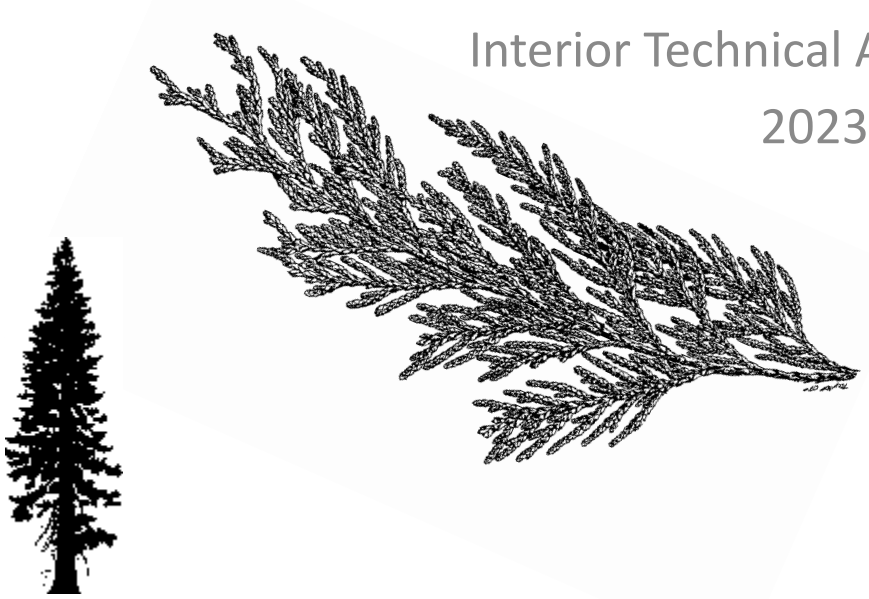
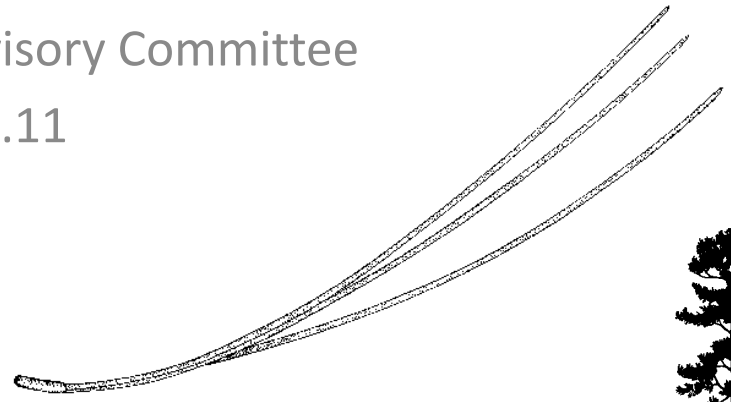
Program Updates: Interior Western Redcedar and Ponderosa Pine

Marie Vance, PhD, RPF

Interior Technical Advisory Committee

2023.01.11



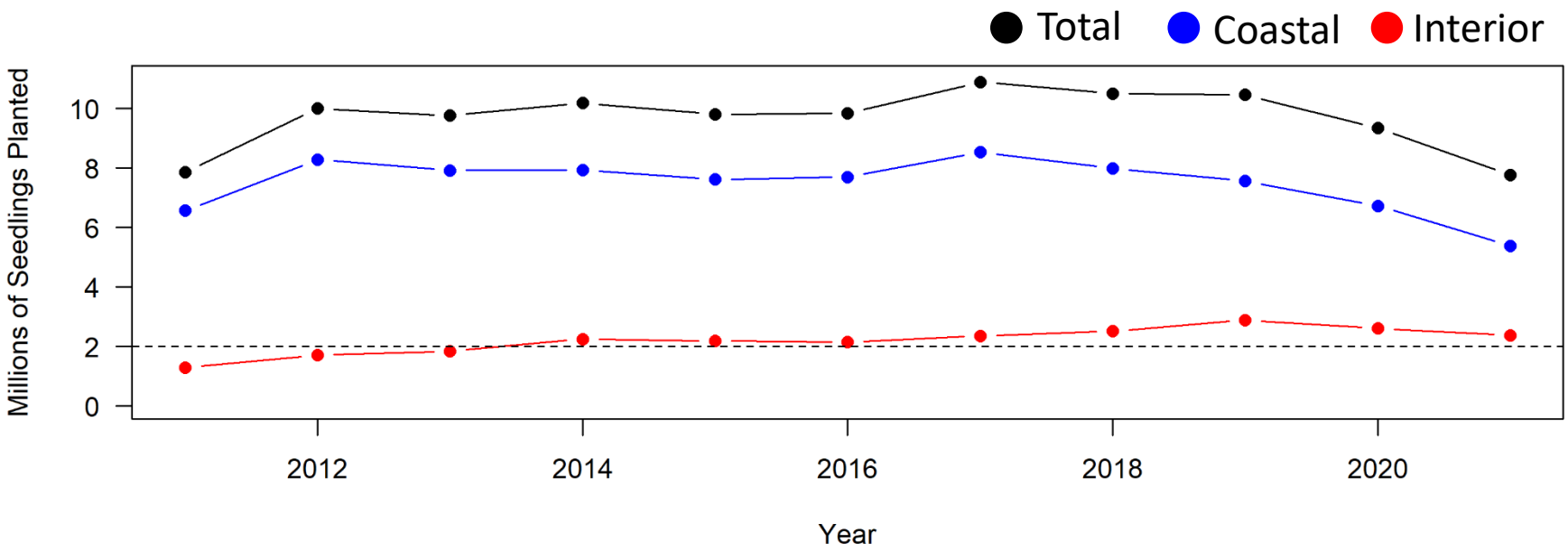


Cwi Breeding Program

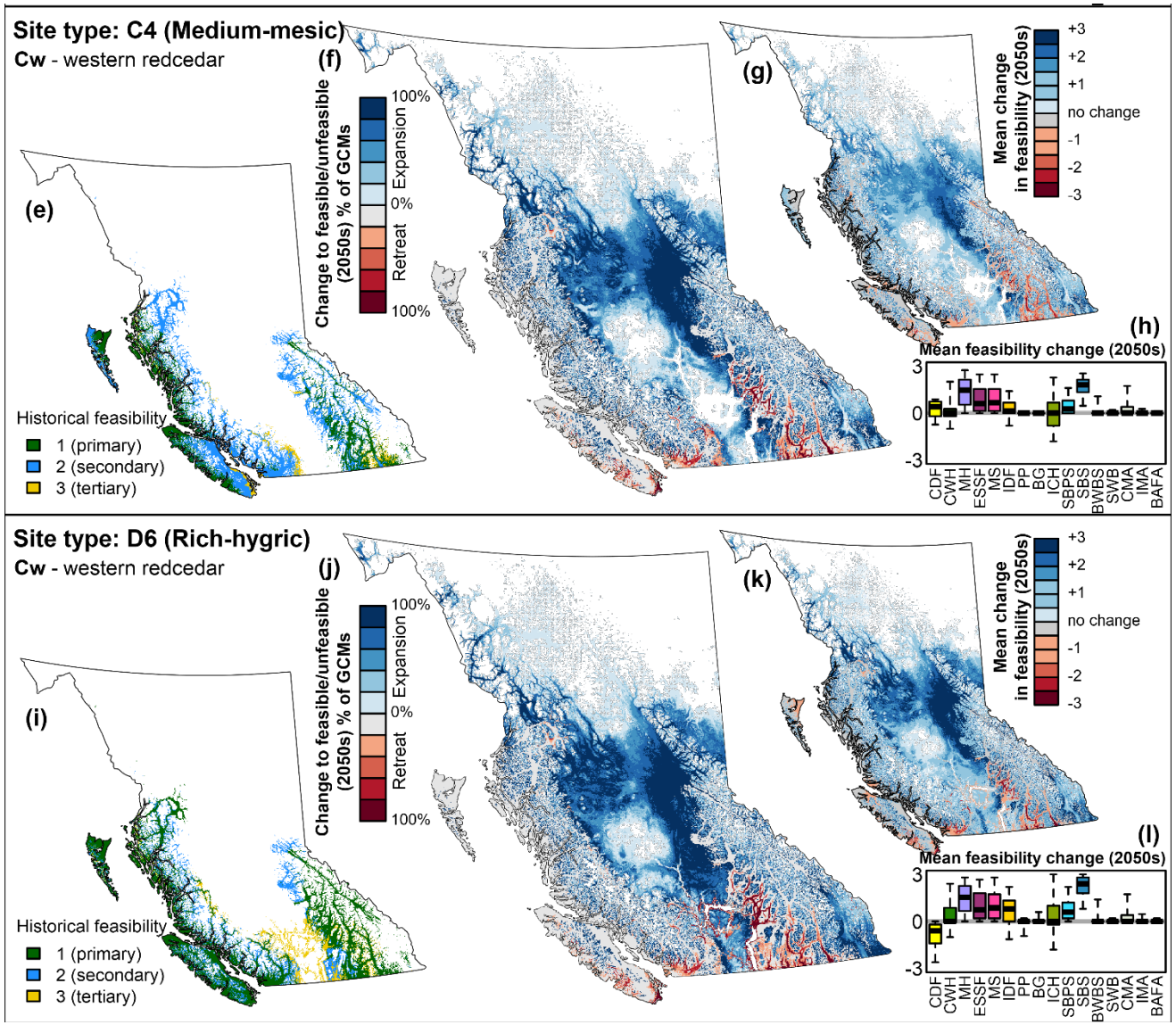
FLNRORD Saanich Seed Orchard (Chris Halldorson)

Cw Planting in RESULTS

- Mean 9.7 million seedlings planted annually
- Interior proportion has increased to 31%



Interior Western Redcedar (Cwi)



MacKenzie and Mahony 2021

Cwi Program Objectives

- Establish first-cycle progeny tests:
  - To select families with superior performance
  - To inform seed transfer policy

Date Creek Cwi provenance test

Thomas Main Cwi progeny test (Jake King)

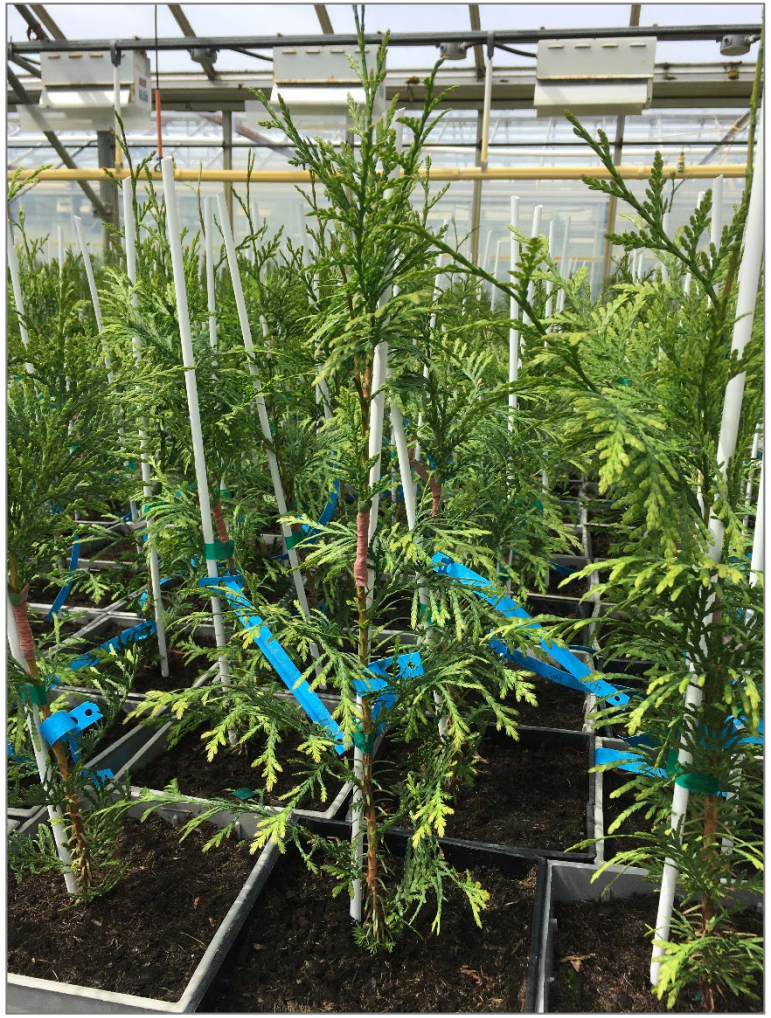
Cw Px6 Forward Selections

95 selections with a genetic gain of 19%

Sebastian Jimenez-Ibarra and Kyle Maddocks

Cw Px6 Forward Selections

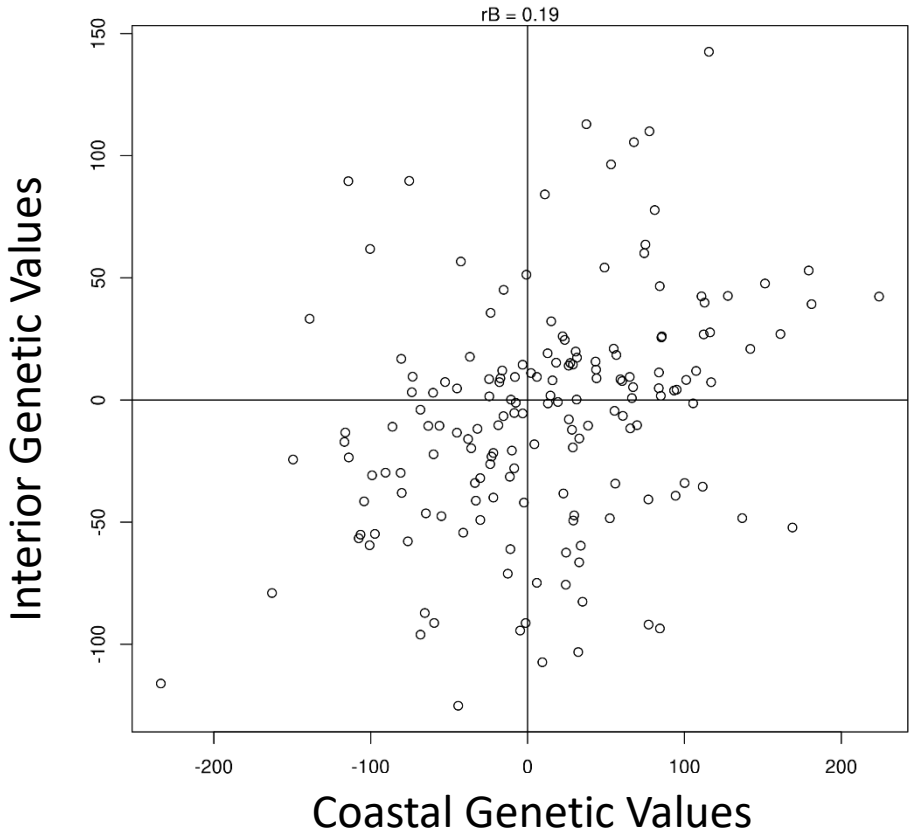
Lindsay Bellingham



95 selections with a genetic gain of 19%

Px6 Genotype X Environment

- Two coastal sites + two sites in the Interior
- High genetic correlations within region (> 0.9)



Despite low levels of genetic differentiation across regions, GxE is high (i.e. low genetic correlations)

Cwi Breeding at CLRS

Cwi Breeding at CLRS

44 males in pollen polymix

Oldrich Hak

Cwi Breeding at CLRS

Oldrich Hak

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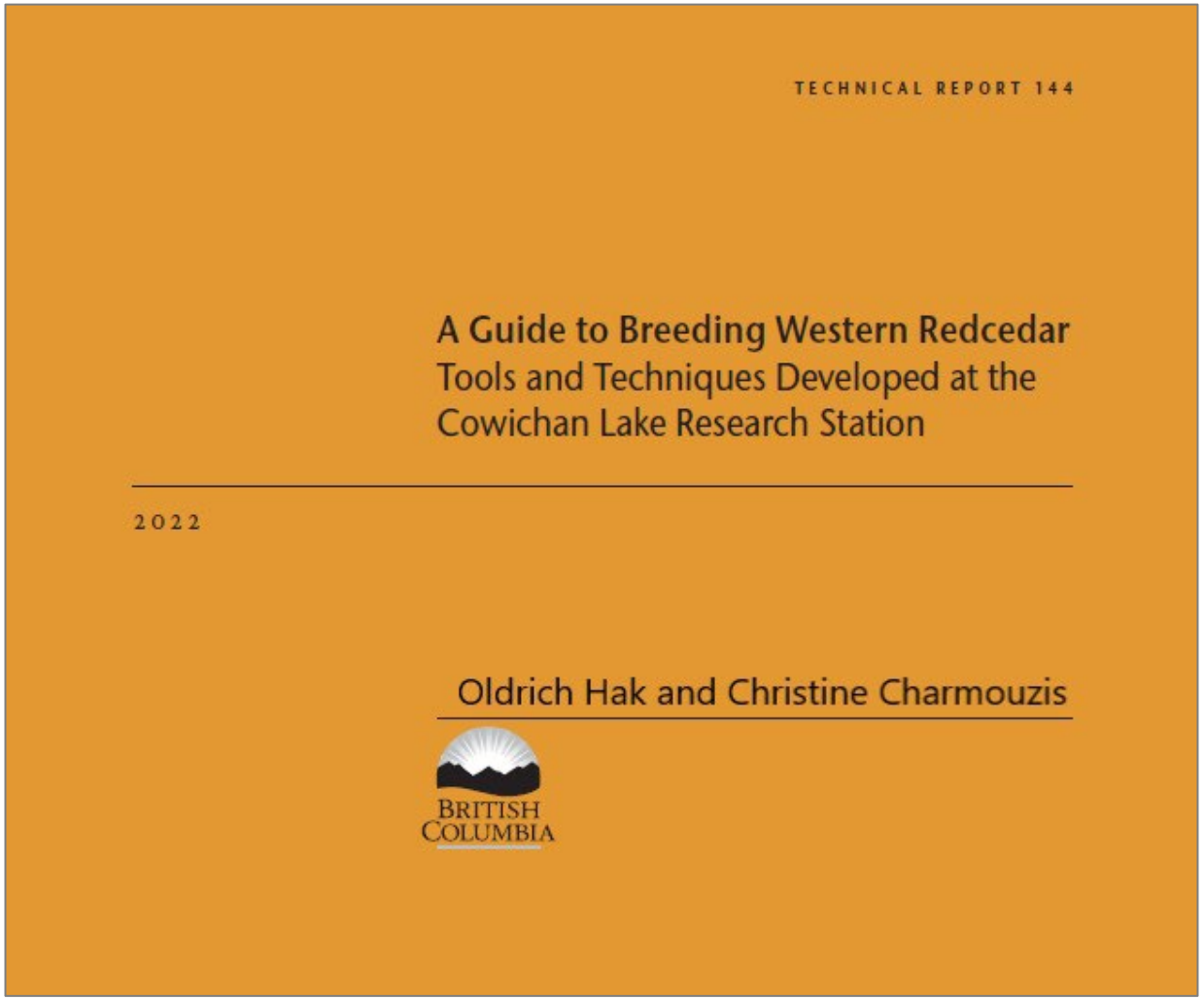


Kal Breeding Arboretum

Kyle Maddocks

Kal Breeding Arboretum

Val Ashley, Cwi Technician

Skimikin Clone Bank

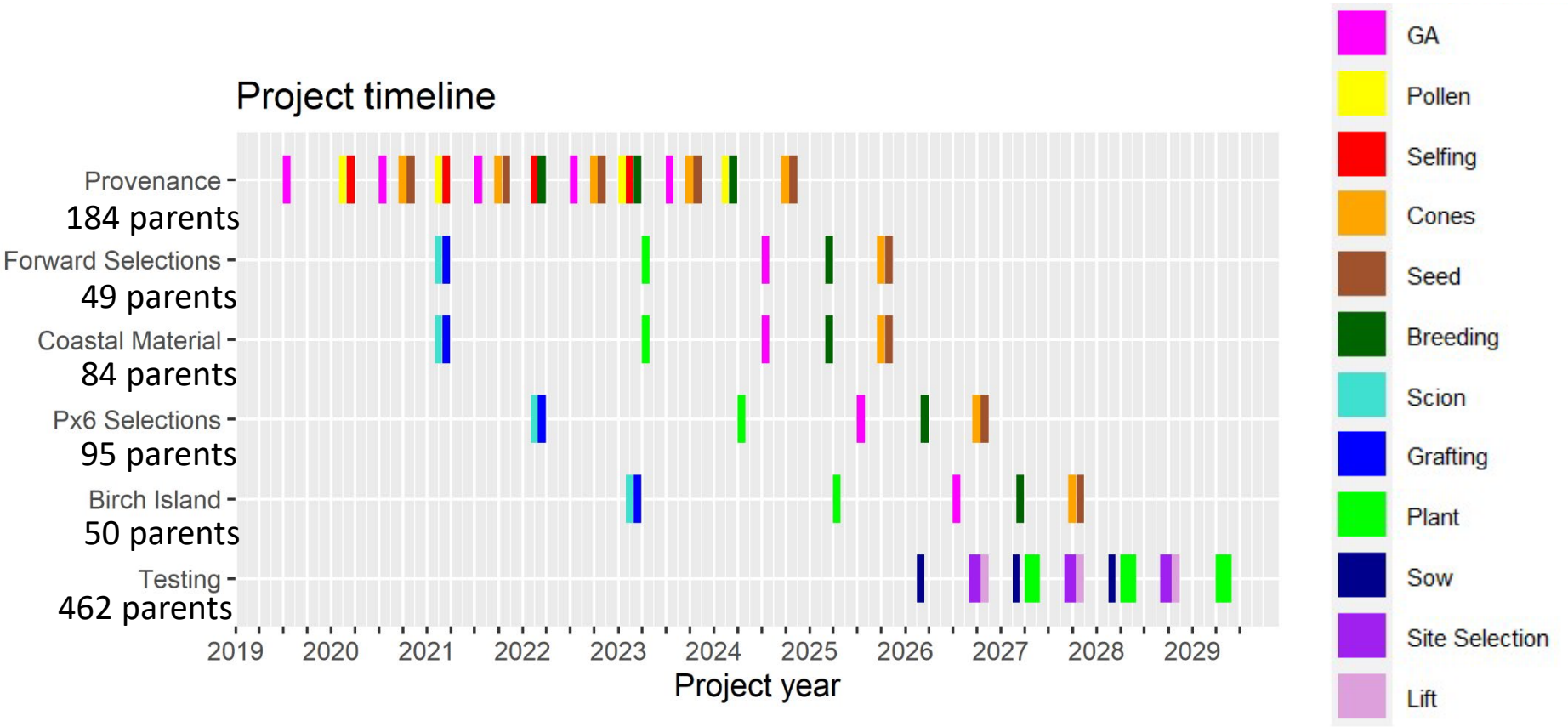
Rob Taylor, Trish Wallensteen, Kailee Charest

GA Application at CLRS

Rose Schmidt, Oldrich Hak, Val Ashley

GA Application at Kal

Cwi Activities 2019 - 2029

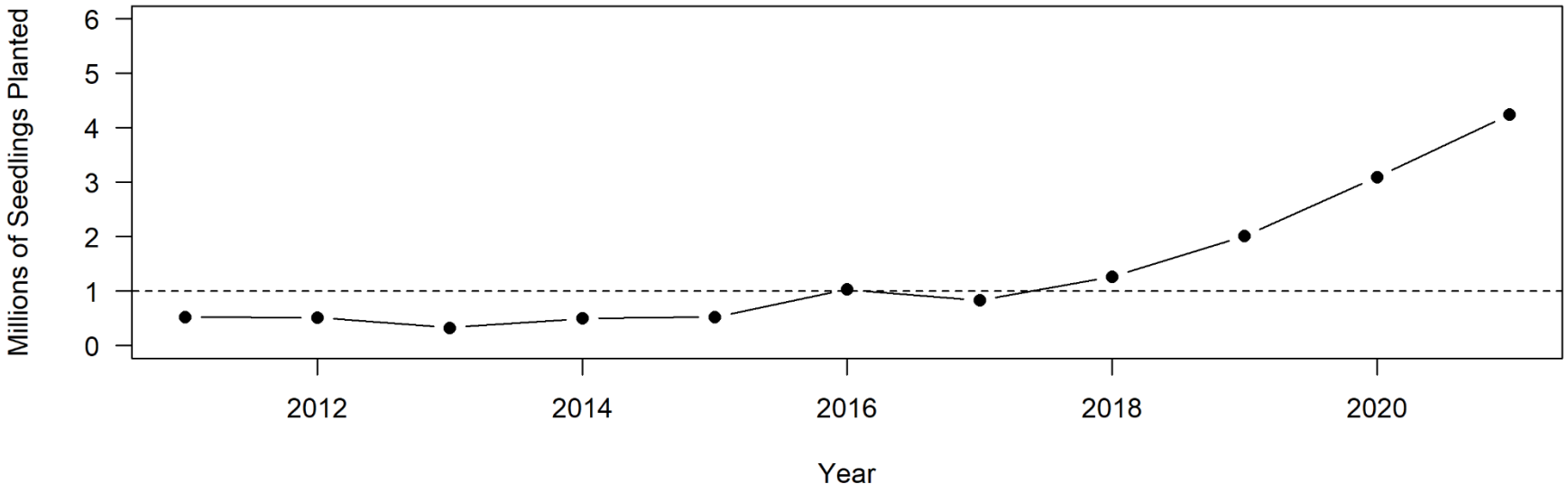


Py Breeding Program

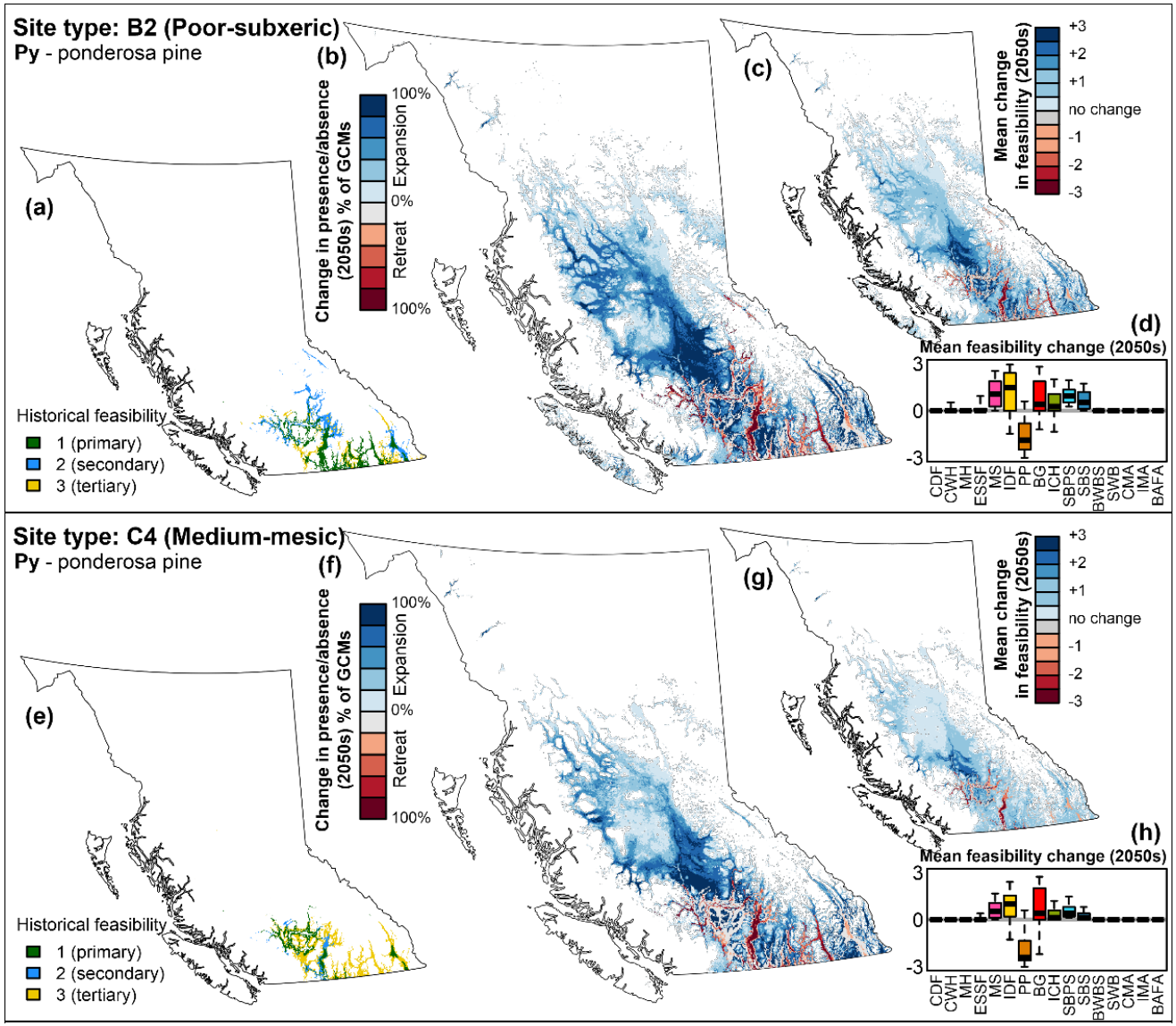
Willamette Valley seed orchard, 11 years from seed (Weyerhaeuser)
Photo credit: Robert L. McNitt

Py Planting in RESULTS

- Plus sowing requests for 2022 = 5.4 million



Ponderosa Pine (Py)



MacKenzie and Mahony 2021

Py Program Objectives

- Establish first-cycle progeny tests:
  - To select families with superior performance
  - To inform seed transfer policy

Okanogan-Wenatchee National Forest, WA

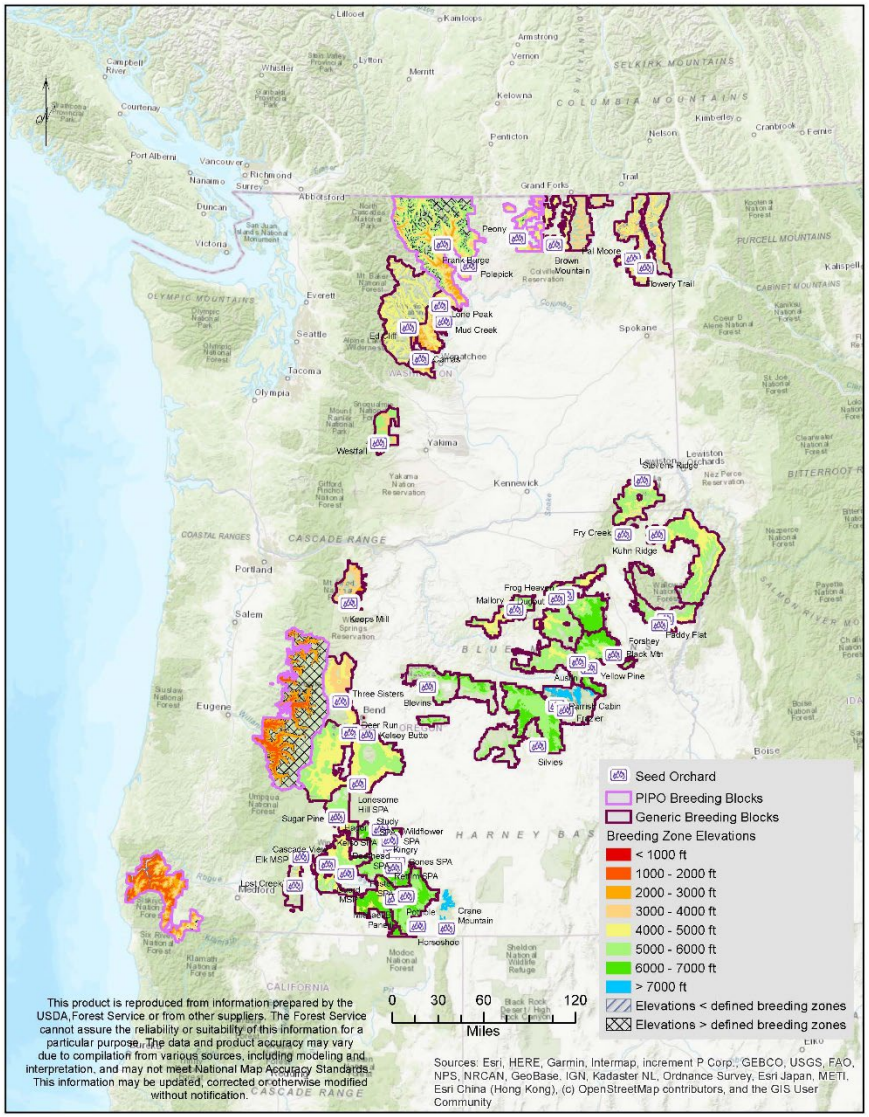
Dugout Seed Orchard, OR

2022 Py Grafting

Val Ashley, Py Technician

2022 Cone Collections

- Recce of 17 orchards in WA and northern OR
- Targeted 6 with enough cones for collections
- Lost 2 to Dioryctria but picked up 1 extra



Scott Kolpak, USDA Region 6

2022 Cone Collections

Creston, BC

J KO INDUSTRIES

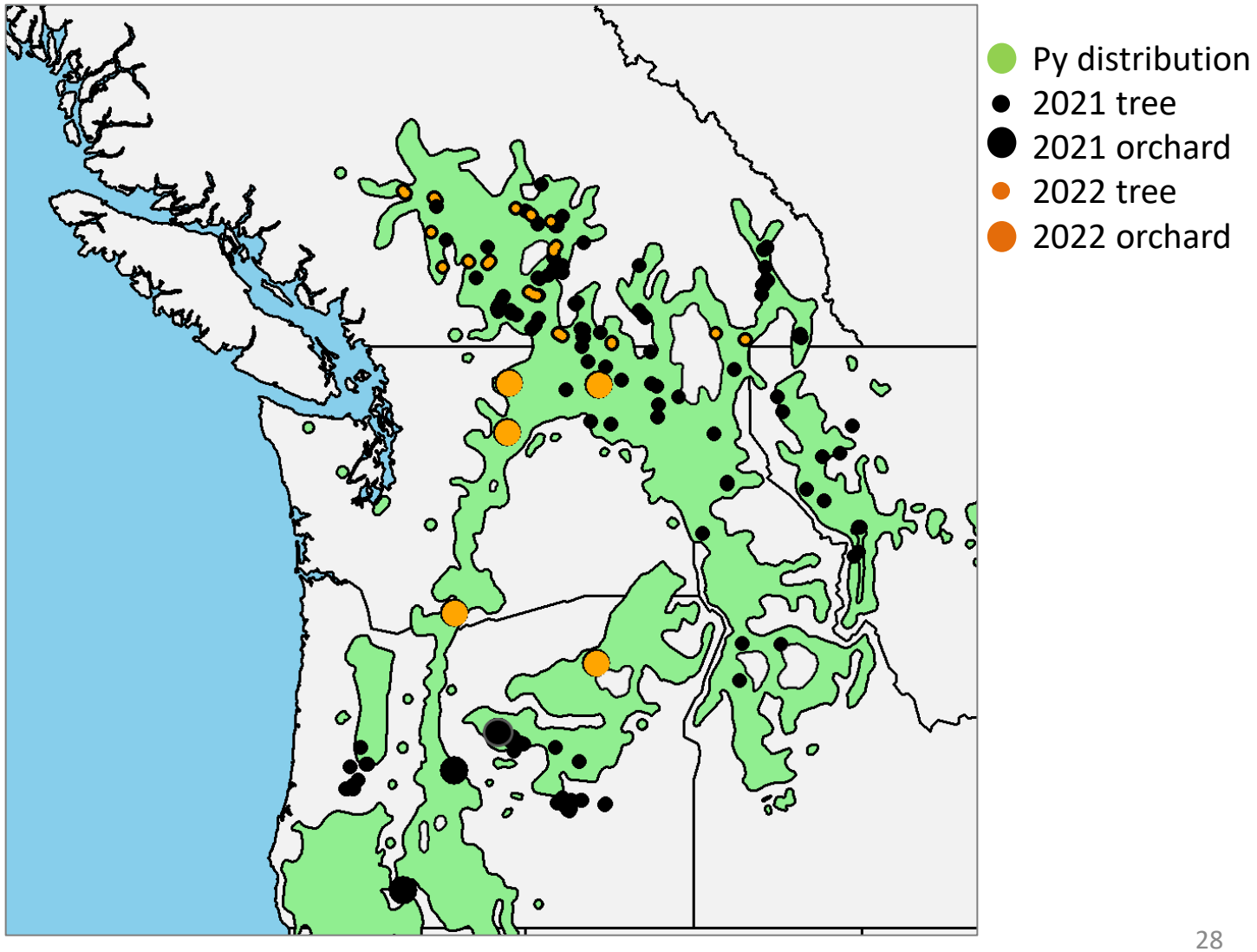
2022 Cone Collections

Fisher Hill Orchard, WA DNR

J KO INDUSTRIES

2022 Cone Collections

2021/2022 Cone Collections

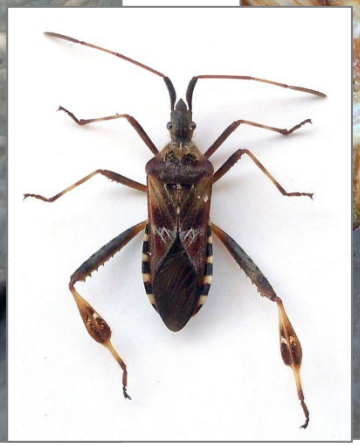


2022 Seed Predators

Ponderosa pine seedworm (*Cydia piperana*)

Squirrels

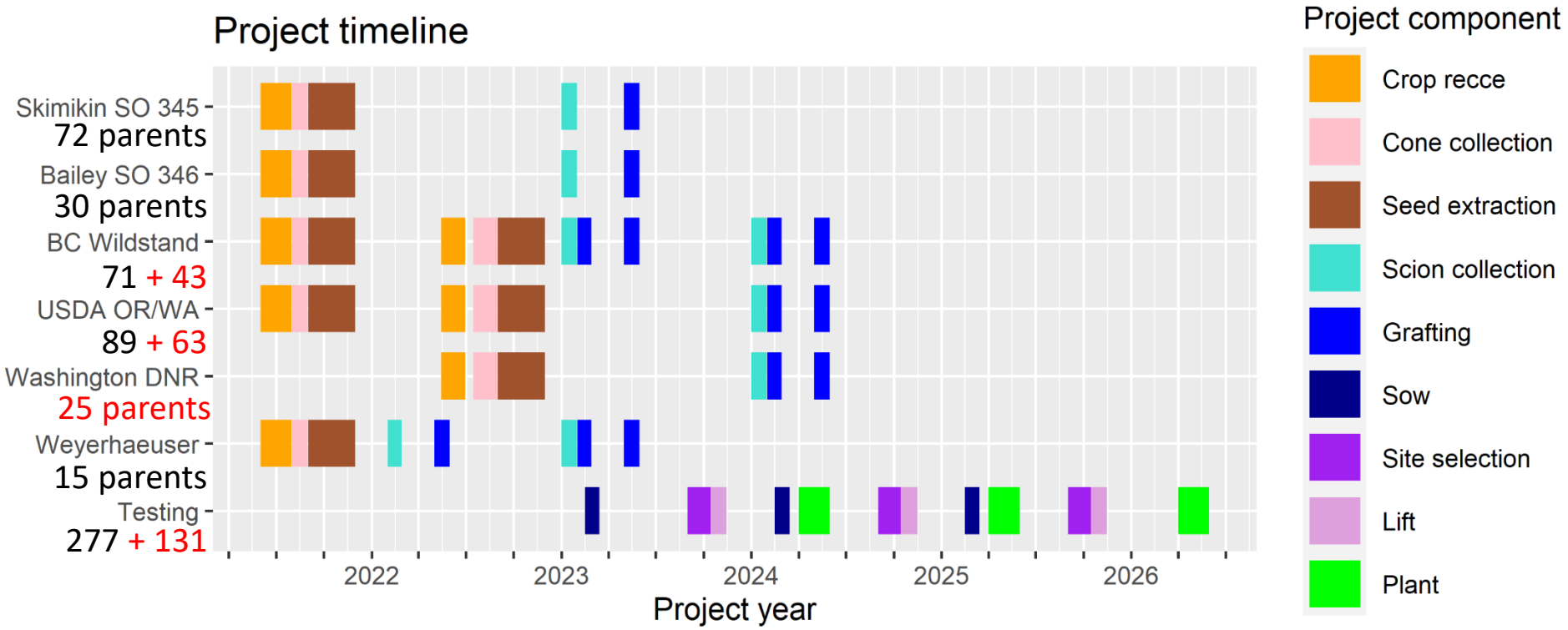
Dioryctria



Leptoglossus

Cone resin midge

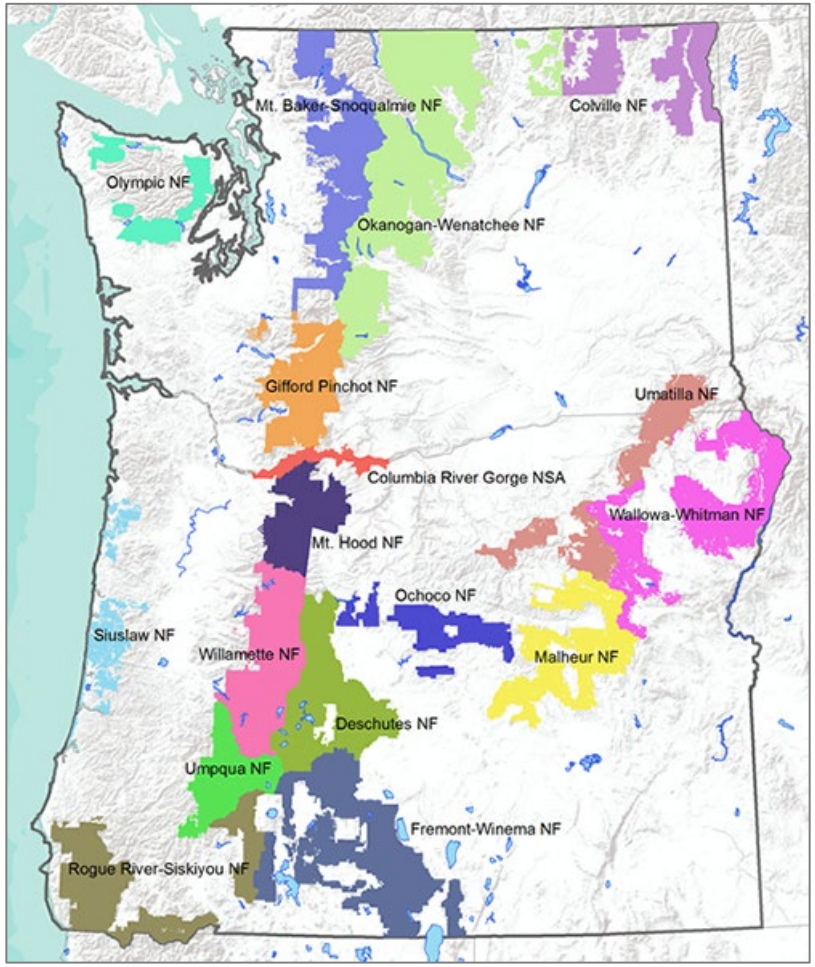
Py Activities 2021 - 2026



2022 collections aren't looking good but we may not need additional cone collections…

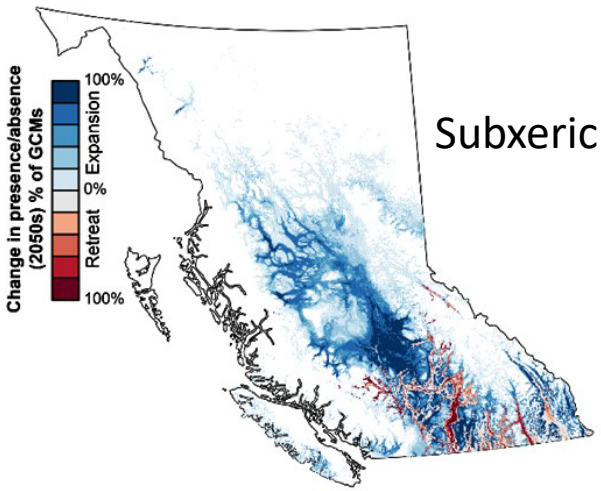
Dorena Genetic Resource Centre

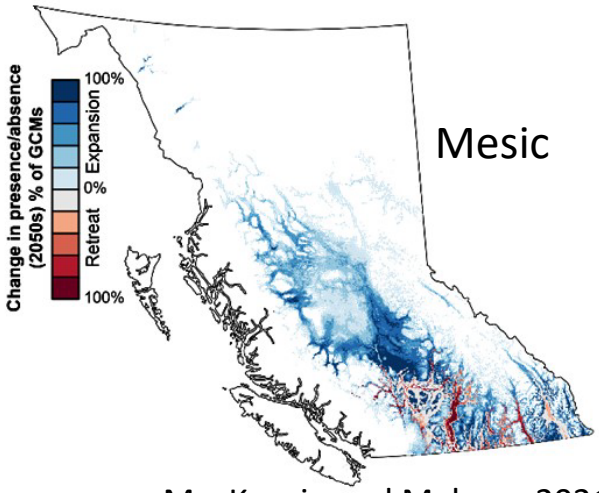
- Over 10,000 individual-tree seed collections
- Memorandum of Understanding is already in place with USDA Region 6
- Boost base population to 500 parents



USDA Forest Service National Forest Climate Change Maps

Testing Strategy?





MacKenzie and Mahony 2021

72 BECvars Feasible for Py in 2021-2061

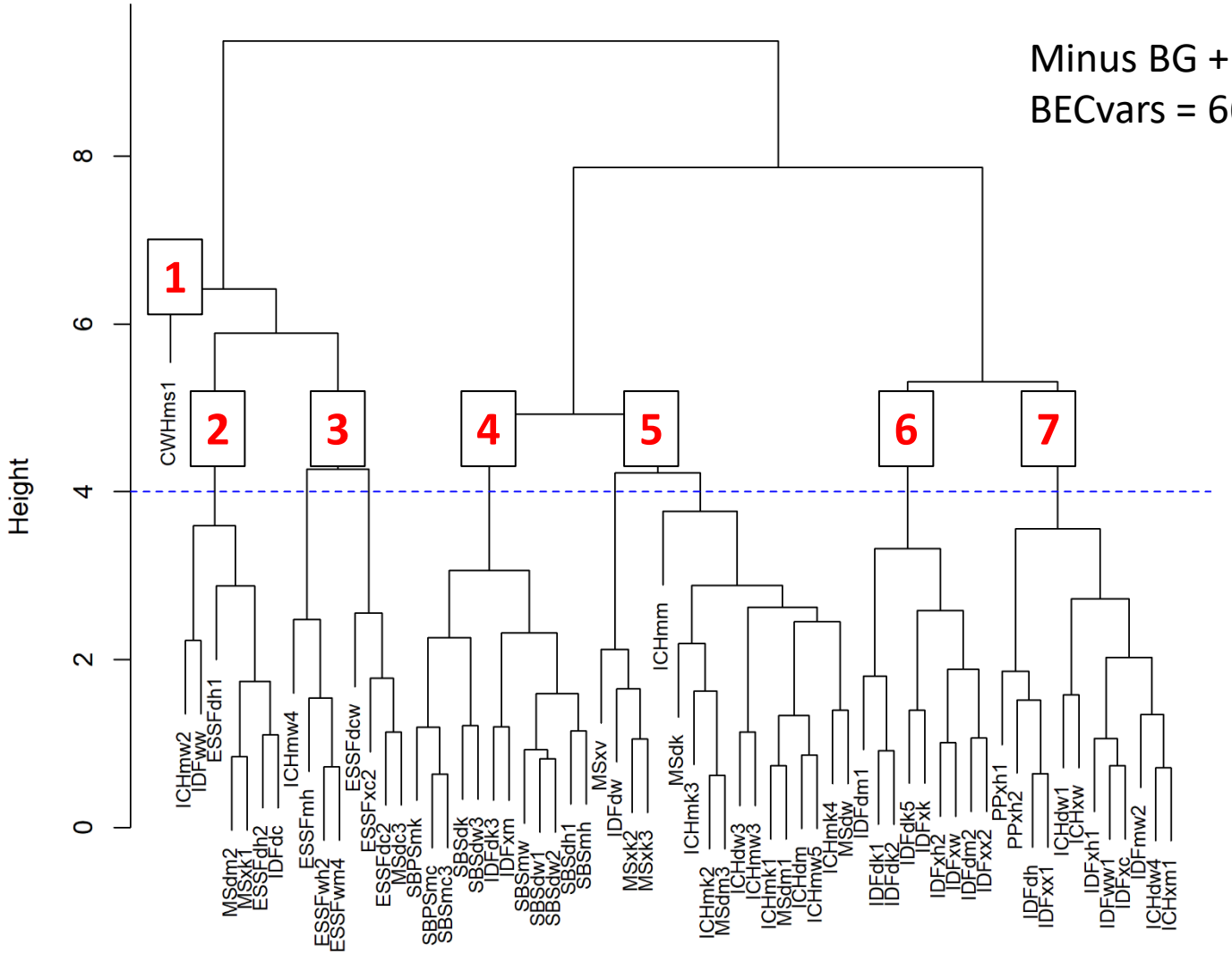
BECvar	2021	2041	2061
BGxh1	3	3	3
BGxh2	3	3	3
BGxh3	3	3	3
BGxw1	3	3	3
BGxw2	3	2	2
CWHms1	2	2	3
ESSFdc2	4	3	3
ESSFdcw	4	3	4
ESSFdh1	3	2	2
ESSFdh2	2	2	2
ESSFmh	3	3	2
ESSFwh2	3	2	2
ESSFwm4	4	3	2
ESSFxc2	4	4	3
ICHdm	3	2	2
ICHdw1	2	2	2
ICHdw3	4	3	3
ICHdw4	3	2	2
ICHmk1	2	2	2
ICHmk2	3	3	3
ICHmk3	4	3	3
ICHmk4	4	3	2
ICHmm	4	4	3
ICHmw2	3	3	2
ICHmw3	3	3	3
ICHmw4	3	3	3
ICHmw5	3	3	2
ICHxm1	3	3	3
ICHxw	2	2	2
ICHxwa	2	2	2
IDFdc	3	3	3
IDFdh	2	3	3
IDFdk1	3	2	2
IDFdk2	3	2	2
IDFdk3	4	3	3
IDFdk5	3	3	2

BECvar	2021	2041	2061
IDFdm1	2	2	2
IDFdm2	2	2	2
IDFdw	3	3	3
IDFmw2	3	3	3
IDFww	3	2	2
IDFww1	2	3	3
IDFxc	2	2	2
IDFxh1	2	2	3
IDFxh2	3	2	3
IDFxk	2	2	2
IDFxm	3	3	3
IDFxw	3	3	2
IDFxx1	3	3	2
IDFxx2	2	2	2
MSdc3	4	3	3
MSdk	4	3	3
MSdm1	3	3	2
MSdm2	3	3	3
MSdm3	4	3	3
MSdw	3	3	3
MSxk1	3	3	2
MSxk2	3	3	3
MSxk3	4	3	3
MSxv	4	3	3
PPxh1	2	2	3
PPxh2	3	3	3
SBPSmc	3	3	3
SBPSmk	4	3	3
SBSdh1	4	3	3
SBSdk	3	3	3
SBSdw1	4	3	3
SBSdw2	4	3	3
SBSdw3	4	3	3
SBSmc3	4	3	3
SBSmh	3	3	2
SBSmw	4	3	3

Feasibility is averaged across site series within BECvar (with 50% weight to zonal if present), then averaged across Districts

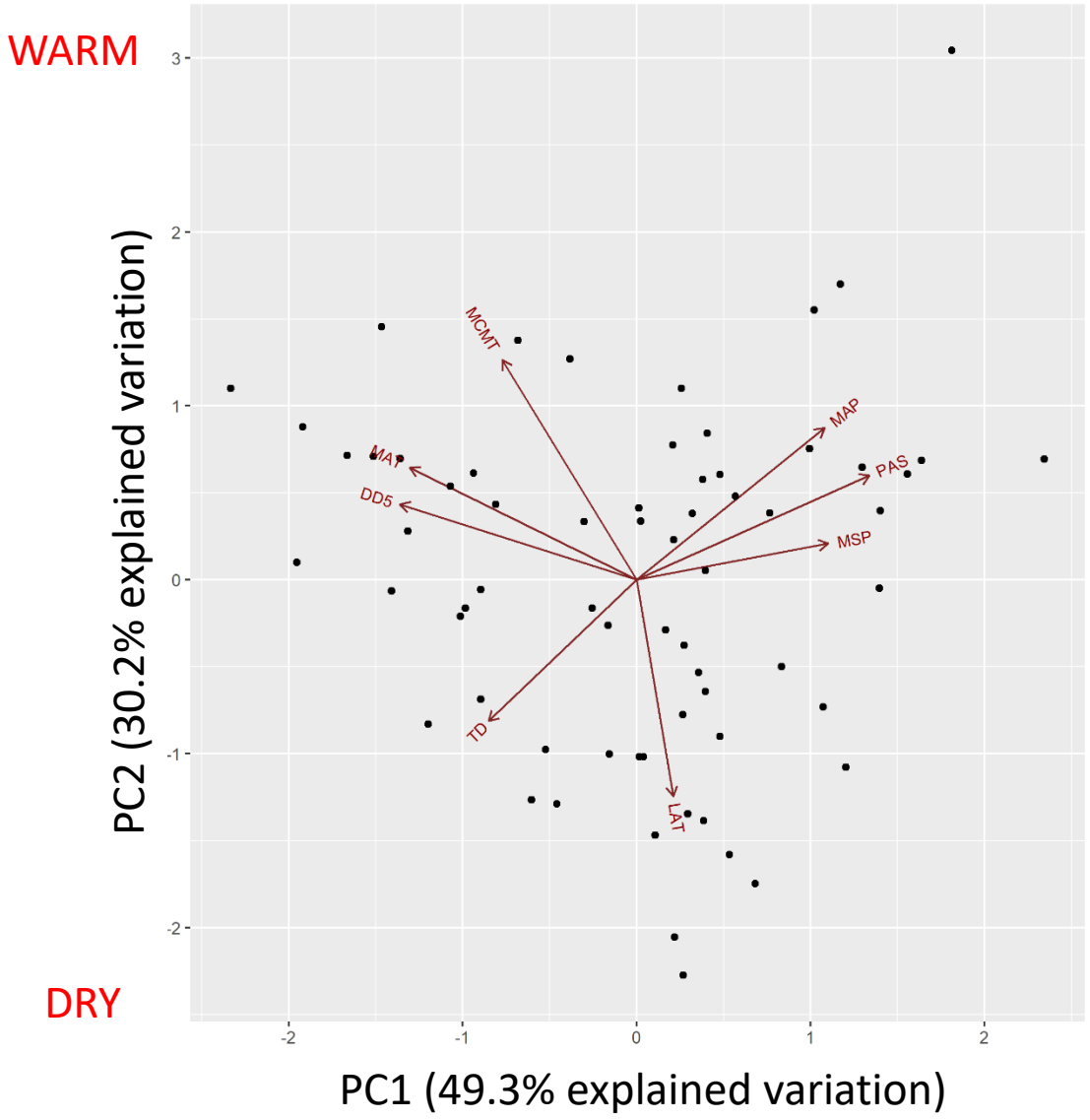
Testing Strategy?

Minus BG + ICHxwa
BECvars = 66 BECvars



Hierarchical Clustering Analysis of CBST v6 variables
(LAT, MAT, MCMT, TD, DD5, MAP, MSP, PAS)

Testing Strategy?

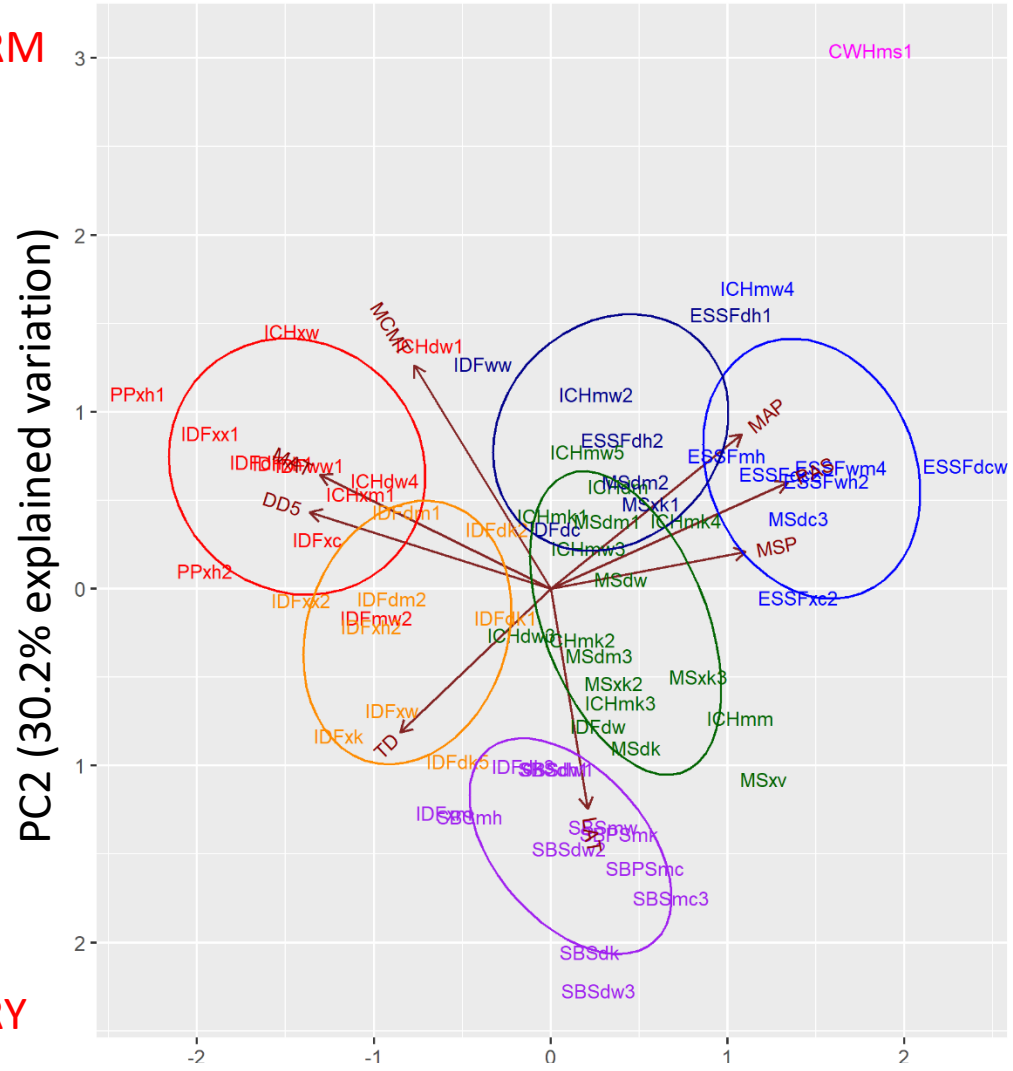


Principal Components Analysis of CCISS BECvars using CBST v6 variables

Testing Strategy?

WARM

WET



DRY

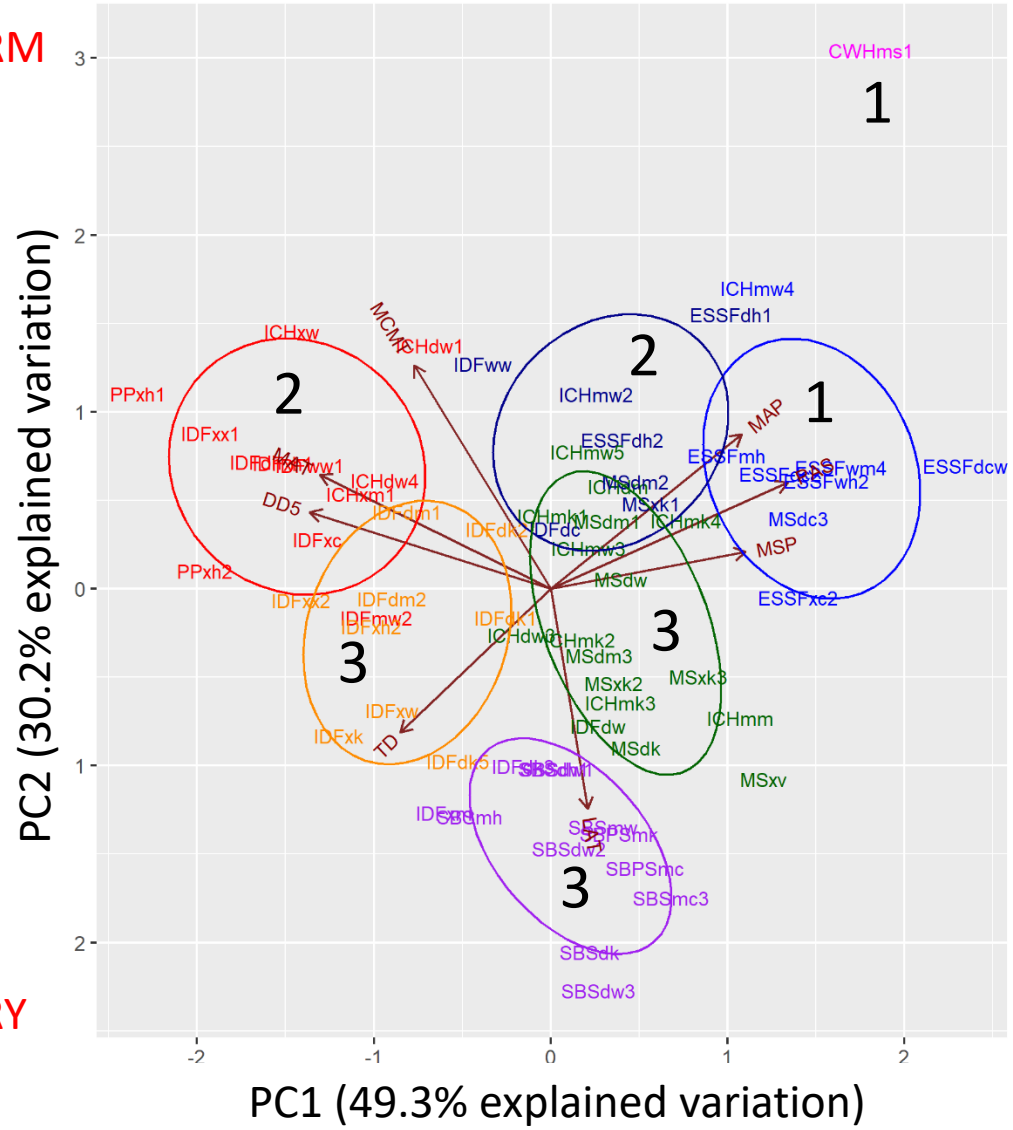
COLD

Clusters do separate out

Testing Strategy?

WARM

WET



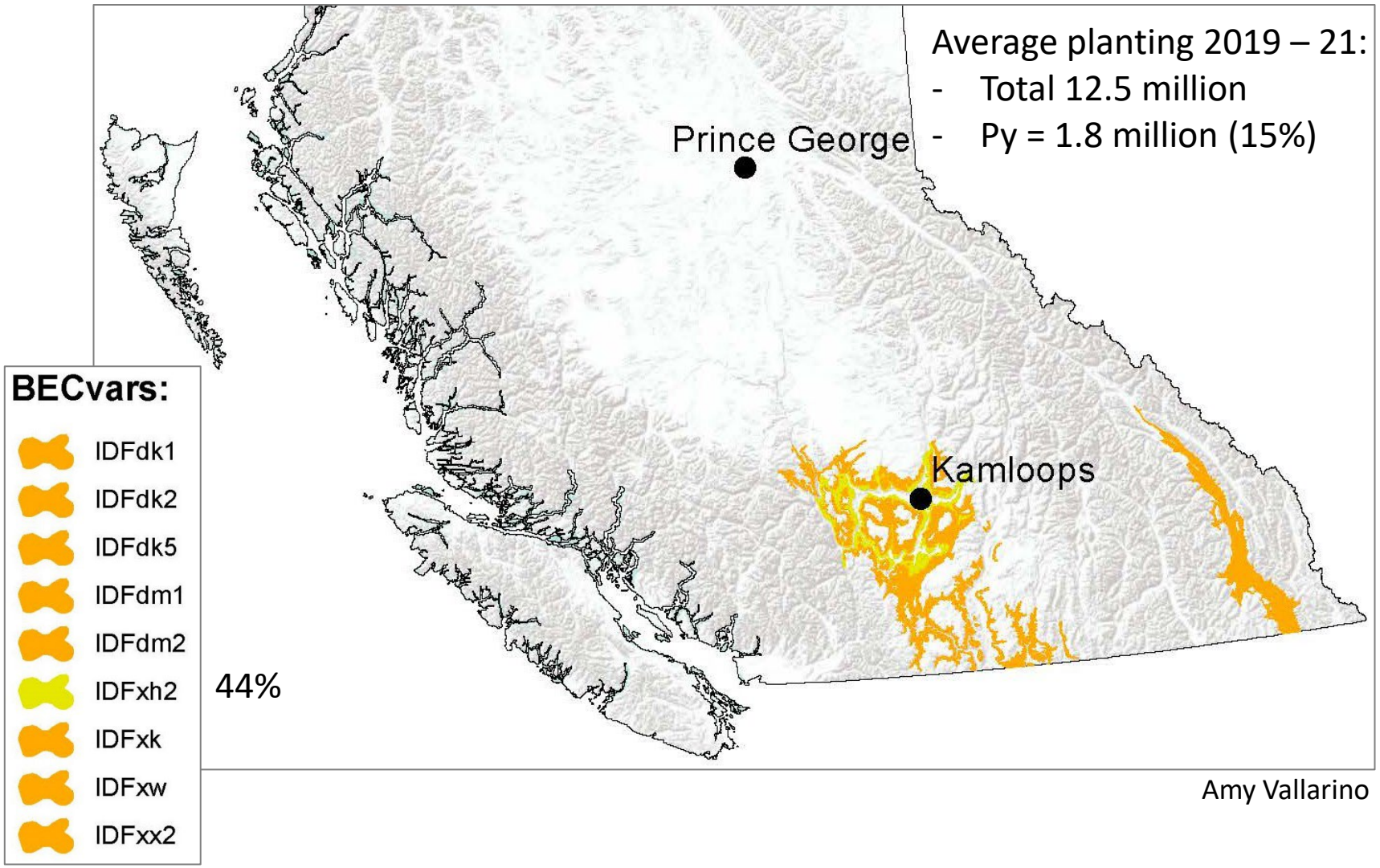
DRY

COLD

15 test sites

3 years planting

Dry IDF (3 sites)



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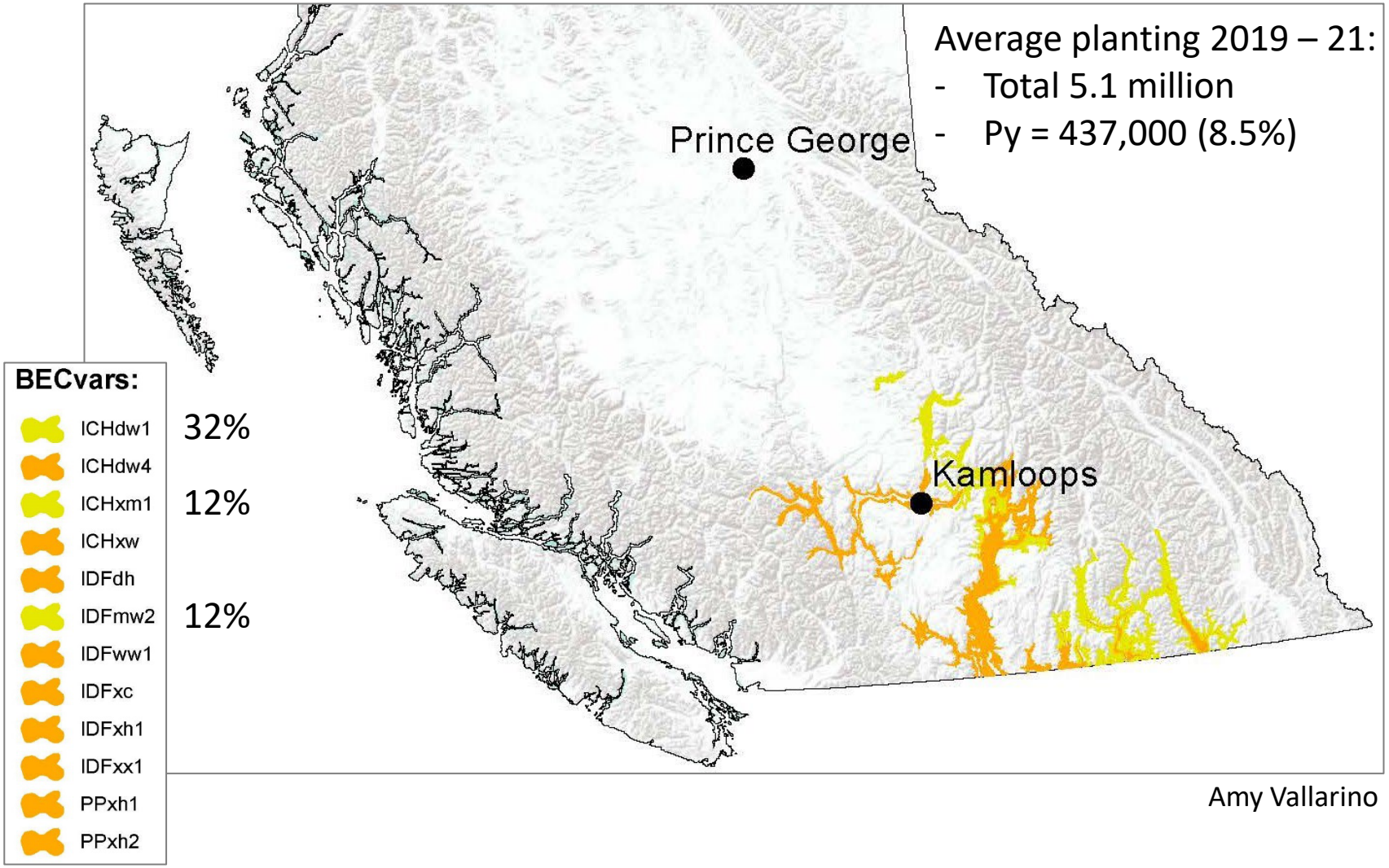
PP (2 sites)



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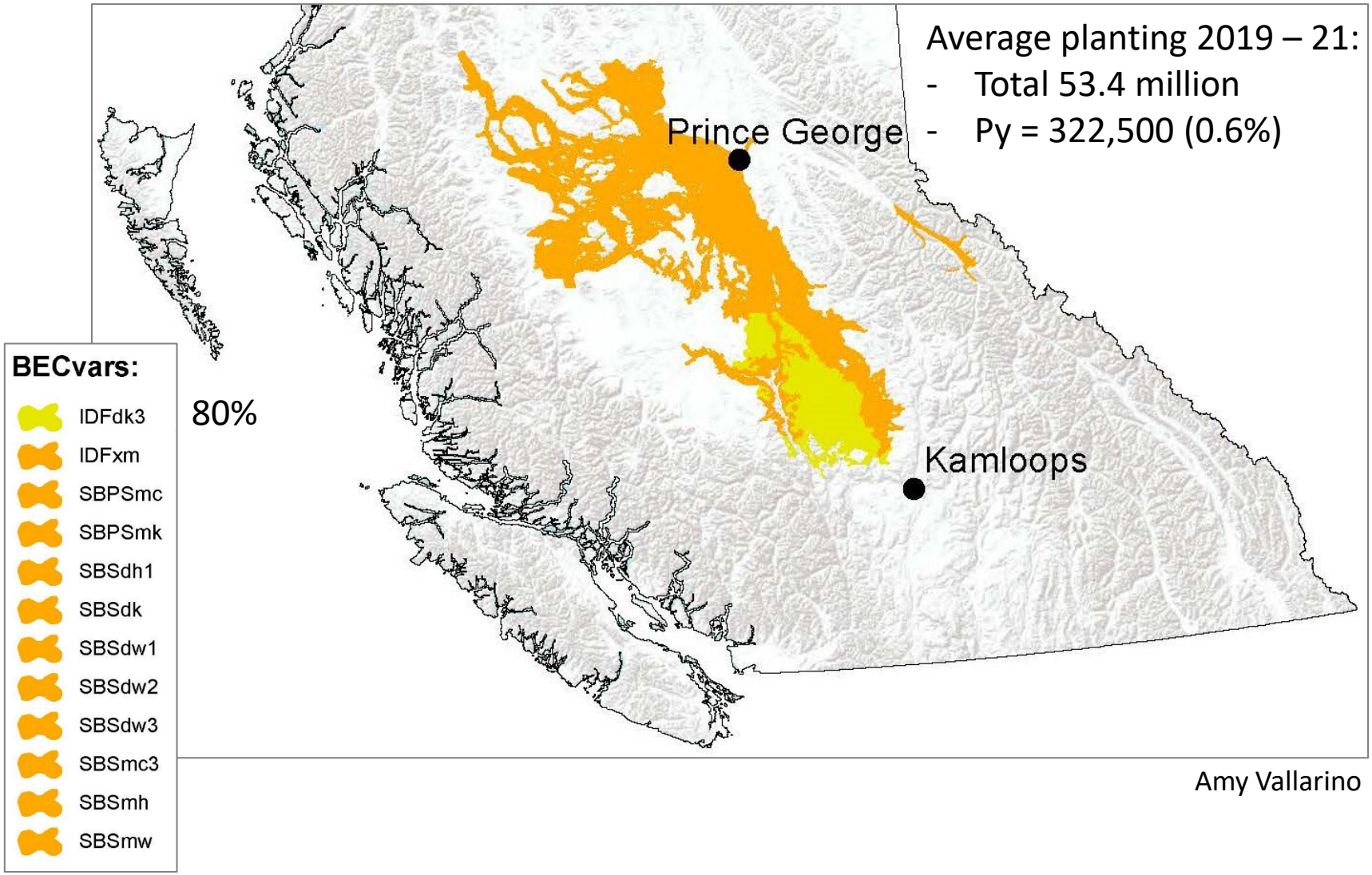
Chilcotin Plateau (3 sites)



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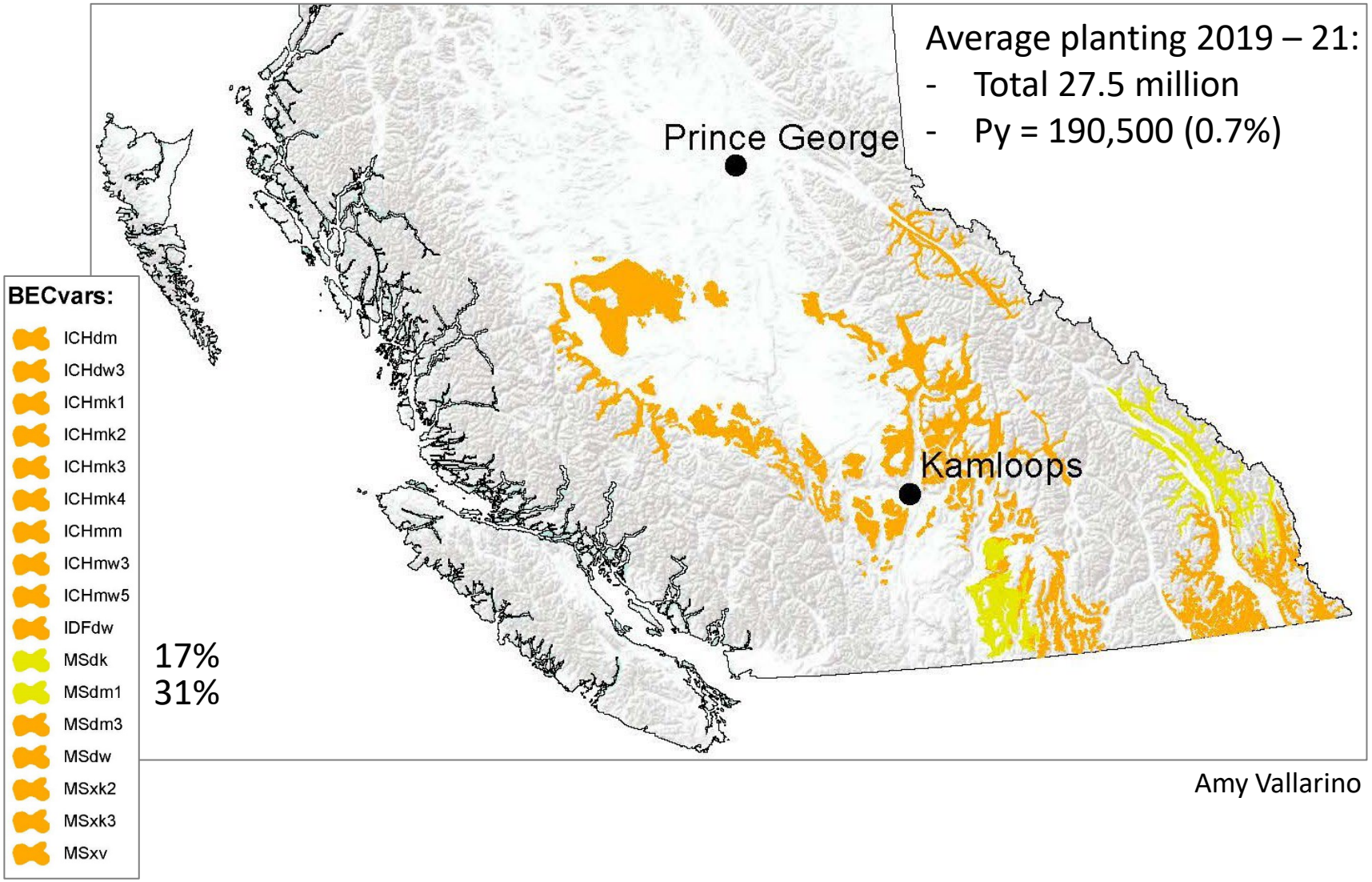
ICH/Dry MS (3 sites)



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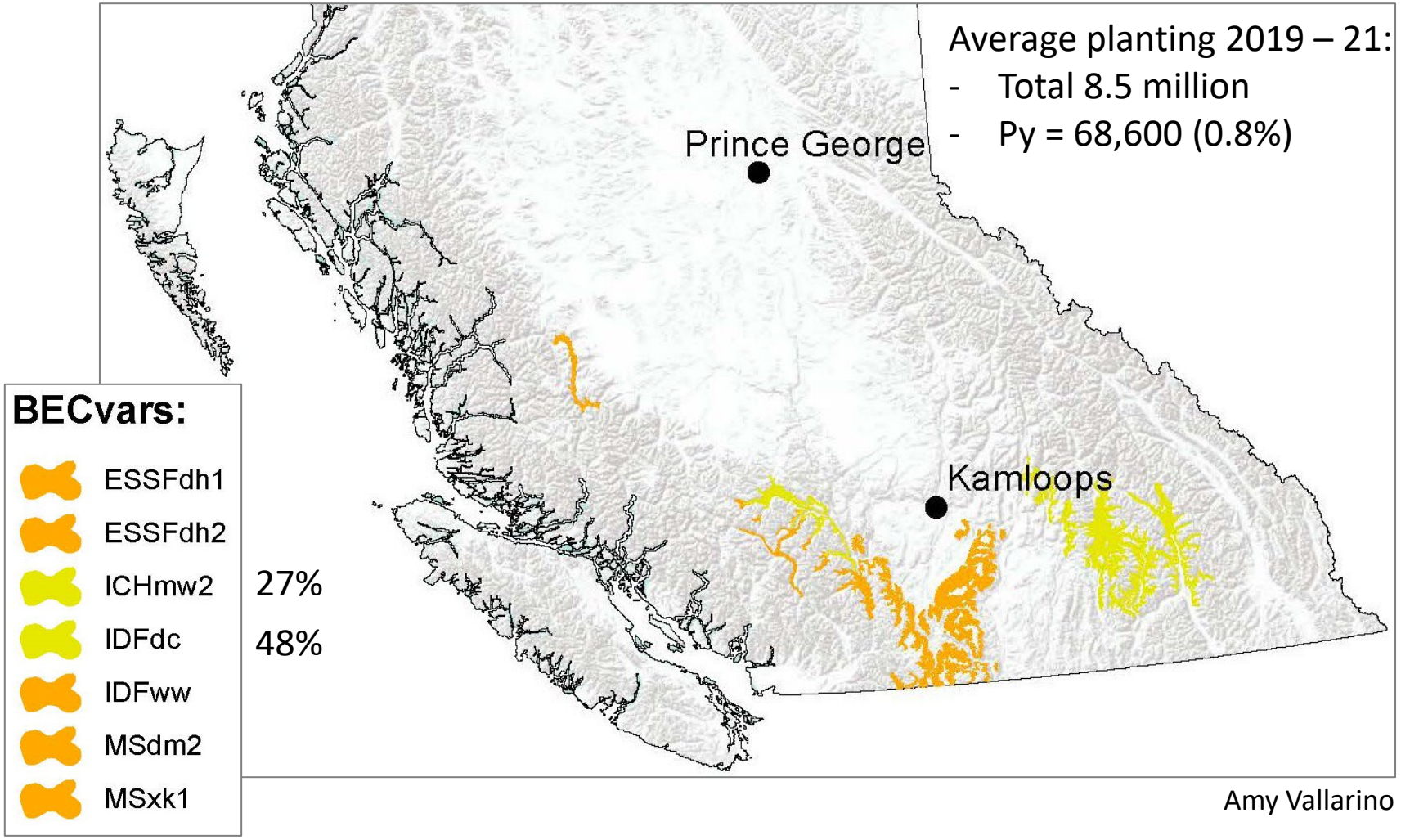
ESSF 2 (2 sites)



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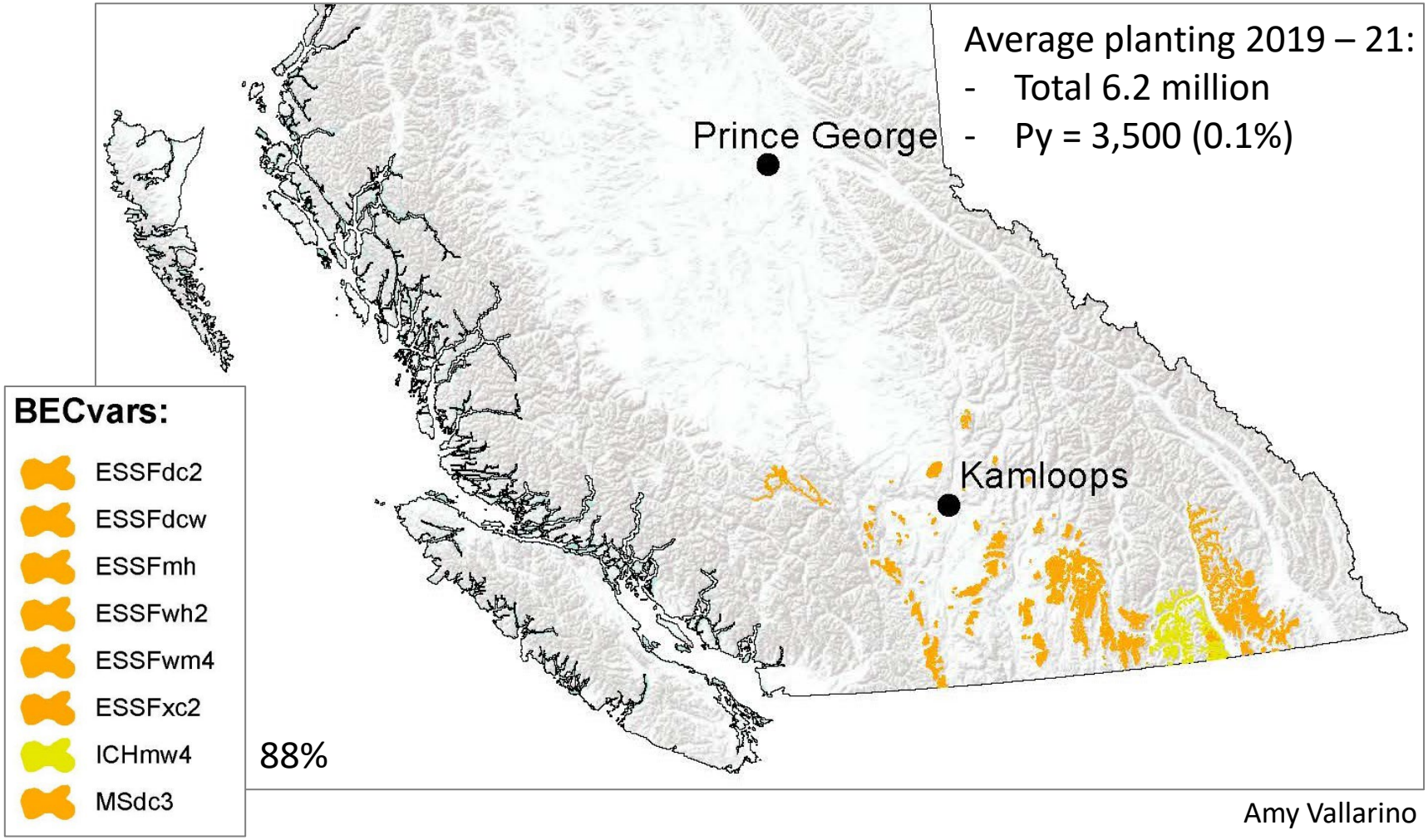
ESSF 1 (1 site)



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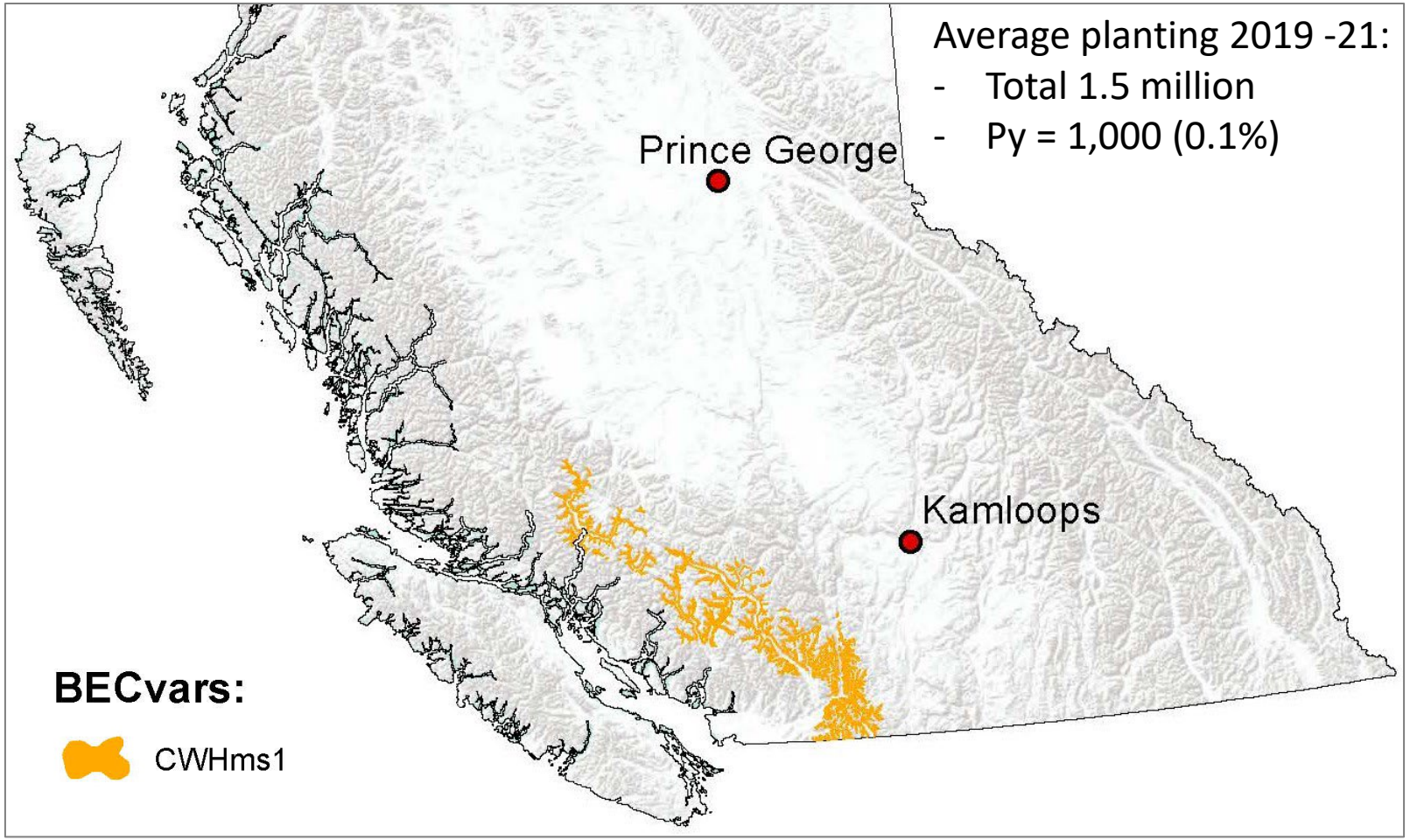
Submaritime Valleys (1 site)



Amy Vallarino

Summary

- I will be looking for Py test sites this year
- I would also love to see existing Py plantations
  - Especially your experimental plantings
- Marie.Vance@gov.bc.ca if you have feedback on Py testing strategy