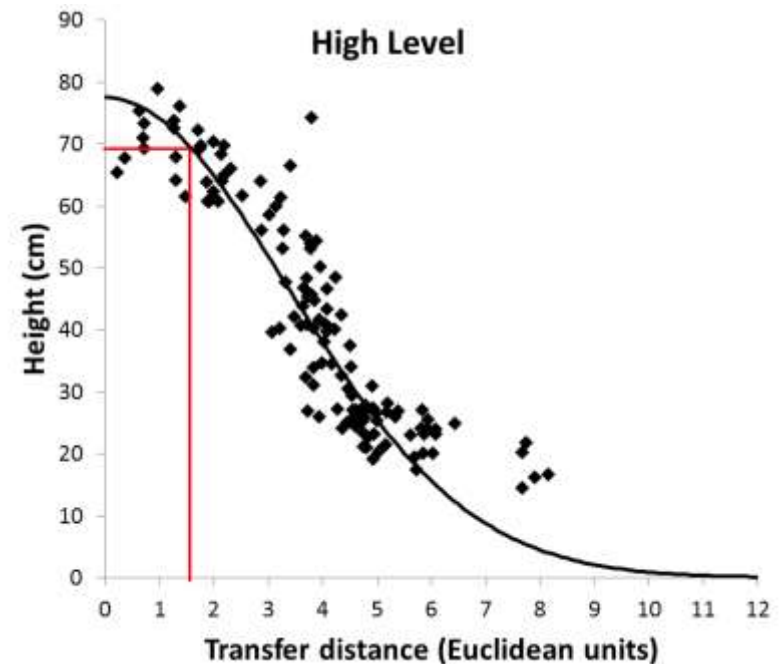
Climate Change Adaptation Research

Project updates 2020

Sx genecology/CC field trial



Seedlot transferability → CBST



- Established 2005
- 128 pops at 17 test sites



Sx genecology/CC field trial

Forest Ecology and Management 338 (2018) 122–130

Contents lists available at ScienceDirect

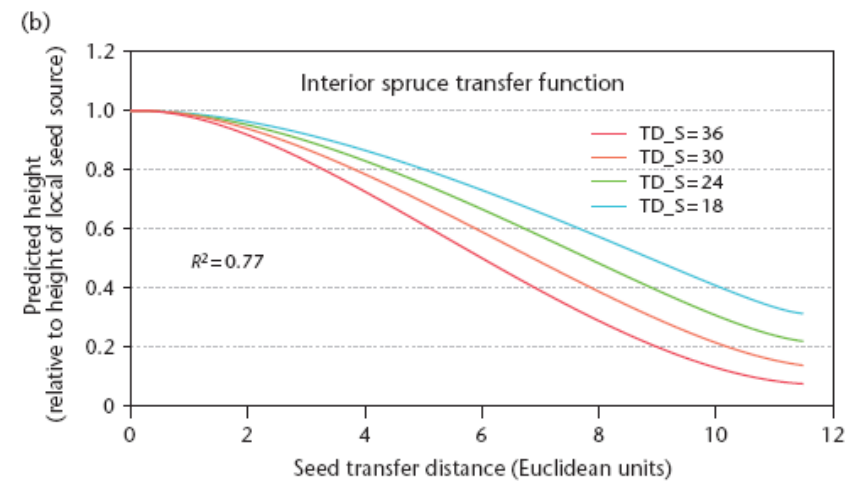
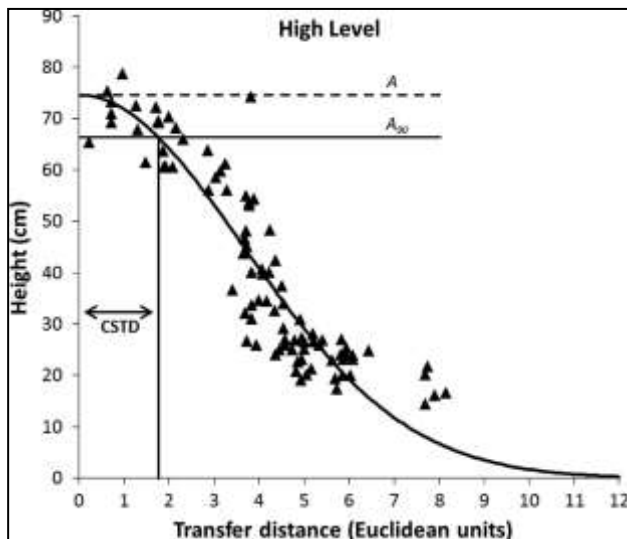
Forest Ecology and Management

journal homepage: www.elsevier.com/locate/foreco

Quantifying safe seed transfer distance and impacts of tree breeding on adaptation

Gregory A. O'Neill^{a,*}, Michael Stoehr^b, Barry Jaquish^a

^aBC Ministry of Forests, Land and Natural Resource Operations, Kelowna Forestry Centre, 3401 Riverside Road, Vernon, BC V1B 2C7, Canada
^bBC Ministry of Forests, Land and Natural Resource Operations, PO Box 9525, Stn. Prov. Govt., Victoria, BC V8W 9C3, Canada

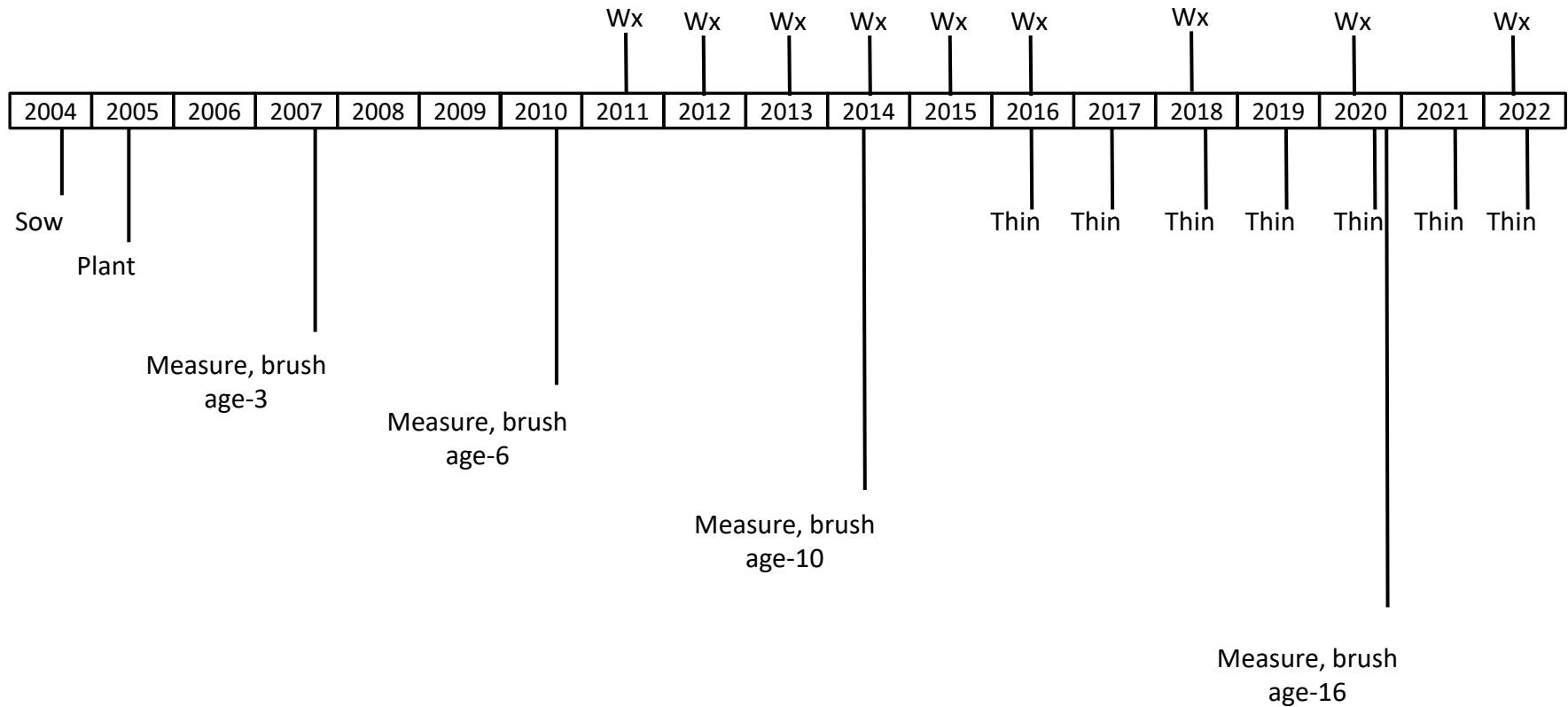




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Project updates 2020

Sx genecology/CC field trial



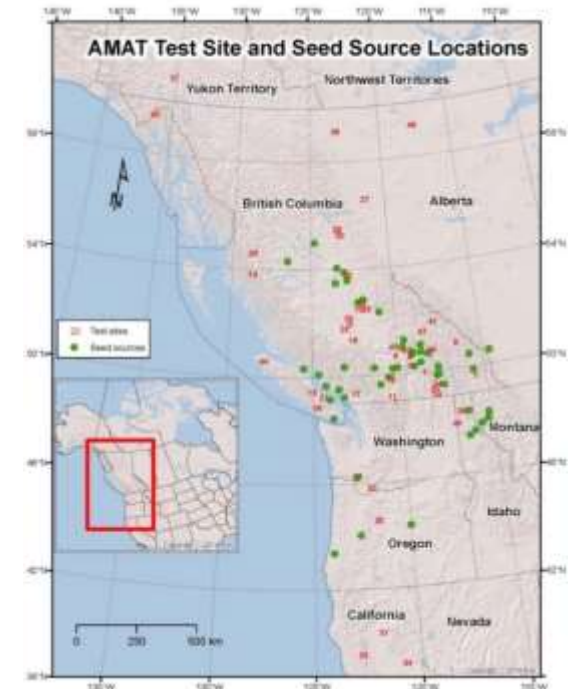


Assisted Migration Adaptation Trial (AMAT)

- Established 2009-12
- 48 test sites
- 15 species, 48 seedlots (mostly Class A)



Photo: Ward Strong



Map: Amy Vallarino

Seedlot transferability → CBST



Climate Based Seed Transfer (CBST)



Current seed transfer zones
(geography)



CBST
(climate)

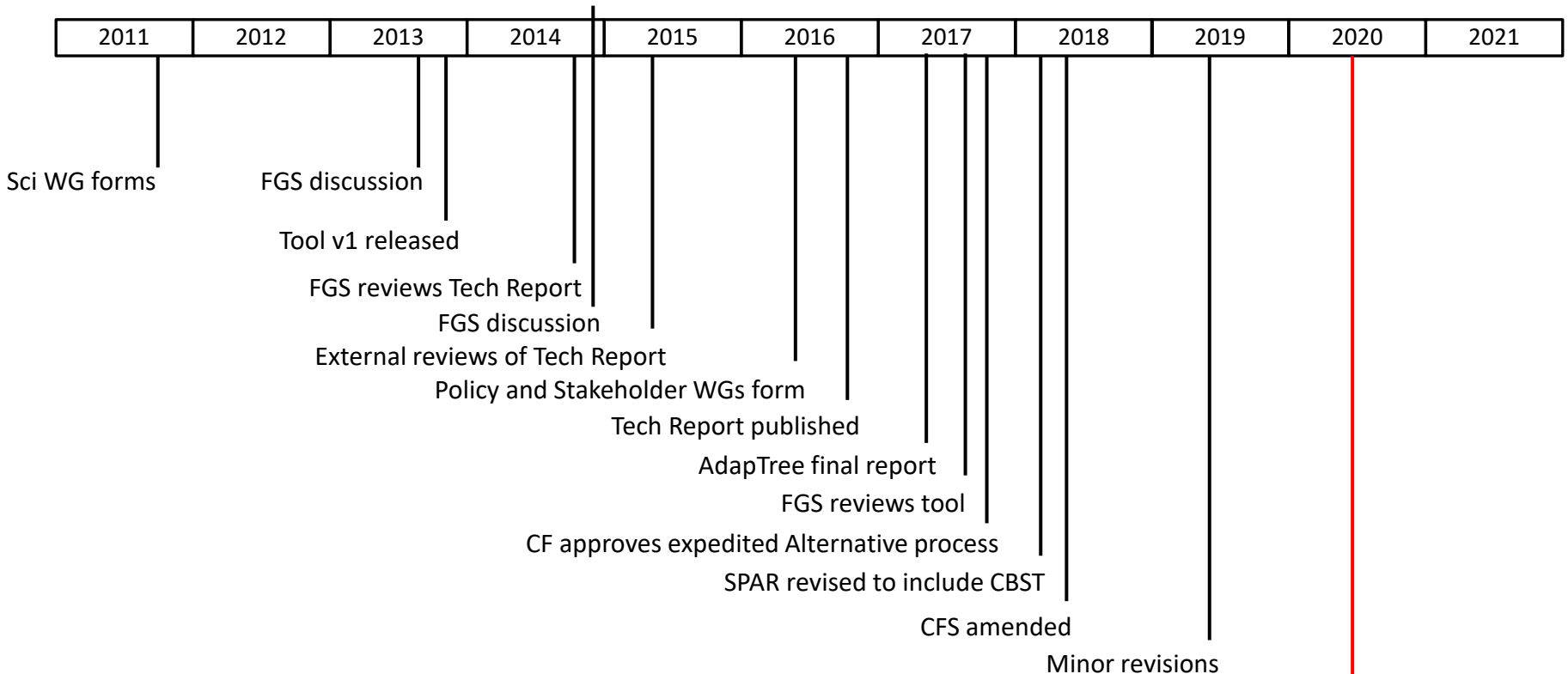
- Better matching of seedlots with plantations
- Facilitates accurate assisted migration
- Maximizes deployment area



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Project updates 2020

Climate Based Seed Transfer (CBST)



- Minor revisions
- BEC11
 - ClimateBC 6.21
 - Variable weighing
 - 2 additional y of AM

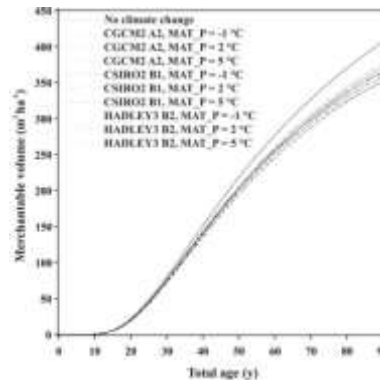


Multiple Seedlot – Genetic Diversification Study

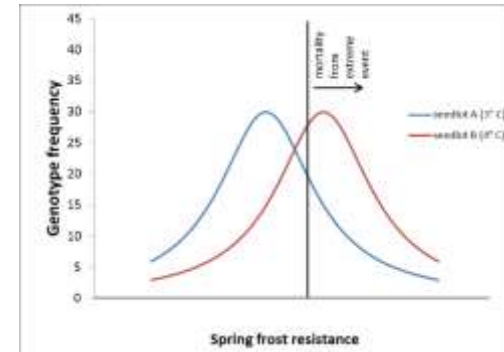


Image: Dave Simpson

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Objectives

- Examine opportunities for using multiple, differently-adapted seedlots as a bet-hedging strategy to buffer extreme climate events
- Develop a climate-sensitive TASS program

Funding 2018/19, 2019/20

- Forest Enhancement Society (\$76,000)
- FAIB (\$25,000)

Funding 2020/21, 2021/22, 2022/23

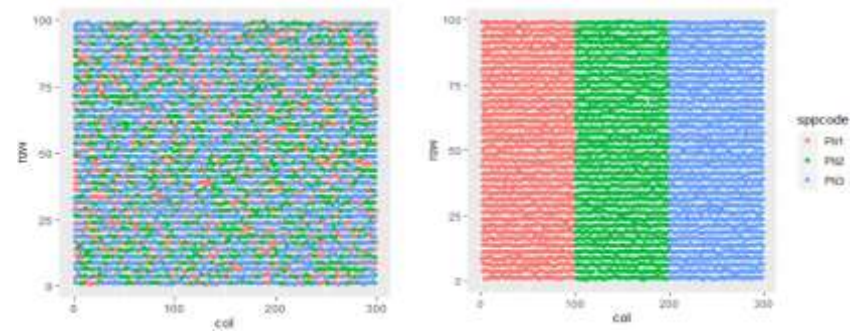
- OCF Research Program (Timber Production) (\$153,000)

Team

- Tongli Wang, Derek Sattler, Kate Peterson, Greg O'Neill

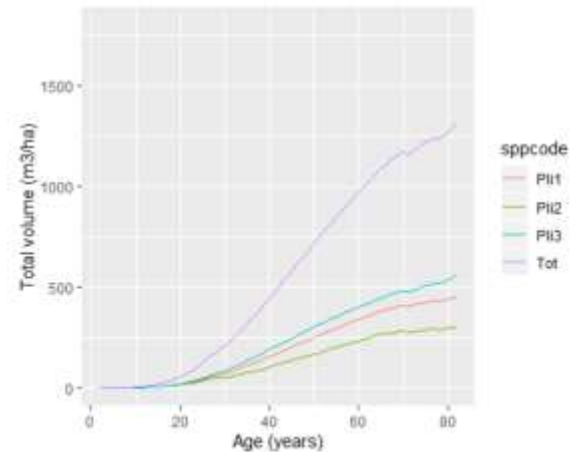


Multiple Seedlot – Genetic Diversification Study



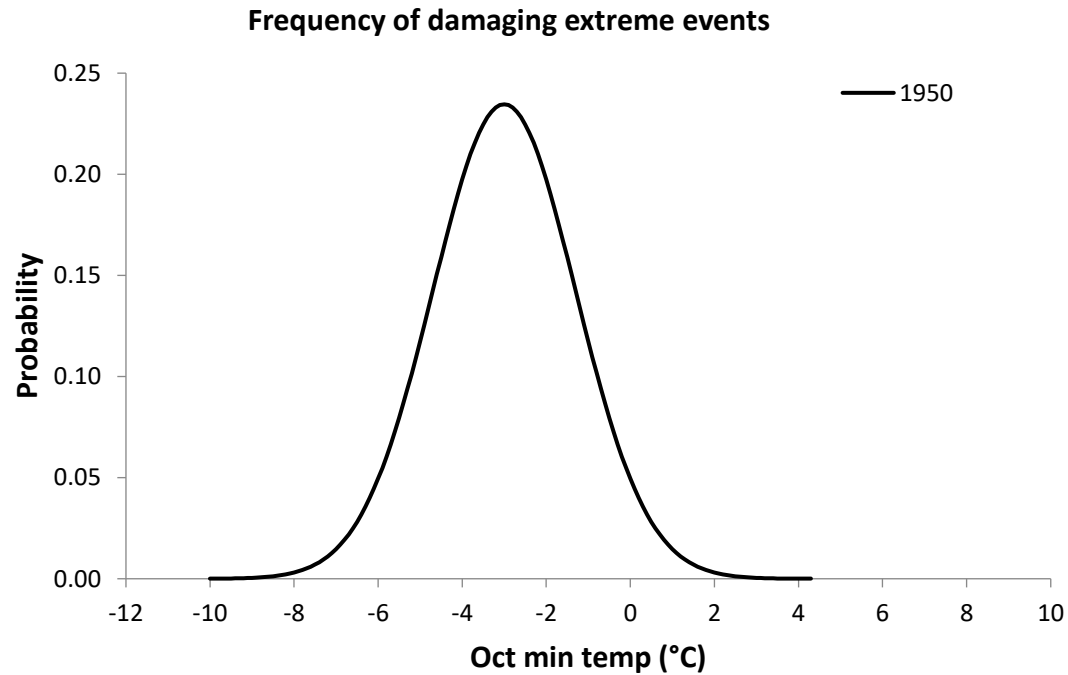
Simulation 2:

- TF in use
- Block pattern
- MCMT - Seedlot 1: -6.6 (local)
- MCMT - Seedlot 2: -5.1
- MCMT - Seedlot 3: -8.1



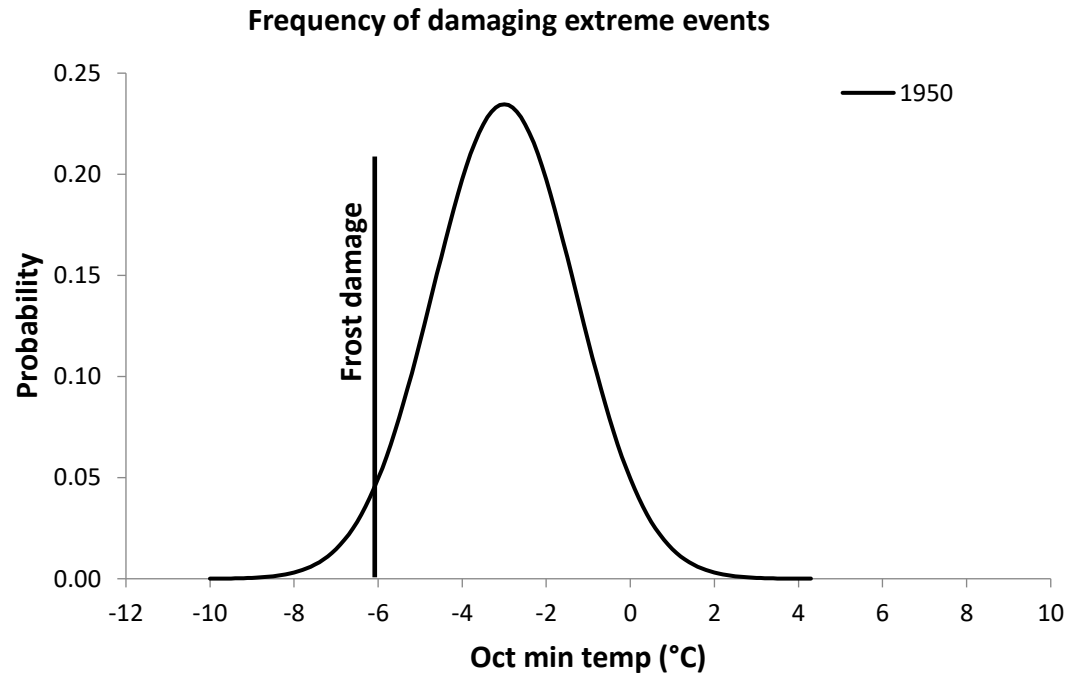


Extreme event study



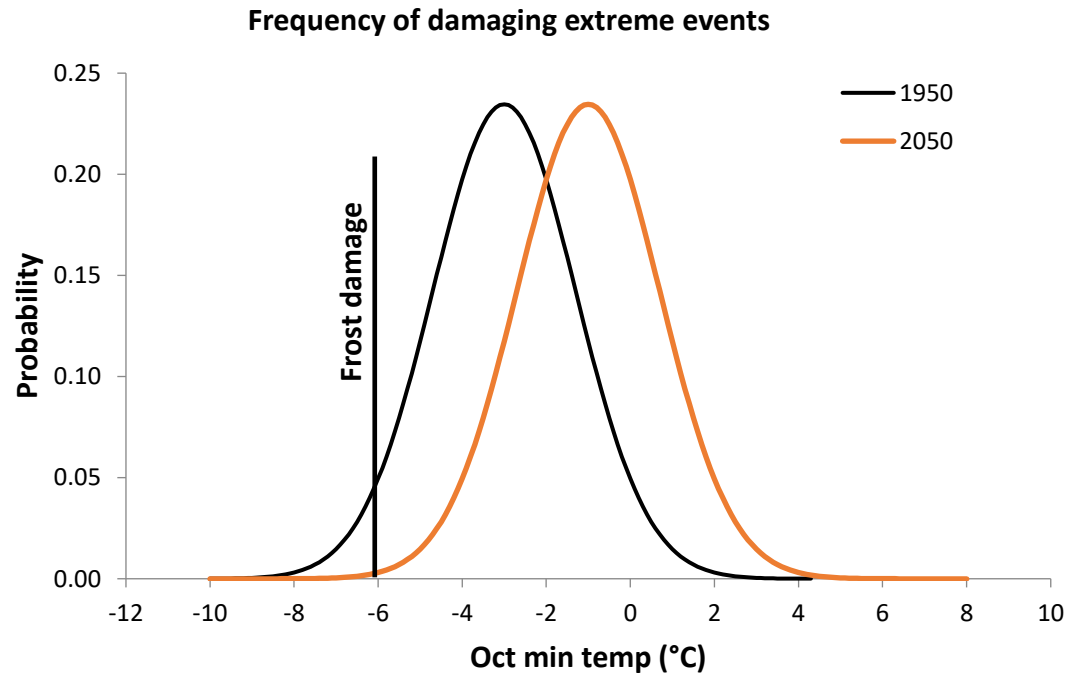


Extreme event study



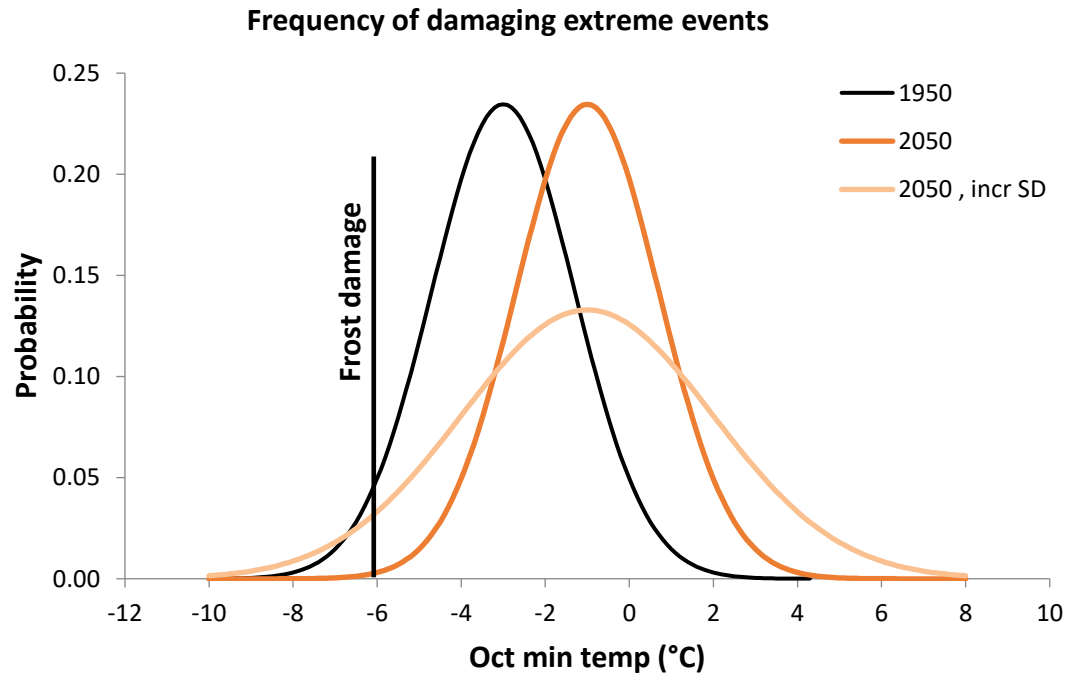


Extreme event study





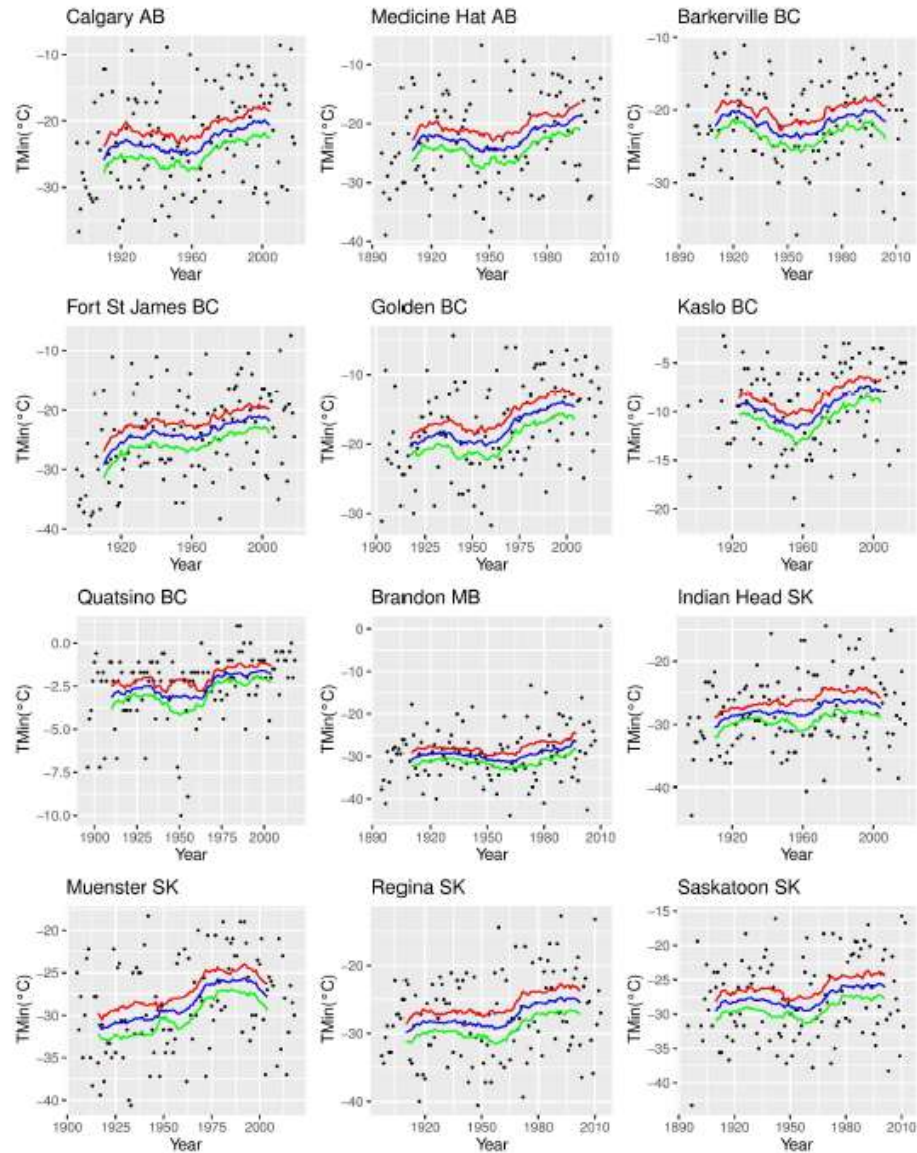
Extreme event study



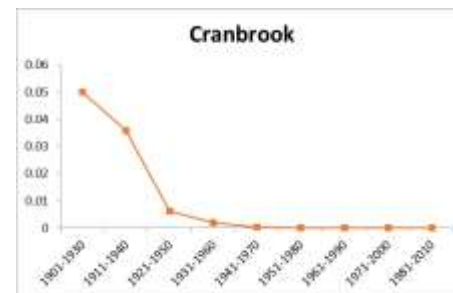
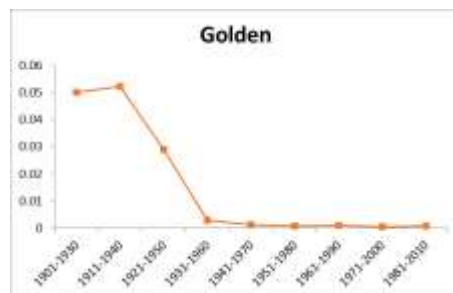
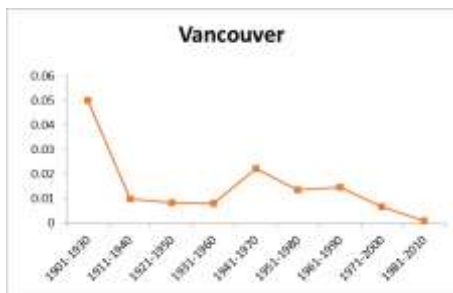
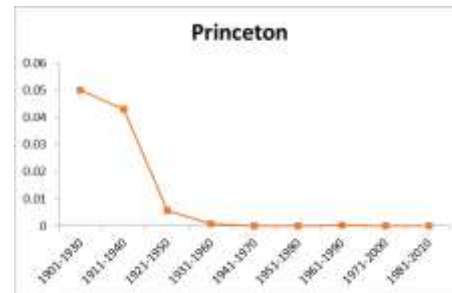
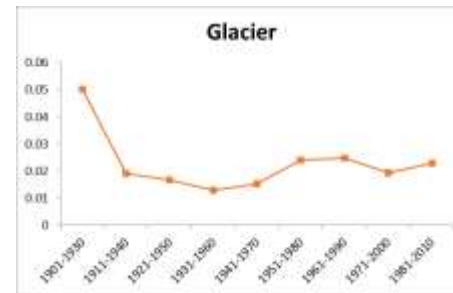
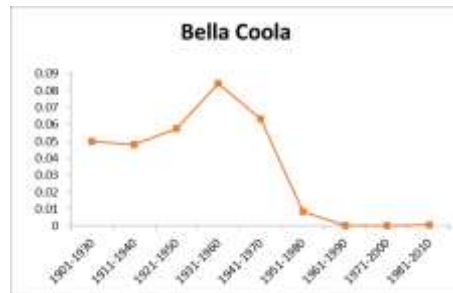
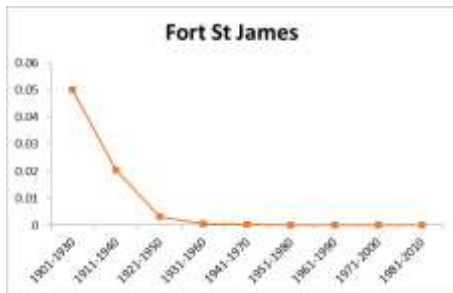


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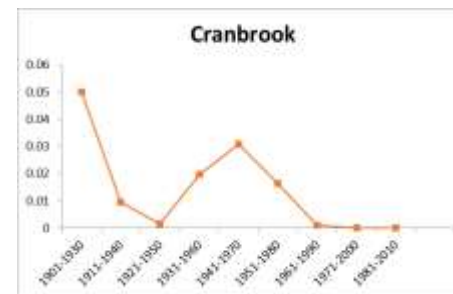
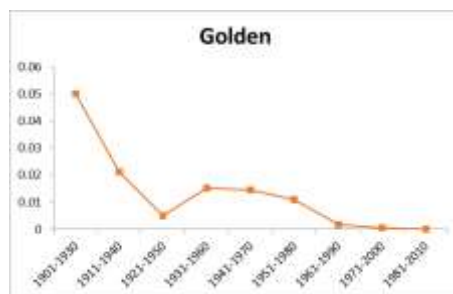
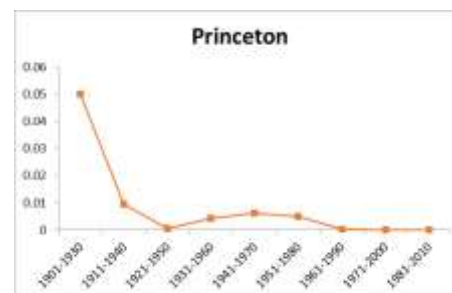
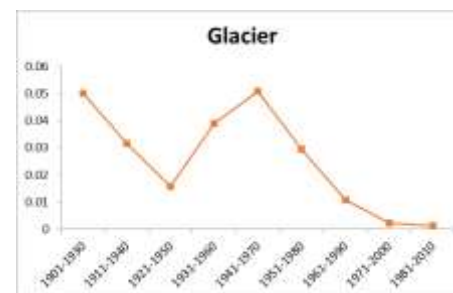
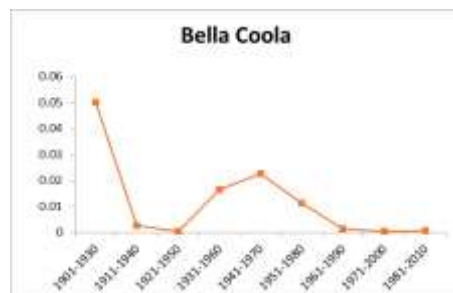
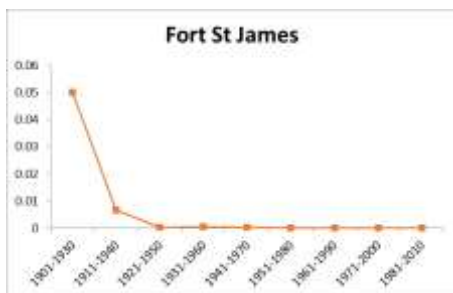
Project updates 2020



March min temp – probability of exceeding an extreme event temp



Oct min temp – probability of exceeding an extreme event temp





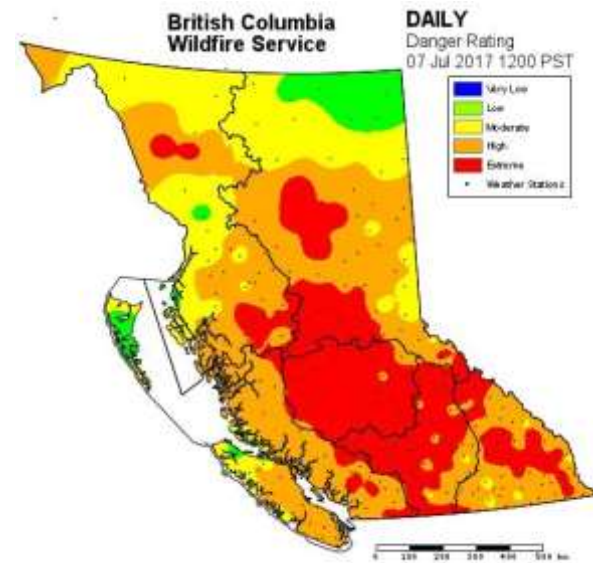
Climate Change Adaptation Research

Project updates 2020

Paired-tree drought study



Photo: Andy Slizak





Climate Change Adaptation Research

Project updates 2020

Paired-tree drought study

Objective

Identify ring, crown traits and tree size traits related to drought tolerance

Materials

- 46 pairs of PI trees – one live, other recently drought-killed
- 4 natural stands > 30 y-old in Okanagan Valley

Methods

- Calculate drought tolerance indices using ring widths pre- and post-2003 drought.
- Do the indices from 2003 drought predict survival in 2017 and 2018 droughts?
- Do crown or size traits differ between live and dead trees?

Funding

- LBIS - \$3400 (dendro analyses)

Team

Hardy Griesbauer, Rachel Reed, Greg O'Neill



Climate Change Adaptation Research

Project updates 2020

Paired tree drought study





Climate Change Adaptation Research

Project updates 2020

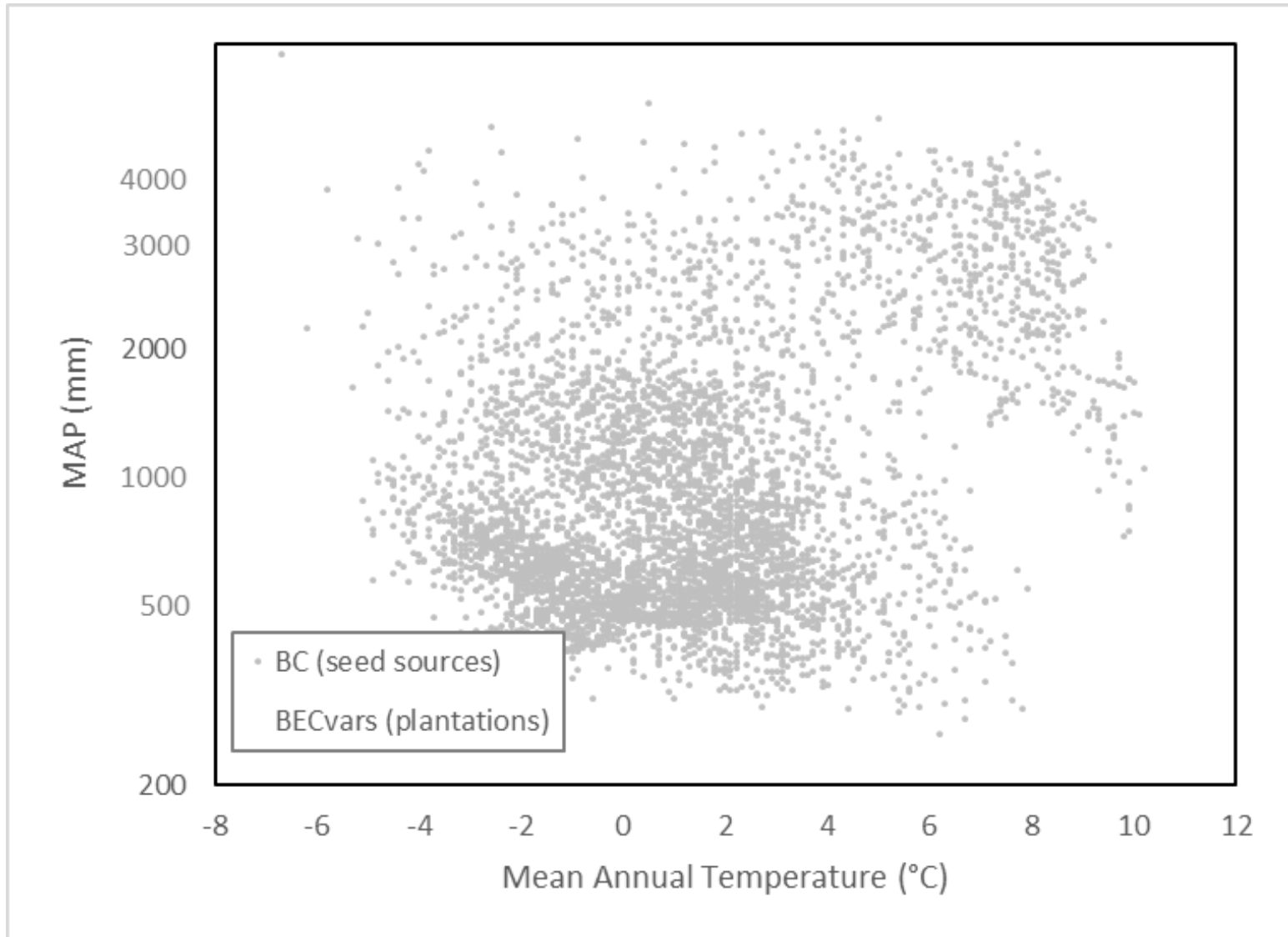
Future plantation orphans

- For which BECvars will we find no eligible BECvar seed sources in the future?
- Where in the USA might we find seed sources or parent trees adapted to these orphaned plantation BECvars today?



Climate Change Adaptation Research

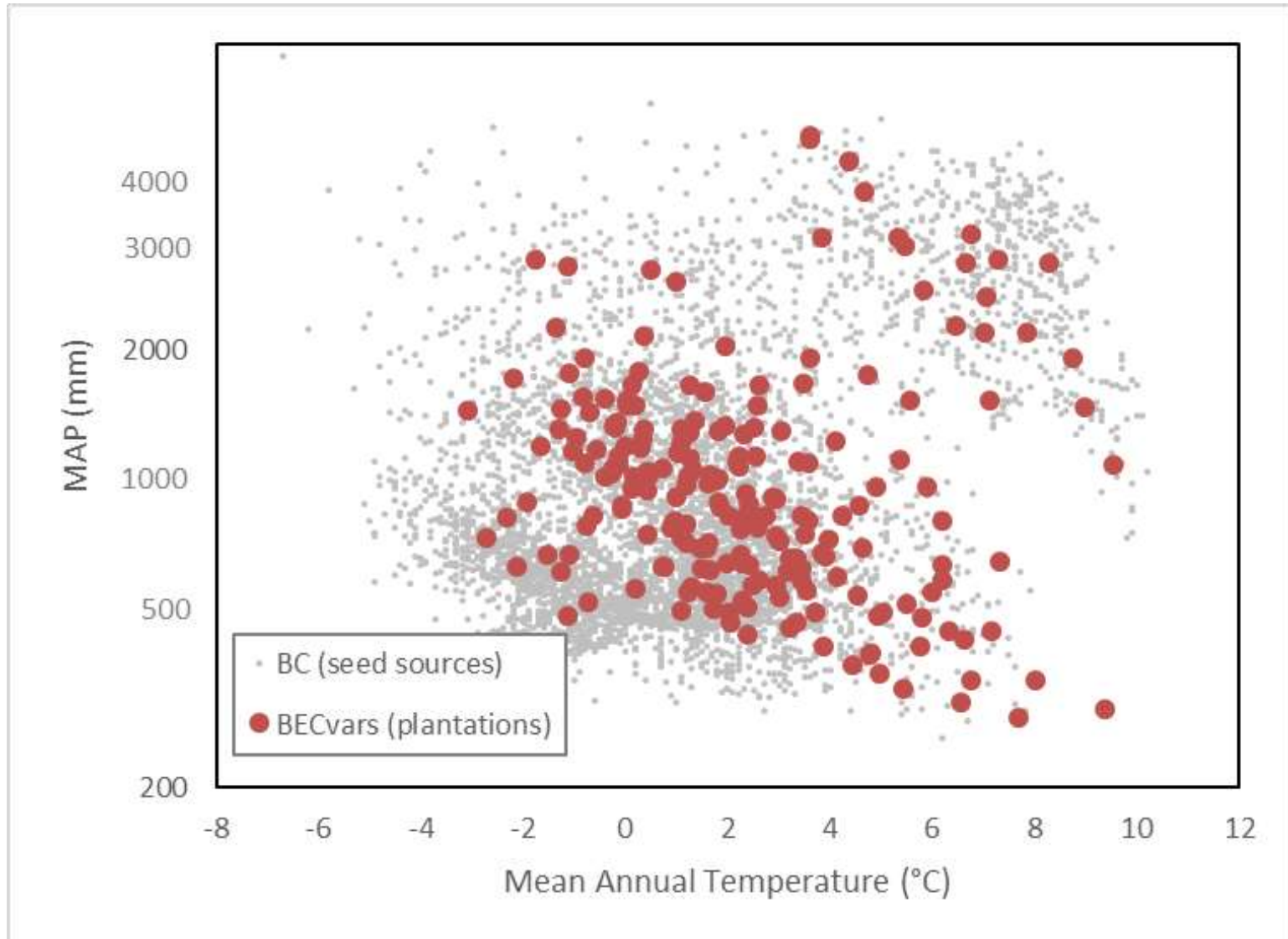
Project updates 2020





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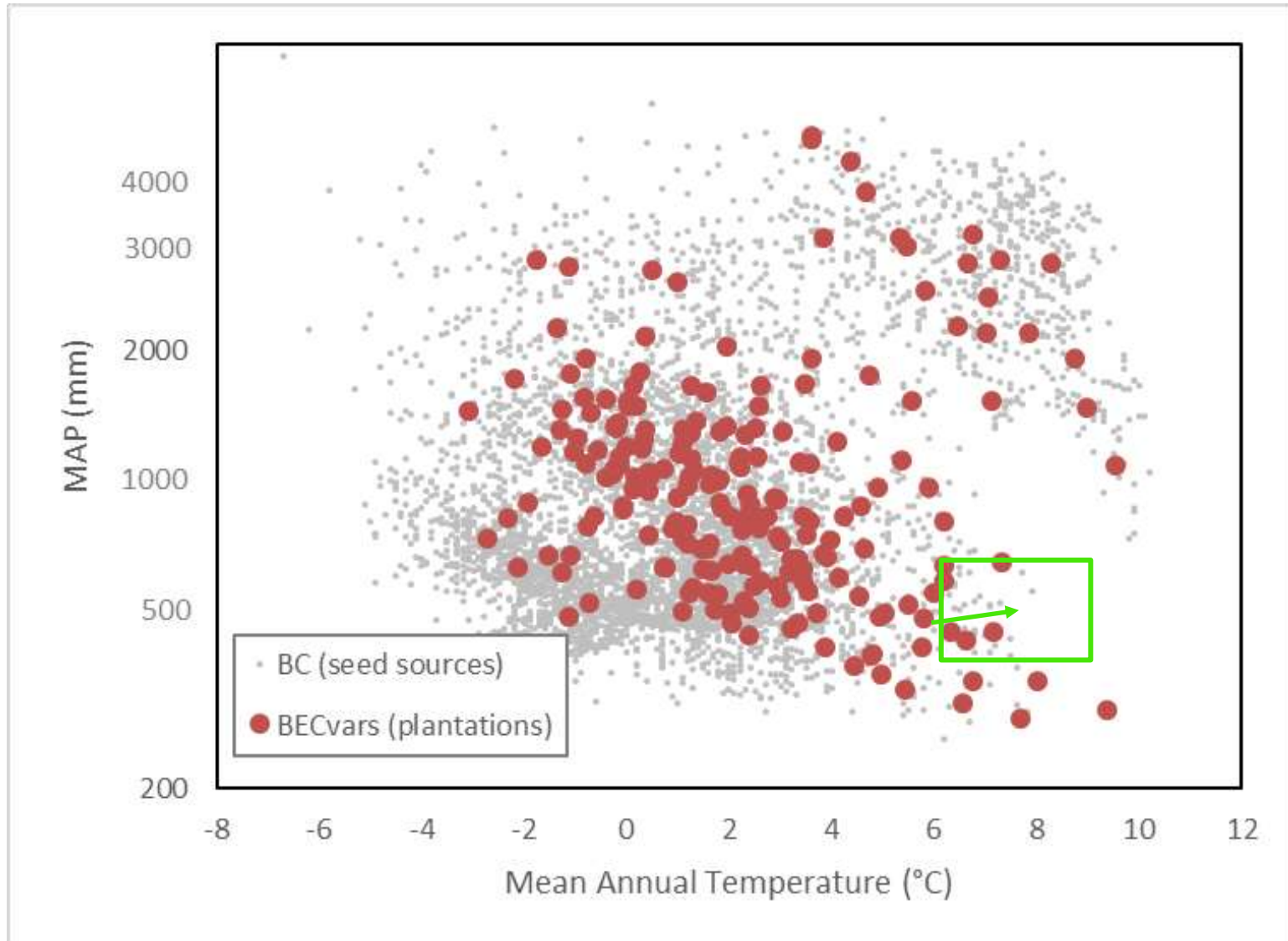
Project updates 2020





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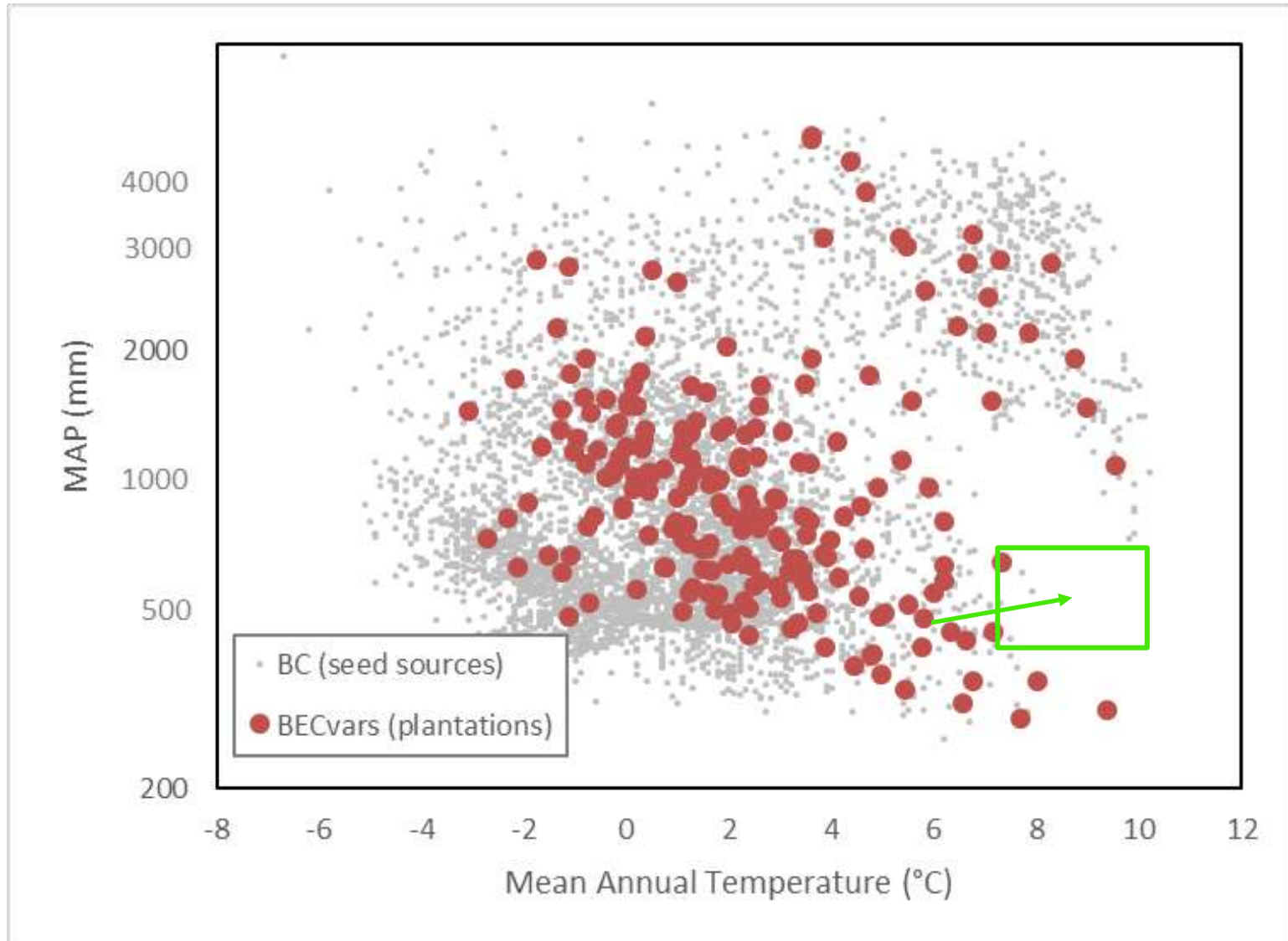
Project updates 2020





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Project updates 2020

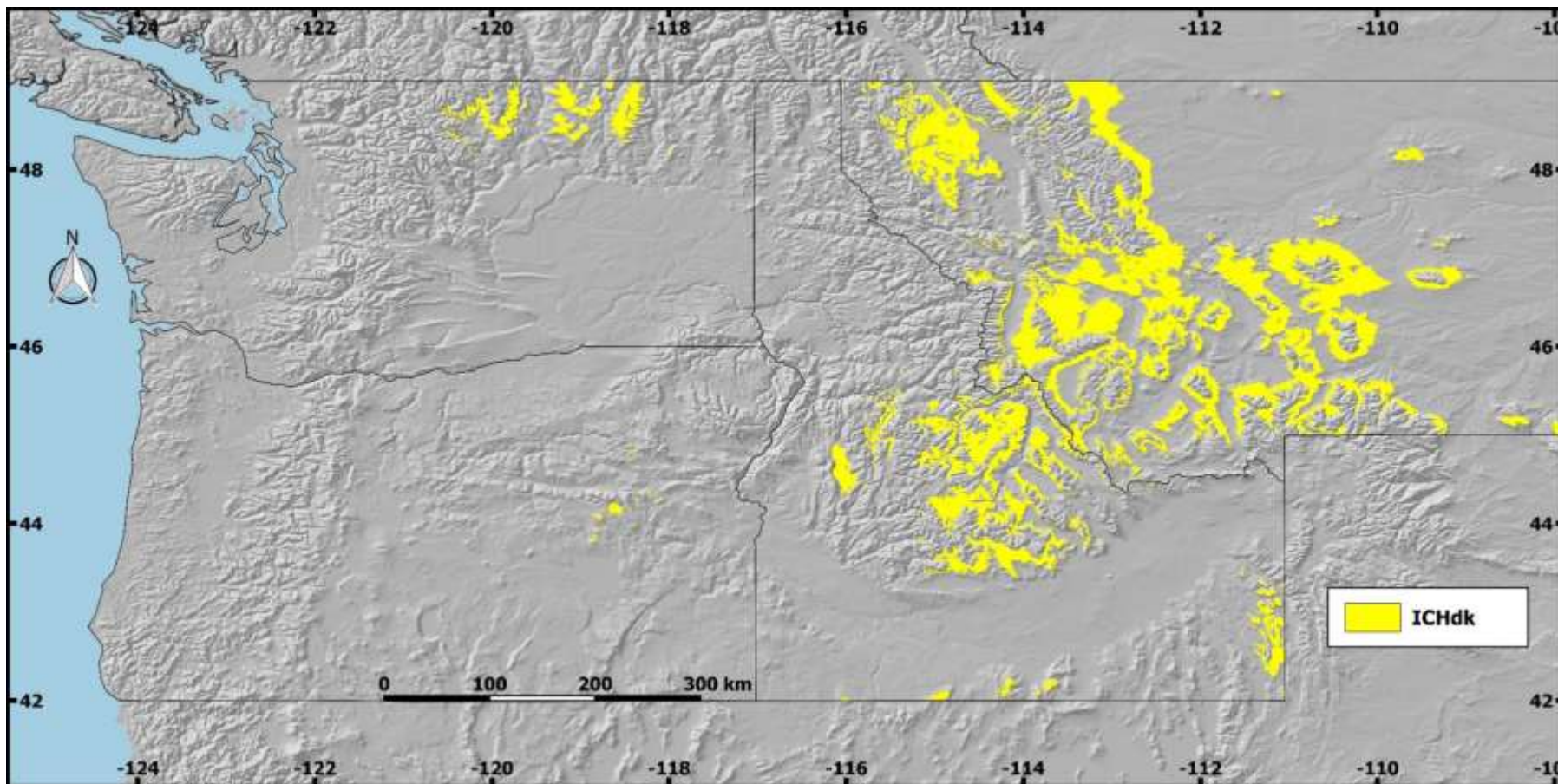




Climate Change Adaptation Research

Project updates 2020

Future plantation orphans





Species transferability

Question

- To what extent do species differ in their safe seed transfer distance?

Methods

- PI, Sx, Fdi, Bc, and Hw prov data
- Build transfer function
- Quantify safe seed transfer distance

Funding

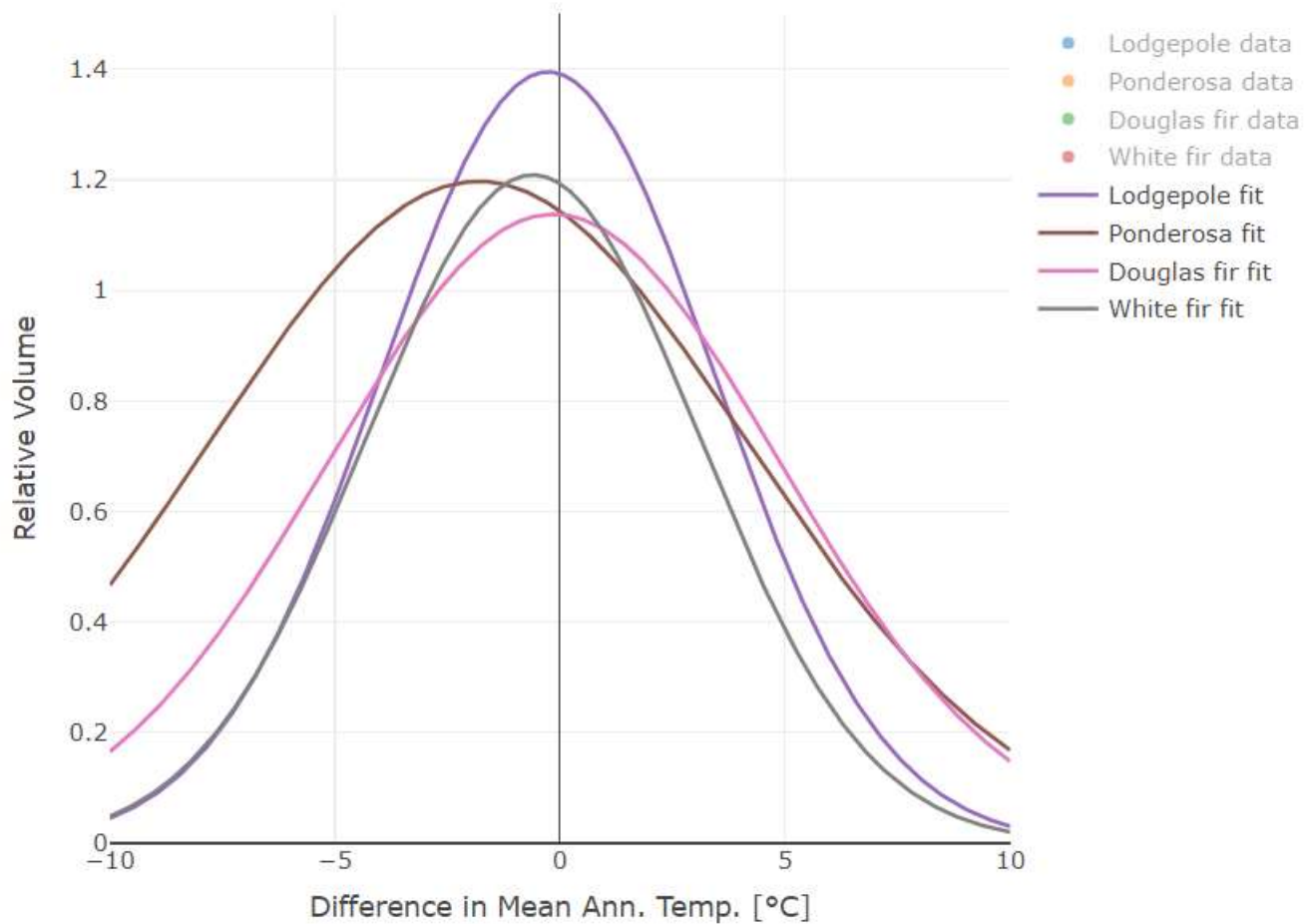
- UC Davis

Team

- Joseph Stewart (UC Davis), Jessica Wright (USDA FS), Greg O'Neill



Species transferability





Remote sensing in genetic field trials

Question

- Can remote sensing (multi-spectral imaging) be used to assess genetic field trials?
- Which traits can (or cannot) be accurately assessed with remote sensing?

Methods

- Compare drone-based multi-spectral imaging with ground-based assessments
- Sample several genetics field trials
- Develop point-cloud assessment techniques

Funding

- LBIS \$33,000 (2019)
- NSERC \$66,000 (2020, 2021, 2022)

Team

- Sam Grubinger (PhD student, UBC), Nicholas Coops (UBC), Greg O'Neill

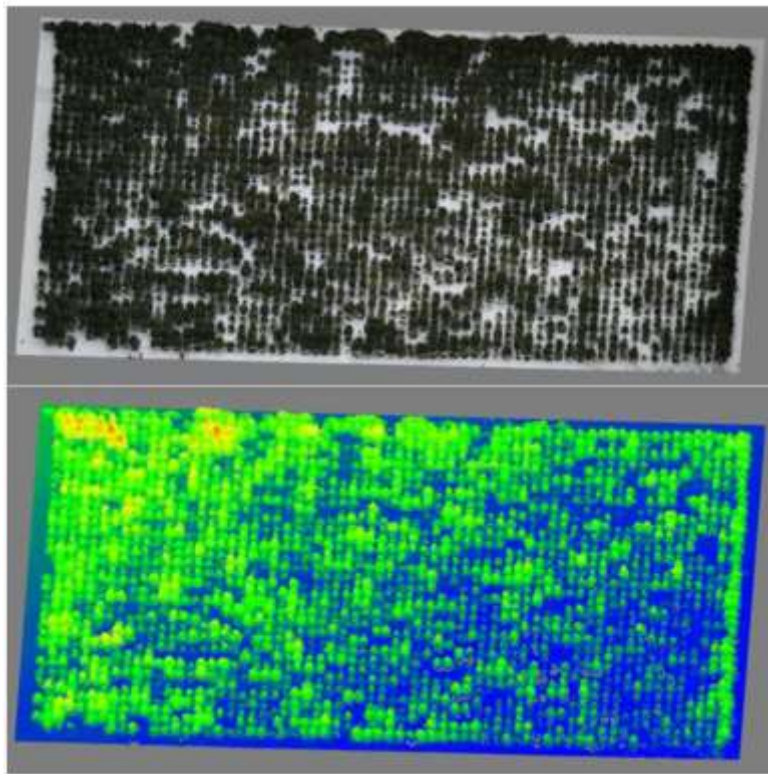
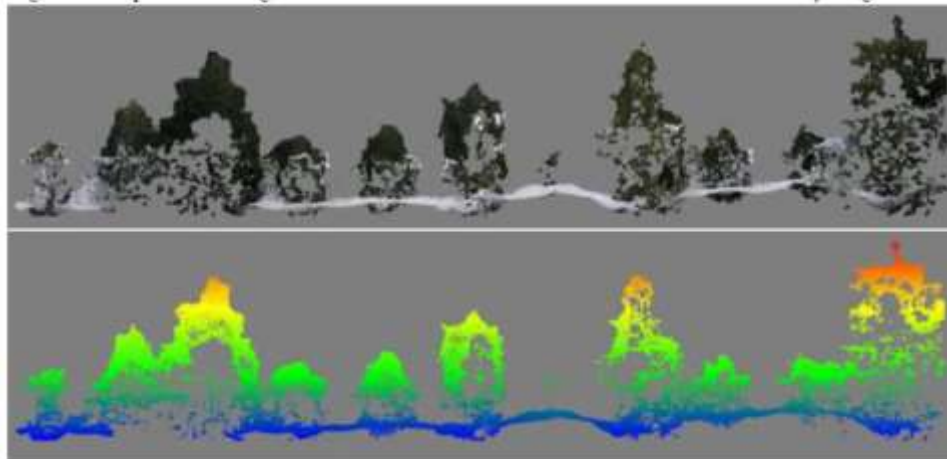


Fig. 6: DAP point clouds generated at the Skimikin site in true color and colored by height.





Climate Change Adaptation Research

Project updates 2020

Extension

2019/20 Presentations, tours, meetings		
Date	Audience	Format
April	Multiple seedlot project - Victoria	meeting
April	UBC For Gen grad students - Kal	tour
May	OCF Admin Staff - Kal	tour
May	Fulton High School - Kal	tour
May	Vernon Community School - Kal	tour
June	UBC For. Management (Eskelson & Barbieto) - Kal	tour
June	Western Forest Genetics Association - Placerville CA	presentation
June	CSC - Parksville	tour (by M. Stoehr)
July	Okanagan -Shuswap District office staff - Kal	tour
July	Mercer International - PeaceRiver AB	webinar
July	NSC - Mackenzie	tour (by B. Laing and K. Wang)
Aug	5-needle pine mtg - Spillmacheen AMAT	tour (by W. Strong)
Aug	AMAT - Public Outreach tour by Canfor	tour (by Caitlyn Klaudt)
Sept	Cw species com mtg - Sannich WFP	presentation
Oct	CCISS/CBST overlap - online	webinar
Oct	Forest Genetics Section - Victoria	meeting
Oct	Norwegian foresters - Kal	tour
Oct	Kalamalka auxiliary staff - Kal	presentation
Oct	Conference Board of Canada - Ottawa	presentation (by J. Fykes)
Oct	Louisiana Pacific - Golden	presentation (by S. King)
Nov	Forest Genetics class - UBC	presentation
Nov	UBCO student (Guy) - Kal	tour
Nov	Mexican grad student (Gomez-Pineda)	tour
Nov	Forest Mangement class - UBCO	presentation
Dec	Science to Policy - PFC Victoria	meeting
Dec	Using CBST in SpaDES - PFC Victoria	meeting
Jan	Anthropocene magazine - Kalamalka	tour
Jan	Alberta Forest Service staff - online	webinar
Feb	Scion Forest Research - New Zealand	presentation
Feb	ITAC - Vernon	presentation
March	Tree Improvement Alberta - online	webinar

Climate Change Adaptation Research	
LBIS request 2020/21	
Item	\$K
AMAT - measurements, brushing, weather station download, materials, travel	103
Sx genecology/CC trial - measurements, brushing, weather station download, materials, travel	30
TOTAL	133

Welcome to  Sovereign
Lake
NORDIC CENTRE

