



NSC 2020 Winter Conference: **How to Meet the Demands of our Changing Forests?**

February 25-26, 2019

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Forecasting Seedling Needs

Northern Silviculture
Committee Workshop

Prince George
Feb 26, 2020



Brian Barber, RPF
Select Seed Co. Ltd

Kat Gunion, RPF
Forsite Consulting

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Agenda

- Project Overview
- Methods
- Preliminary Results
- Observations
- Next Steps & Applications

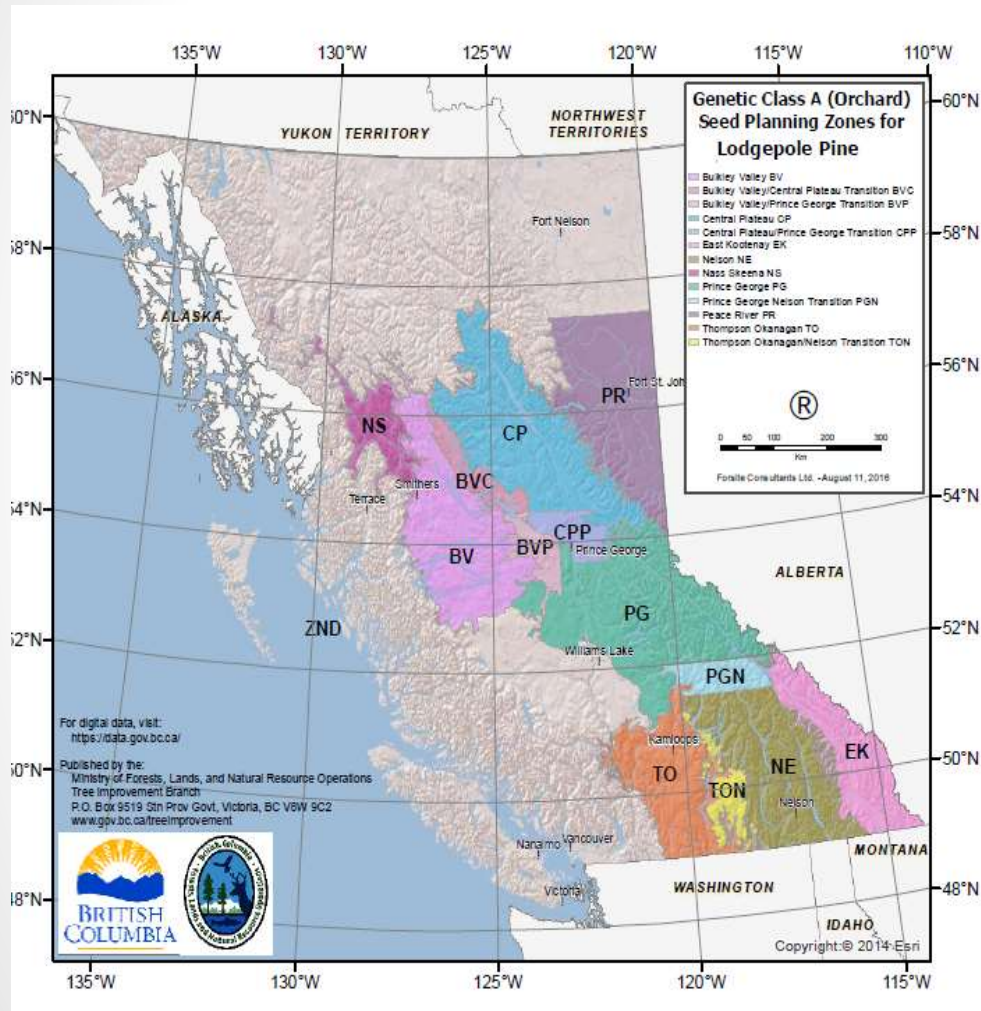


Bonus: New Lodgepole Pine Seed Orchards for Northern BC

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Overview – Why New Forecasts Needed?



CBST Seedlot Selection Tool Version 4.0

Chief Forester's Standards for Seed Use, [BEC 10]

Instructions | I Have A Cutblock | I Have A Seedlot

Orchard Number:

238

Set Representative Seedlot

OR

Seedlot Number:

63159

Set Species & BEC

OR

Species:

PLI

BEC Variant:

SBSdh1

GO



BCTS
BC Timber Sales



Ministry of
Forests, Lands, Natural
Resource Operations
and Rural Development

SelectSeed



Overview – Why New Forecasts Needed?

- Declining AACs
- Species Harvest Shifts
- Changes to stocking stds
- Increased Disturbances – wildfire and pests
- Government Programs (e.g. Feds 2B Trees)
- Past seed use no longer a good predictor of future.
- Orchards take ~10 years to produce seed.

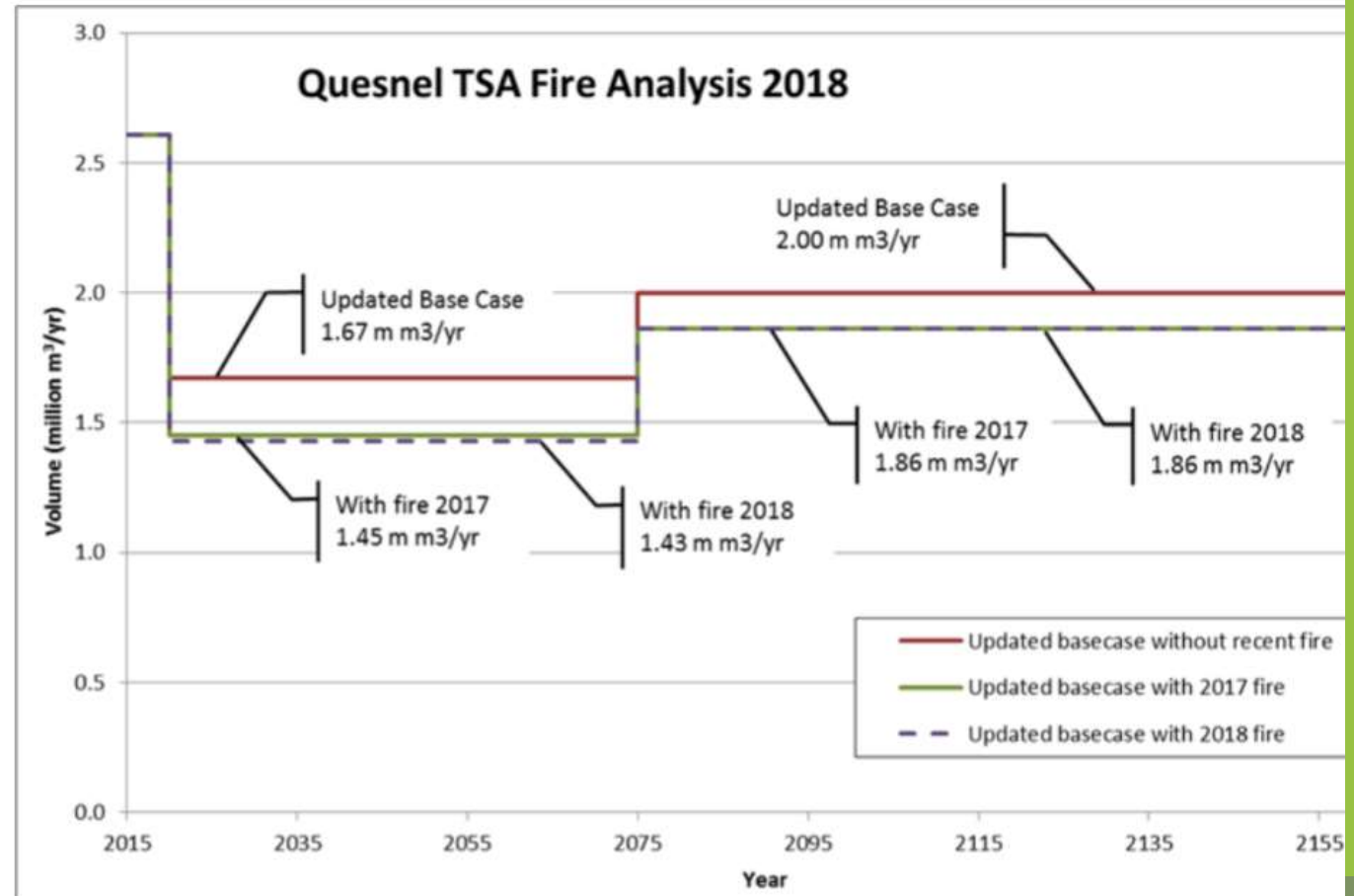


Figure 9. Updated timber supply projection for Quesnel TSA.

Overview – A New Forecast Method also Needed



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Overview – Project Objectives

- Estimate seedling needs to 2049 by...
 - Species
 - BEC variant
 - Management Unit
- Guide seed planning and investments
- Updatable - new information & sensitivity analysis



Project Plan and Website at: <https://arcg.is/DH0PX>

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Overview - Sponsors

- Vernon Seed Orchard Co. (VSOC) – Jeff Mycock
- Forest Improvement and Research Management Branch – Pat Martin
- BC Timber Sales – Mark Hay
- Select Seed Co. Ltd – Brian Barber

Project Team

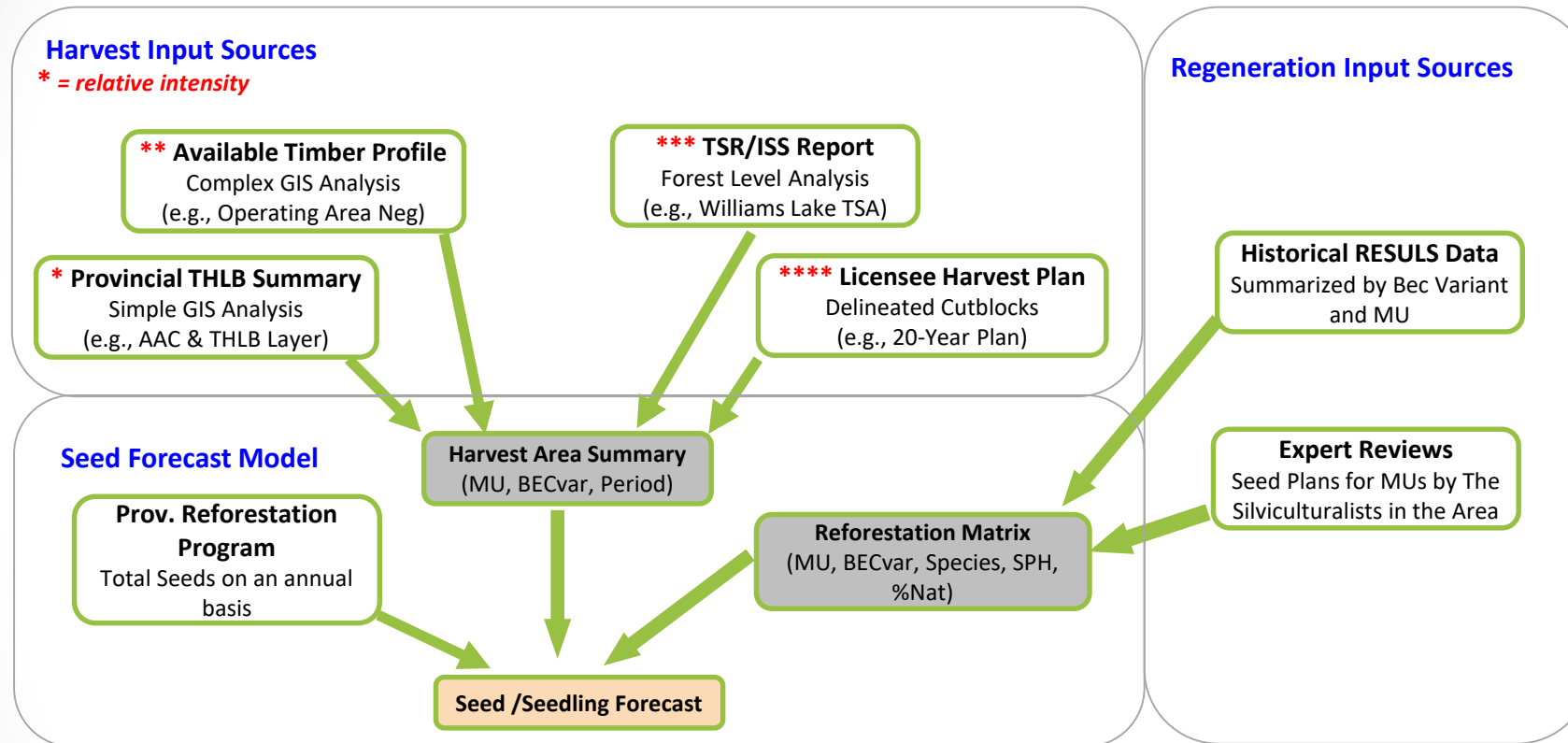
- Jeff Mycock, VSOC
- Kevin Astridge & Stephen Joyce, FIRM
- Kona Van Diest, BCTS
- Brian Barber, SelectSeed/FGC
- Pat Bryant & Kat Gunion, Forsite.



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Overview - Approach



Methods

Reforestation Matrix

- Started with recent (3,5, & 10 year) performance by MU
- Requested Expert Feed Back

Management Unit	MAP_LABEL	NAT	SPH	SPP_01	SPP_PERC_01	SPP_02	SPP_PERC_02	SPP_03	SPP_PERC_03	SPP_04	
Kamloops TSA	MSdm2		0%	1,400	PLI	20%	SX	40%	FDI	30%	LW
Kamloops TSA	MSdm3		0%	1,400	PLI	20%	SX	40%	FDI	30%	LW
TFL23	ICHxw		0%	1,200	FDI	45%	PY	25%	LW	20%	PW
TFL35	MSdm3		0%	1,800	SX	40%	PLI	20%	FDI	30%	LW
TFL8	ESSFmh		0%	1,200	SX	50%	PLI	20%	LW	20%	FDI
100 Mile House TSA	ICHmk3		0%	1,400	SX	40%	PLI	10%	FDI	35%	CW
Kamloops TSA	ICHdw3		0%	1,400	FDI	35%	SX	40%	PLI	10%	CW
Prince George TSA	SBsdw3		1%	1,501	PLI	40%	SX	40%	FDI	10%	LW
TFL8	ICHmk1		0%	1,200	FDI	30%	LW	30%	SX	25%	PLI
100 Mile House TSA	ICHdk		0%	1,400	PLI	10%	SX	40%	FDI	35%	CW
100 Mile House TSA	ICHmw3		0%	1,400	PLI	10%	SX	40%	FDI	35%	CW
TFL23	ESSFdc1		0%	1,400	SX	60%	PLI	15%	BL	10%	FDI
TFL8	IDFdm1		5%	1,200	FDI	50%	LW	20%	PY	15%	PLI

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Summary of Expert Input

- Expert Input Received from
 - Licensees (FLs and TFLs)
 - BCTS
 - District/TSA Working Groups
 - Government Programs (e.g. FFT)
 - Forest Analysis and Inventory Br.

Table of Status of Expert Input

Forecasting Seedling Need



Historical Regeneration Assumptions	Status of Expert's Regeneration Projection	Status of Expert's Harvest Projection
<u>100 Mile House TSA</u>	West Fraser(Dec 2019)	In Progress
<u>Arrow TSA</u>	Jan 2020	
<u>Arrowsmith TSA</u>		
<u>Boundary TSA</u>	Dec 2019	
<u>Bulkley TSA</u>	Nov 2019	In Progress
<u>Cascadia TSA</u>		
<u>Cassiar TSA</u>		

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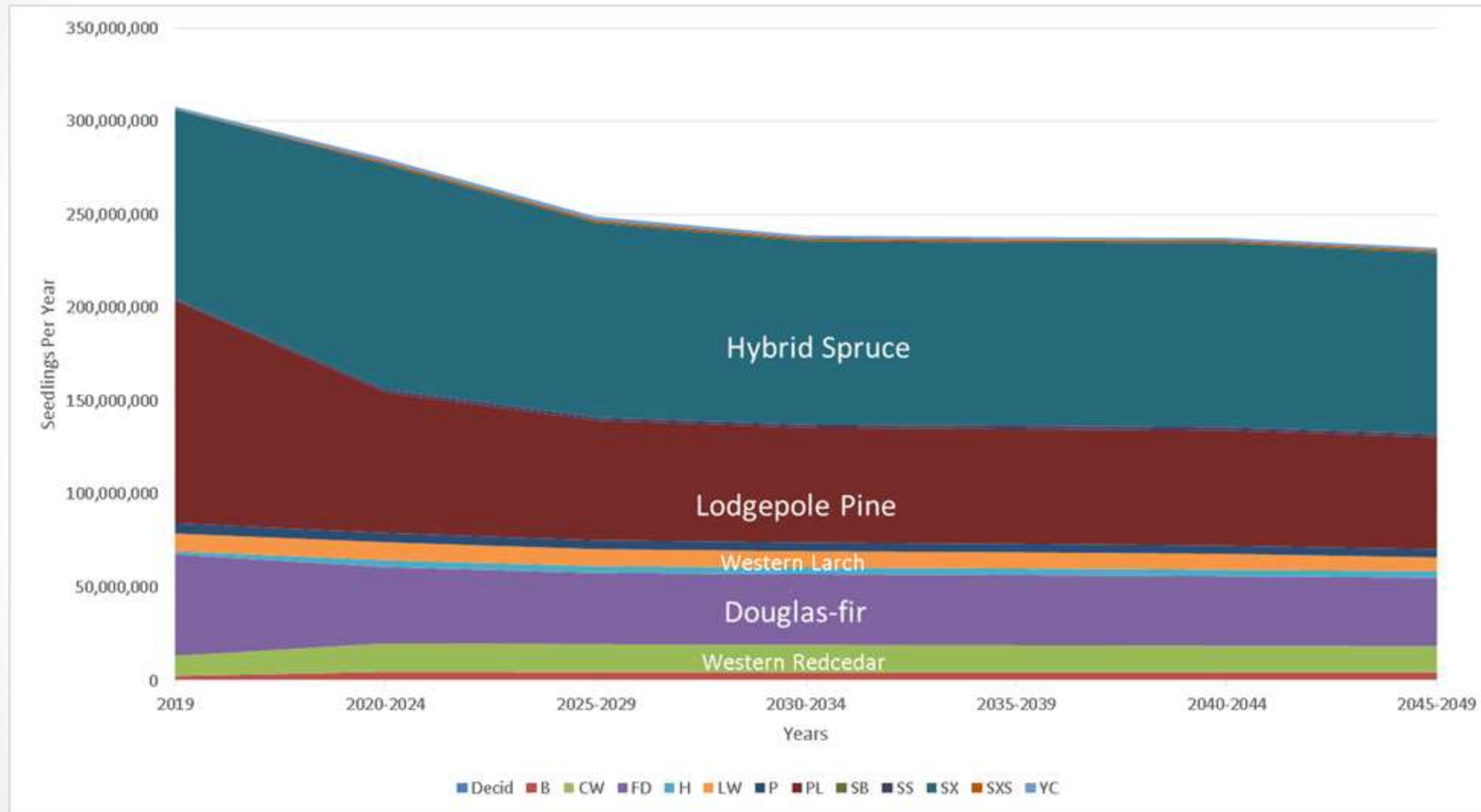
Preliminary Results – Forecasting Seed Need

- Estimates by Species
- Estimates for new Pli breeding zones

Go to Spreadsheets

2019 Provincial Seedling Request	Annual Seedlings						
		2020-2024	2025-2029	2030-2024	2035-2039	2040-2044	2045-2049
117,700	AX	21,211	21,211	21,211	21,211	21,211	21,211
1,165,100	BA	2,099,941	2,097,057	1,986,054	1,977,827	1,986,202	1,984,065
39,700	BG	17,216	17,209	14,435	14,413	17,423	17,401
919,900	BL	2,228,424	2,059,577	2,040,528	2,025,387	2,019,005	2,013,115
112,400	BP	47,666	47,617	33,761	33,700	22,183	22,180
10,824,500	CW	15,336,781	15,032,992	14,750,117	14,620,625	14,341,931	14,206,789
78,600	DR	255,605	256,498	281,808	281,805	242,898	242,906
3,500	EP	3,339	3,339	3,339	3,339	3,339	3,339
13,463,400	FDC	10,001,079	9,994,552	10,126,851	10,120,508	10,135,284	10,188,668
41,023,800	FDI	30,919,104	28,235,014	27,865,628	27,494,978	27,166,150	26,550,716
69,300	HM	344,690	344,172	319,071	318,668	320,787	321,160
1,676,700	HW	3,370,998	3,368,618	3,301,762	3,297,604	3,258,662	3,256,169
9,430,600	LW	9,642,136	9,071,736	8,750,011	8,653,554	8,515,479	7,300,446
0	PA	15,915	15,909	15,905	15,905	15,905	15,905
29,300	PLC	52,763	53,414	54,399	54,399	53,873	53,873
119,681,200	PLI	75,328,657	64,412,066	61,567,322	61,615,858	61,875,085	60,087,936
2,082,500	PW	2,508,954	2,357,708	2,321,805	2,291,020	2,160,475	2,153,633
3,386,700	PY	2,409,447	2,335,299	2,291,086	2,257,289	2,245,762	2,139,030
12,000	SB	12,473	9,184	7,397	7,397	7,397	7,397
709,700	SS	1,540,776	1,530,866	1,554,966	1,552,283	1,604,310	1,603,088
101,744,900	SX	120,883,898	104,578,595	98,752,317	98,491,406	98,895,139	97,326,543
176,700	SXS	1,263,459	1,261,161	1,260,178	1,259,954	1,259,153	1,258,953
1,336,200	YC	1,937,568	1,909,660	1,577,508	1,568,796	1,481,417	1,496,660
308,084,400	Total	280,242,100	249,013,454	238,897,458	237,977,925	237,649,071	232,271,185

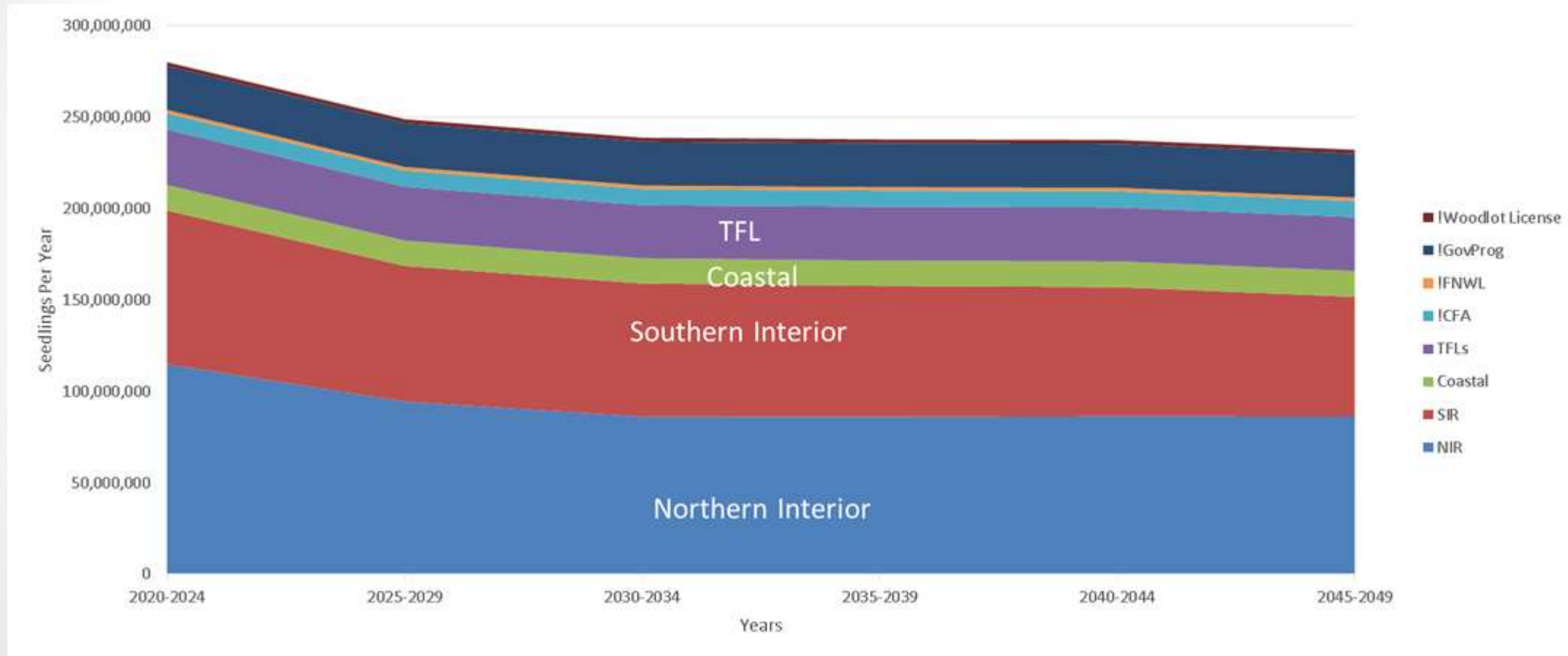
Seedling Forecasts by Species



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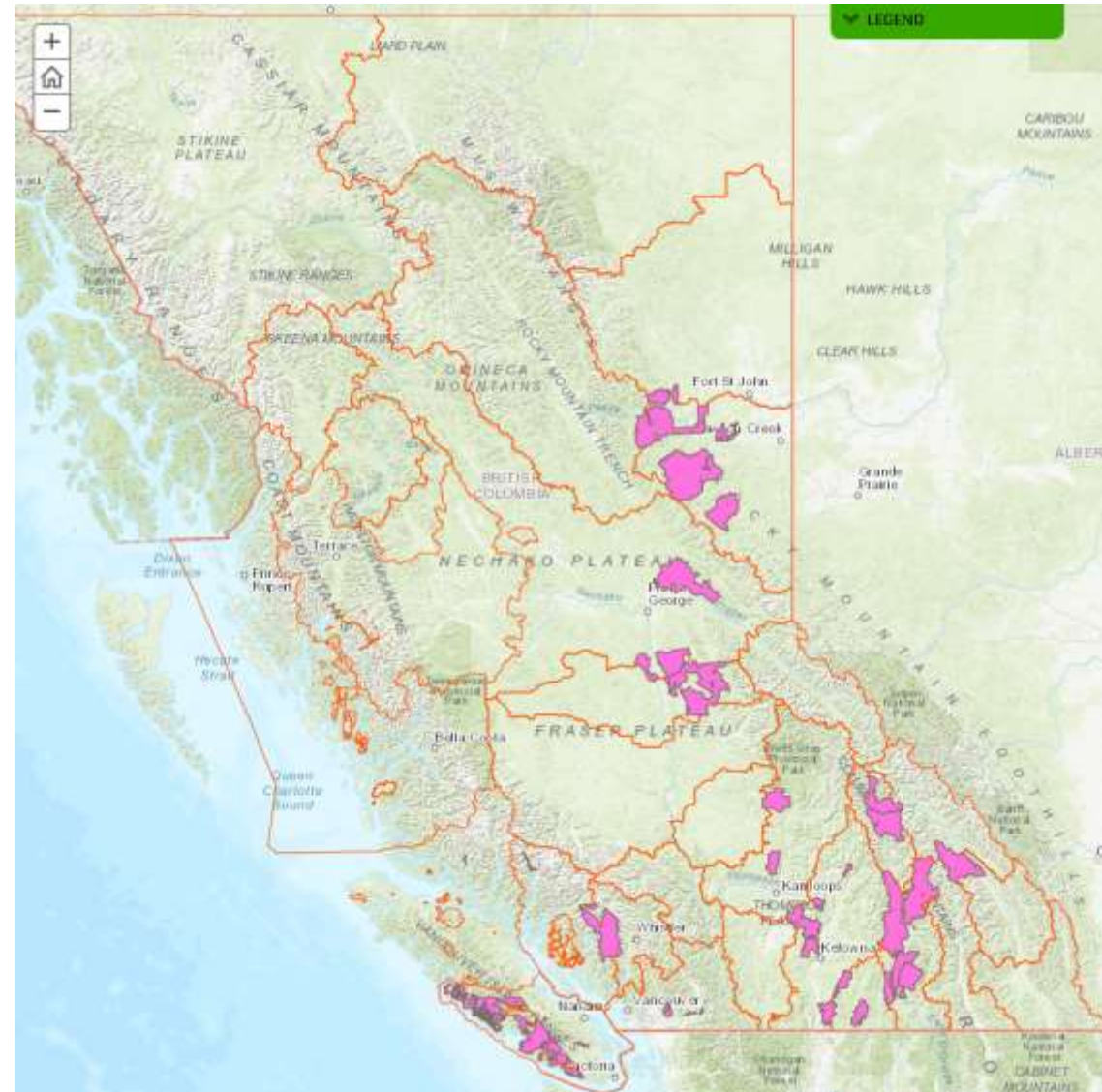
Seedling Forecasts by Management Units



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Observations

- Harvest flow is critical
- Overall numbers very sensitive to SPH and % Natural
- Does not include:
 - FES programs
 - Section 108



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Future Directions

Other Government Programs

***** Rehabilitation**
(i.e., Wildfire, Drought, Insects)
Simple GIS Analysis
(e.g., MADA)

***** Forest Carbon Projects**
(i.e., NHLB-related)
Complex GIS Analysis
(e.g., MADA)

Disturbed Area Summary
(MU, BECvar, Period)

Harvest Input Sources

** = relative intensity*

**** Available Timber Profile**
Complex GIS Analysis
(e.g., Operating Area Neg)

*** Provincial THLB Summary**
Simple GIS Analysis
(e.g., AAC & THLB Layer)

***** TSR/ISS Report**
Forest Level Analysis
(e.g., Williams Lake TSA)

****** Licensee Harvest Plan**
Delineated Cutblocks
(e.g., 20-Year Plan)

Seed Forecast Model

Prov. Reforestation Program
Total Seeds on an annual basis

Harvest Area Summary
(MU, BECvar, Period)

Reforestation Matrix
(MU, BECvar, Species, SPH, %Nat)

Seed /Seedling Forecast

Regeneration Input Sources

Historical RESULTS Data
Summarized by Bec Variant and MU

Expert Reviews
Seed Plans for MUs by The Silviculturalists in the Area

CBST-Based Species Plans (Surplus/Deficit)

CBST Suitability
(BECvar, Species, Orchards)

Seed Inventory
(Species, Orchards, GVO)

Species Plans/Gap Analysis
(Orchards/Breeding Plans)

Optimize
(LP or Heuristic Model)

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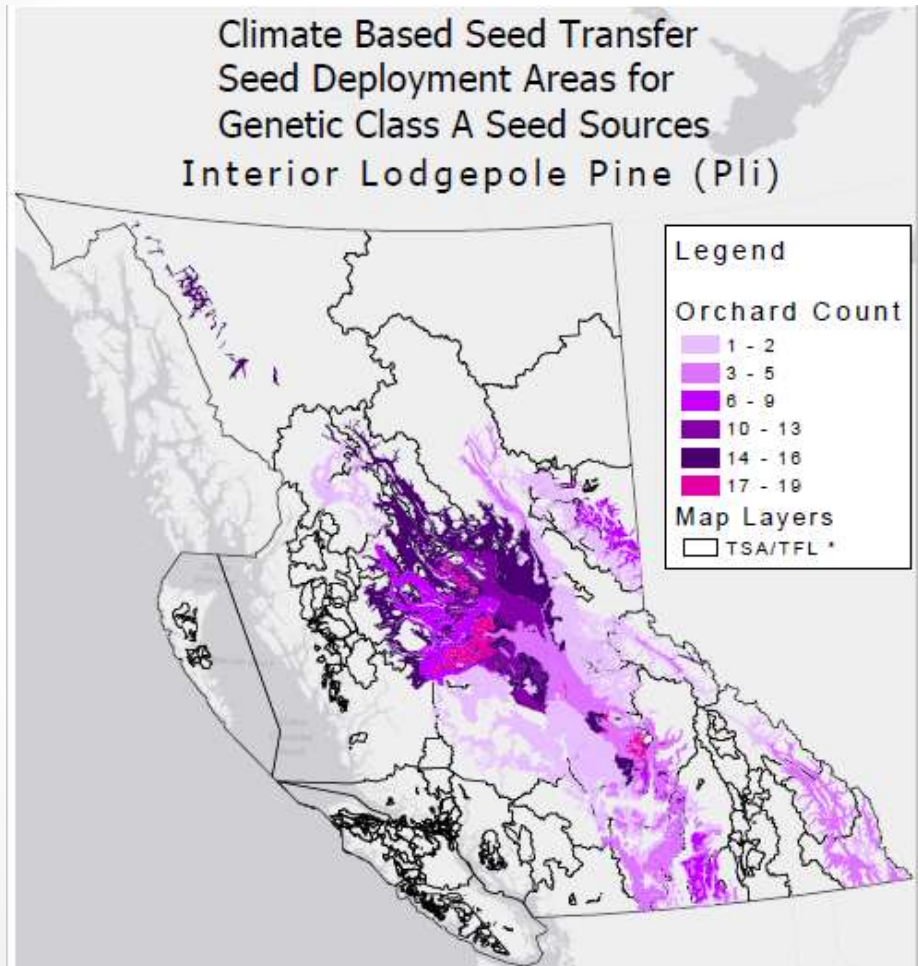
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Next Steps & Applications



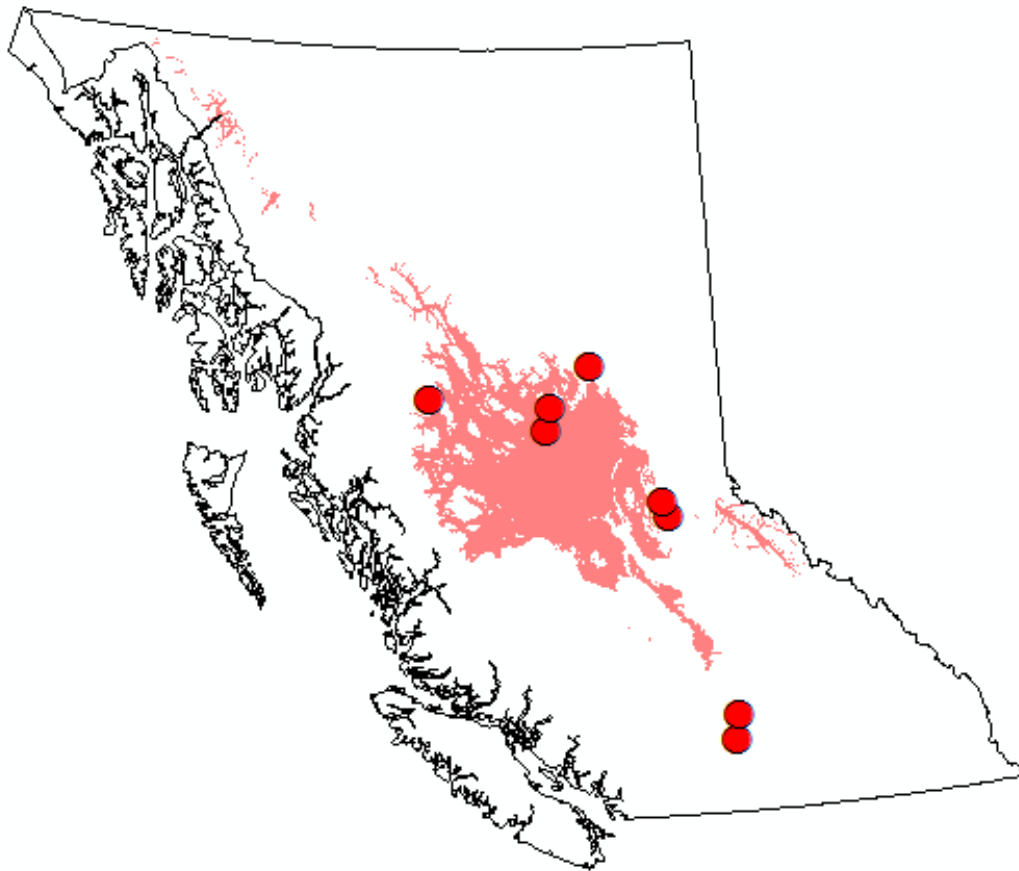
- Solicit assistance to fill in gaps
 - Regeneration assumptions
 - Timber supply & harvest forecasts
 - Non-harvest Drivers
 - Government Programs
- Project Team to finalize #s and report mid-March
- Apply to tree improvement plans:
 - # orchard ramets required for CBST zones
 - FGC Species Plans
 - Tree Improvement Investment Priorities

BC's Lodgepole Pine (Pli) Seed Orchards



- 24 Pli Seed Orchards in BC
- 19 orchards producing for Central under CBST.
- Most located in S. Interior - low seed production
- Only 28% of 120M sowing requests (2019) from Orchard (Class A) seed.
- New seed orchards required located further north.

New CSBT 'Bulkley Valley' Pli Breeding Zone for 2nd generation seed orchards



Target No. Orchard Ramet	15,000
High-gain crosses	24%
Backward selections	10%
First gen selections	24%
Second gen selections	40%
Avg. Volume Gain (GVO)	21%
Avg. Gall Rust Resistance (DSG)	67%
Effective Population Size (Ne)	34

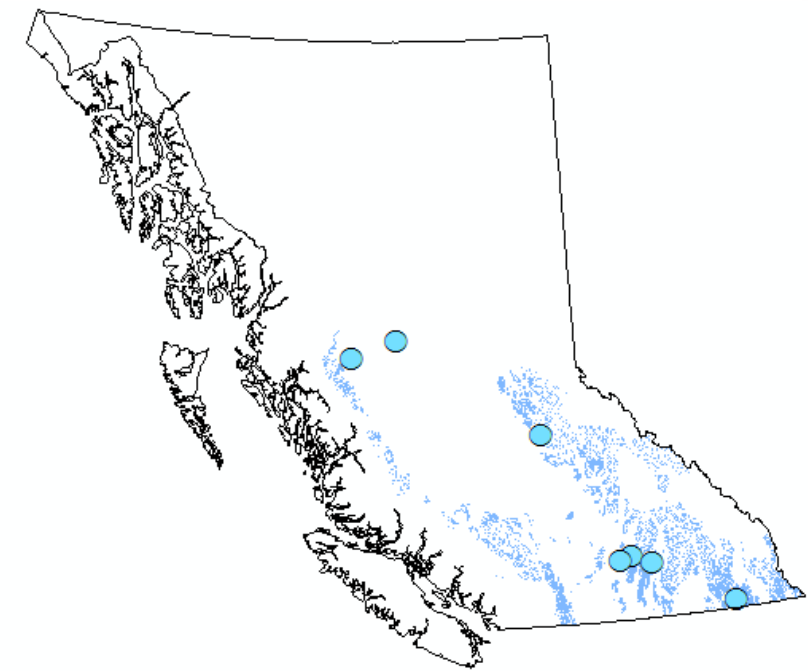
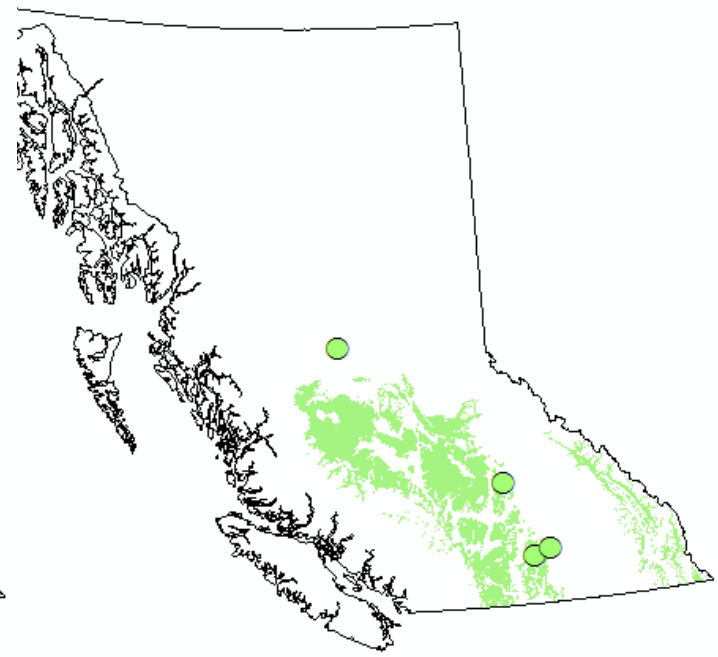
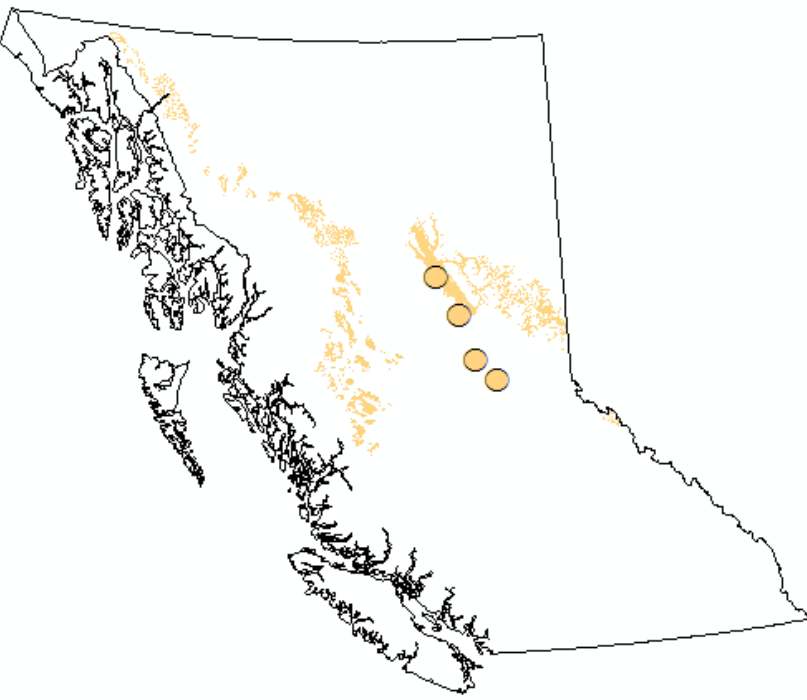
Source: 2020, Nick Ukrainetz, Pli Tree Breeder

Other Proposed CBST-based Pli Breeding Zones

Central Plateau

Big Bar Thompson

Nelson High



Source: 2019, Nick Ukrainetz

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Pli Seed Orchard Replacement Strategy

1. Ministry to select parents, collection scion and graft 15,000 ramets over 3 years (2019-2021).
2. 5,000-ramets provided to Ministry (Prince George), VSOC (Quesnel) and SelectSeed (Quesnel), respectively.
3. First ramets provided and planted in 2020.
4. Maintain 1st gen orchards until supply increases and/or demand decreases.
5. Monitor and update seed demand forecasts
6. Remove 1st gen orchards as supply increases – lowest genetic gain orchards first
7. Select for Comandra blister rust resistance



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SelectSeed's New Seed Orchard Property – S. Quesnel



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In the interim.....



- Ministry, Licensees, and others to identify CBST seed supply and gaps.
- Direct orchard seed to best sites.
- Use wild (Class B) seed where seed orchard seed not available.

Are Cone Collection Workshops
Required June – July 2020?



Questions?

Website: <https://arcg.is/DH0PX>



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