Hardwood Silviculture Cooperative Annual Meeting September 12, 2024

Agenda

9:00am-12:00pm Indoors * Zoom Meeting

- Red Alder Stand Management Study
- Operational yield from managed stands
- Red alder genetics, clones and tree improvement
- UW Alder research update
- Future Direction of the Cooperative
- Annual Budget

12:00pm Lunch (order off menu)

12:30-4:30pm Field tour, OSU Blodgett

HSC Highlights 2023-2024

- **Measurements and maintenance** on six Type 2 pure alder installations (WADNR and Siuslaw NF) and two Type 3 alder/Doug-fire installations.
- ***Updates for Selected Equations in the Red Alder Plantation Version of ORGANON***, continued work with Doug Mainwaring and David Hann to incorporate updated equations in alder growth model.
- **Education events** including: Washington Hardwood Commission (WHC) Symposium, Washington Forest Owner Field Day, and Forest Stewards Guild Hardwood Management Workshop.

Red alder stand management study

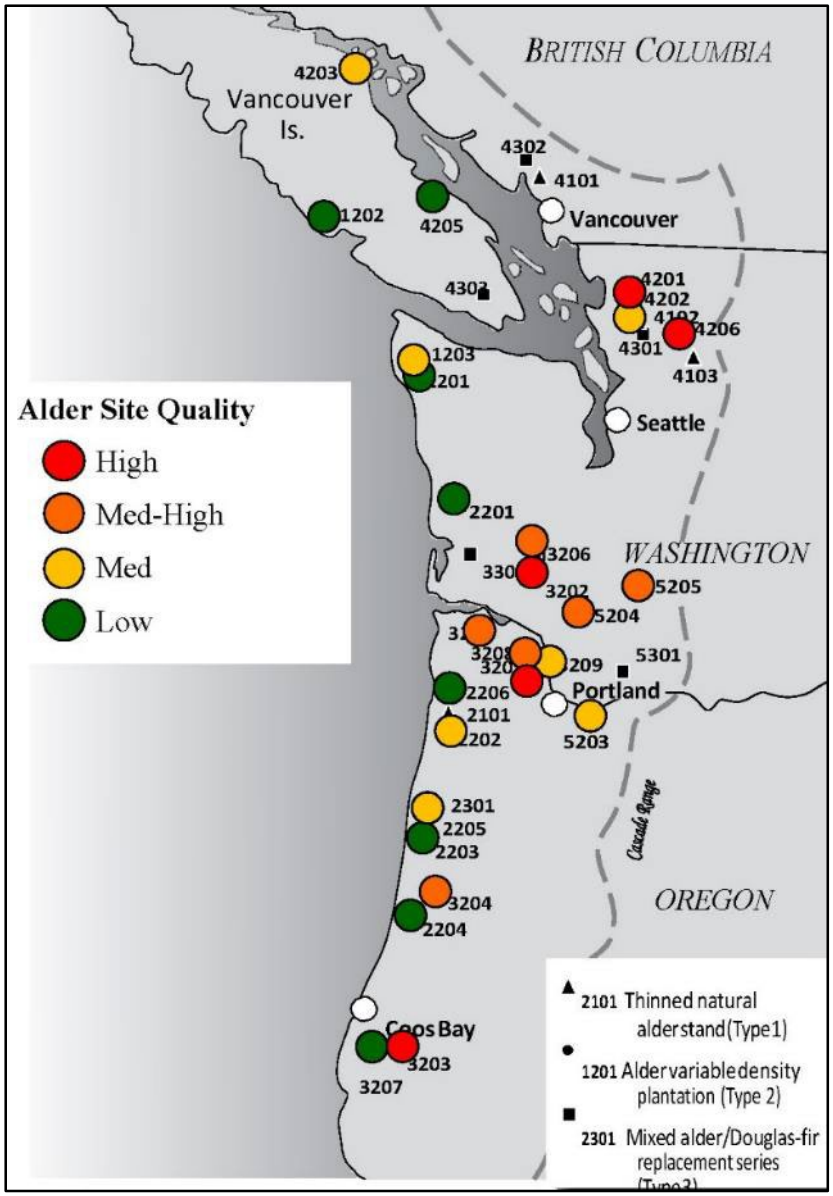
Goals: to Improve understanding of management and production of red alder; especially effects of stand density management on red alder growth and yield.

Installations - established 1989-1997

Type 1- four natural red alder stands thinned to 230 and 525 trees per acre.

Type 2 – twenty six variable-density red alder plantations, large blocks at ~100, 230, 525, and 1200 trees per acre with several thinning and pruning treatments.

Type 3 – seven mixed species plantation of red alder and Douglas-fir at 300 TPA, five proportions.



HSC Field Work 2023-2024

- Contracted with UW for student field crew to help measure 3 installations (thanks to Courtney Bobsin, Ally Kruper).
- Ahrens led crews with help from Cooperators for 4 sites.
- BC Ministry of Forests covered their Type 3 Alder/Dougals-fir installation.
- Andy Bluhm helped at Sitkum and Shamu, just for the fun of it.

UW Student Crew, HSC Type 2 alder installation Sitkum, OR


Ice storm damage at HSC Pioneer Mtn site near Toledo, OR

Pure alder plot, HSC Type 3 installation near Siletz, OR


Pure Douglas-fir plot, HSC Type 3 installation near Siletz, OR

Data Collection Schedule for Type 2 Installations

TYPE 2	GYN	WHC	WHC	GYN	DNR	SNF	NWH	NWH	SNF	ODF	BLM	WHC	BCmin
Site Number	4201	2201	3202	4202	1201	2202	2203	3203	3204	3205	5203	3206	4203
Site Name	Humphrey Hill	John's R.	Ryderwood	Clear Lake	LaPush	Pollard	Pioneer	Sitkum	Keller-Grass	Shamu	Thompson	Blue Mtn.	Mohun Ck.
Year Planted	1989	1990	1990	1990	1991	1991	1992	1992	1992	1992	1992	1993	1993
1st yr Regen	1989	1990	1990	1990	1991	1991	1992	1992	1992	1992	1992	1993	1993
2nd yr Regen	1990	1991	1991	1991	1992	1992	1993	1993	1993	1993	1993	1994	1994
Plot Installation	1991	1992	1992	1992	1993	1993	1994	1994	1994	1994	1994	1995	1995
3rd yr Measure	1991	1992	1992	1992	1993	1993	1994	1994	1994	1994	1994	1995	1995
3-5 yr Thin	1992	1995	1995	1993	1995	1995	1996	1997	1996	1996	1995	1997	1997
Prune Lift 1 6ft	1994	1995	1995	1995	1995	1995	1996	1997	1996	1996	1995	1997	1997
6th yr Measure	1994	1995	1995	1995	1996	1996	1997	1997	1997	1997	1997	1998	1998
15-20' HLC Thin	1994	NA	1998	1995	1998	NA	1999	2000	2000	1999	1999	2001	NA
Prune Lift 2 12ft	1994	2001	1998	1995	2001	1999	1999	2000	1998	1999	1999	2001	2001
9th yr Measure	1997	1998	1998	1998	1999	1999	2000	2000	2000	2000	2000	2001	2001
Prune Lift 3 18ft	1997	2009	2001	1998	2007	2002	2003	2000	2008	2003	2003	2001	2006
12th yr Measure	2000	2001	2001	2001	2002	2002	2003	2003	2003	2003	2003	2004	2004
30-32' HLC Thin	2000	NA	NA	2001	2010	2007	2008	2003	NA	2006	2008	2006	2009
Prune Lift 4 22 ft	2000	NA	2001	2001	2022	2007	2008	2003	2013	2006	2008	2004	2009
17th yr Measure	2005	2006	2006	2006	2007	2007	2008	2008	2008	2008	2008	2009	2009
22nd yr Measure	2010	2011	2011	2011	2012	2012	2013	2013	2013	2013	2013	2014	2014
27th yr Measure	2015	2016	2016	2016	2017	2017	2018	2018	2018	2018	2018	2019	2019
32nd yr Measure	2020	2021	2021	2021	2022	2022	2023	2023	2023	2023	2023	2024	2024

Data Collection Schedule for Type 2 Installations (con't)

TYPE 2	WHC	BCmin	SNF	NWH	BLM	BCmin	SNF	BLM	DNR	DNR	ODF	OSU	GPNF
Site Number	5204	1202	2204	2205	3207	4205	2206	3209	4206	1203	3208	3210	5205
Site Name	Hemlock Ck.	Lucky Ck.	Cape Mtn.	Siletz	Dora	French Ck.	Mt. Gauldy	Scappoose	Darrington	Maxfield	Weebe	Wrongway	Tongue Mtn.
Year Planted	1993	1994	1994	1994	1994	1994	1995	1995	1995	1996	1997	1997	1997
1st yr Regen	1993	1994	1994	1994	1994	1994	1995	1995	1995	1996	1997	1997	1997
2nd yr Regen	1994	1995	1995	1995	1995	1995	1996	1996	1996	1997	1998	1998	1997
Plot Installation	1995	1996	1996	1996	1995	1995	1996	1997	1996	1997	1999	1999	1999
3rd yr Measure	1995	1996	1996	1996	1996	1996	1997	1997	1997	1998	1999	1999	1999
3-5 yr Thin	1997	1998	1998	1998	1998	1998	2000	1999	NA	2001	2002	NA	NA
Prune Lift 1 6ft	NA	1998	1998	1998	NA	1998	2000	1999	1999	2001	2002	2002	NA
6th yr Measure	1998	1999	1999	1999	1999	1999	2000	2000	2000	2001	2002	2002	2002
15-20' HLC Thin	2001	NA	2005	NA	2002/17	2002	NA	NA	NA	NA	NA	NA	NA
Prune Lift 2 12ft	NA	2005	2002	2002	NA	2002	2003	2003	2001	2004	2008	2005	NA
9th yr Measure	2001	2002	2002	2002	2002	2002	2003	2003	2003	2004	2005	2005	2005
Prune Lift 3 18ft	NA	2015	2012	2010	NA	2005	2011	2009	2003	2010	2011	2010	NA
12th yr Measure	2004	2005	2005	2005	2005	2005	2006	2006	2006	2007	2008	2008	2008
30-32' HLC Thin	2006	NA	2017	2010	NA	NA	2011	2009	2011	2010	2011	2010	NA
Prune Lift 4 22 ft	NA	NA	2017	2020	NA	2013	2016	2009	2006	2017	2013	2013	NA
17th yr Measure	2009	2010	2010	2010	2010	2010	2011	2011	2011	2012	2013	2013	2013
22nd yr Measure	2014	2015	2015	2015	2015	2015	2016	2016	2016	2017	2018	2018	2018
27th yr Measure	2019	2020	2020	2020	2020	2020	2021	2021	2021	2022	2023	2023	2023
32nd yr Measure	2024	2025	2025	2025	2025	2025	2026	2026	2026	2027	2028	2028	2028

Data Collection Schedule for Type 3 Installations

Owner	BCmin	NWH	GYN	BCmin	DNR	SNF	GPNF
Site Number	**4302**	**2301**	**4301**	**4303**	**3301**	**2302**	**5301**
Site Name	**East Wilson**	**Monroe-Indian**	**Turner Creek**	**Holt Creek**	**Menlo**	**Cedar Hebo**	**Puget**
Year Planted	1992	1994	1994	1994	1995	1996	1997
1st yr Regen Survey	1992	1994	1994	1994	1995	1996	1997
2nd yr Regen Survey	1993	1995	1995	1995	1996	1997	1998
Plot Installation	1993	1995	1995	1995	1997	1998	1999
3rd yr Measurement	1994	1996	1996	1996	1997	1998	1999
6th yr Measurement	1997	1999	1999	1999	2000	2001	2002
9th yr Measurement	2000	2002	2002	2002	2003	2004	2005
12th yr Measurement	2003	2005	2005	2005	2006	2007	2008
17th yr Measurement	2008	2010	2010	2010	2011	2012	2013
22nd yr Measurement	2013	2015	2015	2015	2016	2017	2018
27th yr Measurement	2018	2020	2020	2020	2021	2022	2023
32nd yr Measurement	2023	2025	2025	2025	2026	2027	2028

Hardwood Silviculture Cooperative Field Activities, Fall 2023-Spring 2024 ?

Type	Activity	Installation	Cooperator
Type 2	27yr Measure	3208	ODF- Weebee Packin
Type 2	27yr Measure	3210	OSU- Wrongway Creek
Type 2	27yr Measure	5205	GPNF- Tongue Mtn.
Type 2	32yr Measure	2203	Greatwoods - Pioneer Mtn
Type 2	32yr Measure	3203	Roseburg- Sitkum
Type 2	32yr Measure	3204	SNF- Keller-Grass
Type 2	32yr Measure	3205	ODF- Shamu
Type 2	32yr Measure	5203	BLM- Thompson Cat
Type 3	27yr Measure	5301	GPNF- Puget
Type 3	32yr Measure	4302	BCMIN- East Wilson

Hardwood Silviculture Cooperative
Field Activities, Fall 2024-Spring 2025

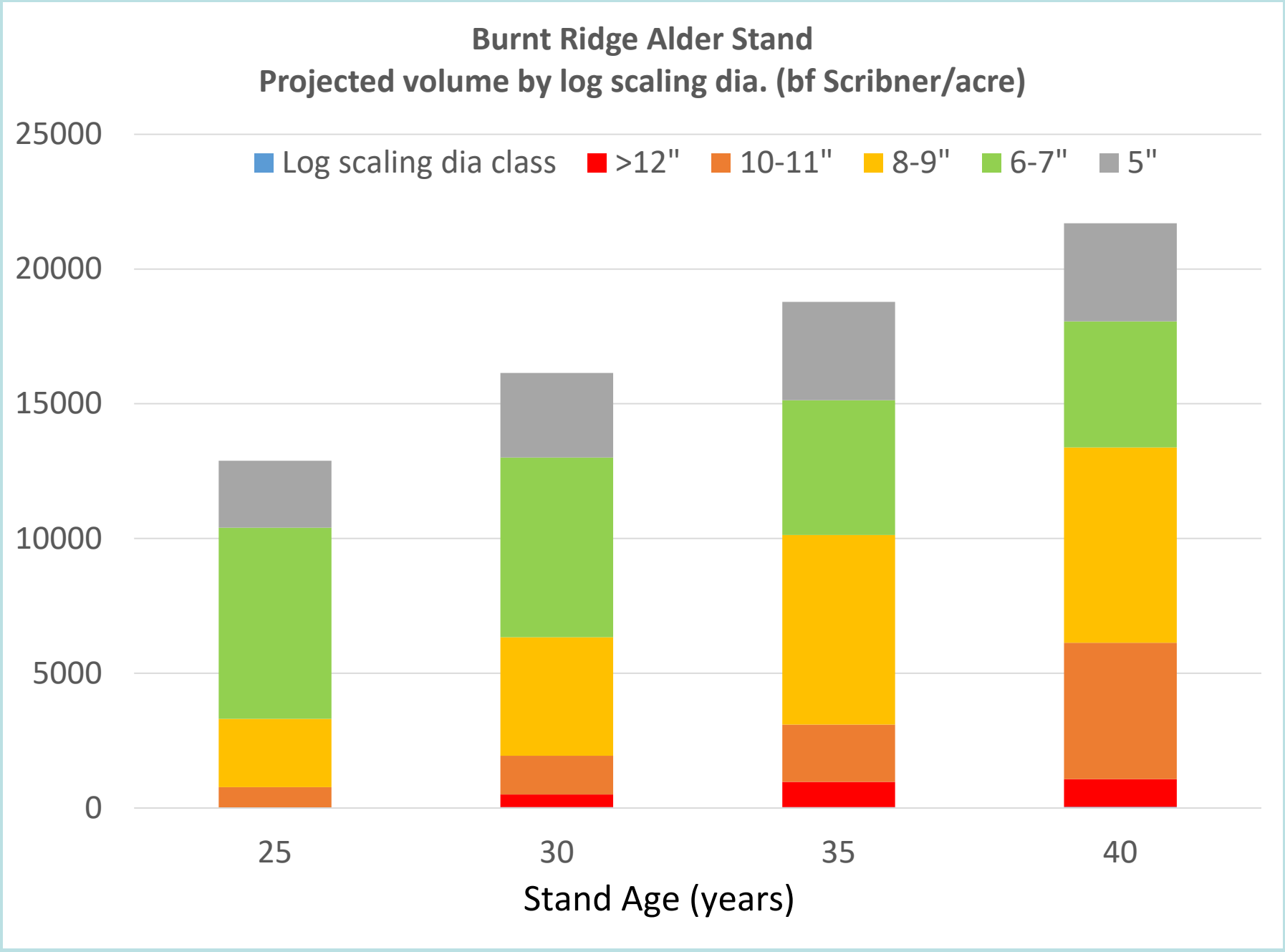
Type	Activity	Installation	Cooperator
Type 2	27-year Measure	3206	WHC Blue Mtn.
Type 2	27-year Measure	4203	BCMIN Mohun Cr.
Type 2	32-year Measure	5204	WHC Hemlock Cr.

Red Alder Growth Model & Yield Tables

- Dr. David Hann (creator of ORGANON) undertook review and update of growth and mortality equations for the **Red Alder Plantation (RAP) ORGANON model**. Draft manuscript is under review for publication.
- Doug Mainwaring at OSU Center for Intensive Planted Forest Silviculture (CIPS) incorporated the updated equations in a working version of RAP ORGANON.
- HSC is applying the updated the RAP model to develop new yield tables and model yields for specific projects on demand.

Burnt Ridge Alder Plantation
Projected sawlog volume
(board feet Scribner, 30 foot log length, 5” top)

		Volume per acre by stand age				
		25	**30**	**35**	**40**	**45**
Log Scaling Dia. (inches)	>12"	0	469	938	1,031	2,062
	10-11"	750	1,437	2,125	5,060	6,213
	8-9"	2,531	4,403	7,033	7,243	7,442
	6-7"	7,094	6,664	5,000	4,682	5,474
	5"	2,487	3,139	3,654	3,639	3,190
	>8 inch	3,281	6,309	10,095	13,335	15,717
	>6 inch	10,375	12,973	15,095	18,017	21,191


Burnt Ridge Alder Stand
Projected volume by log scaling dia. (bf Scribner/acre)
25000
20000
15000
10000
5000
0
Log scaling dia class
>12"
10-11"
8-9"
6-7"
5"
25
30
35
40
Stand Age (years)

Red Alder Plantation Yield (BF per acre*)
Plant 525 Trees/acre, No Thinning

Age	SI 55**	SI 65	SI 75	SI 85
10	128	269	1,325	2,389
15	1,988	3,702	6,039	8,745
20	4,650	7,370	11,064	14,817
25	7,217	11,046	15,032	18,535
30	9,667	13,893	17,683	21,892
35	11,838	15,967	20,298	25,067
40	13,413	17,596	22,771	27,870

*Board feet Scribner (30ft log length, 5” minimum top dia.

**SI 20 in feet, 20 year base

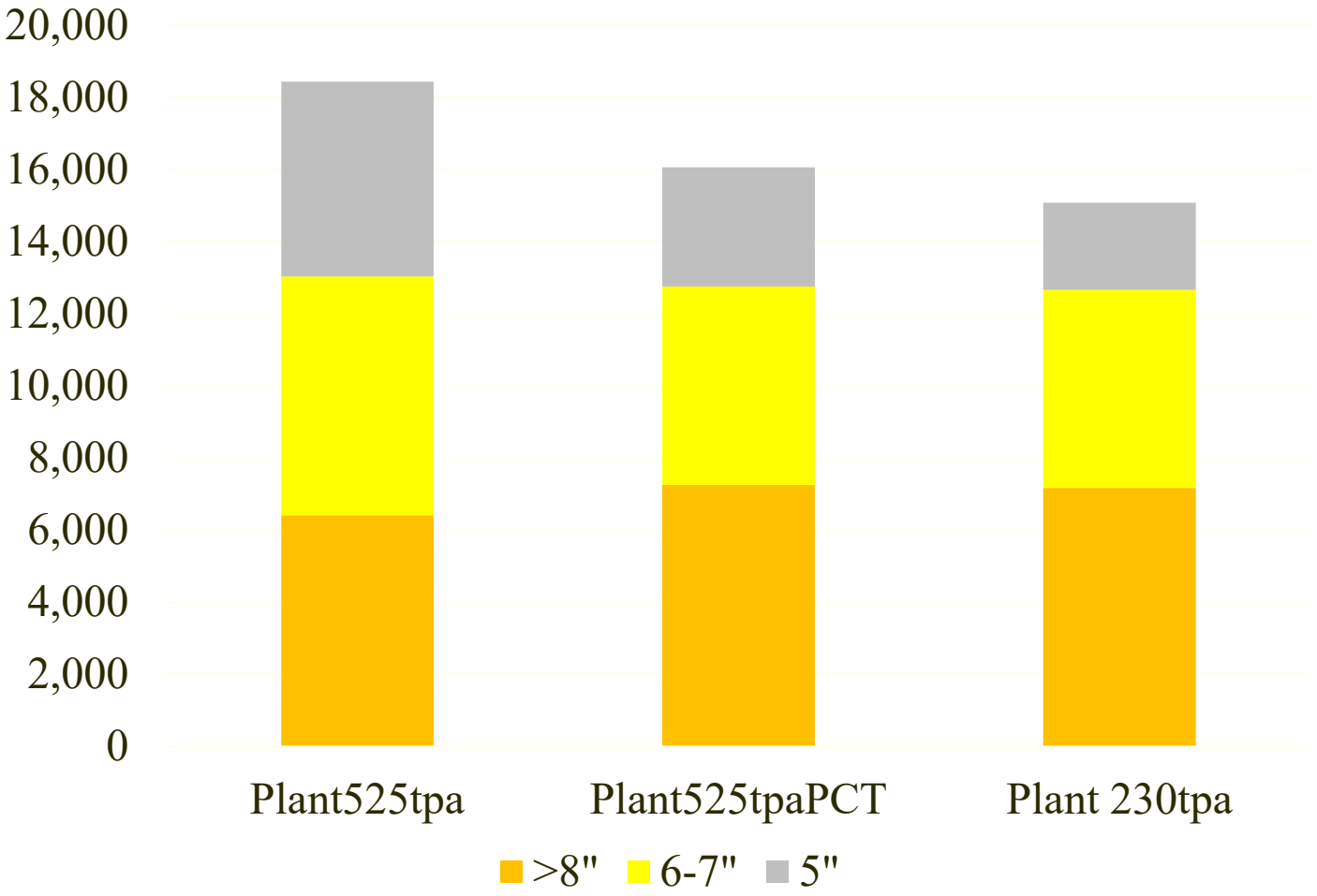
Red Alder Plantation Yield (BF per acre*)
Plant 525 Trees/acre, PCT age 6-8 yrs

Age	SI 55**	SI 65	SI 75	SI 85
10	128	299	1,396	2,666
15	2,162	3,677	5,268	7,293
20	4,347	6,376	9,491	12,974
25	6,399	9,649	13,337	16,763
30	8,689	12,385	16,068	21,098
35	10,784	14,432	19,153	24,840
40	12,476	16,545	22,245	28,124

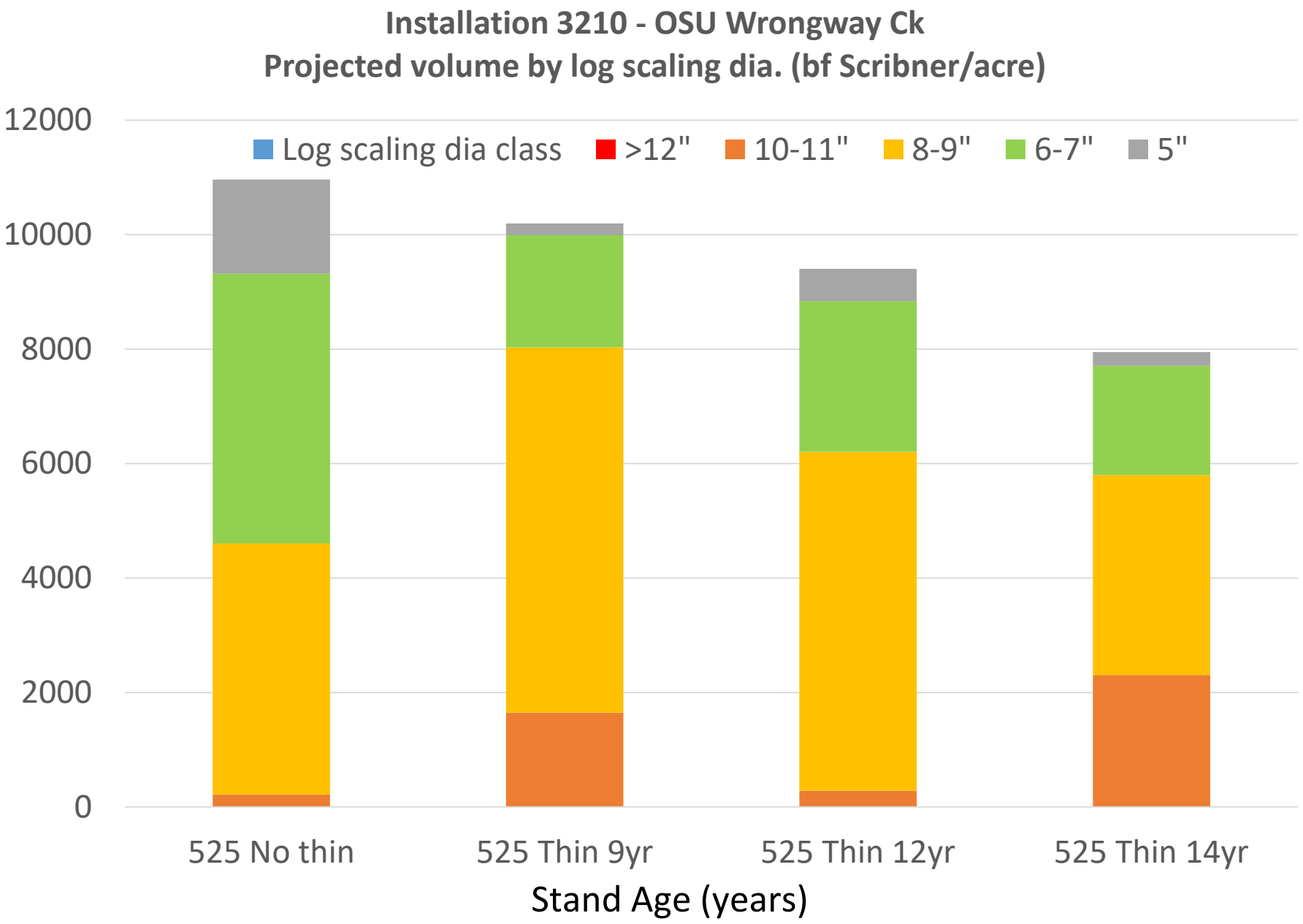
*Board feet Scribner (30ft log length, 5” minimum top dia.

**SI 20 in feet, 20 year base

Red alder platation yield SI 75
Age 30 yr bf/acre by log scaling dia

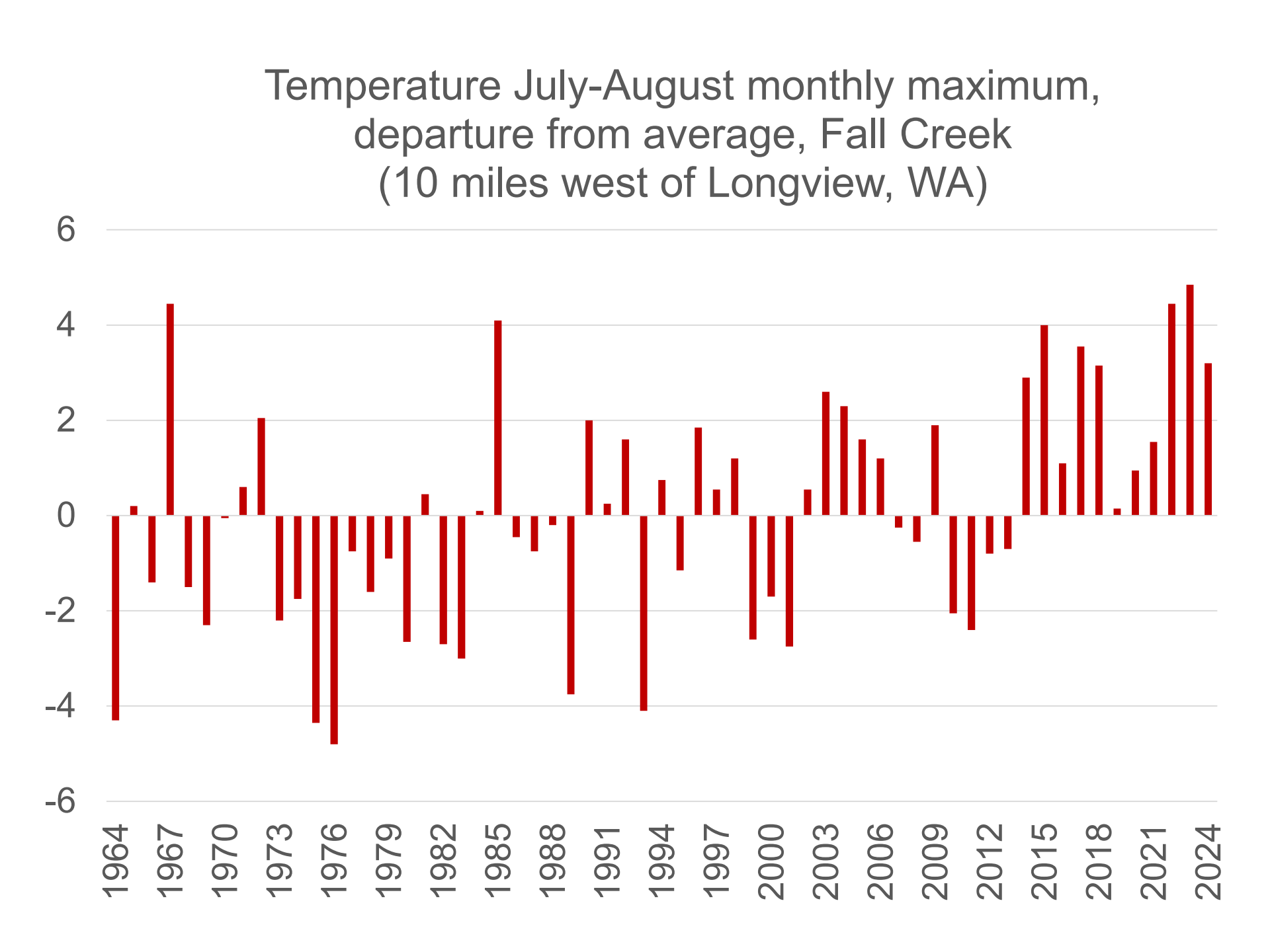


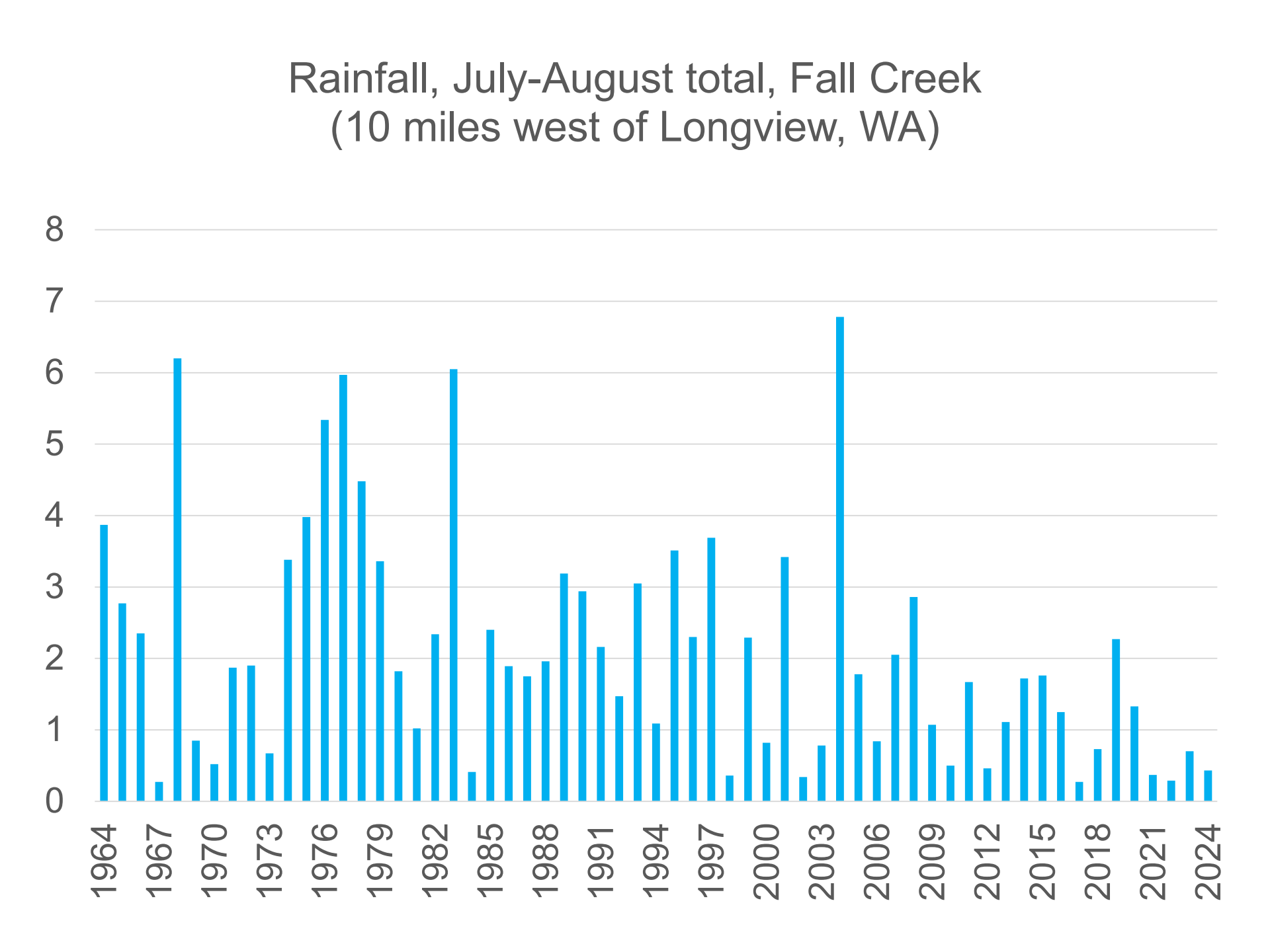
Projections using Red Alder Plantation ORGANON growth and yield model based on OSU Hardwood Silviculture Cooperative, Red Alder Stand Management Study

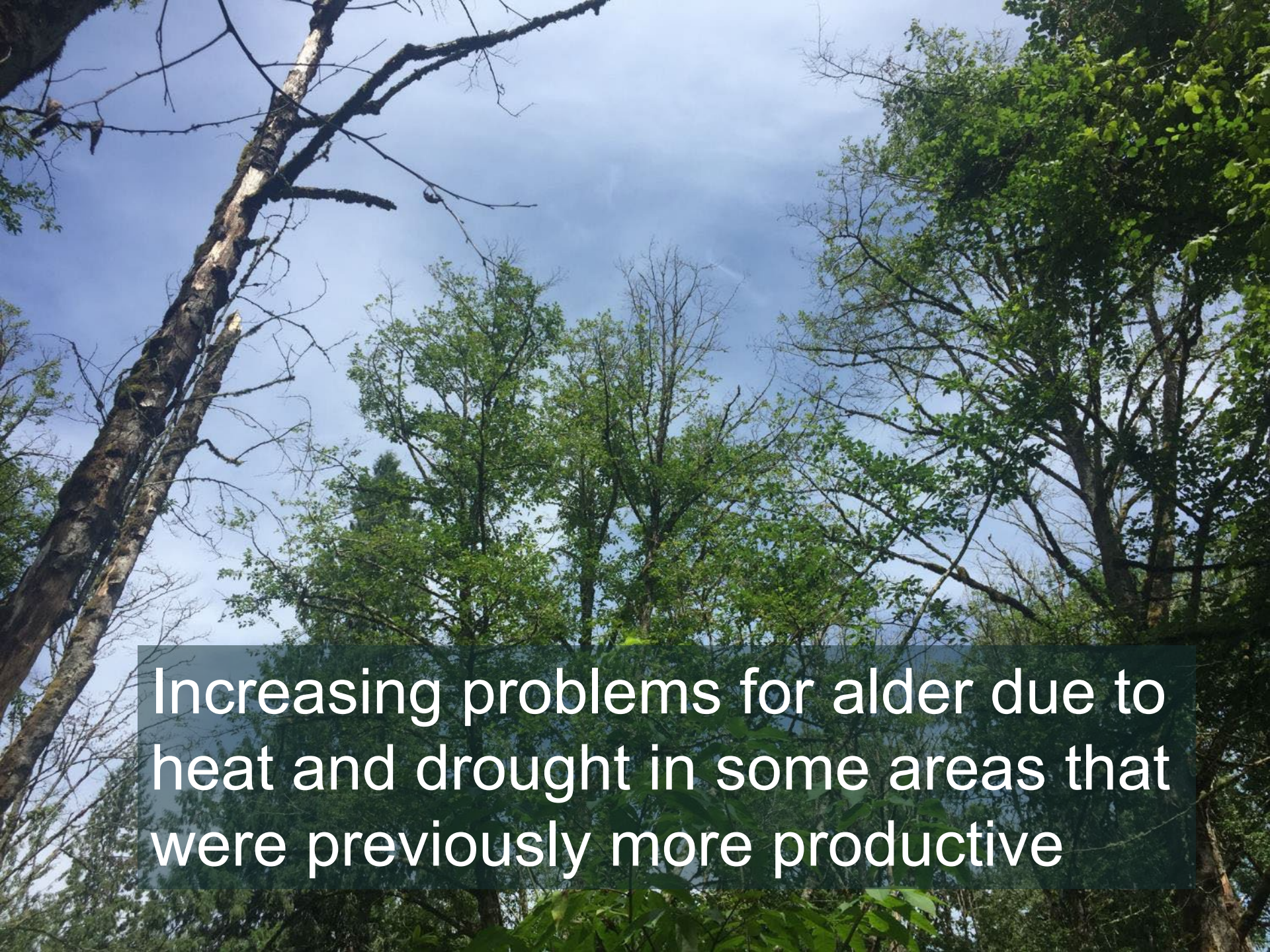

Installation 3210 - OSU Wrongway Ck
Projected volume by log scaling dia. (bf Scribner/acre)
Log scaling dia class
>12"
10-11"
8-9"
6-7"
5"
12000
10000
8000
6000
4000
2000
0
525 No thin
525 Thin 9yr
525 Thin 12yr
525 Thin 14yr
Stand Age (years)

Ongoing observations of growth decline and tree mortality

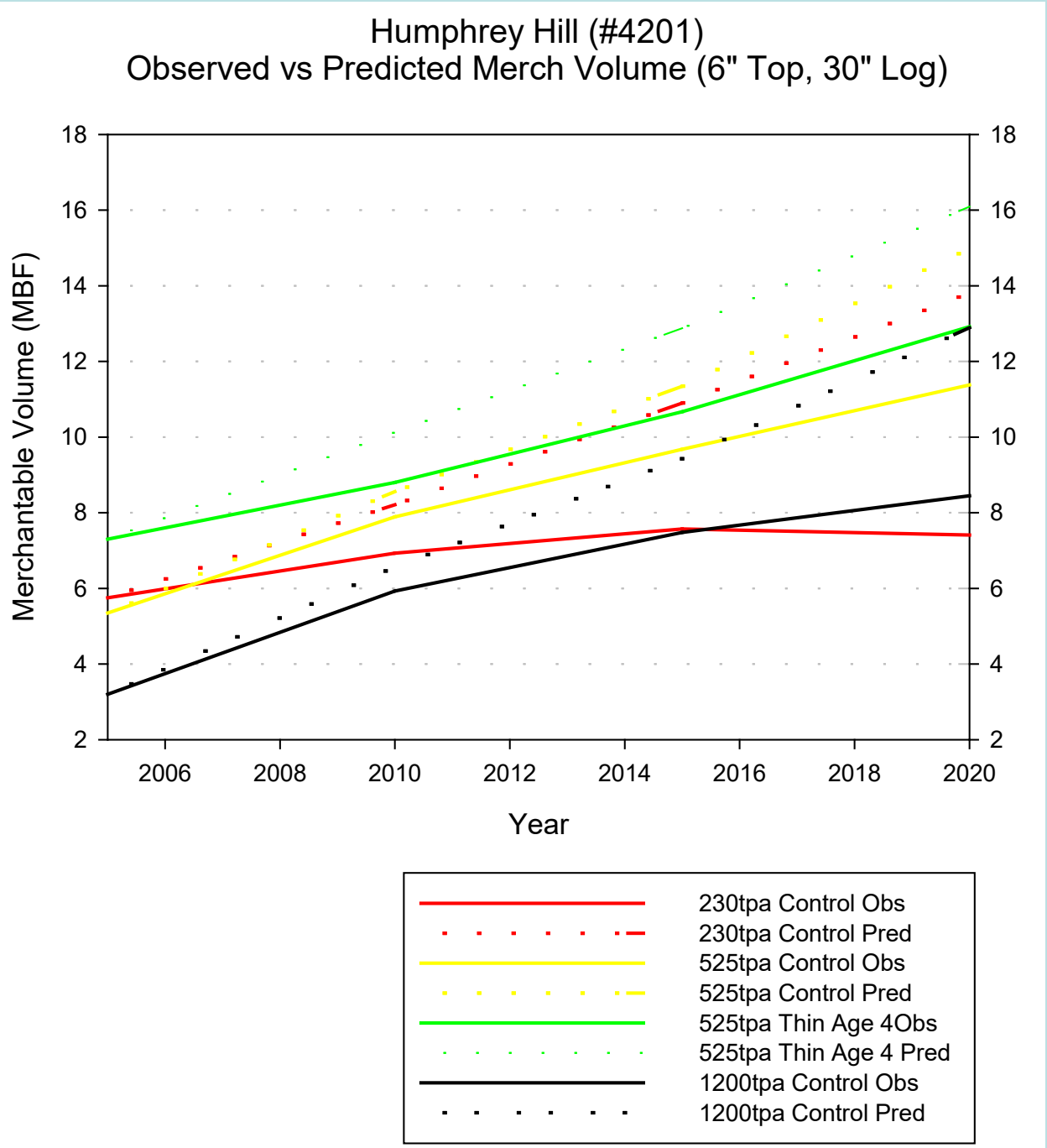
- Observations during re-measurements continue to indicate reduced growth and increased mortality on some (but not all) installations over the last 10 years.
- This appears to be related to drought and heat, interactions with insects and diseases.
- Work is ongoing to explore this, looking at site-specific data for affected installations.

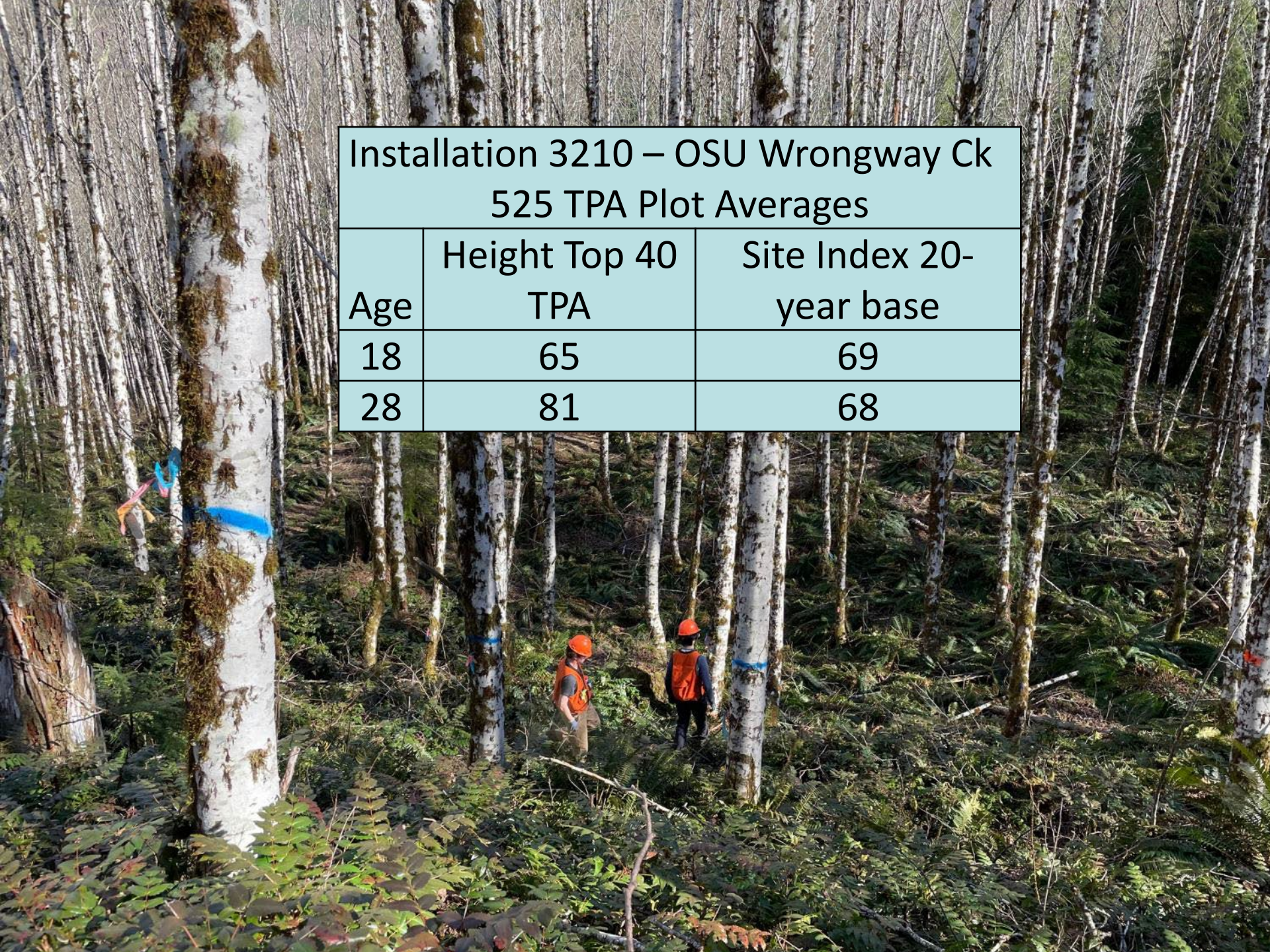

Temperature July-August monthly maximum, departure from average, Fall Creek (10 miles west of Longview, WA)
6
4
2
0
-2
-4
-6
1964
1967
1970
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
2006
2009
2012
2015
2018
2021
2024


Rainfall, July-August total, Fall Creek
(10 miles west of Longview, WA)
8
7
6
5
4
3
2
1
0
1964
1967
1970
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
2006
2009
2012
2015
2018
2021
2024


Increasing problems for alder due to heat and drought in some areas that were previously more productive


Red alder dieback
Drought * stem
canker fungus


Humphrey Hill (#4201)
Observed vs Predicted Merch Volume (6" Top, 30" Log)
Merchantable Volume (MBF)
18
16
14
12
10
8
6
4
2
2006
2008
2010
2012
2014
2016
2018
2020
Year
230tpa Control Obs
230tpa Control Pred
525tpa Control Obs
525tpa Control Pred
525tpa Thin Age 4Obs
525tpa Thin Age 4 Pred
1200tpa Control Obs
1200tpa Control Pred



Installation 3210 – OSU Wrongway Ck 525 TPA Plot Averages		
Age	Height Top 40 TPA	Site Index 20-year base
18	65	69
28	81	68

Red alder stand management study next steps

- Work with CIPS and Cooperators to make the *RAP ORGANON* model and yield table products available and useful.
- Continue installation measurements, data input, data management in 2025.
- Work with Cooperators to review draft red alder management “handbook”.
- Further discuss plans beyond 2026 with Cooperators.

Red alder stand management study next steps

- Climate is a major driver of site quality - accounting for effects of climate variability and climate change will be important for predicting performance of alder and other species going forward.
- Consider use of adjustments to site index based on climate or alternative growth models with climatic variables.

Red Alder: A Natural Climate Solution for the Pacific Northwest?

- Funded by The Nature Conservancy in 2022 to explore “natural climate solutions” (NCS) - nature-based activities that either avoid carbon emissions, or promote carbon sequestration.
- Exploring red alder silviculture as a NCS for working forests in western Washington. Study of biomass production and carbon sequestration rates for red alder vs. conifers.
- A joint effort with the Center for Intensive Planted Forest Silviculture (CIPS) at OSU and the Center for International Trade in Forest Products (CINTRAFOR) and others at the University of Washington.


Alder vs.
Douglas-fir

Findings suggest a major opportunity for expanded management of red alder on the landscape

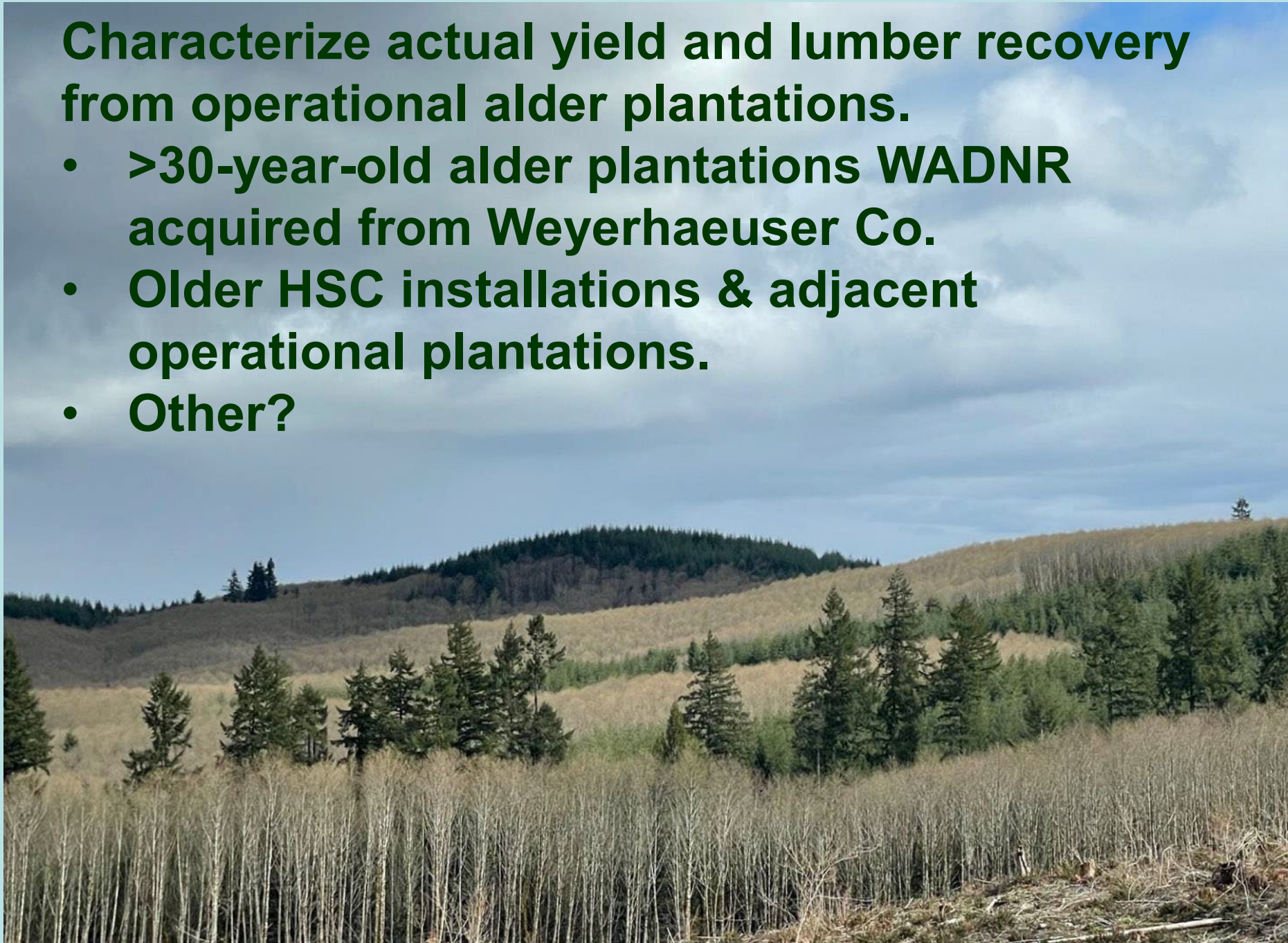
- Estimates of Carbon sequestration over the next 25 years are higher for red alder compared to Douglas-fir on 63% of W. Washington sites (WA 2050 goal).
- With longer rotations, C-sequestration of Douglas-fir is higher on 68% of sites (100 yr). But accounting for increased soil Carbon under alder could reverse that.
- Alder in mixed stands or with crop rotation can increase C in short term or even long-term on sites degraded by severe fire.
- There is good potential for alder to play a significant role in reducing fire severity at both stand- and landscape-level.

Red Alder: A Natural Climate Solution for the Pacific Northwest?

Project report posted at:

https://live-onrc.pantheonsite.io/wp-content/uploads/2023/08/Alder-NCS-Phase-I-Report.pdf

- Will carbon sequestration potential for alder stimulate more establishment and management or red alder?
- Possible Phase 2 proposal for funding from The Nature Conservancy.
- Related proposal to Paul G. Allen Family Foundation.



Characterize actual yield and lumber recovery from operational alder plantations.

- **>30-year-old alder plantations WADNR acquired from Weyerhaeuser Co.**
- **Older HSC installations & adjacent operational plantations.**
- **Other?**

Red Alder Clone Trial – OSU CoF Blodgett Tract

- Established a clone trial to compare the performance of red alder clones and woods run controls as described in HSC 2019 Annual Report.

- Four sources of seedlings were used in this trial:
  1) Eighteen clones from the WSU program and grown as PSB 615A plugs
  2) Woods run bare root seedlings from the Weyerhaeuser Aurora nursery
  3) Woods run 615 plugs grown by PRT Hubbard from the 041 seed source
  4) "Open pollinated" plugs (lot #249) from a WSU clone trial.

- Planted in April 2020 in a 1 acre, unfenced area cleared of any burn piles, and hand sprayed. Planted on a 9X9' grid (537tpa). Surrounded by an operational planting of the same clonal stock

- Measured survival, height & caliper in Spring 2020 (initial), Winter 2020/21 (year 1), and Winter 2021/22 (year 2).

- **Need to install long-term tree tags and measure trees in Fall/Winter 2024-2025 (year 5)**

Red Alder Clone Trial

Red Alder Clone Trial

- 2nd year survival was poor- averaging 73% (54%-96%). No difference between woods run and clones.
- 2nd year caliper averaged 20mm (15mm-27mm). No difference between woods run and clones.
- 2nd year height averaged 145cm (137cm-155cm) for the woods run vs. 165cm (101cm-239cm) for the clones.
- Certain clones perform better than other clones and/or woods run sources. However, results are only from 2 year seedlings from one location.

Red Alder Clone Bank

- HSC established a red alder clone bank at the J.E. Schroeder Seed Orchard (ODF) 2019.
- Purpose was to preserve the improved genetic materials developed by WSU's tree improvement program.
- Three ramets each from 20 production clones were planted at an 18' x 12' spacing with randomized planting spots.
- The clones are doing well and are now 15-20 feet tall. A potential source of vegetative material and/or seed for further propagation.

Red Alder Clone Bank

- Beyond the goal of preserving some improved genetic material, the HSC needs to decide on the longer-term objectives for these clones.

- We need to 1) assemble an interest group to discuss needs for an Alder Tree Improvement program and 2) investigate possible collaboration with the established BC Ministry alder breeding program.

- Annual costs for simply maintaining the clones at Schroeder have been $400-$900.

University of Washington
Red alder research update

Hardwood Silviculture Cooperative

Financial support FY 2024 & FY 2025

Cooperators and Dues	2024	2025
B.C. Ministry of Forests	8,500	8,500
Bureau of Land Management	8,500	8,500
Cascade Hardwood LLC	8,500	8,500
Port Angeles Hardwood	8,500	8,500
Swaner hardwoods	4,500	4,500
Washington Dept. Natural Resources	8,500	8,500
Subtotal	47,000	47,000
Oregon State University	14,833	15,133
TOTAL	$61,833	$62,133

Hardwood Silviculture Cooperative Budget FY 2024	**2024 Projected**	**2024 Actual**
Expenses		
Research Assistant	$43,000	$0
Services UW Crew	$0	$15,807
Services ODF Clone Bank	$900	$435
Supplies	$800	$516
Travel	$5,000	$6,794
Meetings	$0	$0
Printing/publishing	$100	$0
Subtotal	$49,800	$23,552
Overhead - OSU 17.5%	$8,715	$4,122
Total Expense	**$58,515**	**$27,673**
Revenue		
Member Dues	$47,000	$47,000
Carryover	$39,817	$39,817
Total income	**$86,817**	**$86,817**
Balance	**$28,302**	**$59,144**

Hardwood Silviculture Cooperative Budget FY 2025	**2024 Actual**	**2025 Proposed**
Expenses		
Research Assistant	$0	$50,000
Services UW Crew	$15,807	$0
Services ODF Clone Bank	$435	$600
Supplies	$516	$500
Travel	$6,794	$4,000
Meetings	$0	$0
Printing/publishing	$0	$0
Subtotal	$23,552	$55,100
Overhead - OSU 17.5%	$4,122	$9,643
Total Expense	**$27,673**	**$64,743**
Revenue		
Member Dues	$47,000	$47,000
Carryover	$39,817	$59,144
Total income	**$86,817**	**$106,144**
Balance	**$59,144**	**$41,401**

HSC Future Direction

Issues and opportunities:

- Field measurements and data management have demanded the majority of HSC's limited capacity. How much longer to sustain the effort for field measurements?
- HSC membership and financial support has declined. Need further effort to engage new cooperators, determine new research priorities, and develop more funding related to hardwood silviculture.
- New opportunities with UW and Olympic Natural Resource Center, OSU CIPS cooperative, The Nature Conservancy, others?

HSC Future Direction

Issues and opportunities:

- Continued interest in managing alder plantations for timber production.
- Continued interest in the ecology and management of red alder across the range of agencies and landowners.
- New interest in role of alder and potential demand for more alder management for Carbon, fire resilience, and diversity.
- HSC's network of long term alder study sites has great value for pursuing a wide range of research questions of interest in the future.
- Need to understand response of alder to climate stress and potential shifts in site suitability - decline in alder production at lower latitudes and elevation <> growth increases in higher latitudes and elevations?

HSC Future Direction - Recommendations

- Recruit a new Faculty Research Assistant/Assistant Director. Use accumulated funds to support pulse of effort at 50% or higher FTE?
- Plan for future leadership and staffing – Ahrens retirement 2026?
- Explore hardwood-related issues and needs of HSC members and other interested entities.

HSC Future Direction - Recommendations

- Develop products from the Red Alder Stand Management Study in cooperation with CIPS and HSC members – yield tables, site assessment tools, red alder management “handbook”.
- Continue data collection and data management for Stand Management Study and clone trial through the 2024-25 field season.
- Continue to pursue study of yield and lumber recovery study from managed red alder plantations – WADNR, HSC Installations, Other?

HSC Future Direction - Recommendations

New:

- Pursue new opportunities to support HSC & expand capacity.
- Explore additional goals and increased partnerships.
  - genetics/tree improvement – for climate adaptation and sustaining productivity
  - species diversity, fire resilience, carbon sequestration, etc.,
- Work with partners to organize a Red Alder Symposium?

Thank you for your support and your interest in the HSC!

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