



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!)

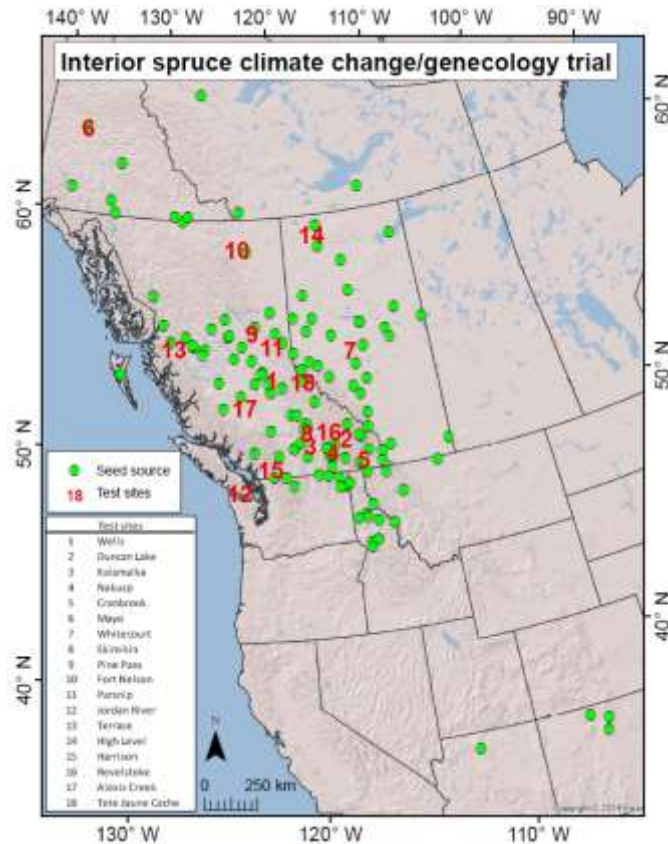




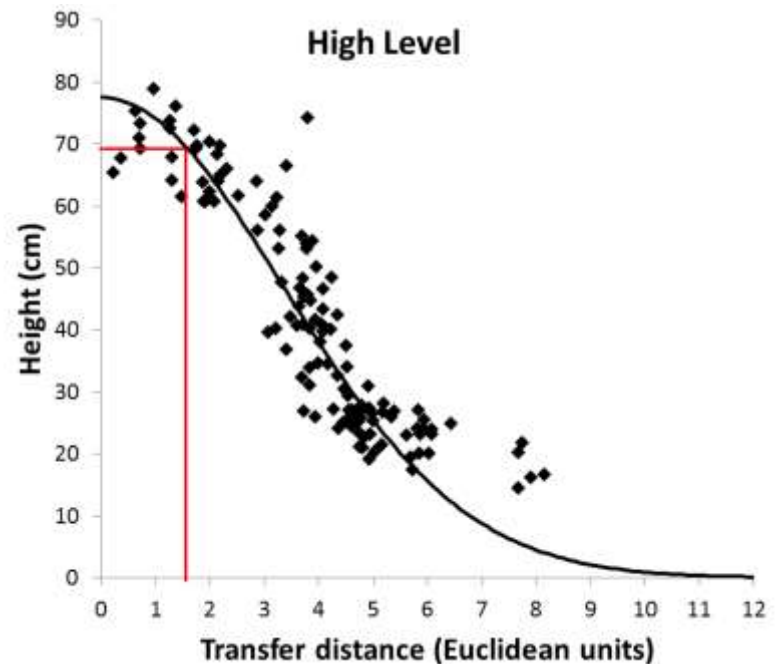
Climate Change Adaptation Research

Project updates 2020

Sx genecology/CC field trial



Seedlot transferability → CBST



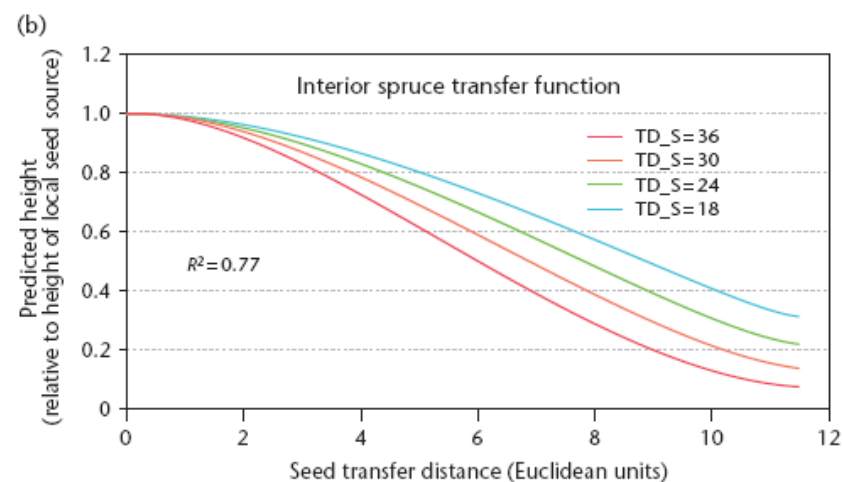
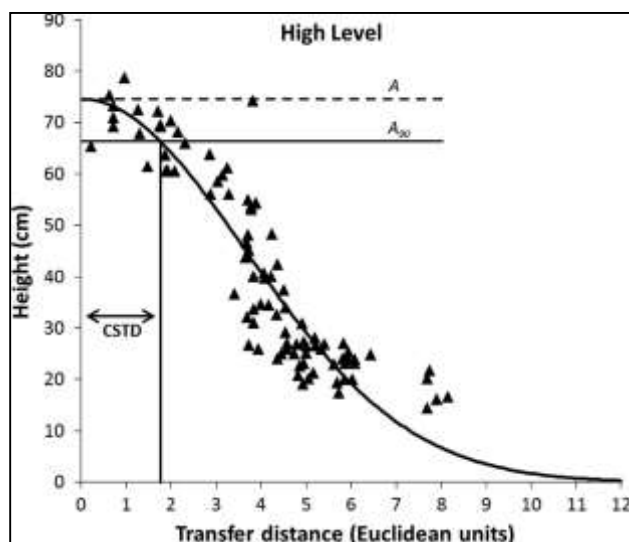
- Established 2005
- 128 pops at 17 test sites



Climate Change Adaptation Research

Project updates 2020

Sx genecology/CC field trial

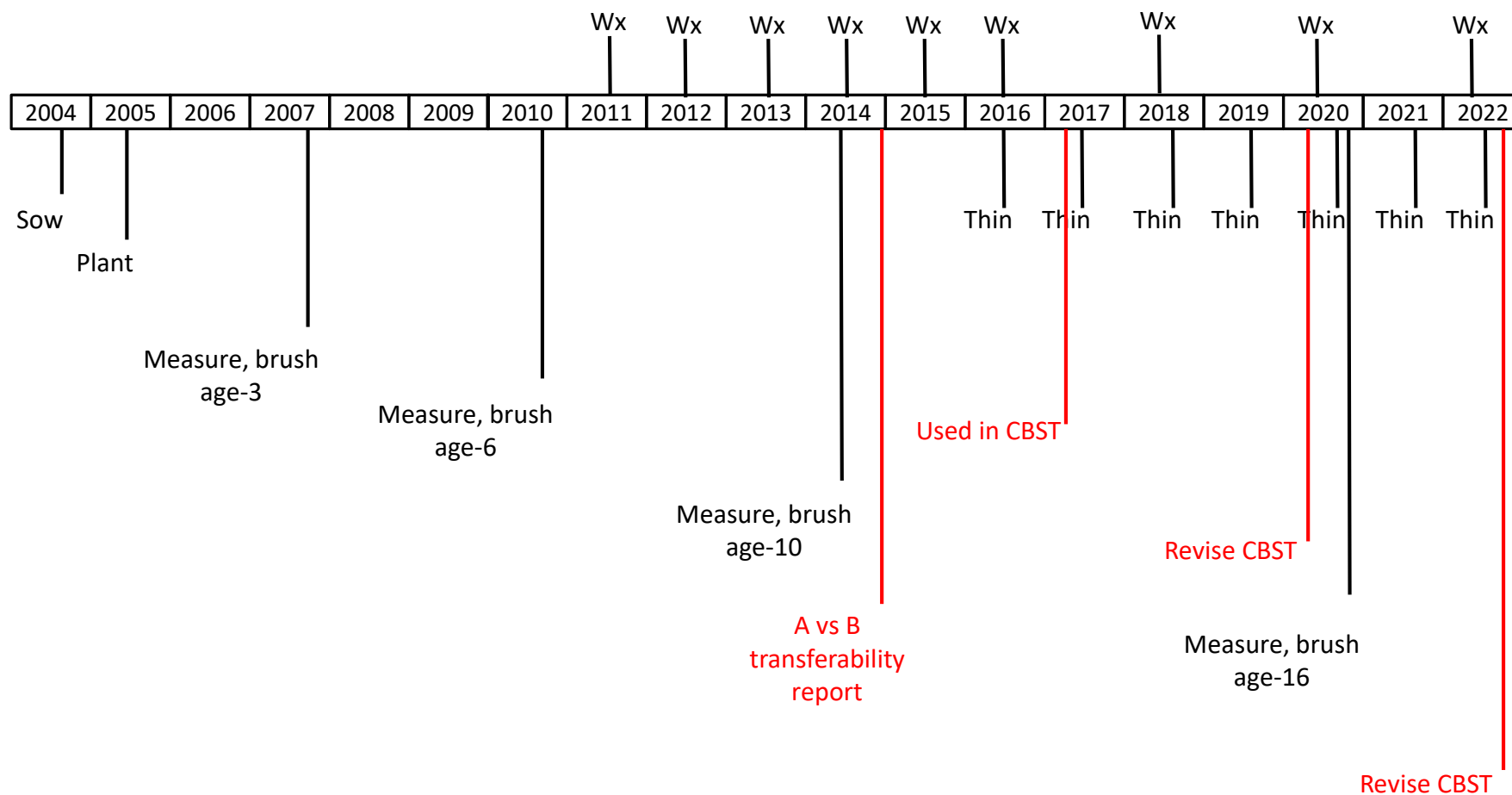




Climate Change Adaptation Research

Project updates 2020

Sx genecology/CC field trial





Climate Change Adaptation Research

Project updates 2020

Sx genecology/CC field trial

| | 2014 | 2014 | 2015 | 2015 | 2016 | 2016 | 2017 | 2017 | 2018 | 2018 | 2019 | 2019 | 2019 | 2019 | 2020 | 2020 | 2020 | 2020 |
|------|-------------|---------|--------|-------------|---------------|------------|---------------|-------------|---------------|---------|---------------|------------|------------|--------------|-----------------|------------|-------------|------------|
| Site | 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 |



Climate Change Adaptation Research

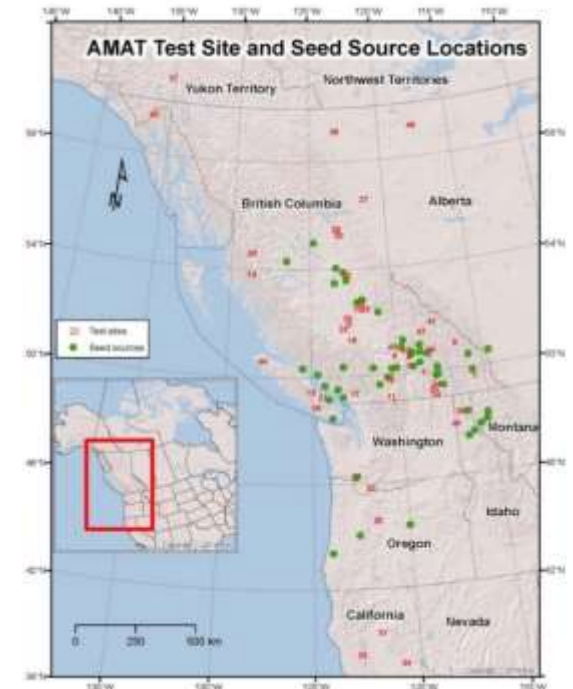
Project updates 2020

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

[illegible]



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 (8) | 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 |



Climate Based Seed Transfer (CBST)



Current seed transfer zones
(geography)



CBST
(climate)

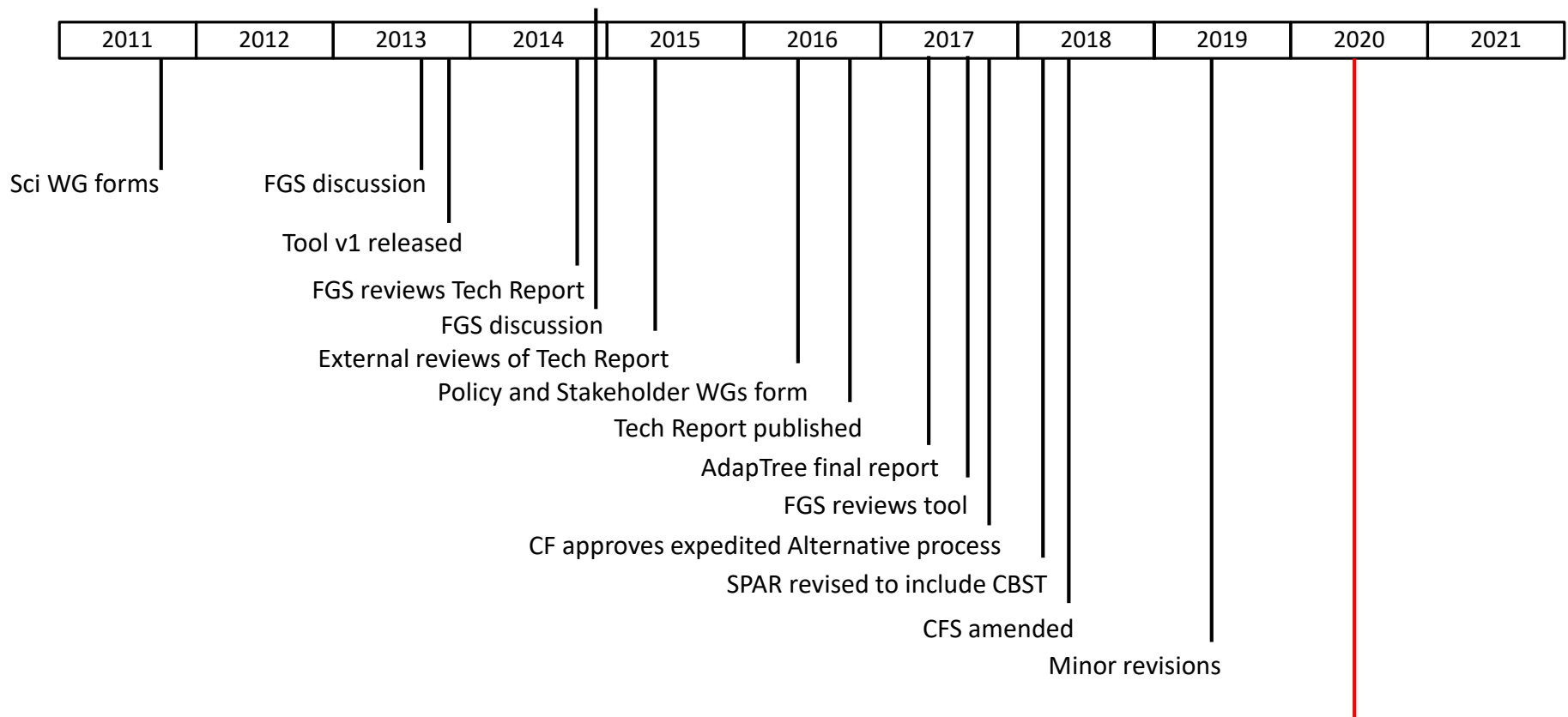
- Better matching of seedlots with plantations
- Facilitates accurate assisted migration
- Maximizes deployment area



Climate Change Adaptation Research

Project updates 2020

Climate Based Seed Transfer (CBST)



- Minor revisions
- BEC10
- ClimateBC 6.21
- Variable weighing



Climate Change Adaptation Research

Project updates 2020

Multiple Seedlot – Genetic Diversification Study

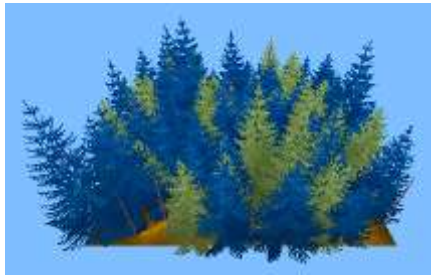
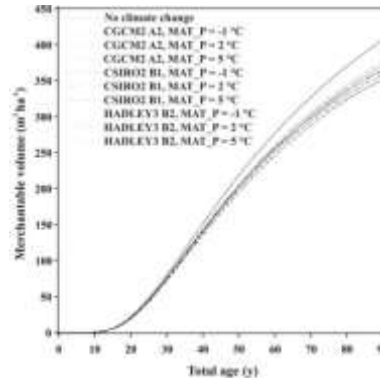
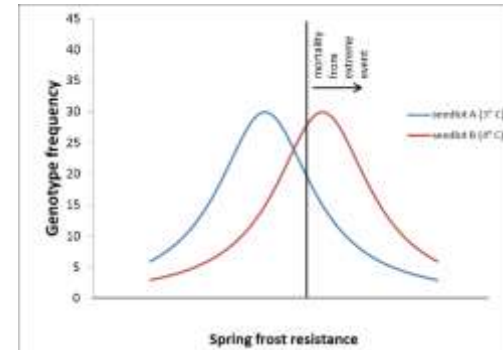


Image: Dave Simpson

+



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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

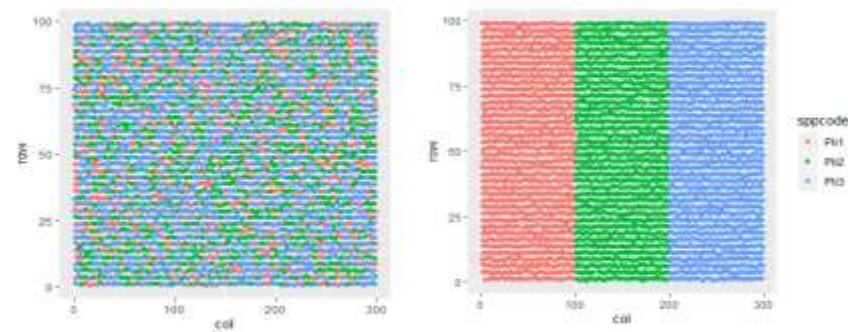
- OCF Research Program (Timber Production) (\$180,000)

Team

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

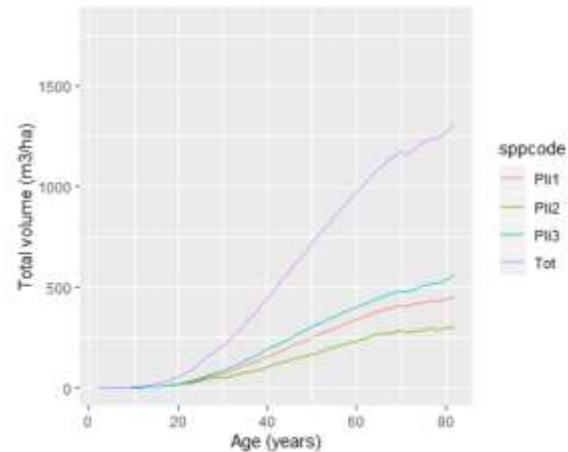


Multiple Seedlot – Genetic Diversification Study



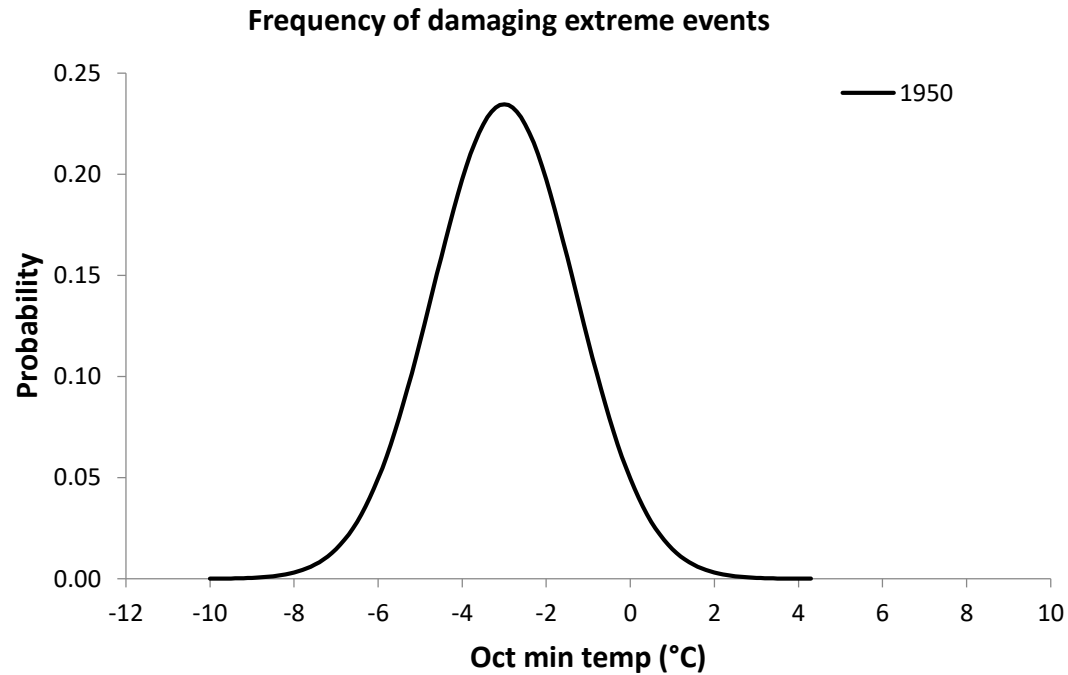
Simulation 2:

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



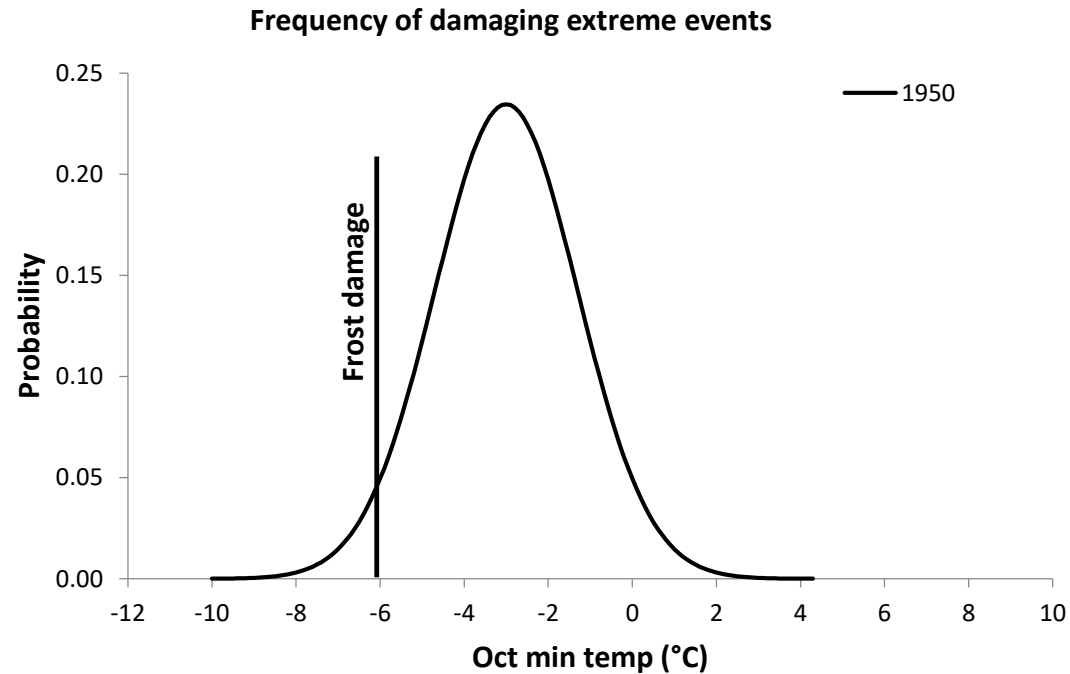


Extreme event study



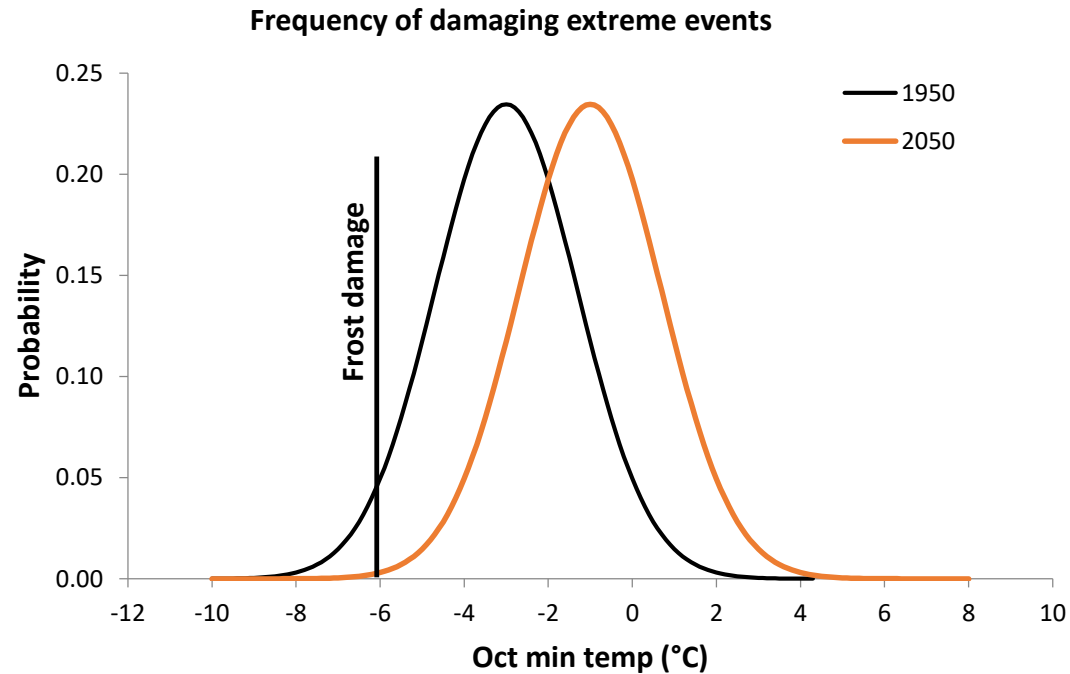


Extreme event study



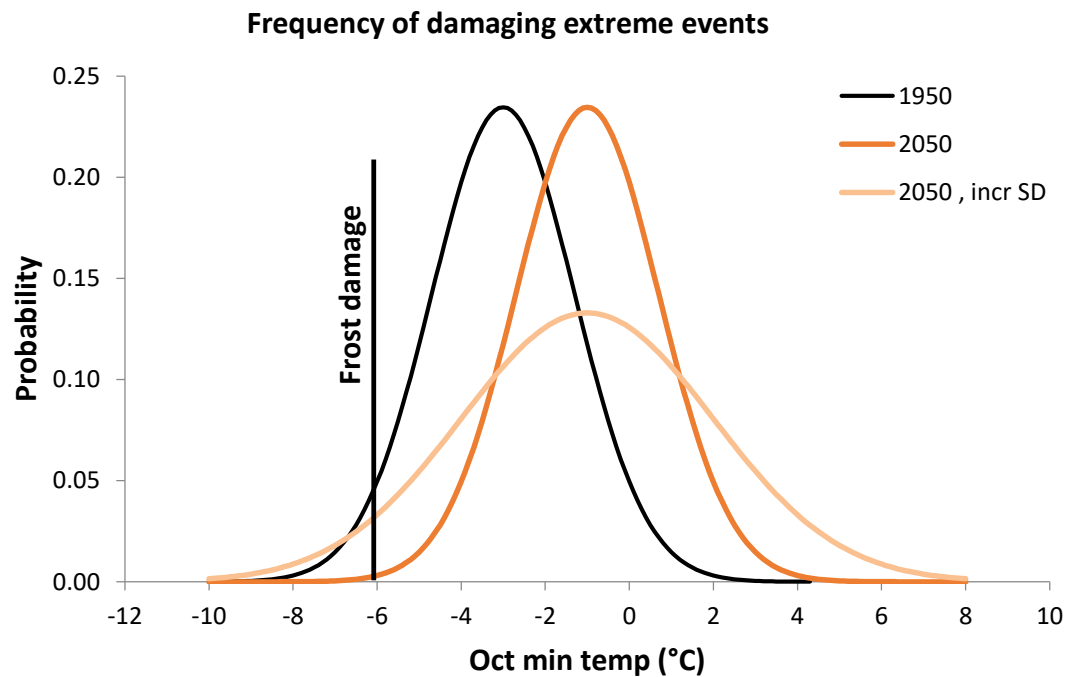


Extreme event study





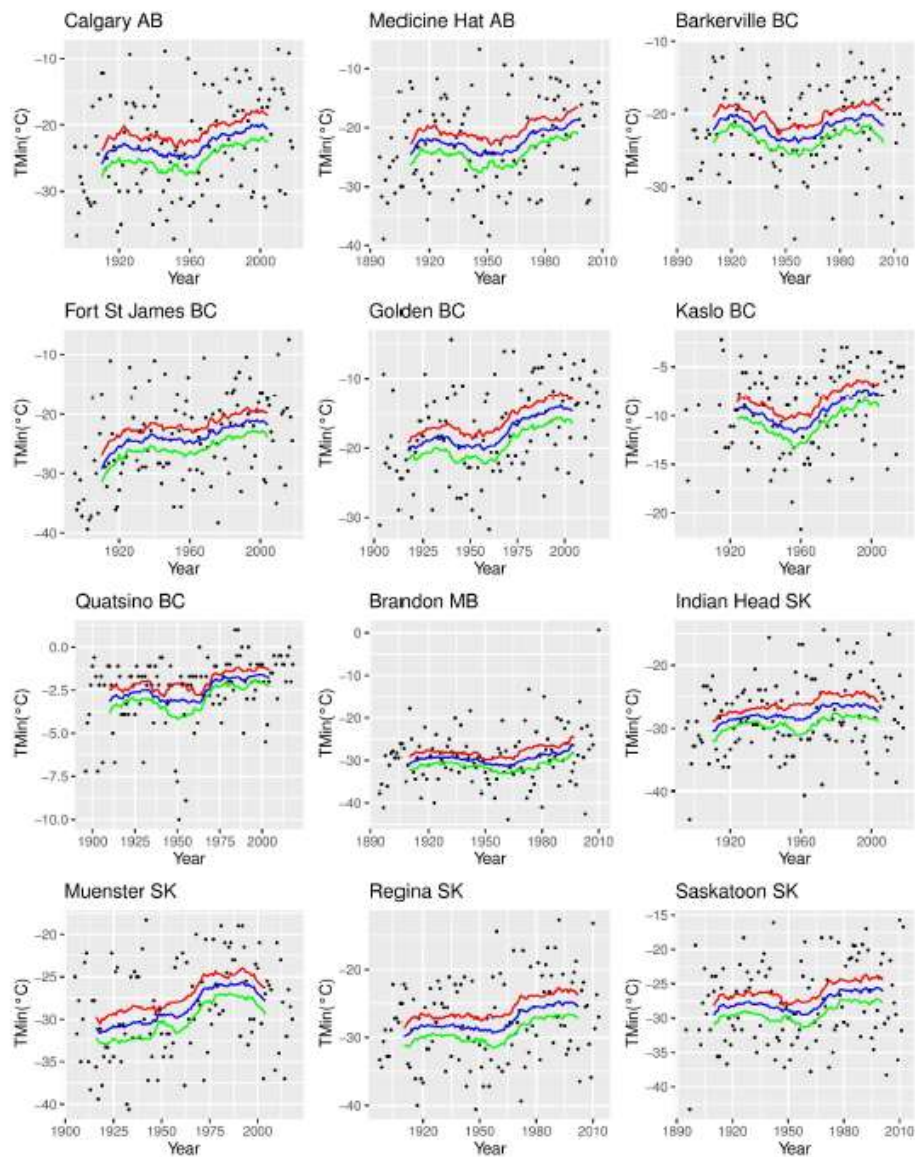
Extreme event study





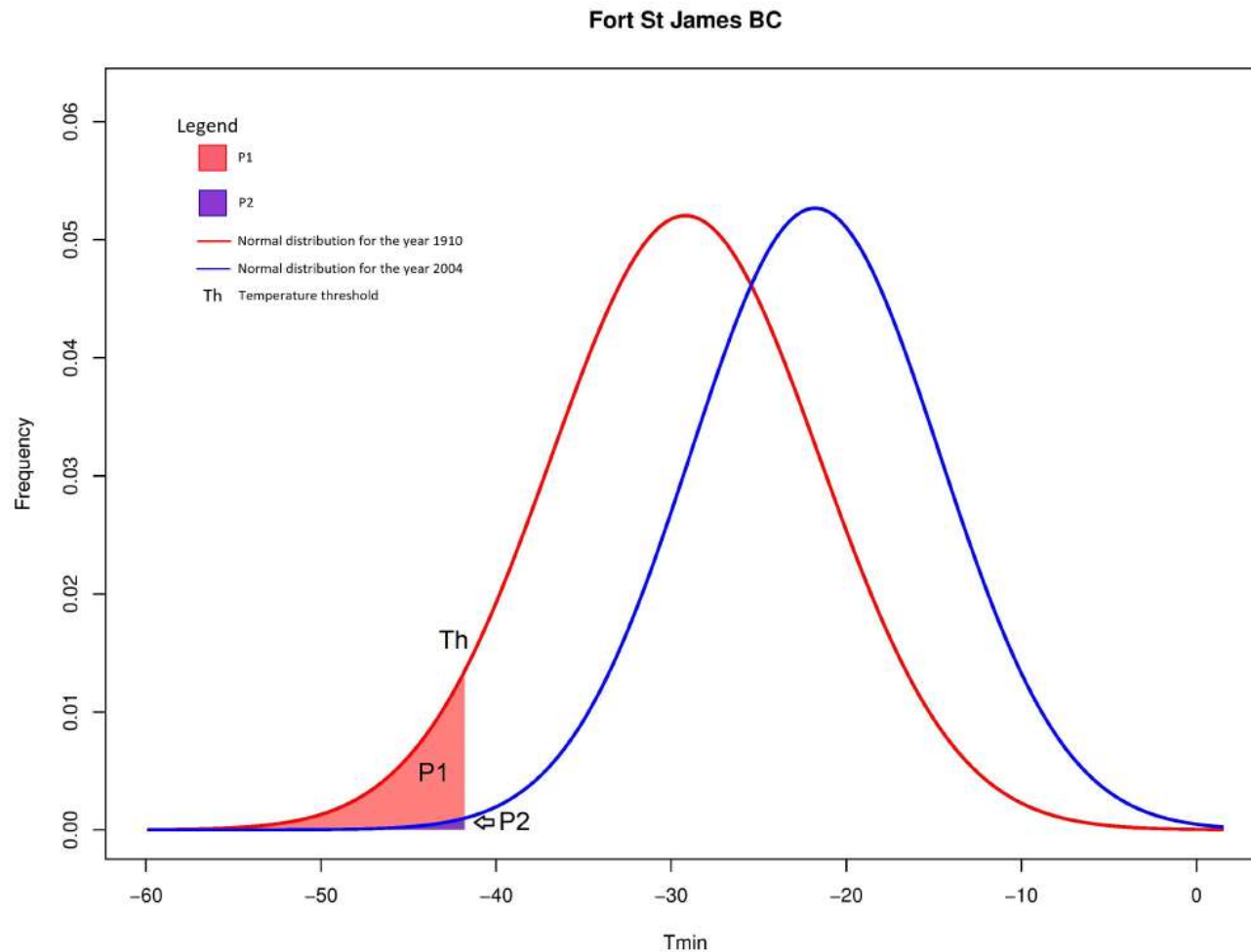
Climate Change Adaptation Research

Project updates 2020

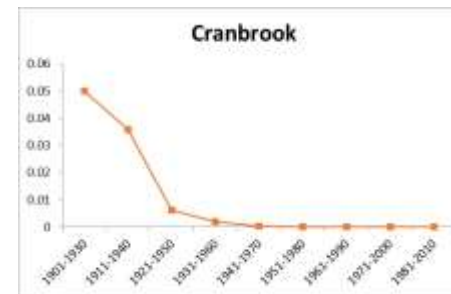
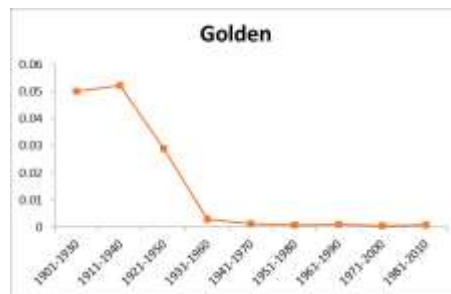
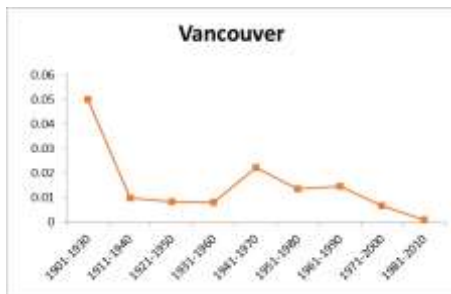
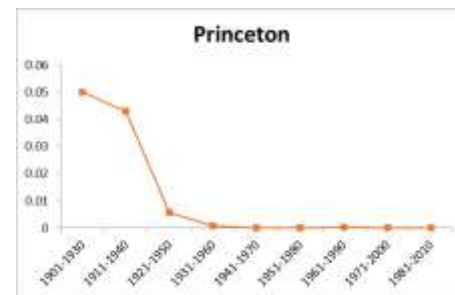
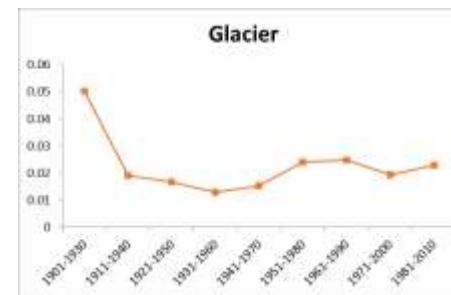
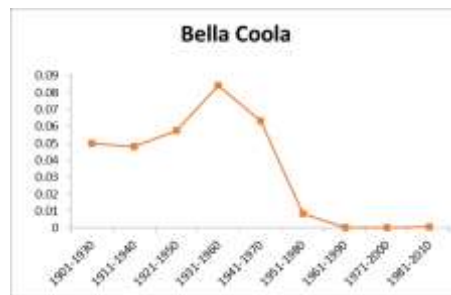
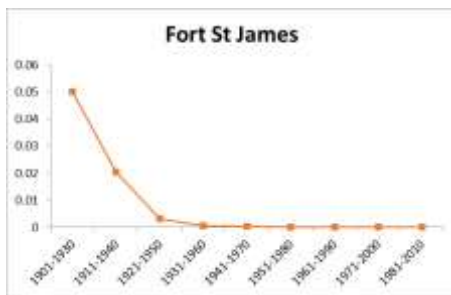




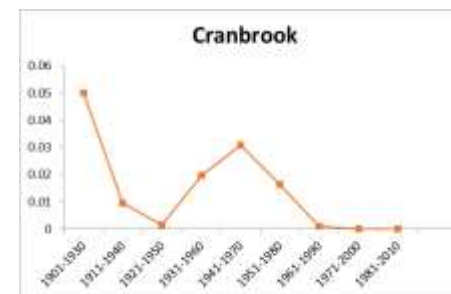
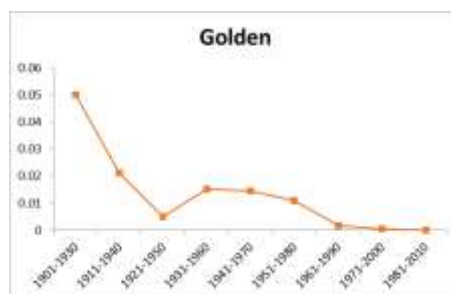
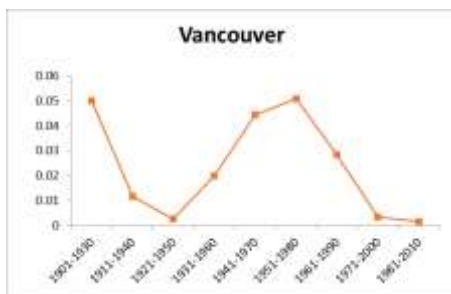
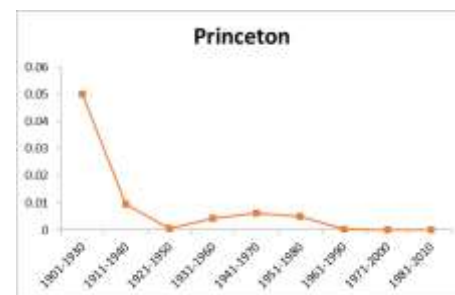
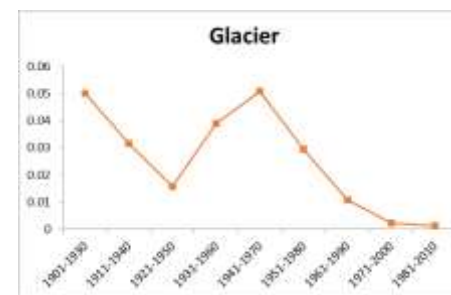
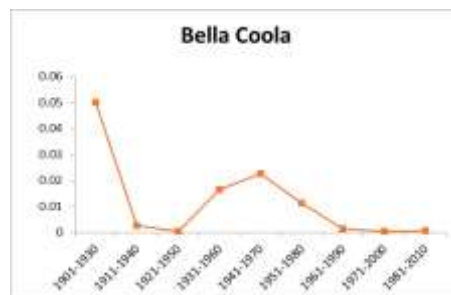
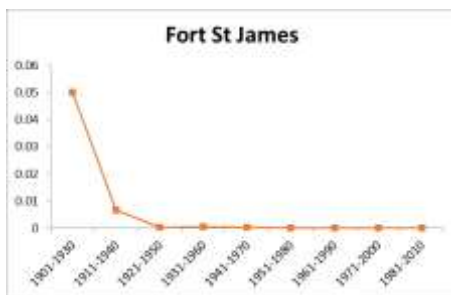
Extreme event study



March min temp – probability of exceeding an extreme event temp



Oct min temp – probability of exceeding an extreme event temp





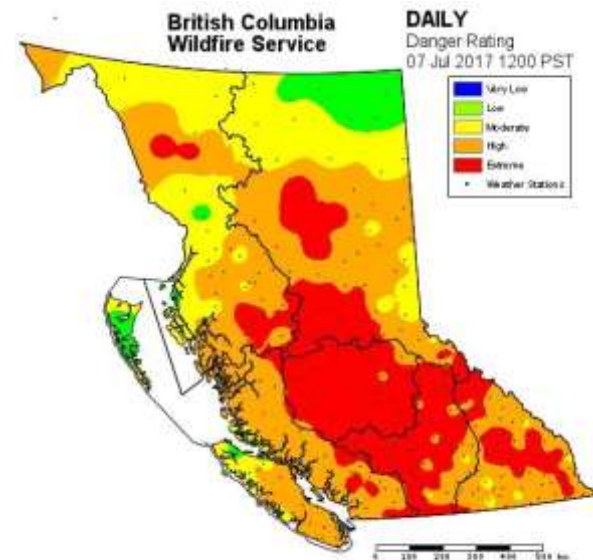
Climate Change Adaptation Research

Project updates 2020

Paired-tree drought study



Photo: Andy Slizak





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





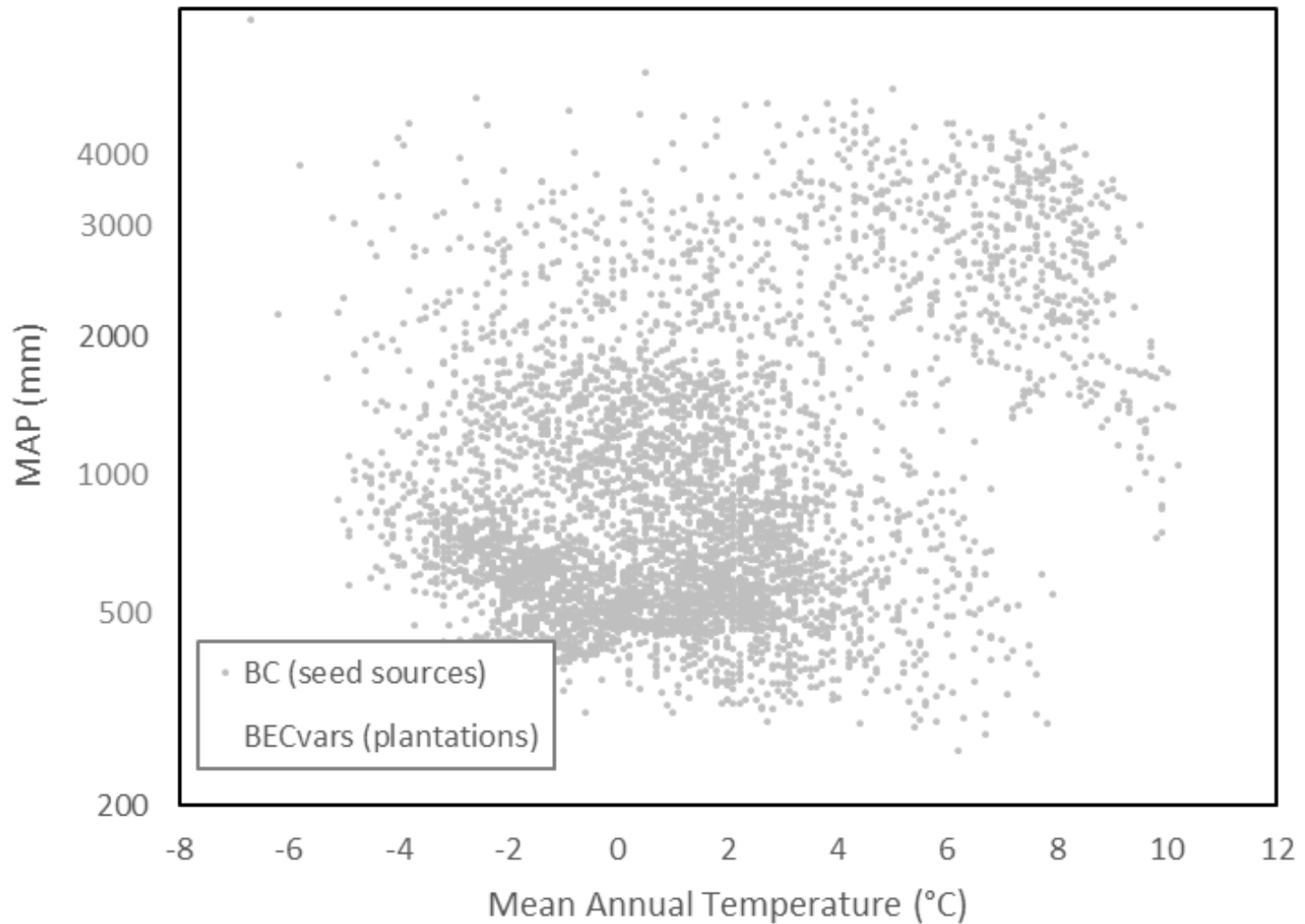
Future plantation orphans

- 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

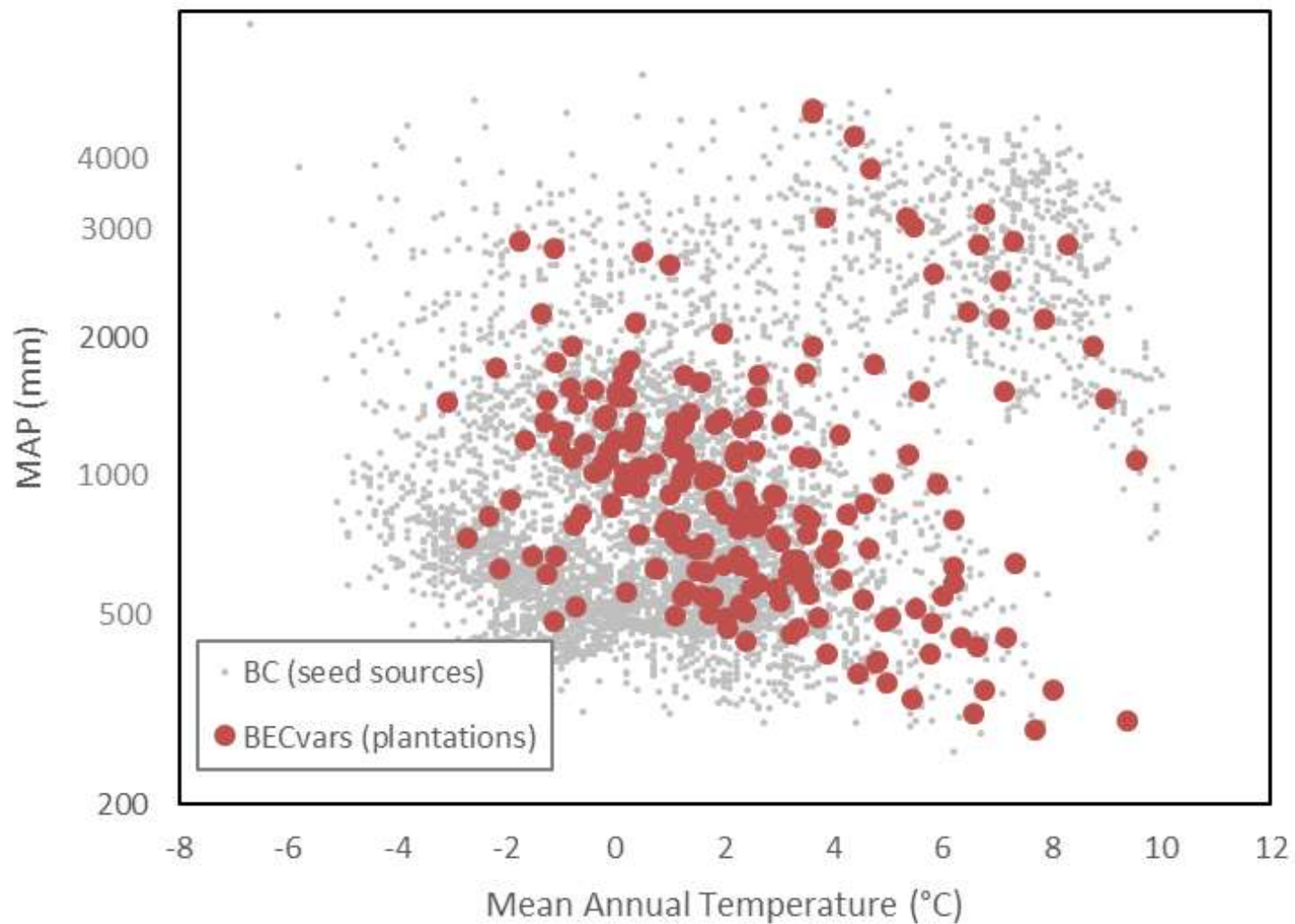
Project updates 2020





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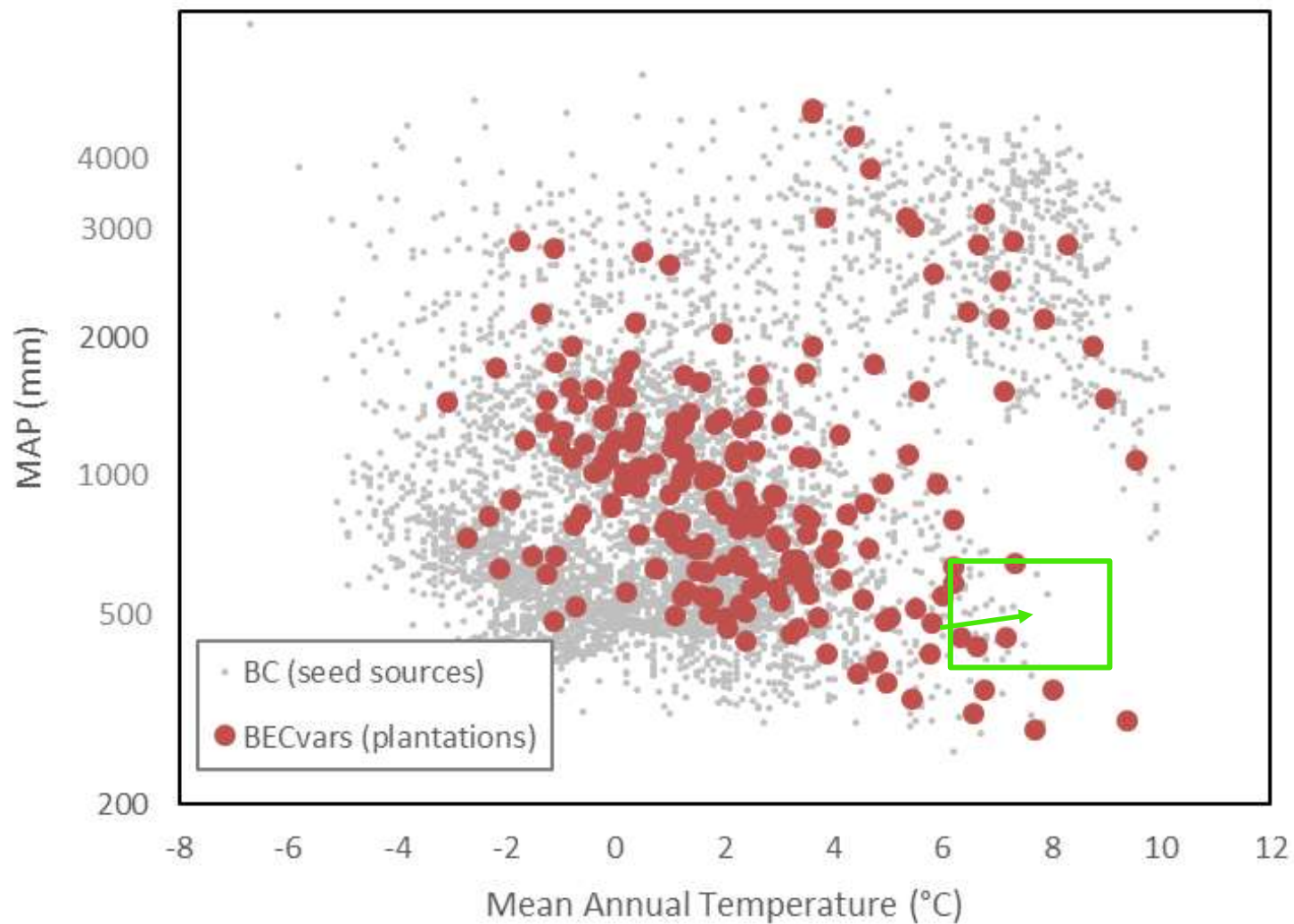
Project updates 2020





Climate Change Adaptation Research

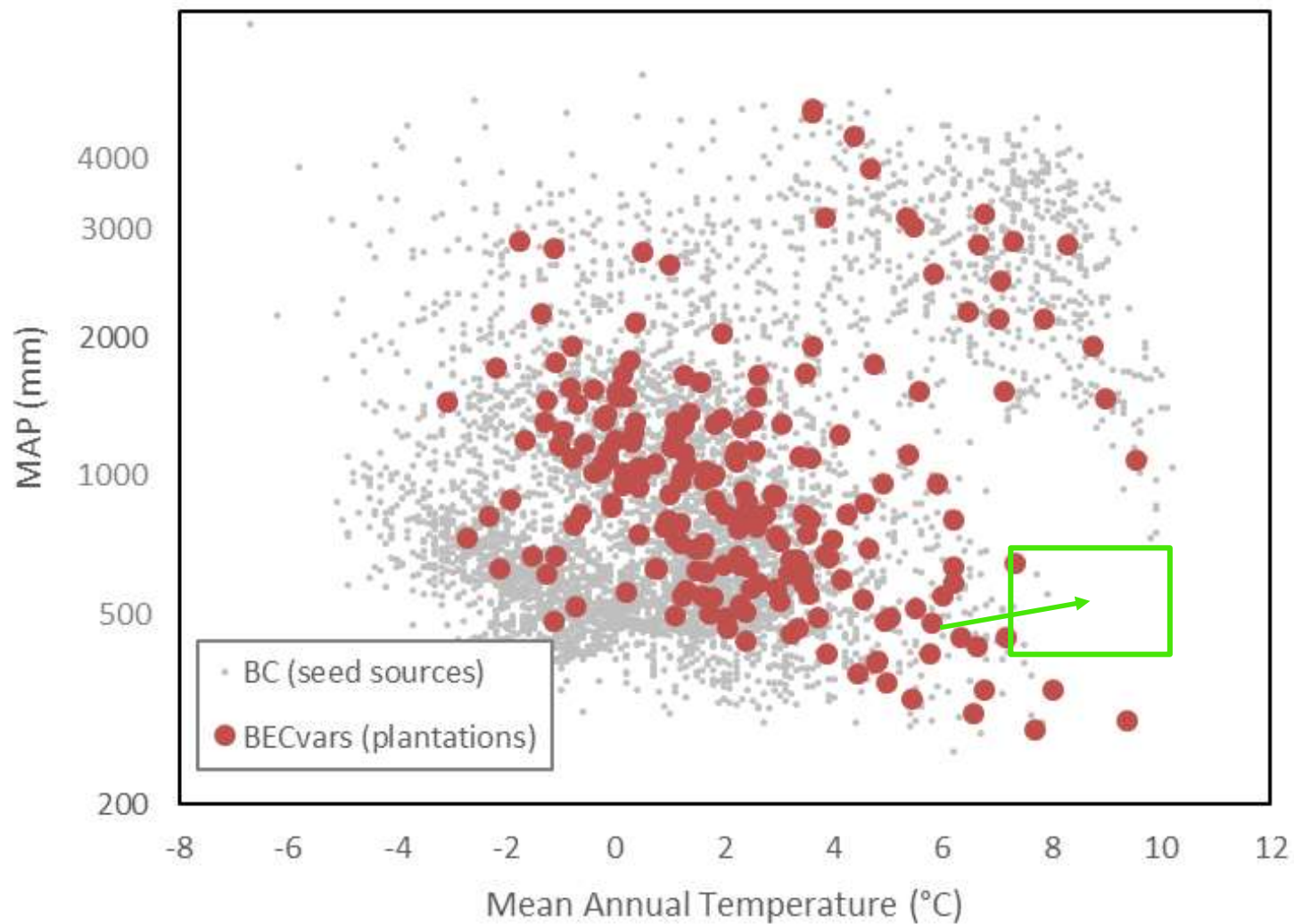
Project updates 2020





Climate Change Adaptation Research

Project updates 2020

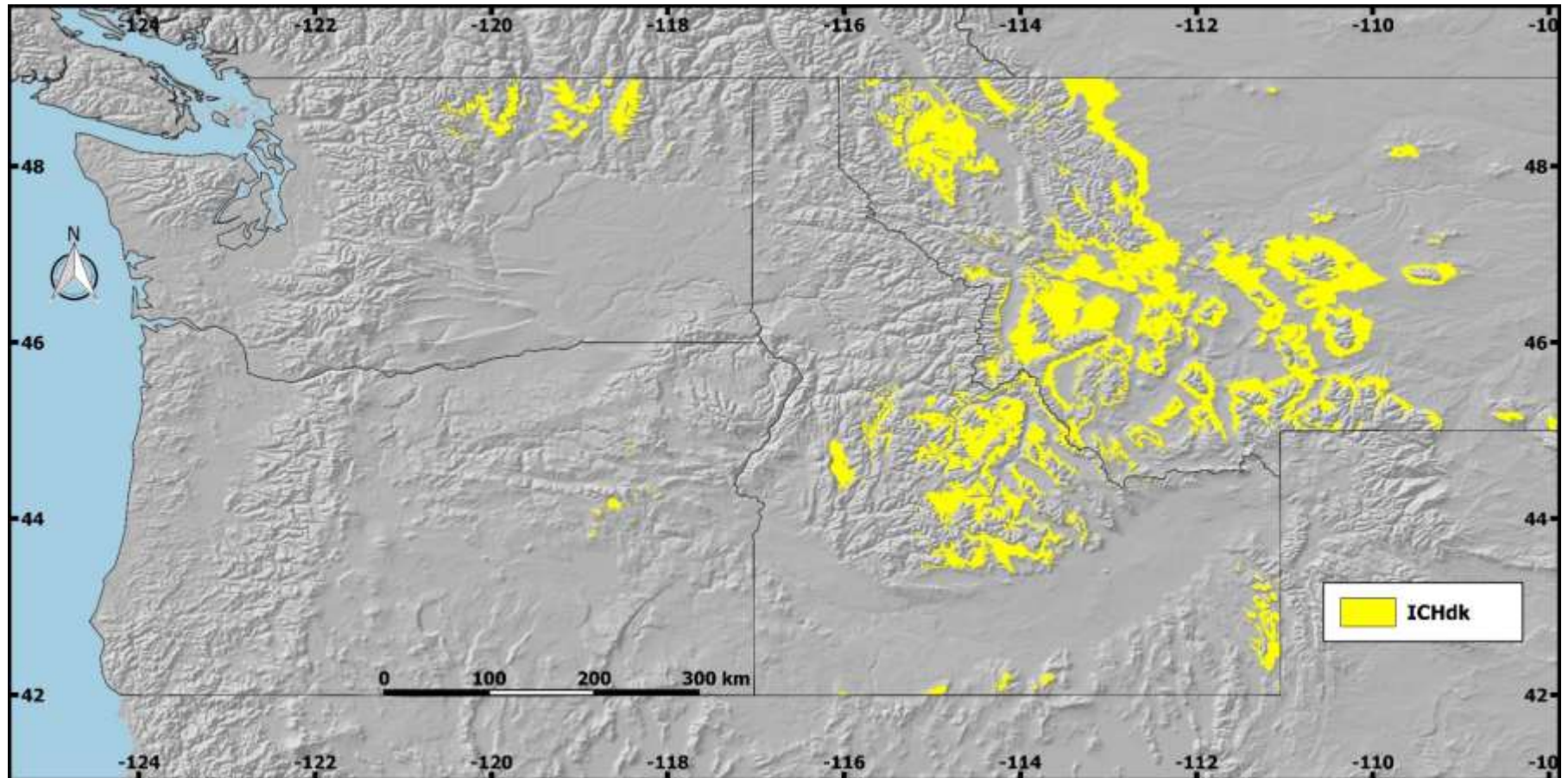




Climate Change Adaptation Research

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

Funding

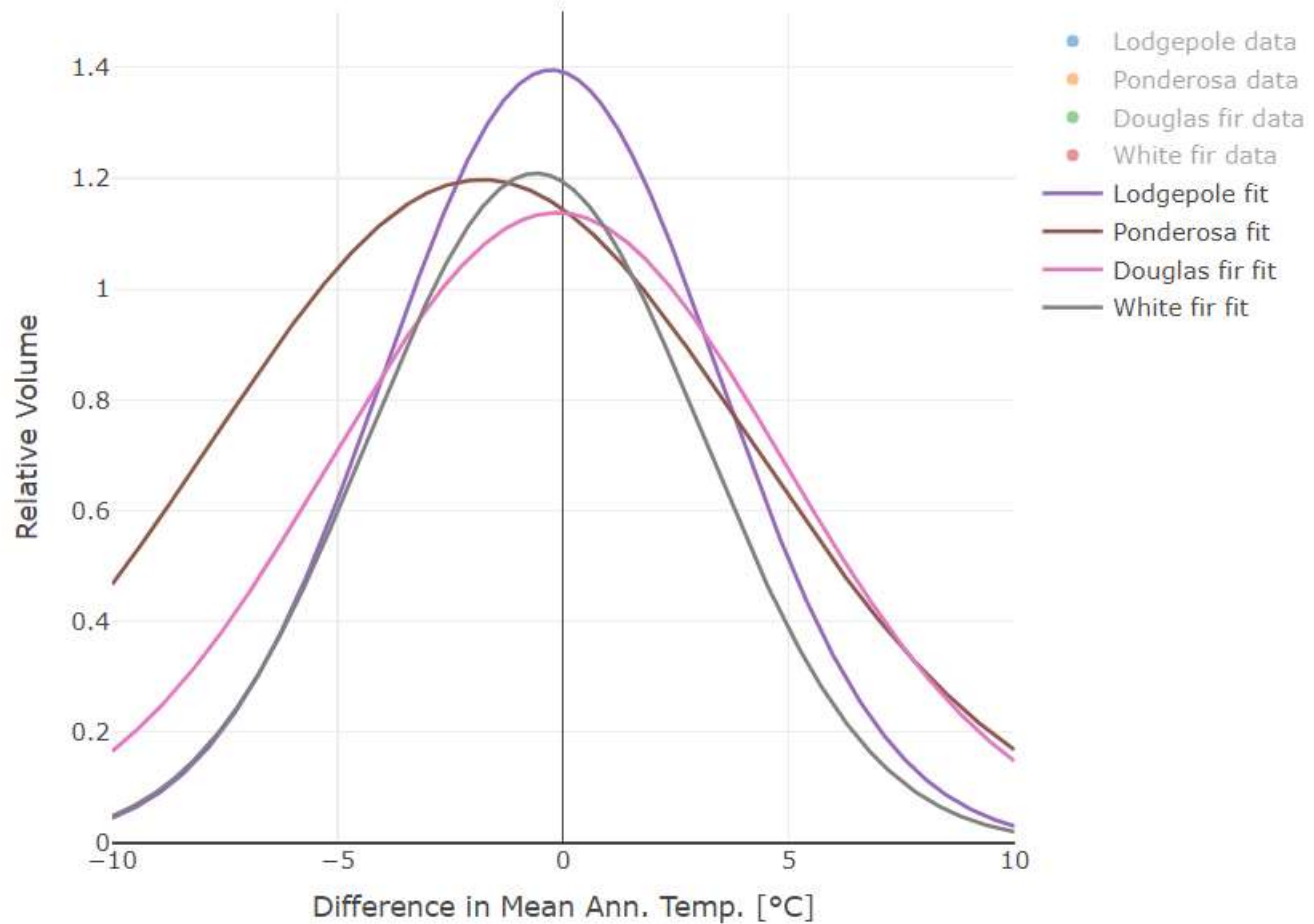
- ?? (UC Davis)

Team

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



Species transferability





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



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 Klauadt) |
| 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

