



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!)
- Sx genecology study (new!)

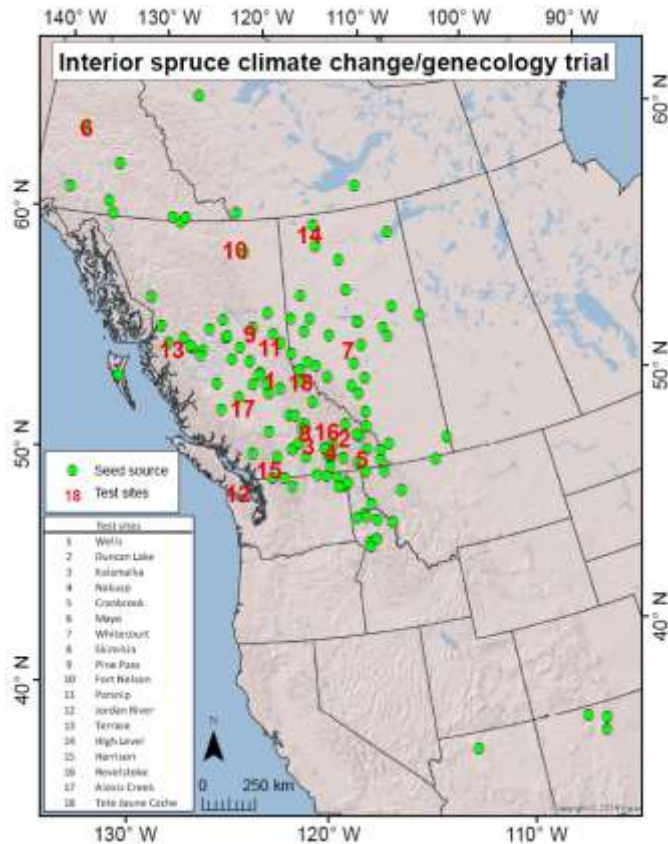




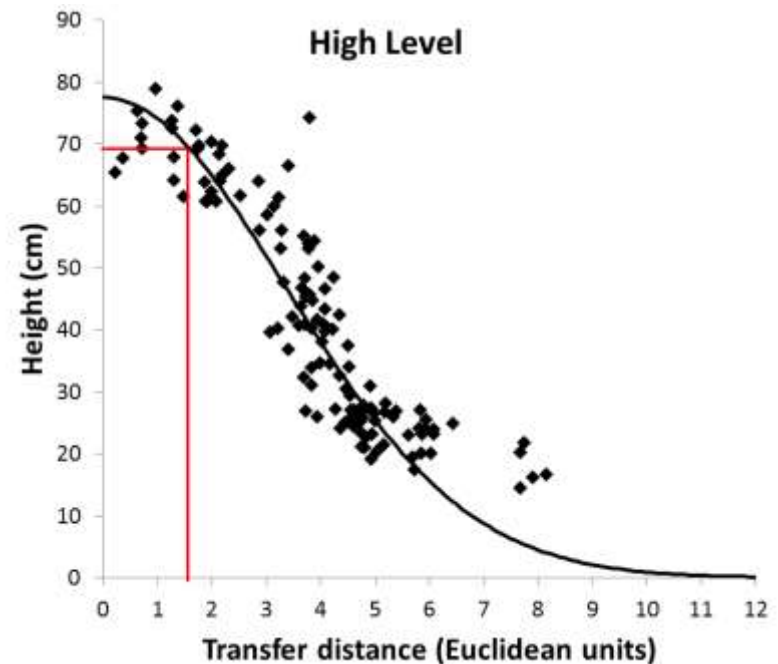
Climate Change Adaptation Research

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

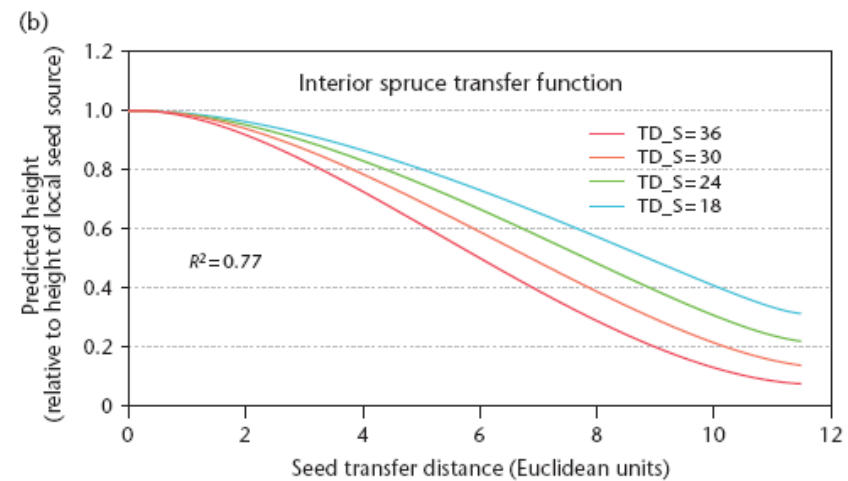
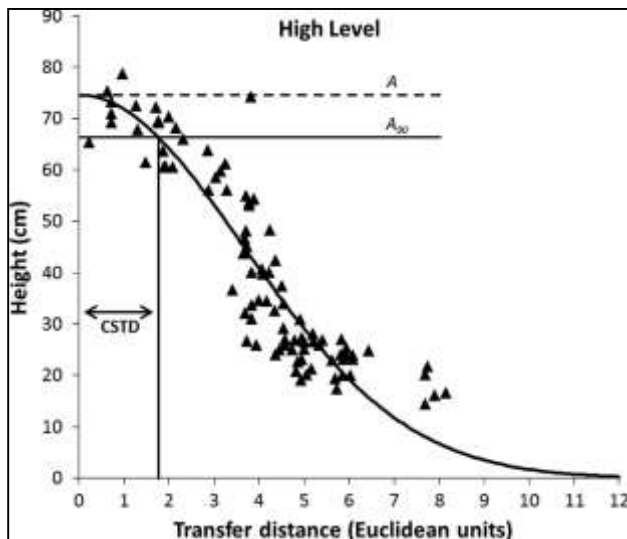
Forest Ecology and Management

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

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

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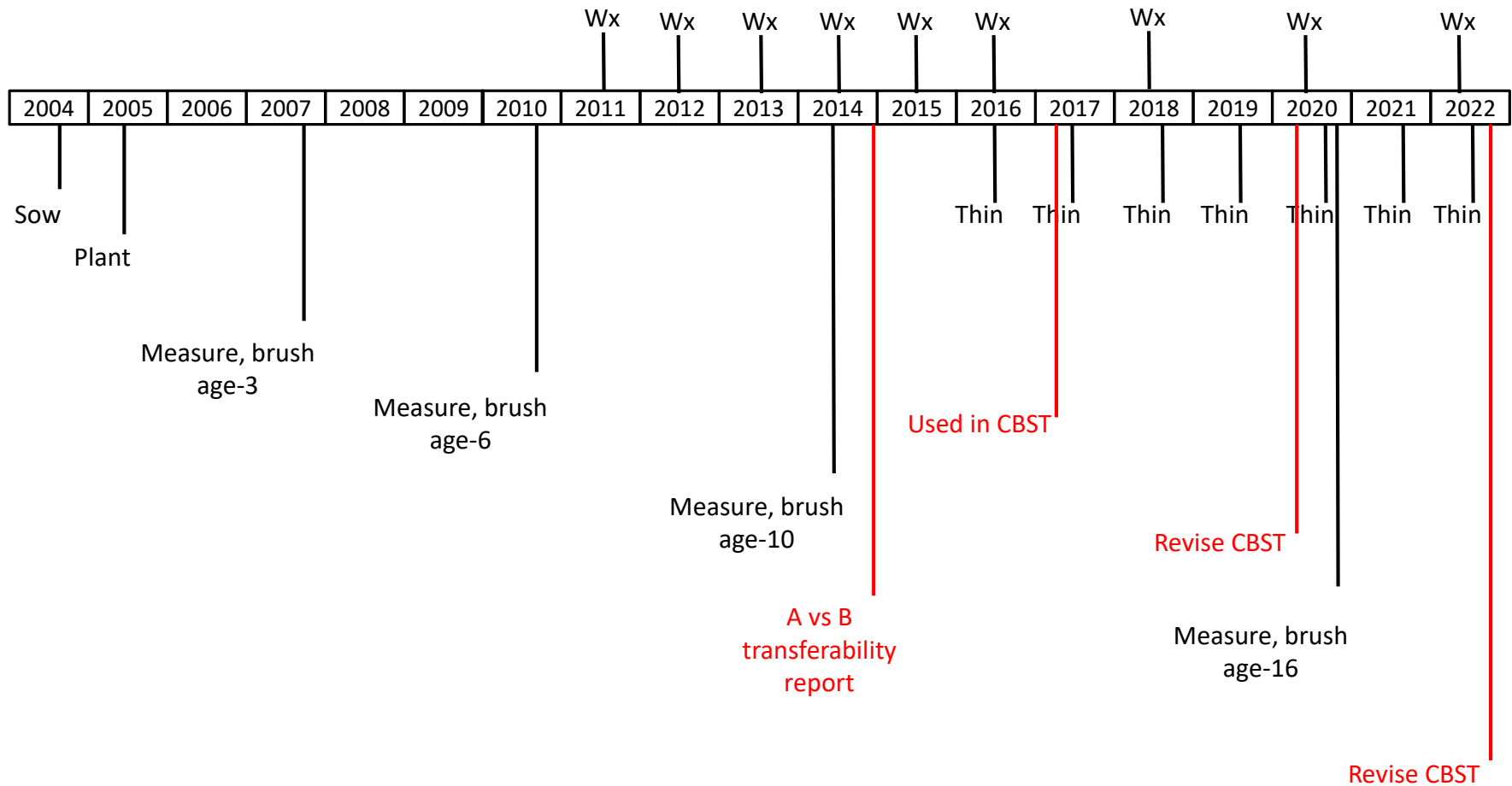




Climate Change Adaptation Research

Project updates 2020

Sx genecology/CC field trial





Climate Change Adaptation Research

Project updates 2020

Sx genecology/CC field trial

Site	2014	2014	2015	2015	2016	2016	2017	2017	2018	2018	2019	2019	2019	2019	2020	2020	2020	2020
	measure-10y	weather	thin	weather	thin	weather	thin	weather	thin	weather	thin	weather	BRUSH	Label/Stakes	thin	brush	measure-16y	weather
Cran	yes	yes						Charlotte		skip	2020?	contractor	should be	Should be	contractor 2020	contractor	contractor	contractor
Dunc	yes	yes			No/Armillaria	contractor	No/Armillaria	skip	No/Armillaria	Amy	No/Armillaria	skip	no	no	No/Armillaria	contractor	contractor	contractor
Ftne	yes	none	MB	none	2015	no station	2015	none	2015	no stn	2015	none	no	no	2015	contractor	contractor	none
Harr	yes	yes	MB	yes	2015		2015	Greg	2015	Amy	2015	skip	no	no	2015	FIRM/UBC	FIRM/UBC	FIRM/UBC
High	yes	yes		ABFS		ABFS		see AMAT		ABFS	2025?	ABFS	sprayed?	no	2040	AB FS	AB FS	AB FS
Jord	yes	yes		yes	contractor	contractor	2015	skip	2016	Keith	2016	skip	no	no	2016	contractor	contractor	contractor
Kala	yes	yes		Vicky		Greg		Greg		Amy	2020	Amy	complete	complete	FIRM/UBC 2020	FIRM/UBC	FIRM/UBC	FIRM/UBC
Mayo	yes	yes		YFS		YFS		Steve/Blake		YFS	2055?	YFS	to be done	no	2040	FIRM/UBC	FIRM/UBC	FIRM/UBC
Naku	yes	yes		yes				not done	2018	Amy	2018	contractor	no	good	2018	contractor	contractor	contractor
Pars	yes	yes		Vanessa		Vanessa	RWW	Vanessa	2017	Vanessa	2017	vanessa	?	good	2017	contractor	contractor	contractor
Pine	yes	yes		Vanessa		Vanessa	RWW	Vanessa	2017	Vanessa	2017	vanessa	should be	good	2017	contractor	contractor	contractor
Reve	yes	yes	MB	yes	2015		2015	Charlotte	2015	Amy	2015	skip	no	good	2015	contractor	contractor	contractor
Skim	yes	yes	Hilary	Vicky	2015	Greg/Rob	2015	Rob	2015	Rob	2015	Amy	no	good	2015	FIRM	FIRM	FIRM
Terr	yes	yes	MB	yes/removed	2015	no station	2015	N/A	2015	NA	2015	NA	no	no	2015	contractor	contractor	none
Tete	yes	yes		Vanessa		Vanessa	RWW	Charlotte	2017	Vanessa	2017	vanessa			2017	contractor	contractor	contractor
Well	yes	yes		Vanessa		Vanessa		Charlotte		Amy	2025?	skip	no	good	2025	contractor	contractor	contractor
Whit	yes	yes		ABFS		ABFS		Cole	2019	ABFS	2020	ABFS	good	good	AB FS 2020	AB FS	AB FS	AB FS

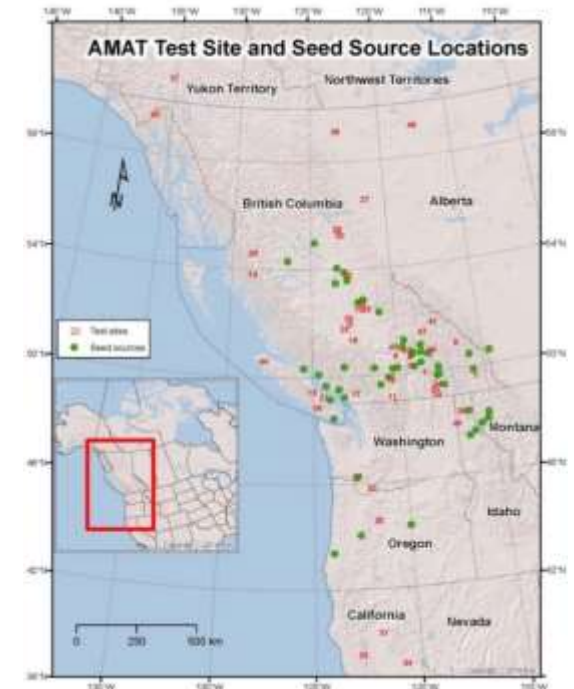


Assisted Migration Adaptation Trial (AMAT)

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



Photo: Ward Strong



Map: Amy Vallarino

Seedlot transferability → CBST



Climate Change Adaptation Research

Project updates 2020

AMAT

Site Name	2020				
	centre stake	brush	prune	measure	download
Winnifred Creek	no	contractor (2)	no	no	contractor
Deep Creek	no	contractor (6)	yes	no	contractor
Riske Creek	no	no	no	no	no
Kalamalka	no	FIRM	no	no	FIRM
Cranbrook	no	no	no	no	contractor
Spillimacheen	no	no	no	no	contractor
Barnhartvale	no	no	no	no	FIRM
Shrimpton	no	no	no	no	FIRM
Lynn Creek	no, bring in	no	no	no	FIRM
Likely	no	no	no	no	contractor
Mt St Helen WA	no	contractor	no	no	collaborator
Glenmerry	no	no	no	no	no
Port Alberni	no	no	no	no	no
McLeese Lake	no	no	no	no	no
Malcolm Knapp	no	no	no	no	N/A
Churn Creek	no	no	no	no	no
Kitimat	no	no	no	no	no
Strouse Lake	no	no	no	no	no
Parksville	no	no	no	no	no
Fletcher Lake	no	no	no	no	no
Bulldog	no	no	no	no	no
Ladybird	no	no	no	no	no
Gavin Lake	no	no	no	no	no
PGTIS	no	no	no	FIRM	FIRM
Ft St John	no	no	no	contractor	contractor
Mackenzie North	no	contract (2pd)	no	r	or
Kitsumkalum	no	no	no	contractor	contractor
Mackenzie South	no	contract (2 pd)	no	contractor	contractor
Lyman Springs CA	no	no	no	contractor	collaborator
Wind River WA	no	no	no	contractor	collaborator
Mendocino NF CA	contractor	contractor(2)	no	contractor	collaborator
Forest Hill CA	contractor	contractor(1)	no	contractor	collaborator
Sisters OR	contractor	no	no	contractor	collaborator
Revelstoke South	no	FIRM (4 pd)	no	FIRM	FIRM
Whitehorse ResF	no	no	no	Cory	Cory
Fort Nelson	no	contractor (3)	no	no	contractor
Priest River ID	few	contractor (8)	no	no	Frank
Spirit Lake ID	no	contractor (4)	no	no	Frank
Golden	no	contractor (4pd)	no	no	contractor
Haines	no	contractor (5 pd)	no	no	Greg P
Skimikin	no	no	no	no	FIRM
Holberg	no	contractor (5pd)	maybe	no	Cassidy
McLure	no	no	no	no	FIRM
Nitinat	no	no	no	no	no
Revelstoke North	no	contractor (3pd)	no	no	Copperthwaite
High Level AB	no	no	no	no	Clarisa



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Project updates 2020

Climate Based Seed Transfer (CBST)



Current seed transfer zones
(geography)



CBST
(climate)

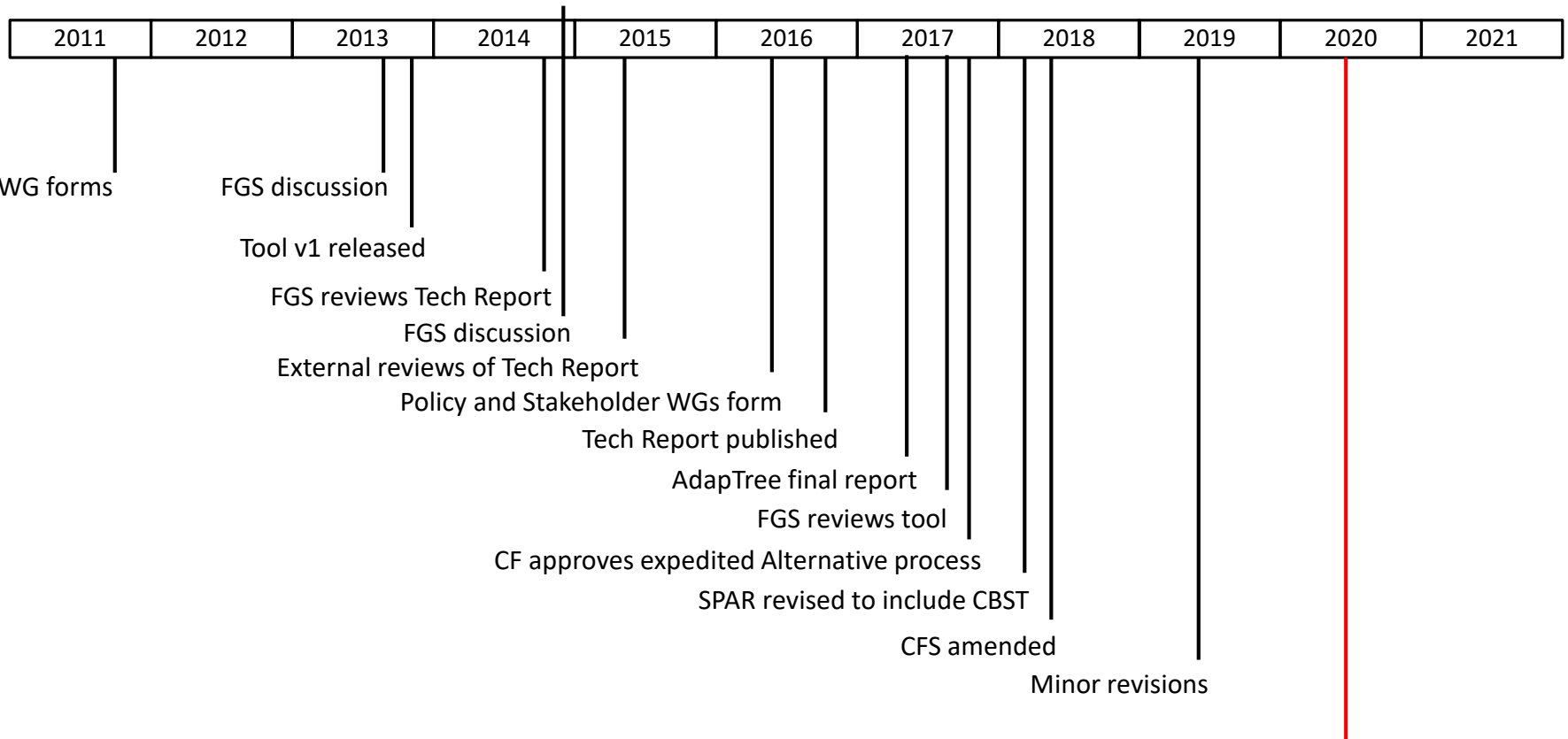
- Better matching of seedlots with plantations
- Facilitates accurate assisted migration
- Maximizes deployment area



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Project updates 2020

Climate Based Seed Transfer (CBST)



- Minor revisions
- BEC10
- ClimateBC 6.21
- Variable weighing



Multiple Seedlot – Genetic Diversification Study

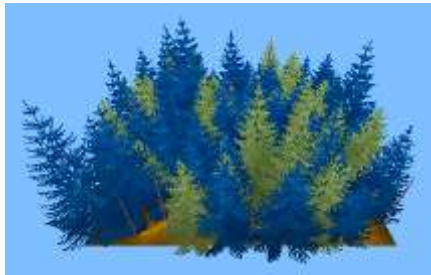
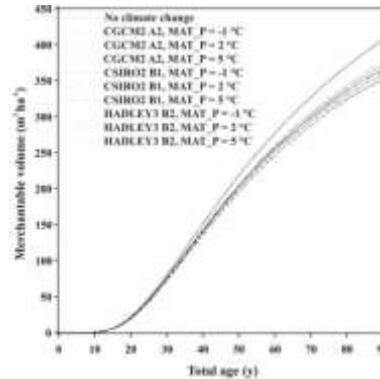
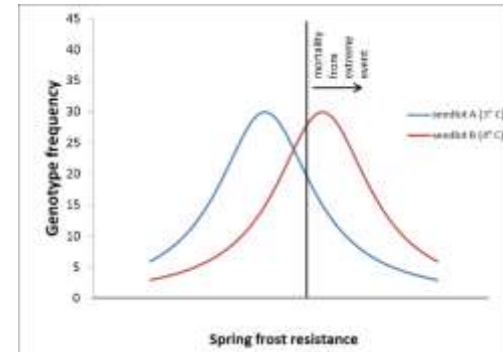


Image: Dave Simpson

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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

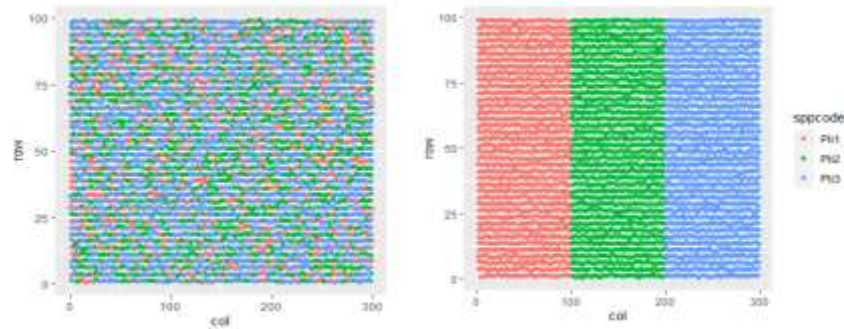
- OCF Research Program (Timber Production) (\$180,000)

Team

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

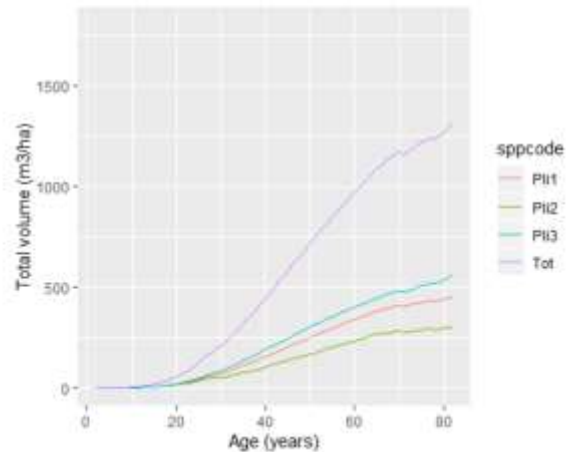


Multiple Seedlot – Genetic Diversification Study



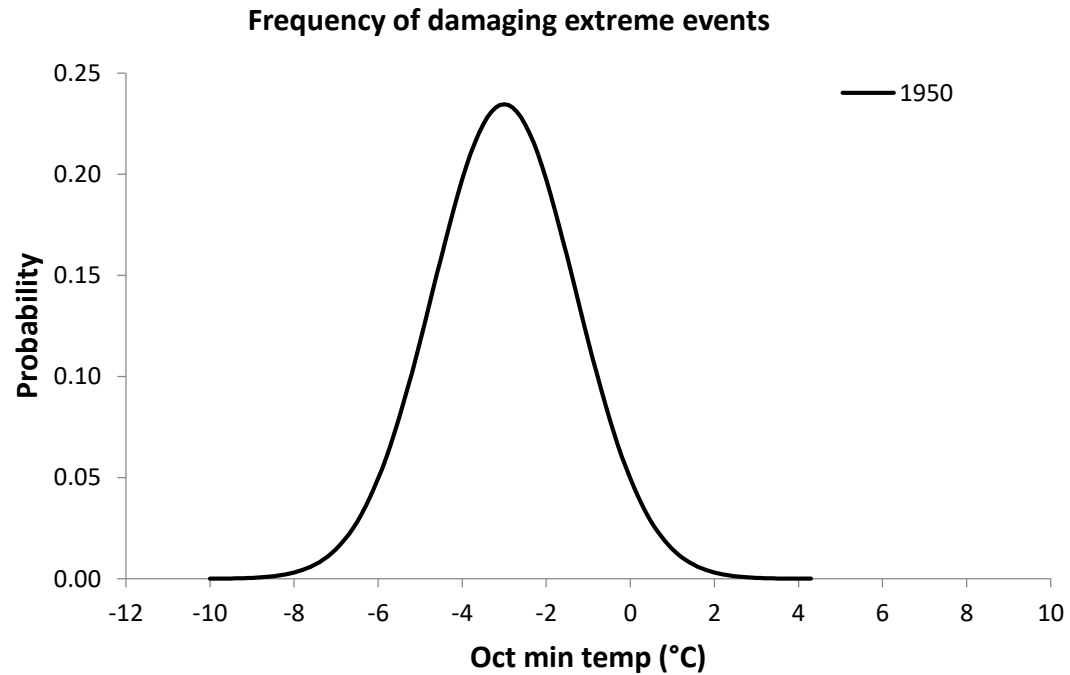
Simulation 2:

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



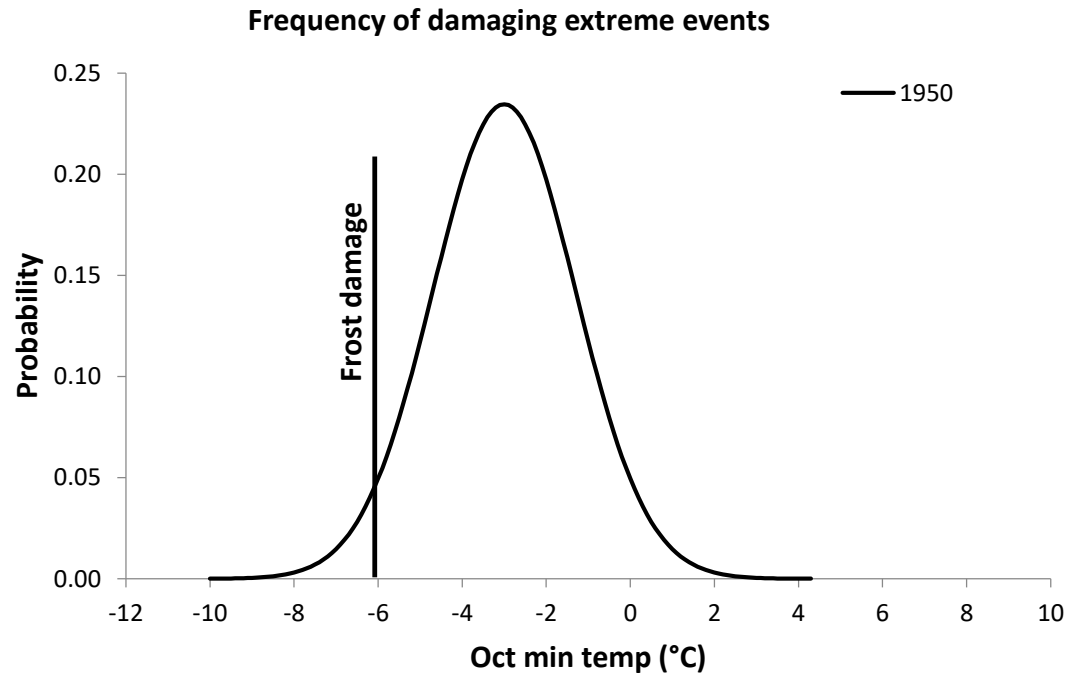


Extreme event study



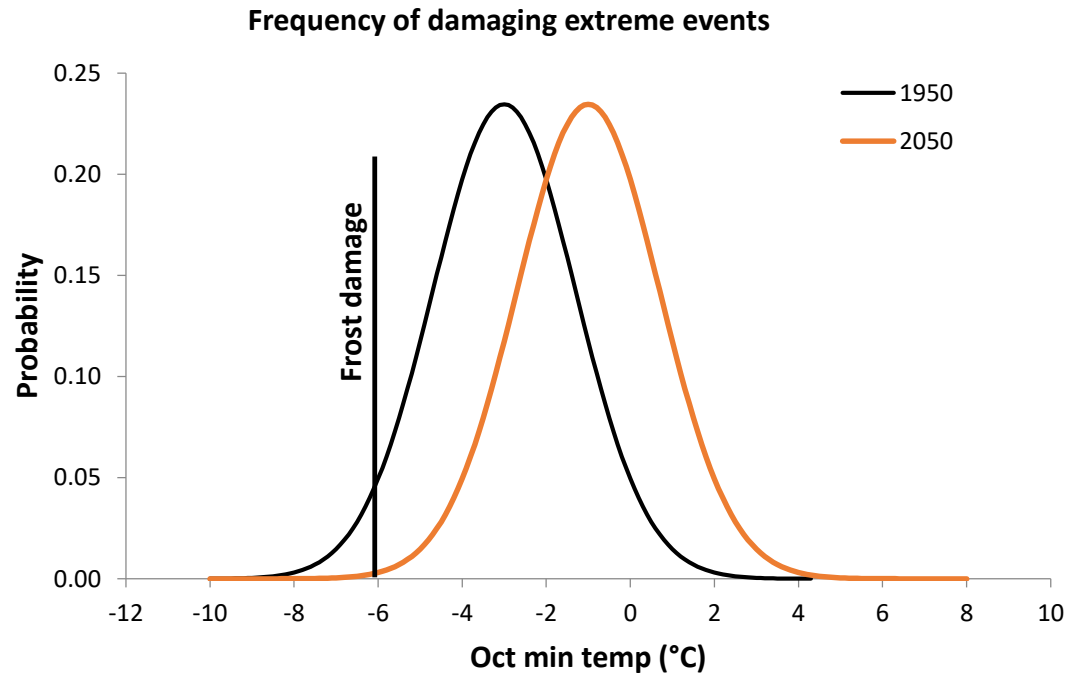


Extreme event study



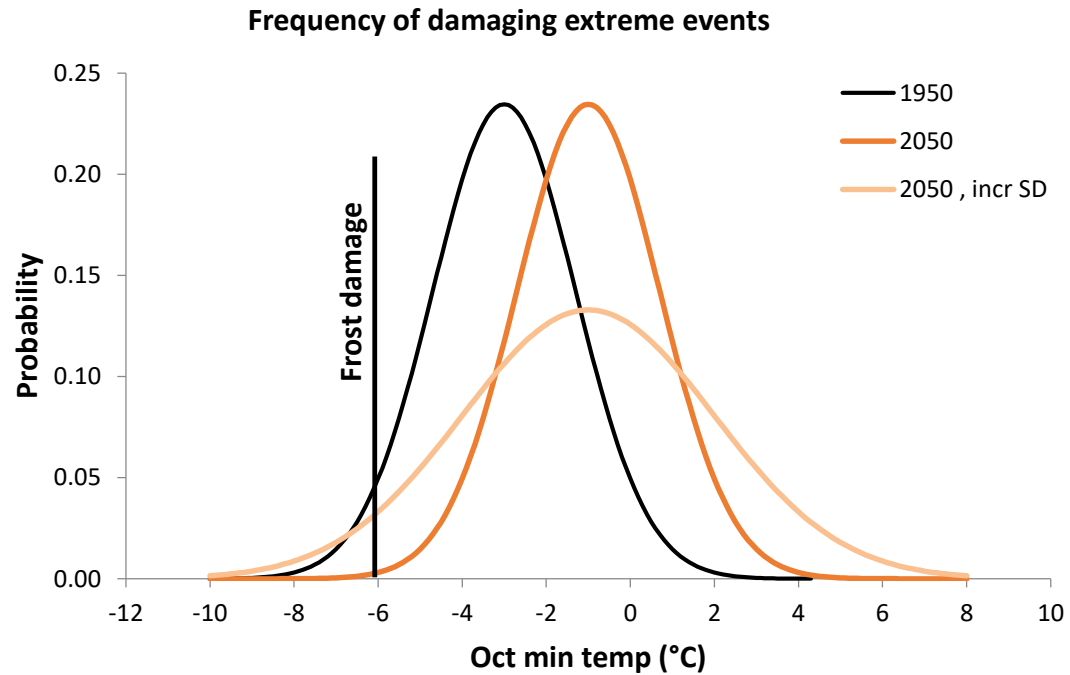


Extreme event study





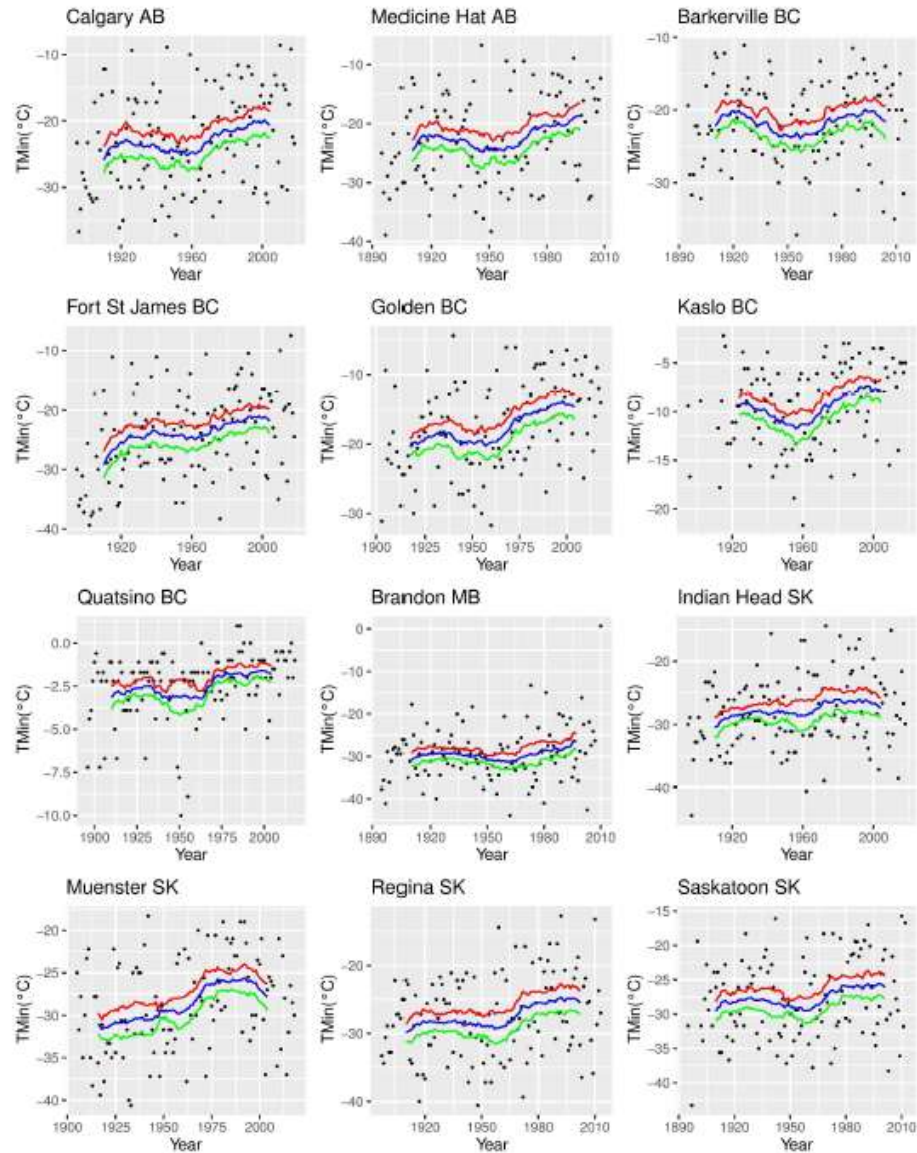
Extreme event study





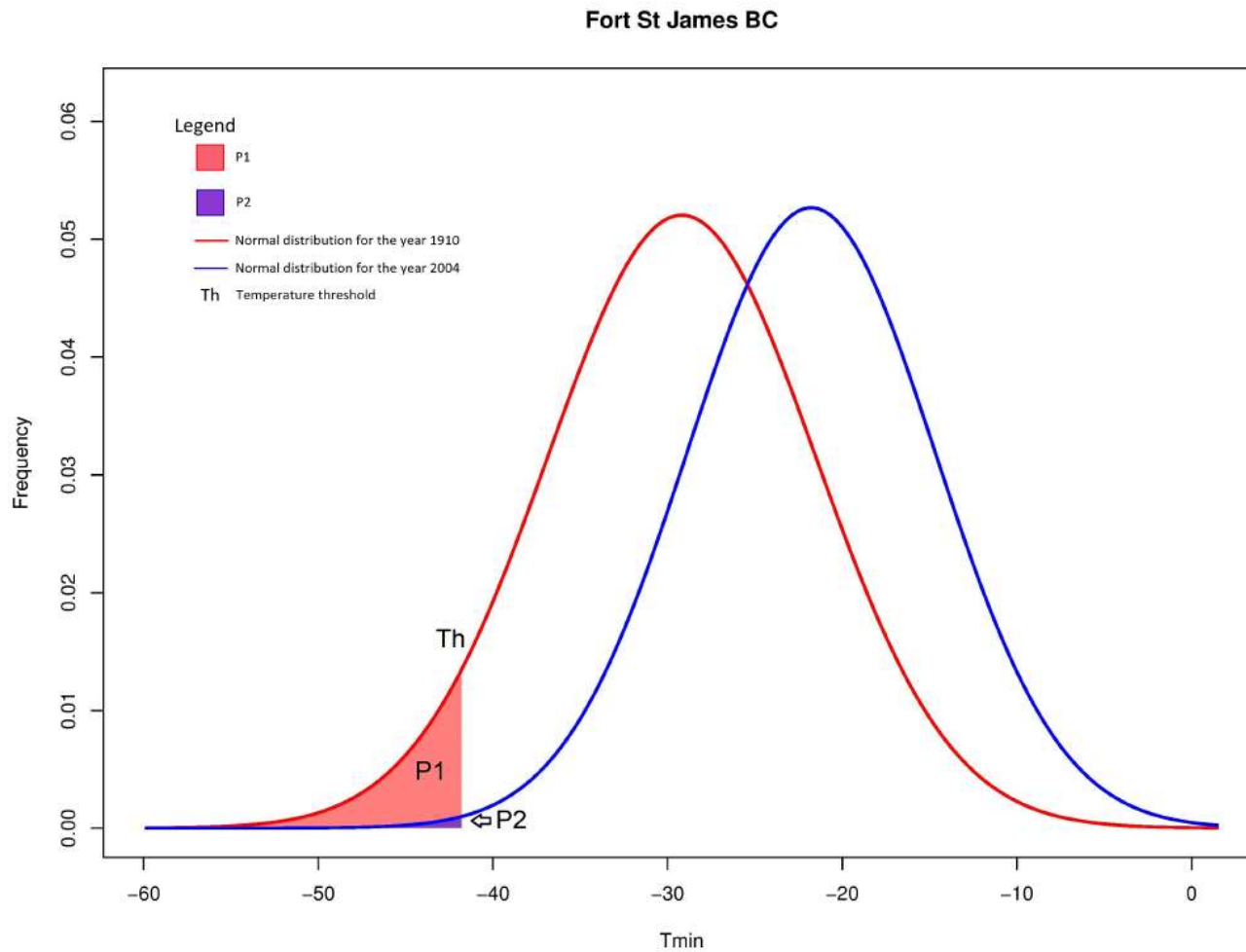
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Project updates 2020

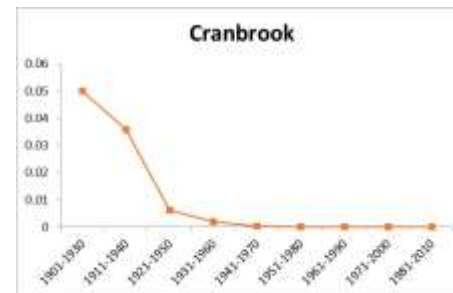
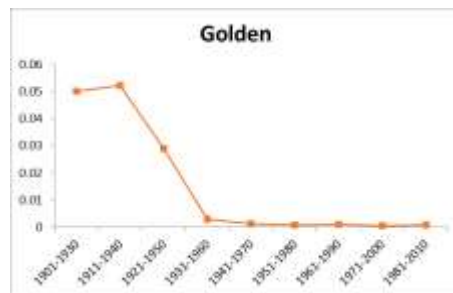
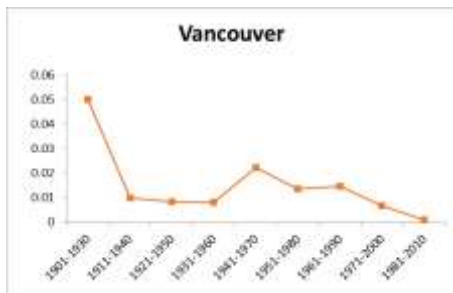
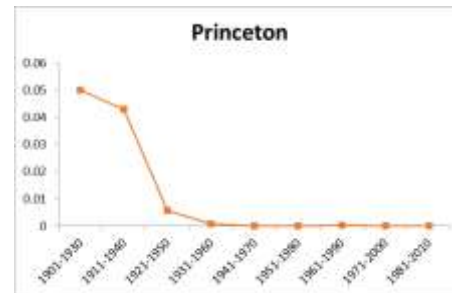
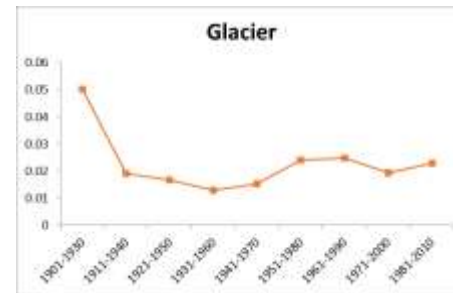
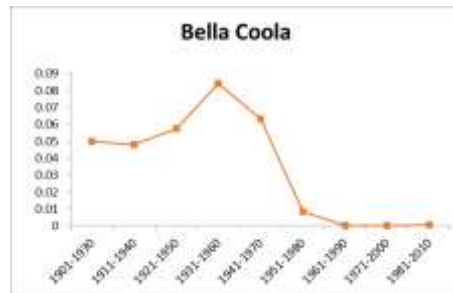
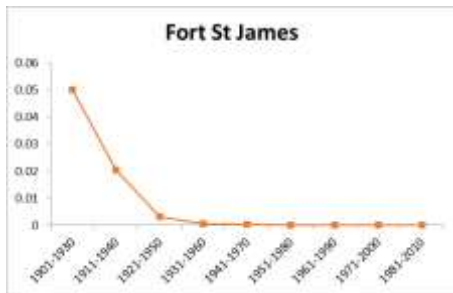




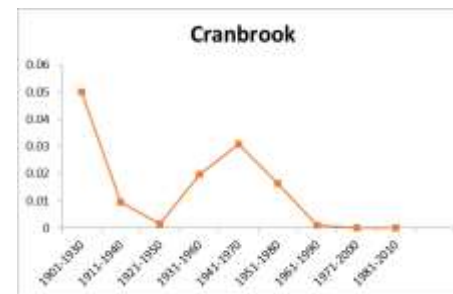
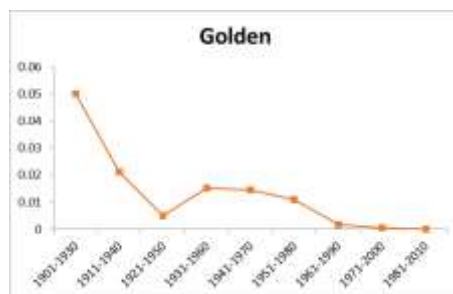
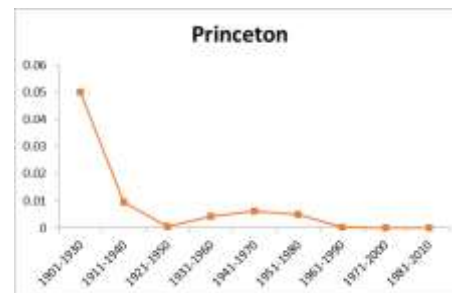
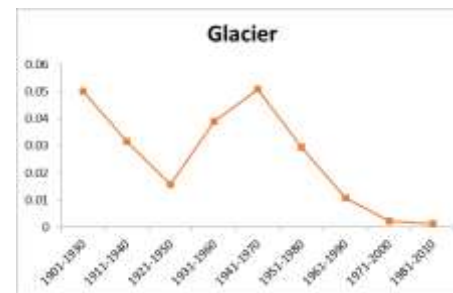
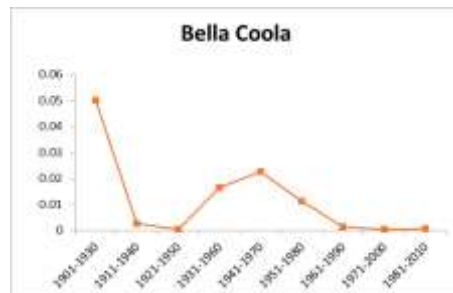
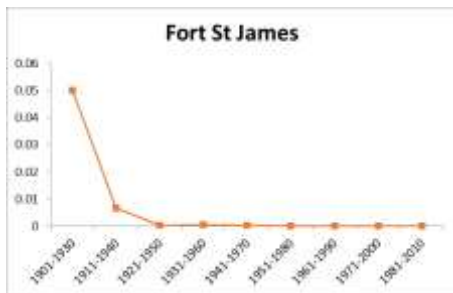
Extreme event study



March min temp – probability of exceeding an extreme event temp



Oct min temp – probability of exceeding an extreme event temp





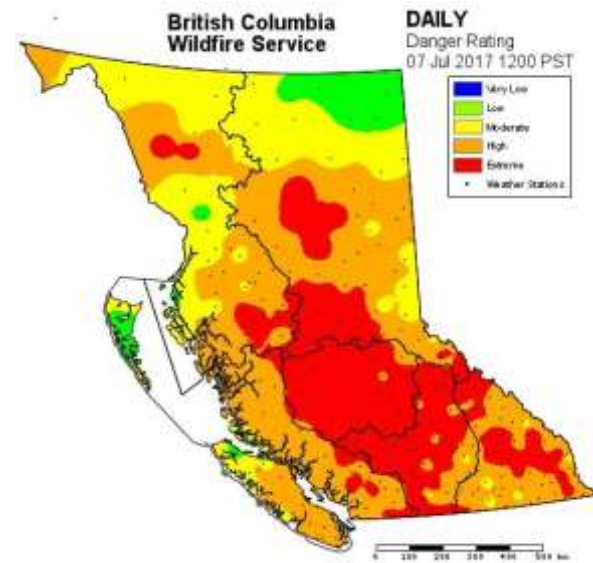
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Project updates 2020

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



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Project updates 2020

Paired tree drought study





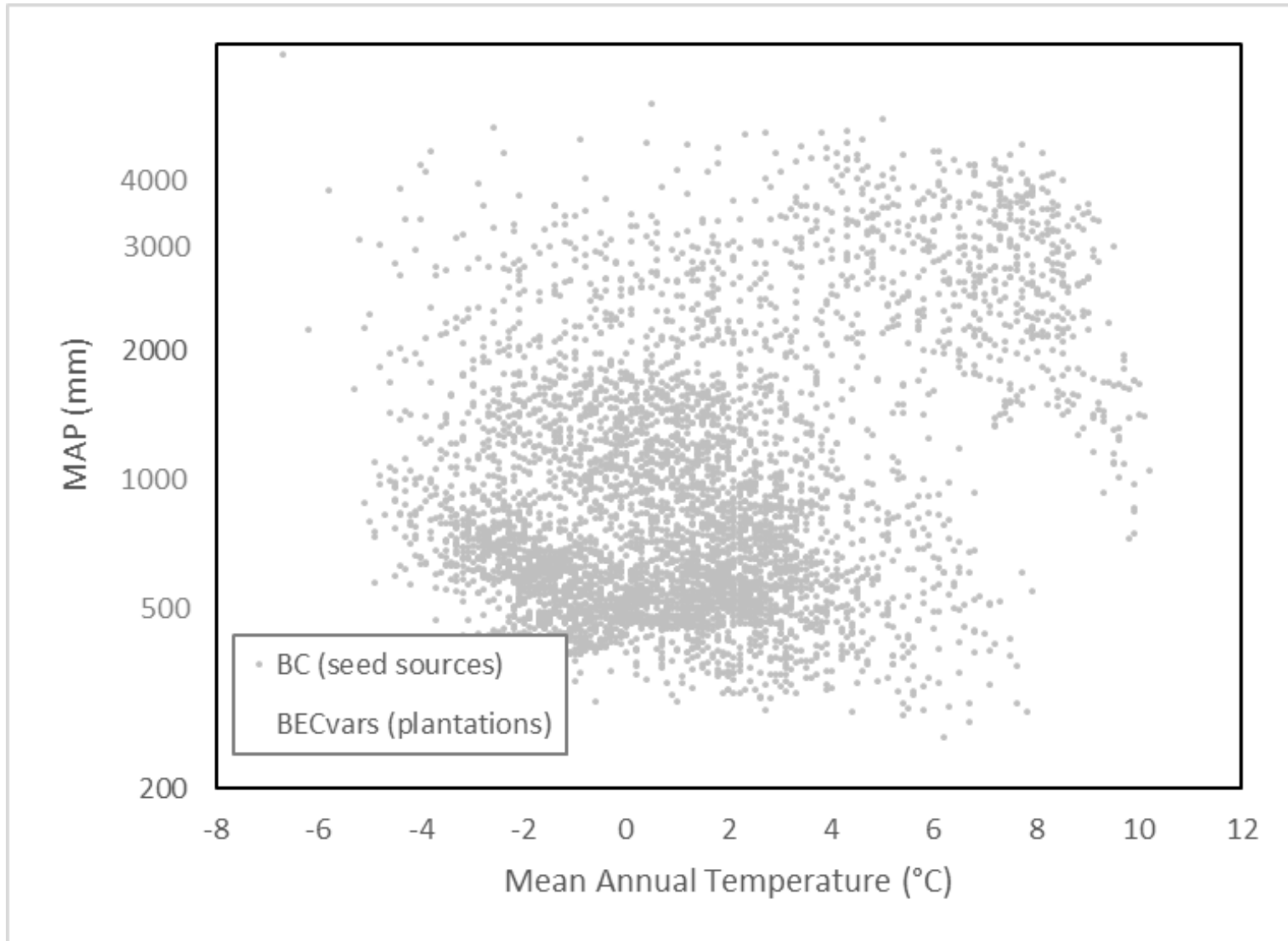
Future plantation orphans

- 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?



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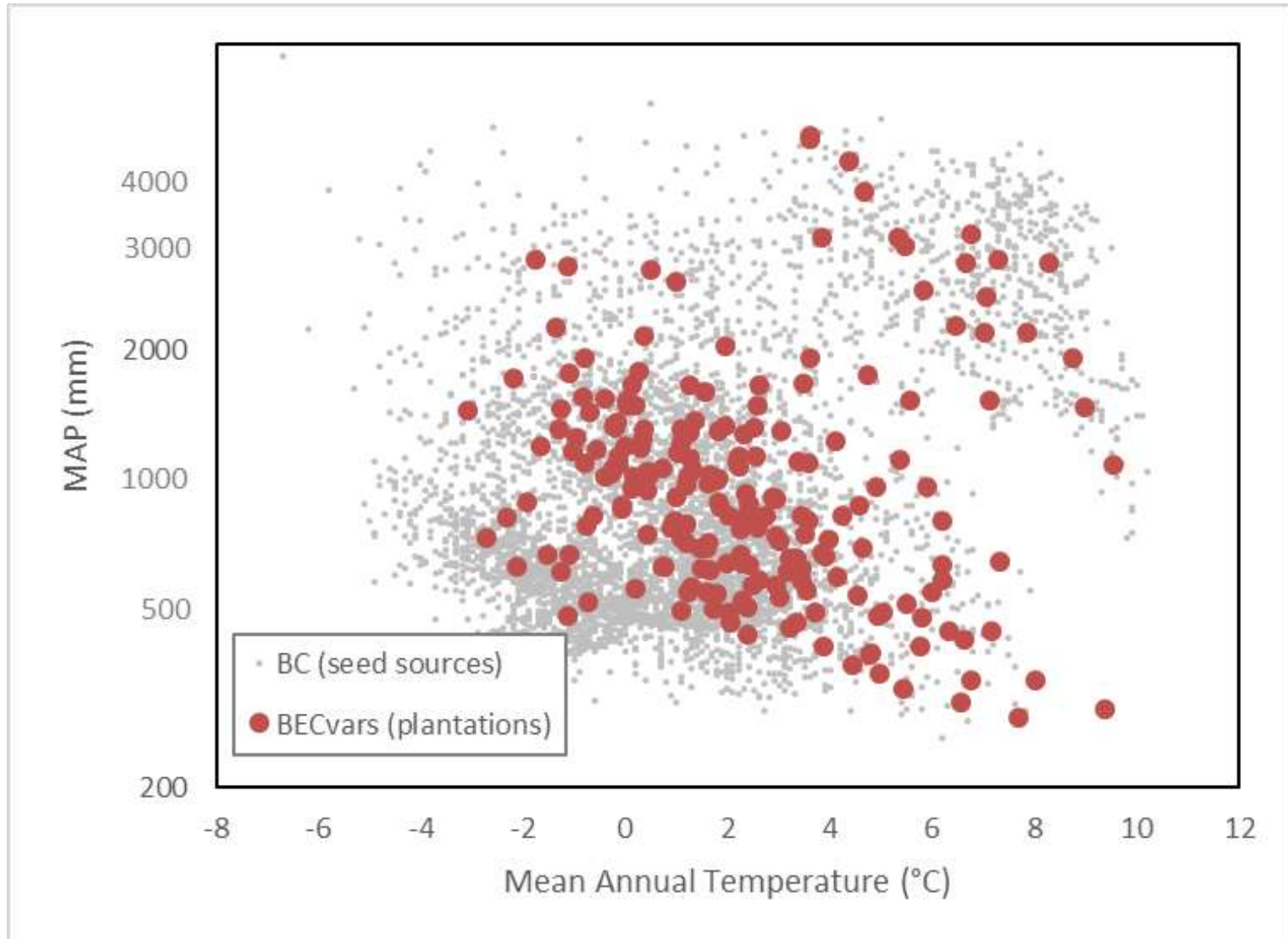
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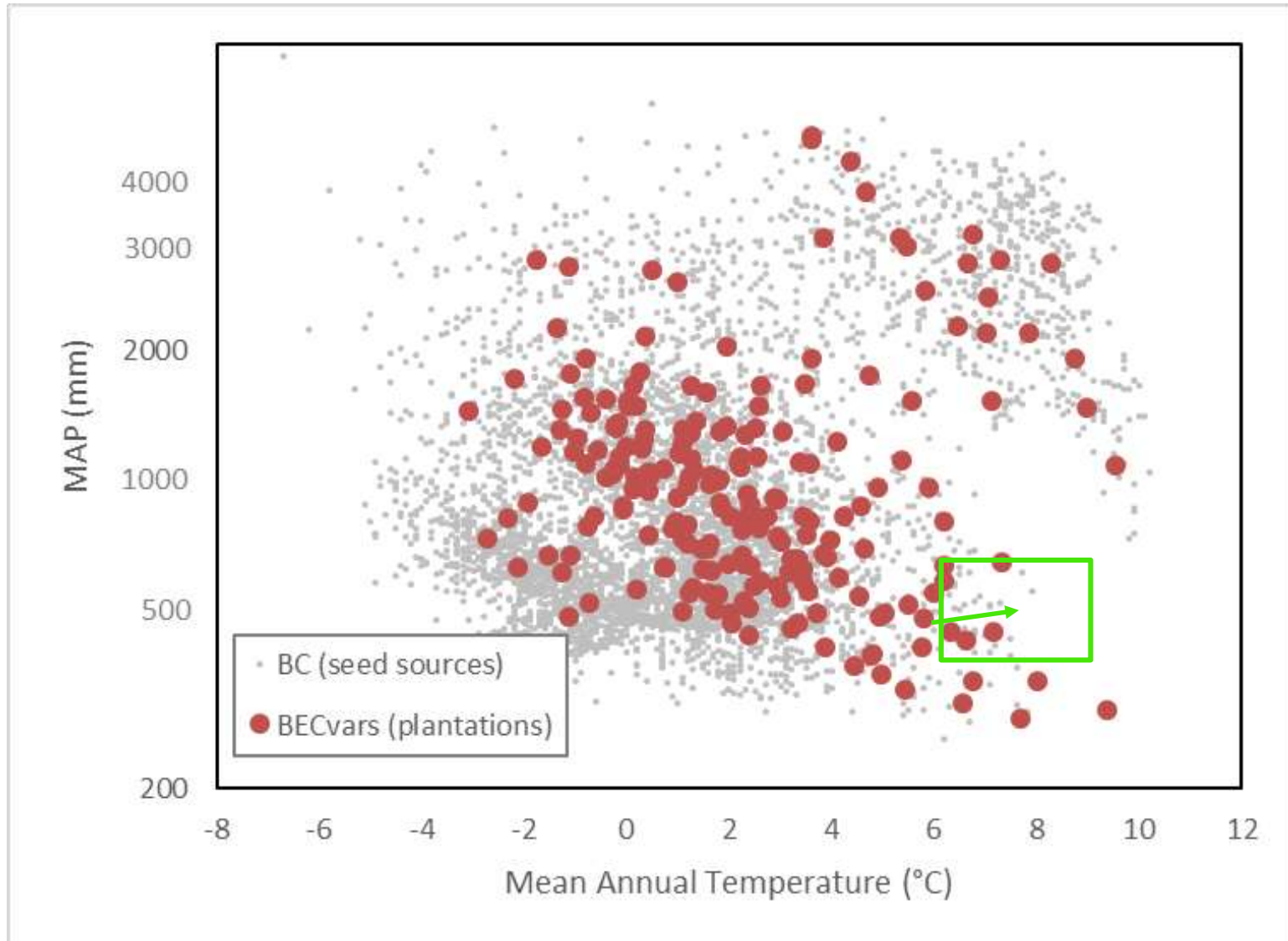
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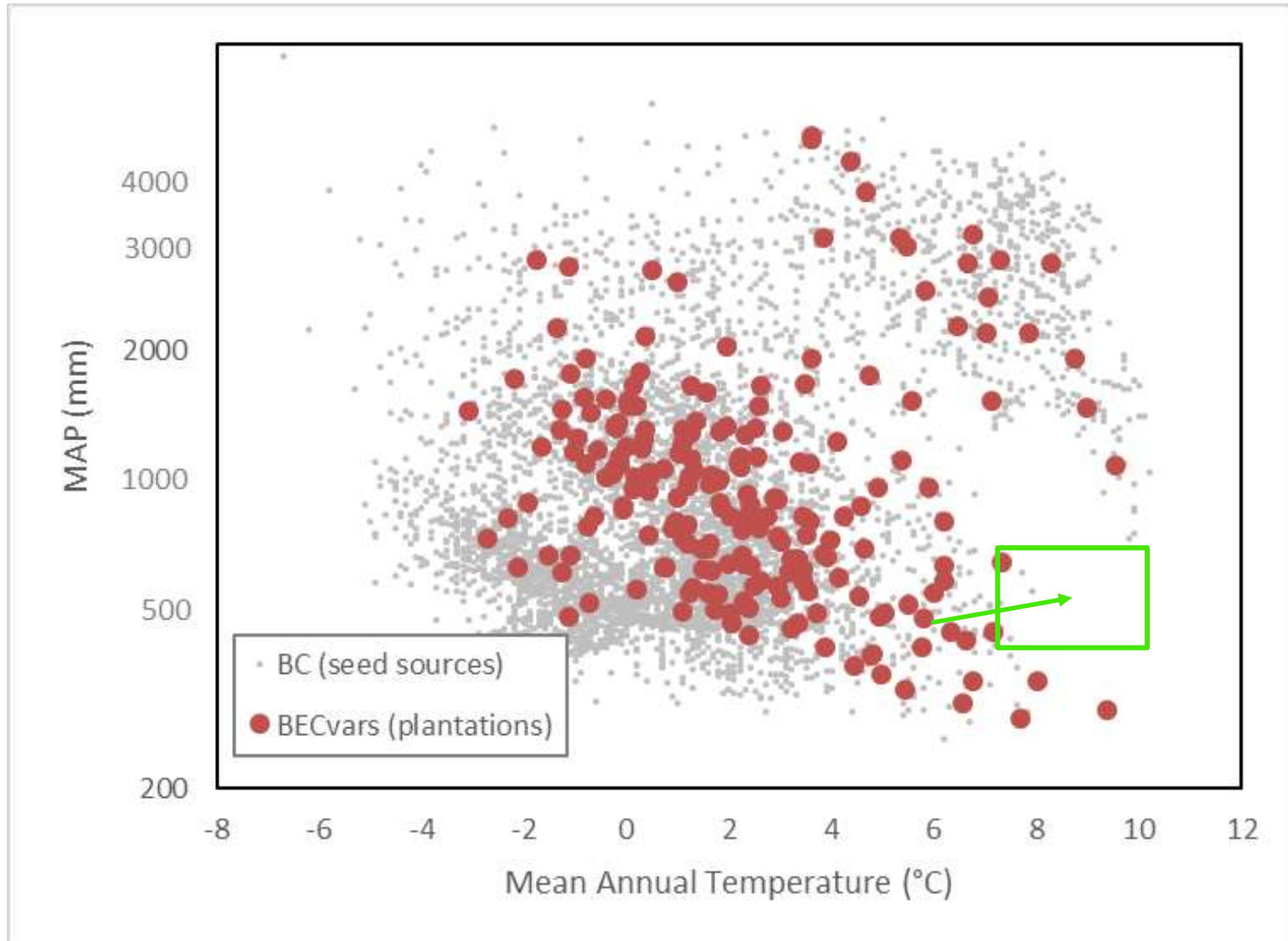
Project updates 2020





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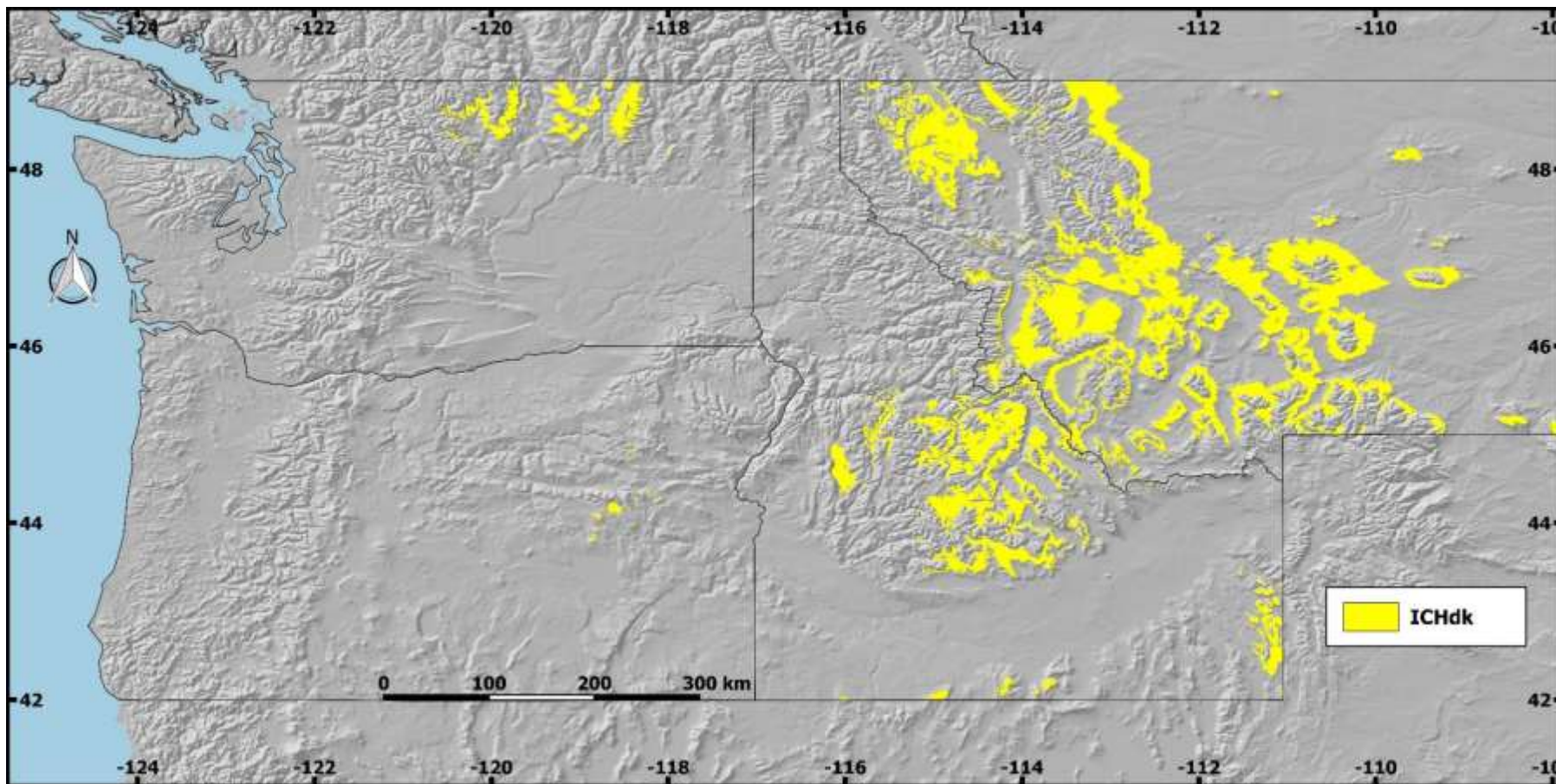




Climate Change Adaptation Research

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

Funding

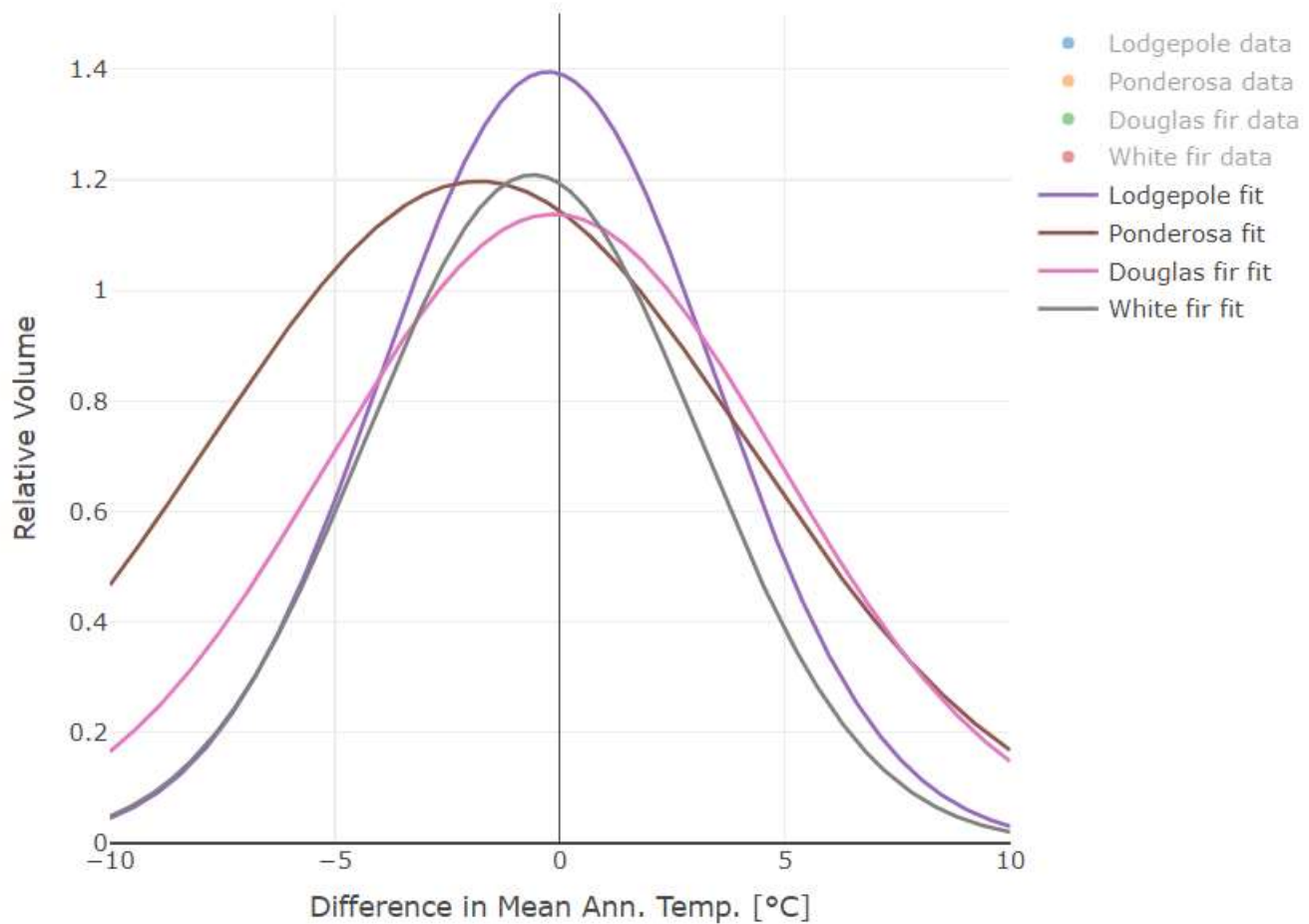
- ?? (UC Davis)

Team

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



Species transferability





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Project updates 2020

Sx genecology study

Question

- Comparison of approaches to calculate safe seed transfer distances?
- Impact of CC on A vs B plantations?
- Impact of CC on BC's native and planted Sx stand productivity?

Methods

- Sx genecology/CC trial data – age-16

Funding

- \$20K X 3 y (LCELF)

Team

- Iva Wang (MSc student, UBC) Tongli Wang (UBC), Greg O'Neill



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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

Welcome to



Sovereign
Lake
NORDIC CENTRE

