

HOW TO SUCCESSFULLY GROW RED ALDER

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How To Successfully Grow Red Alder

- Red Alder Background
 - Species information
 - History of commercial use
- Pacific Cascade Region of DNR
 - Overview
 - Red Alder Program
- Private Landowner Tools
 - Growth and Yield with Financial Analysis



Red Alder Background

- *Alnus rubra* Bong.
- Pioneer species
- Nitrogen Fixer
 - Frankia
- Browse
 - Deer, elk, beaver...



Red Alder Background

Red Alder Catkins



Red Alder Frankia



<http://hsc.forestry.oregonstate.edu/red-alder-physical-characteristics>

Fact Sheets

<http://dendro.cnre.vt.edu/>

red alder *Betulaceae* *Alnus rubra* Bong.  symbol:
ALRU2

vTree

Leaf: Alternate, simple, deciduous, ovate, 3 to 6 inches long, prominently penniveined leaf with doubly serrate margins that are tightly rolled under at the edges (revolute); petiole 1 inch long and grooved; green to yellow green above and paler green below.

Flower: Species is monoecious but flowers are borne in unisexual aments (catkins); preformed males are slender, pendent, and hang in clusters of 2 to 5; female catkins are short and thick, borne at the ends of branchlets.

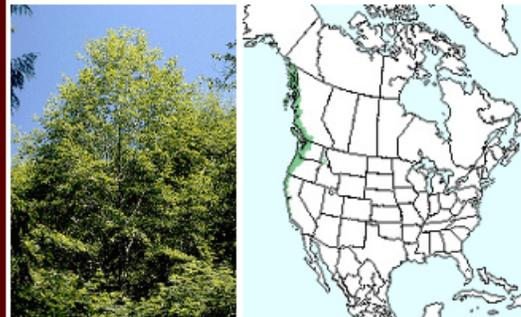
Fruit: A small semi-woody cone about 1/2 to 1 inch long, persists through the winter, brown, seeds are tiny winged nutlets, shed in the fall.

Twig: Young twigs are distinctly triangular in cross-section; olive to reddish brown; prominent lenticels; clearly stalked buds.

Bark: Ashy gray to grayish brown, generally smooth but breaking into flat, irregular plates near the base, increasingly covered with white lichens as it ages; inner bark is tan but turns red when exposed to air.

Form: A medium sized tree reaching 120 feet tall and 1 to 3 feet in diameter. Typically has a moderately straight bole with an open, broadly pyramidal or dome-shaped crown. Lower trunk is usually free of branches due to intolerance to shade.

Looks like: [white alder](#) - [Sitka alder](#) - [thinleaf alder](#) - [Arizona alder](#)



Additional Range Information:
Alnus rubra is native to North America.
Range may be expanded by planting.

[See states reporting red alder.](#)

More: [Wood](#)

External Links:

[USDAFS Silvics of North](#)

[America](#)

[USDAFS Additional Silvics](#)

[Landowner Factsheet](#)

[USDA Plants Database](#)

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Edward Jensen, Alex Niemiera,
and John Peterson

Red Alder Range



http://commons.wikimedia.org/wiki/File:Alnus_rubra_range_map_1.png#/media/File:Alnus_rubra_range_map_1.png

Resources for Growth

- Photosynthetically Active Radiation (PAR) (i.e. sunlight...)
- Water
- Macro Nutrients
 - N, P, K, S, Ca, Mg
 - RA Produces its own N!!!
- Micro Nutrients
 - Fe, Mn, Cu, Zn, B, Cl, Mo
- Liebig's Law of the Minimum

Minimum



Red Alder History

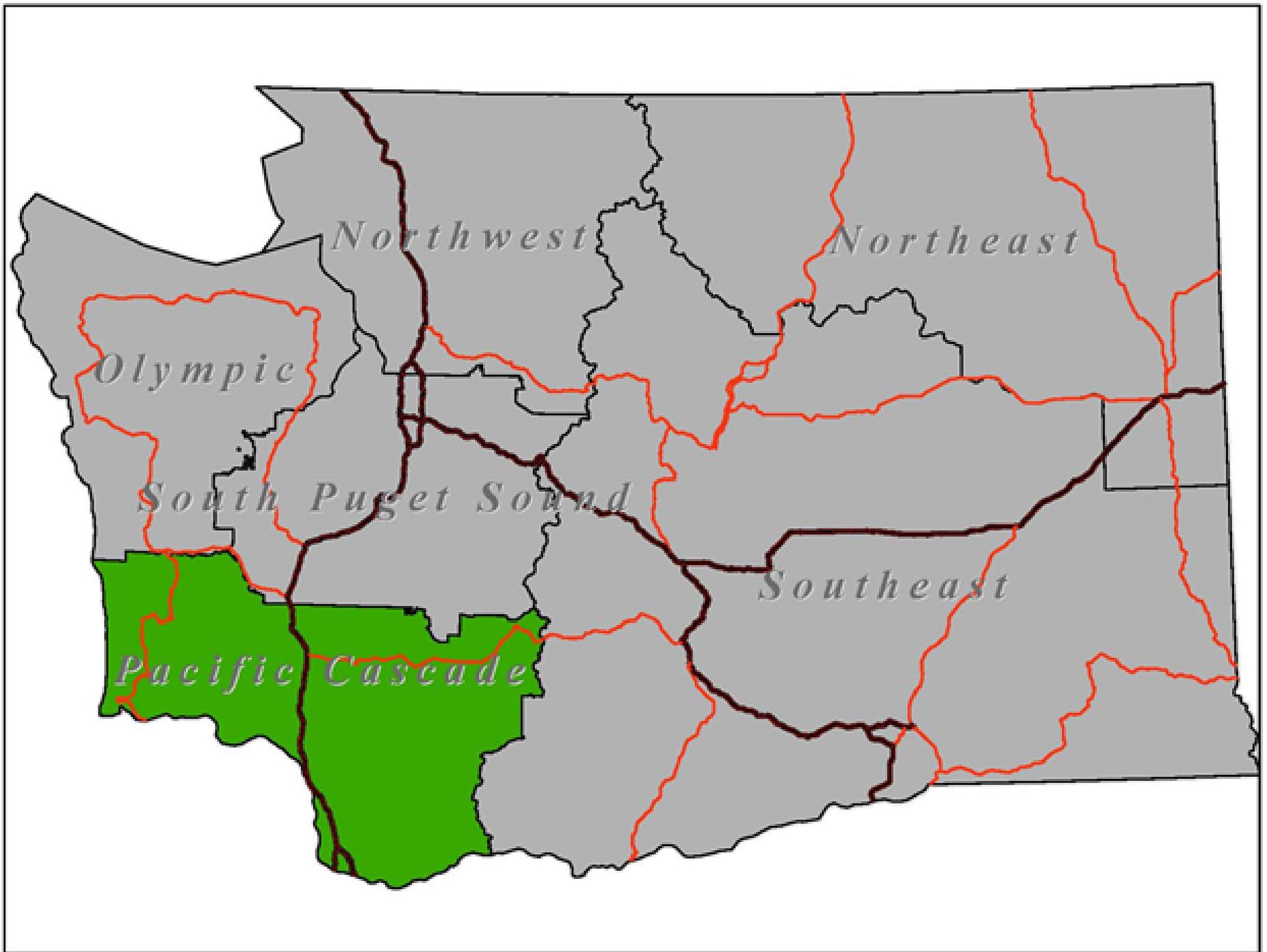
- Unwanted
 - Outgrew conifer
 - Little commercial value
 - Pioneer species
- Markets change
 - Commercial value has increased
 - Relative ease of wood working
 - Short Rotation
 - Disease resistance



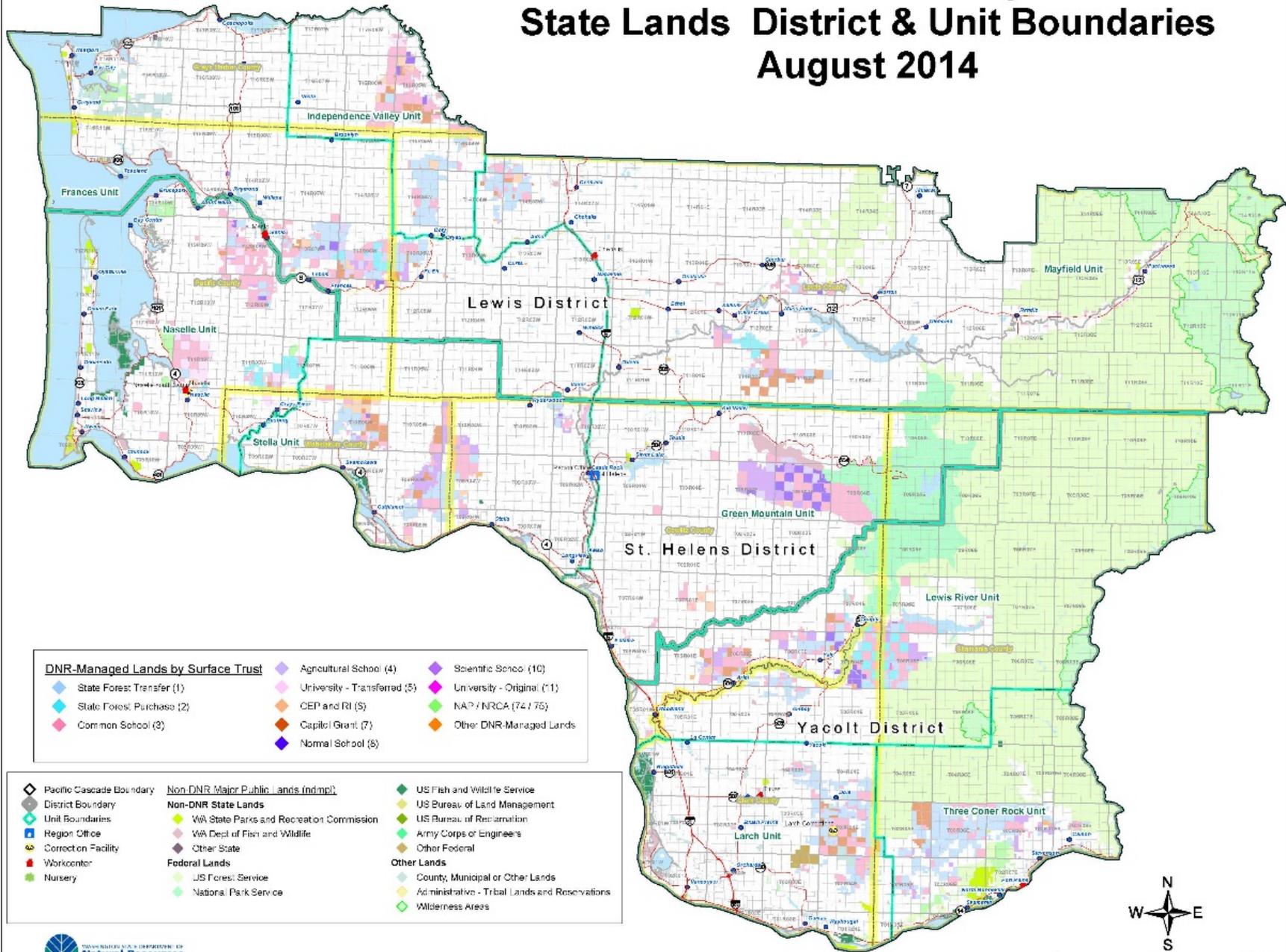
Red Alder Plantations in PC Region

- Pacific Cascade Region
 - Region Overview
 - Why Alder
 - History of Alder Establishment
 - Benefits of Red Alder
 - Risks of Red Alder
 - Site Selection
 - Tools Used





Pacific Cascade Region State Lands District & Unit Boundaries August 2014



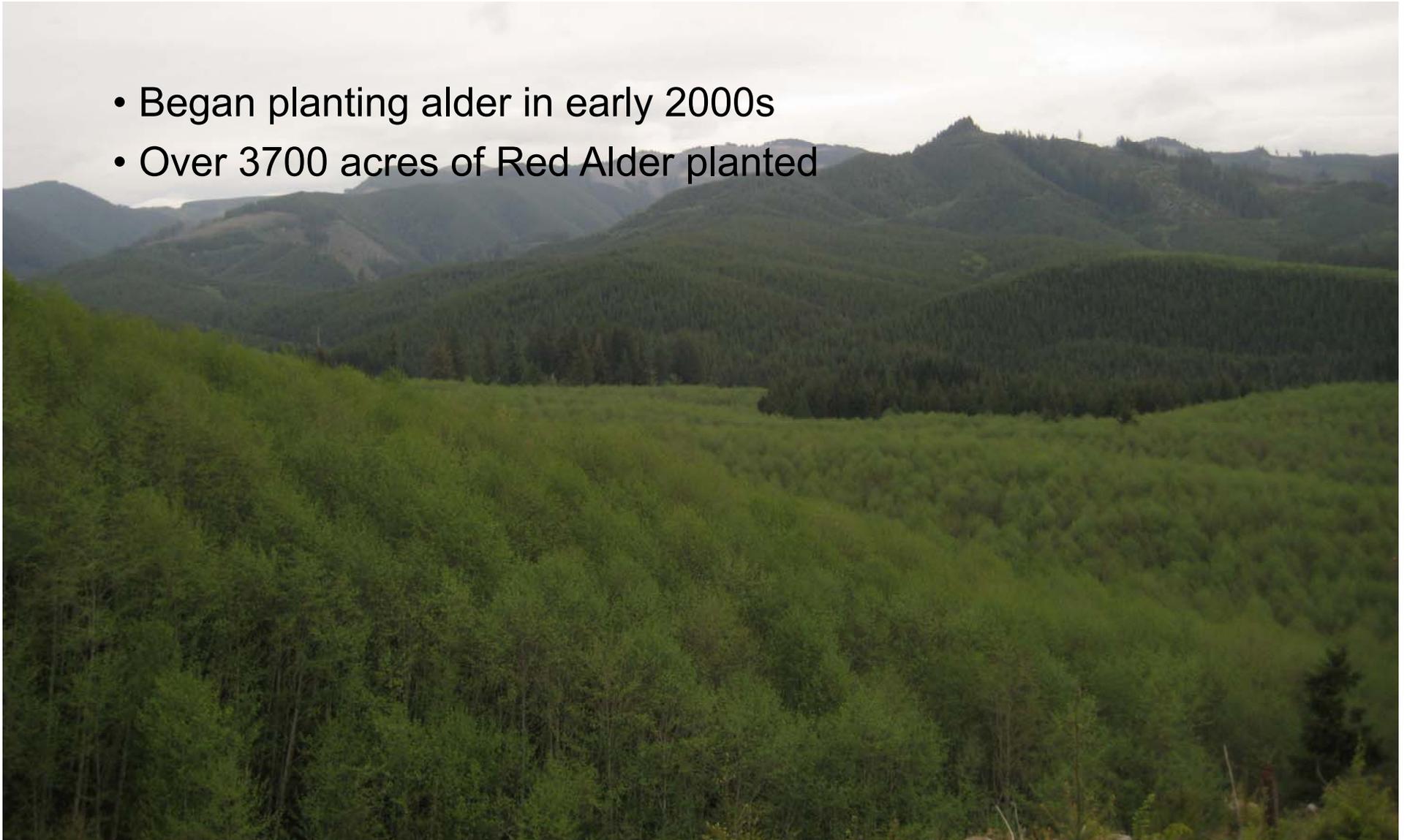
Why Alder in PC

- Maximize Return to the Trusts
 - Bare Land Value
 - Prudent Person doctrine of Trust Mandate
 - “Avoid undue risk”
- Good Stewardship
 - Forest health concerns
 - Attempt to mitigate
 - Build diverse portfolio
 - Provide diversity
- Our Management goals
 - 30-35 year rotation
 - Only manage productive sites
 - Keep it operational

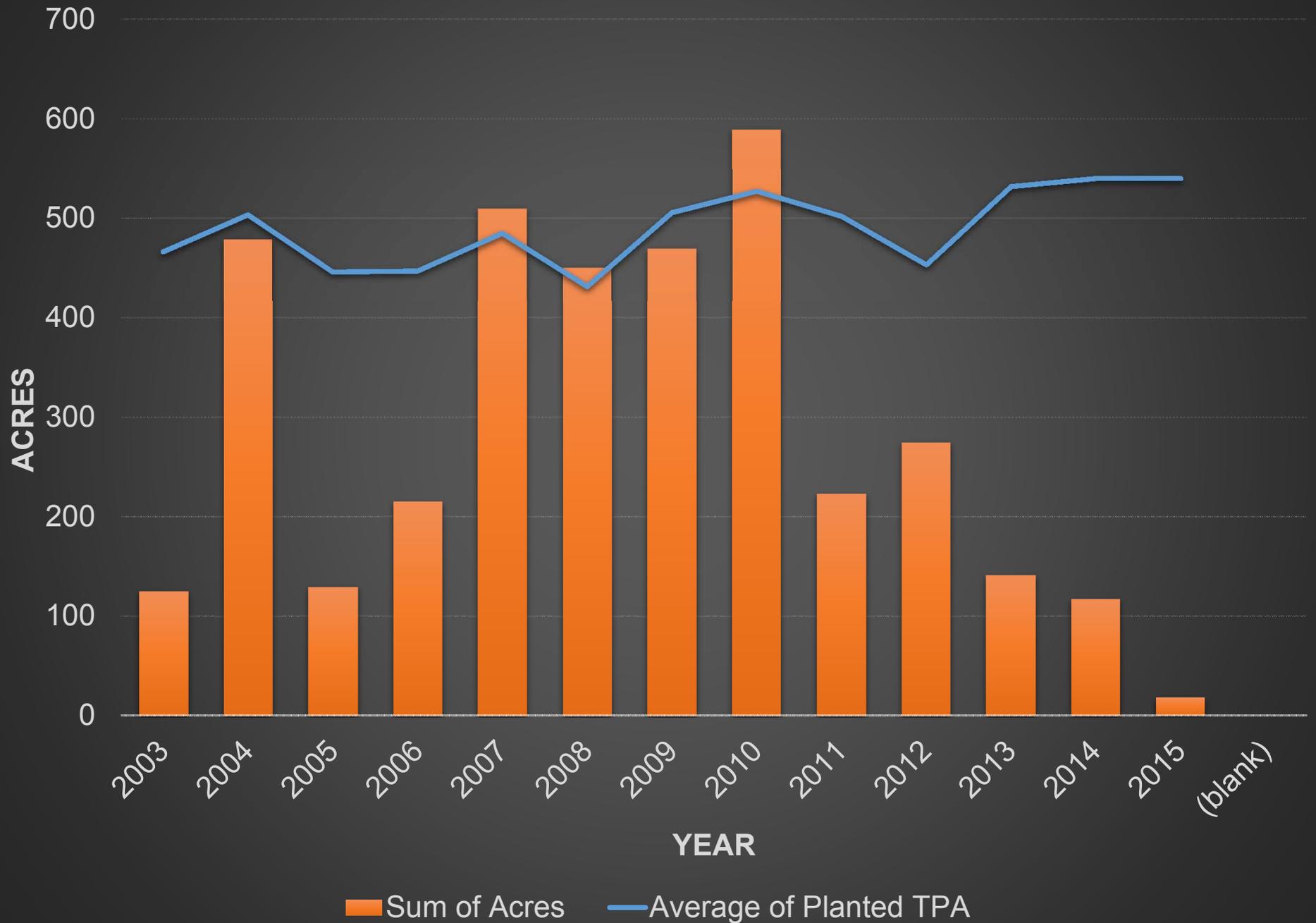


PC Region

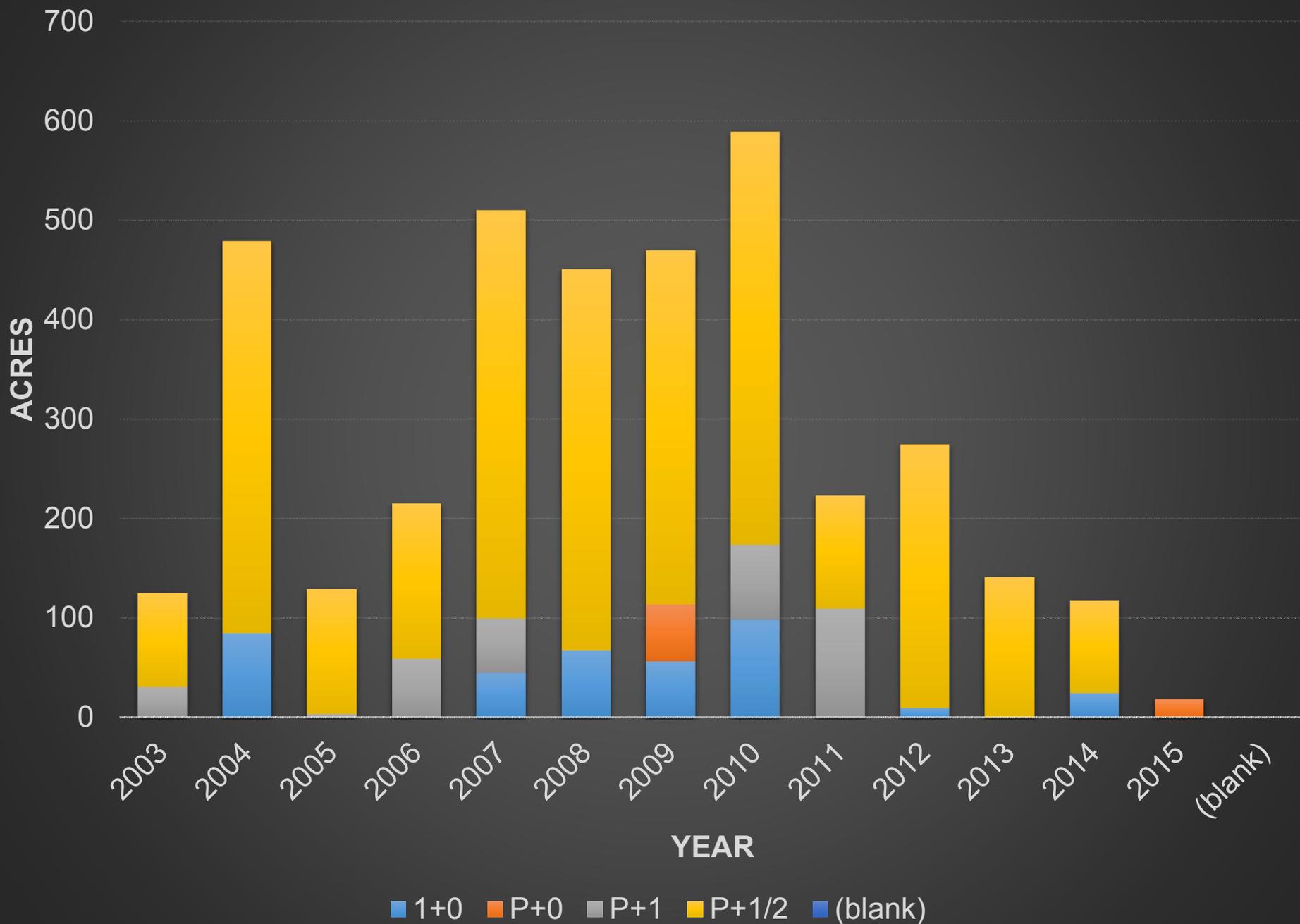
- Began planting alder in early 2000s
- Over 3700 acres of Red Alder planted



Pacific Cascade Region Red Alder Establishment



Red Alder Stock Type Planted



Benefits and Risks

- Financial
 - Shorter rotation
 - Intensive young stand management
- Policy
 - Achieve “Green Up” faster
 - Hydrologic maturity calculations
- Forest health
 - Opportunity to mitigate certain diseases
 - Sensitive to frost damage
- Planting Stock
 - Frost damage
 - Where to get trees???



Red Alder Considerations

- Why plant alder
 - Alder availability
 - Alder life cycle
 - Nitrogen fixer
 - Forest health (not an issue for phelinus, but susceptible to armillaria and annosus)
 - economics
- You're leaning towards RA
 - Compare possible species
- Fine tuning your decision
 - Site selection
 - Veg management
 - PCT
 - Rotation length (30-35 years)
 - Other?



Site Selection

- Soil
- Climate
- Slope (aspect and position)
- Competition
- Disease presence
- Frost damage
- Ungulates



Disease Concerns - *Heterobasidion annosum*



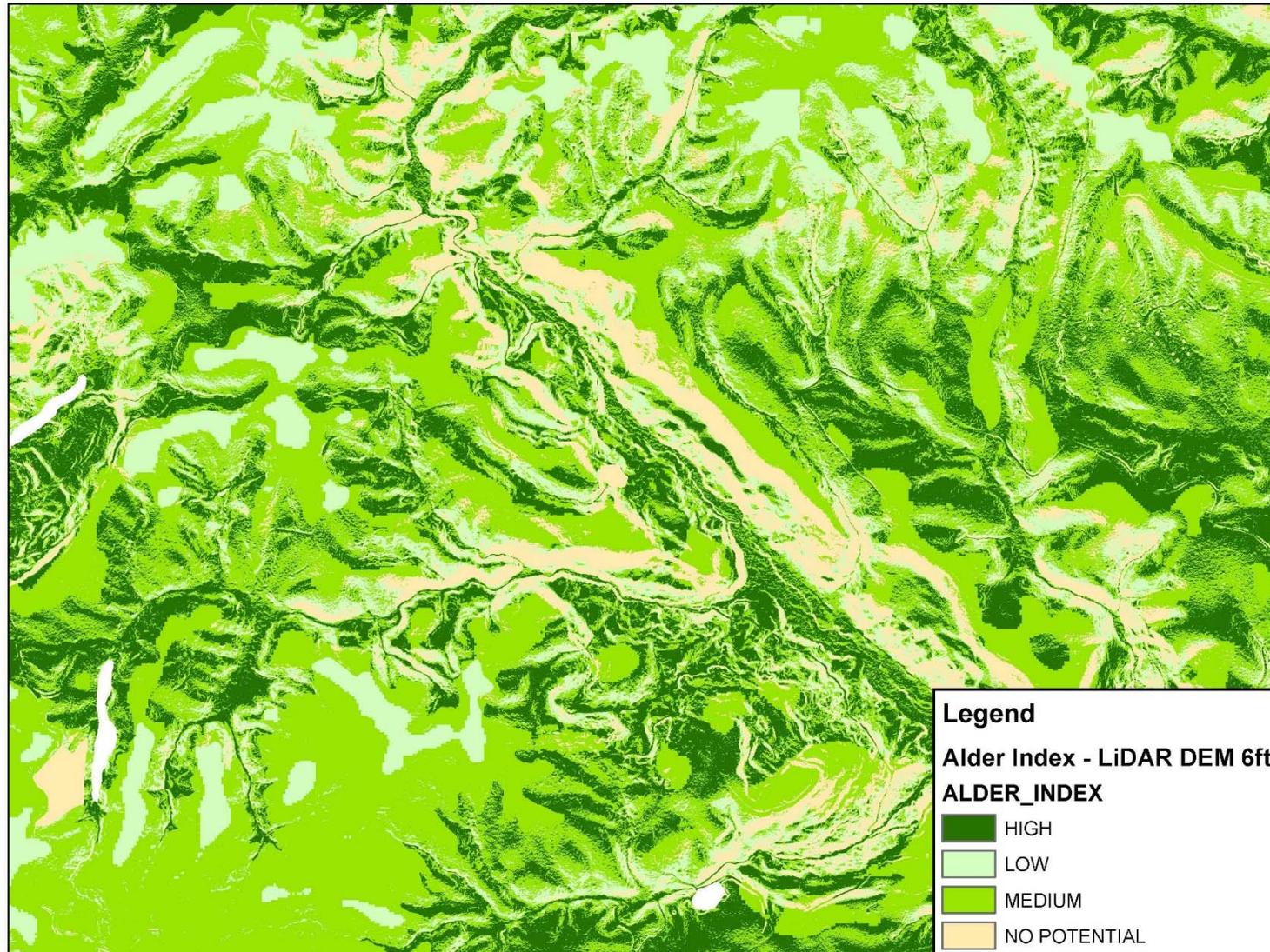
Vegetation Management



Pre-Commercial Thinning (7-10 years old)

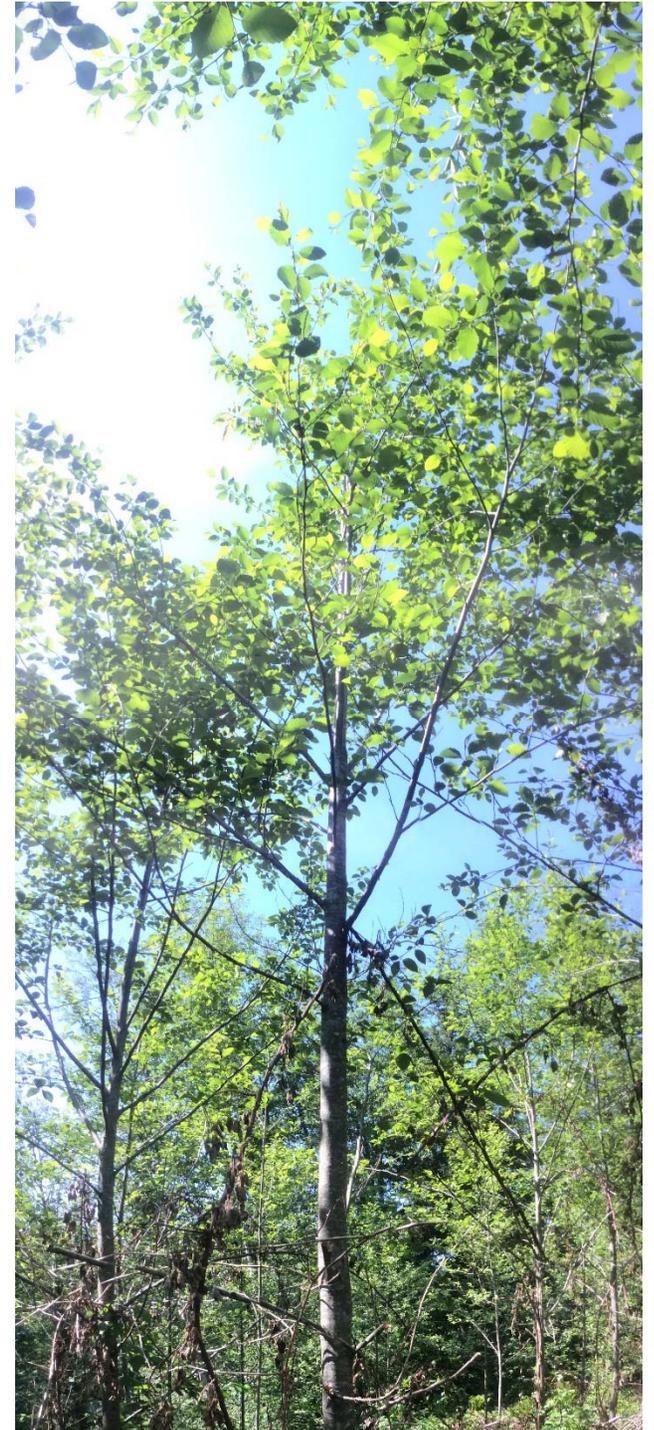


State Lands Alder Index



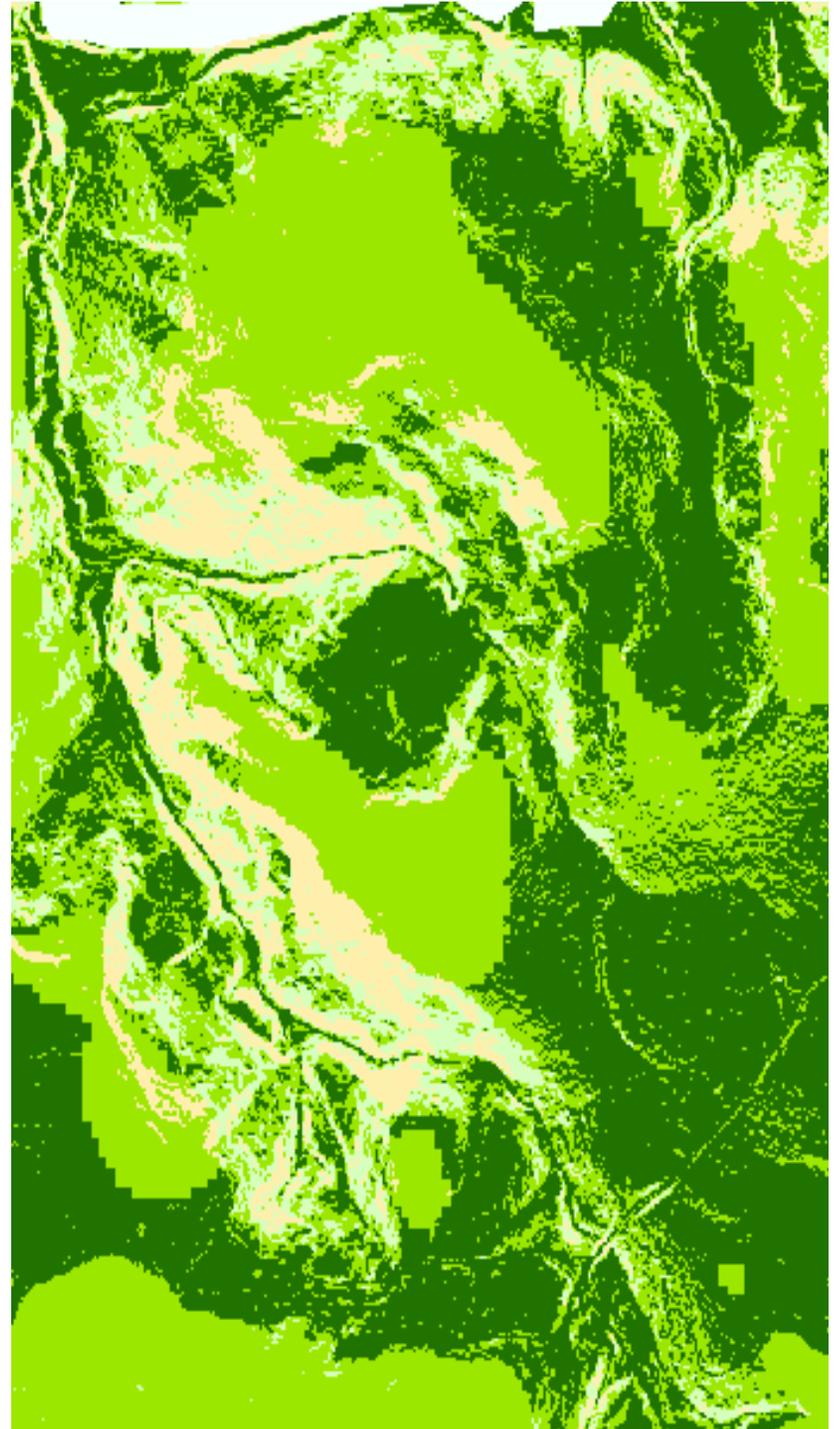
State Lands Alder Index

- Geospatial “Model” for Red Alder Suitability
 - Utilized DNR spatial data
 - Elevation
 - Aspect
 - Slope
 - Topographic Position
 - Soil Type
 - Rock Fragment Percent
 - Measured Site Index
 - Produced Four Site Classes
 - High, Medium, Low, and No Potential



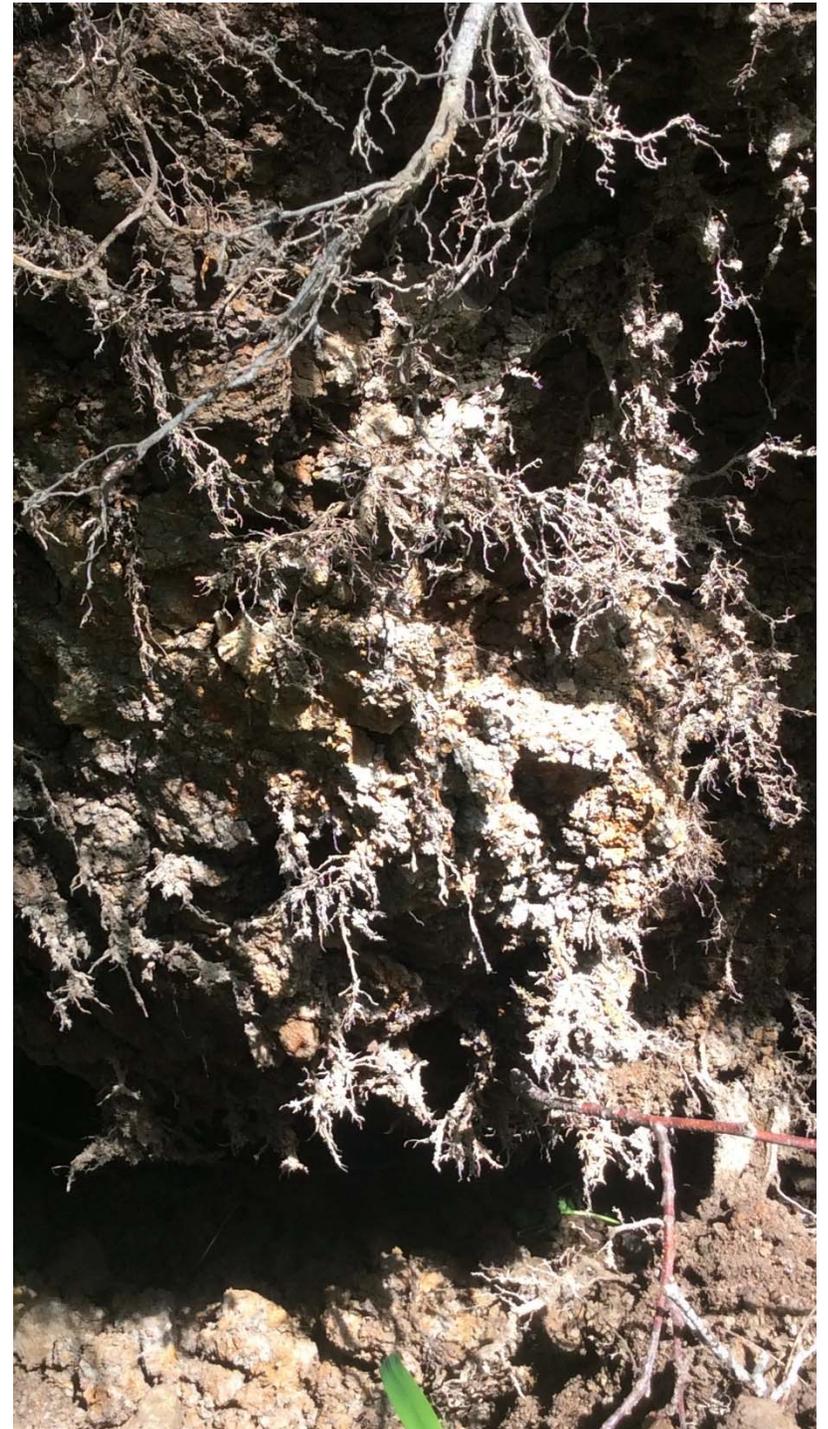
State Lands Alder Index

- Elevation
 - Ideal is 0-1000ft
 - Can grow at 2500ft
- Aspect
 - Depends on slope
 - North is best
- Soil Type
 - Loam to Silt Clay Loam is best
- Ideal Site
 - Low elevation
 - North aspect with low slope
 - Loam soil
 - Little rock
 - Well drained soil



State Lands Alder Index

- IT'S A MODEL!!!
 - Very helpful tool
 - Site visit is CRUCIAL
 - Things to watch for:
 - Soil type
 - Drainage patterns
 - Air and Water
 - Plant communities
 - Salal vs. sord fern
 - Possible competition problems
 - Himalayan Blackberry
 - Forest disease and pests
 - Operational Constraints



Lessons Learned

- Failure can happen
 - Nature can be tricky
- Frost pockets are important
 - Air dams...
 - Lack of cover...
- Planting stock is important
 - Geographic location of nursery
 - Weather...
 - Caliper is crucial
- Thin early
 - You must invest to realize gain
- Alder is sensitive
 - Soils, frost, density, wind, etc.



Frost Damage from Nursery



Frost Damage (year 2)



Caliper (Smallest 25%)



Caliper (Largest 75%)



Estimating future value



Growth and Yield Modeling

- ORGANON Version 4
 - Traditional model interface
- **OR**
- CIPS Red Alder Growth Simulator
 - Center For Intensive Planted-forest Silviculture
 - Requires
 - MS Excel file (Macro-enabled)
 - ORGANON DLL
 - A little Visual Basic experimentation
 - Its really easy...



Modeling Growth and Yield



Stand information input	
RA Site Index	70.0
DF Site Index	120
Even Aged?	1
BH_AGE	5
Age from seed	7
ORGANON input/output	
VERSION	4
Number of plots	1
Merchandising Specifications	
<i>Cubic Foot Volume</i>	
Stump Height (ft)	0
Top Diameter (inches)	0
<i>Board Foot Volume</i>	
Log length (ft)	10
Min Log length (ft)	10
Top Diameter (inches)	5
Stump height (ft)	0.5
Trim (inches)	8
Economic Specifications	
Interest rate (%)	8
Inflation rate (%)	2
Timber Pro Increase (%)	0.5
<i>Costs</i>	
Logging, thin	150.00
Logging, Final harvest	150.00
Haul	80.00
PCT	125.00
Spray	80.00
Site Prep	200.00
Plant	100.00
<i>Log Prices</i>	
4" scaling diameter	400.00
5" scaling diameter	400.00
6" scaling diameter	450.00
7" scaling diameter	450.00
8" scaling diameter	550.00
9" scaling diameter	550.00
10" scaling diameter	575.00
11" scaling diameter	600.00
12"+ scaling diameter	650.00

Select Proper Treatments

A	B	C	D	E
Treatment (user thin, RD or TPA thinning from below, fertilization)	Stand Age	Type 0=final harvest; 1=user thin; 2=RD thin; 3=TPA thin; 4=output stand/tree data	Treatment specifics user code (if type=1); Residual RD (if type=2); Residual TPA (if type=3);	Thinning specifics: (% of total that should be removed proportionally)
1	15	3	232	0
2	20	3	190	0
3	30	3	110	0
4	60	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
Comparison to control? (1=yes, 0=no)		1		

Thin Early, Thin Often



Input Stand Data

- Data Collection
 - Tree Number
 - Species (pure RA???)
 - User Code (thinning?)
 - DBH
 - Crown Ratio (!!!)
 - Expansion Factor
 - Based upon sampling method

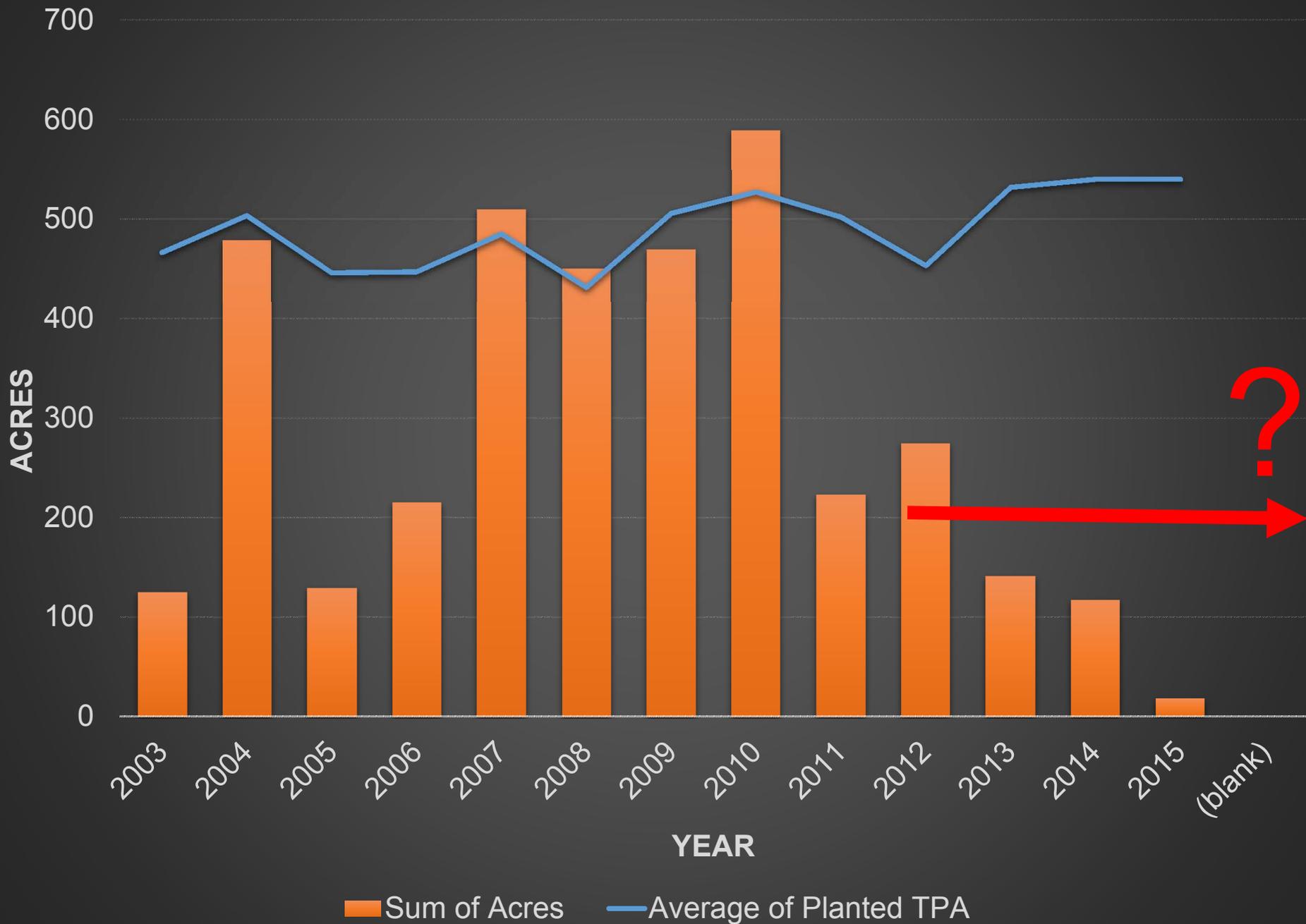
A	B	C	D	E	F	G	H	I	J
Plot	Tree	Species	User code	DBH	Ht	CR	EXPF		
204	161	351	0	2.8			3		
204	162	351	0	2.9	25.9	0.82	3		
204	163	351	0	3.6	28.9	0.85	3		
204	164	351	0	2.9			3		
204	165	351	0	3.7	24.9	0.82	3		
204	166	351	0	1.9			3		
204	167	351	0	3.5	23.7	0.85	3		
204	168	351	0	3.5			3		
204	169	351	0	2.3			3		
204	171	351	0	3.5	26.9	0.83	3		
204	172	351	0	2.7			3		
204	173	351	0	3.3			3		
204	174	351	0	2.4			3		
204	175	351	0	3.5	24.3	0.87	3		
204	176	351	0	2.4			3		
204	177	351	0	3.1			3		
204	178	351	0	2.4			3		
204	179	351	0	2.1			3		
204	180	351	0	2.6	24.2	0.77	3		
204	181	351	0	2.9	25.0	0.86	3		
204	182	351	0	3.1			3		
204	183	351	0	2.8			3		
204	184	351	0	2.4			3		
204	185	351	0	2.7			3		
204	186	351	0	2.8			3		
204	187	351	0	2.3			3		
204	188	351	0	1.8			3		
204	189	351	0	2.2			3		
204	190	351	0	2.5			3		
204	191	351	0	1.4	14.3	0.68	3		
204	192	351	0	1.6			3		
204	193	351	0	2.2			3		
204	194	351	0	1.7			3		
204	195	351	0	2.1			3		

Run
ORGANON

Output Table

A	B	C	D	E	F	G	H	I	J	K	L	M
Cycle	Age	TPA	BA	QMD	HT40	CFV	BFV	CFV MAI	BFV MAI	RD	IRR	PNW
0	7	576.0	21.0	2.6	25.5	251	0	35.9	0.0	22.0	0.0%	-\$300.00
1	8	573.3	31.8	3.2	30.9	441	0	55.2	0.0	30.7	0.0%	-\$300.00
2	9	570.6	42.8	3.7	35.6	673	0	74.8	0.0	38.9	0.0%	-\$300.00
3	10	567.6	53.3	4.1	39.8	930	64	93.0	6.4	46.3	-12.0%	-\$293.10
4	11	563.8	63.0	4.5	43.5	1197	353	108.9	32.1	52.9	-12.0%	-\$263.78
5	12	549.3	71.3	4.9	46.8	1456	934	121.3	77.9	58.1	-8.4%	-\$207.87
6	13	530.6	78.4	5.2	49.8	1703	1584	131.0	121.8	62.2	-0.9%	-\$147.71
7	14	513.8	84.7	5.5	52.6	1943	2191	138.8	156.5	65.8	2.7%	-\$94.19
8	15	498.5	90.5	5.8	55.0	2174	3283	145.0	218.9	68.9	8.0%	\$0.66
8	15	232.0	58.5	6.8	55.0	1455	3283	97.0	218.9	41.7	6.7%	-\$38.14
9	16	231.9	63.8	7.1	57.3	1653	3933	103.3	245.8	44.7	8.1%	\$23.72
10	17	231.8	68.9	7.4	59.4	1848	4391	108.7	258.3	47.5	8.8%	\$62.04
11	18	231.7	73.7	7.6	61.3	2040	4946	113.3	274.8	50.1	9.7%	\$122.52
12	19	231.6	78.2	7.9	63.1	2228	5763	117.3	303.3	52.6	10.7%	\$212.32
13	20	231.4	82.5	8.1	64.8	2412	6388	120.6	319.4	54.9	11.2%	\$275.27
13	20	190.0	72.1	8.3	64.8	2120	5658	106.0	282.9	47.4	10.6%	\$167.79
14	21	190.0	76.0	8.6	66.3	2286	6144	108.9	292.6	49.4	10.8%	\$304.43
15	22	189.9	79.7	8.8	67.8	2449	6471	111.3	294.1	51.3	10.9%	\$325.33
16	23	189.9	83.2	9.0	69.2	2608	6973	113.4	303.2	53.1	10.9%	\$353.80
17	24	189.8	86.5	9.1	70.5	2764	7271	115.2	303.0	54.8	10.9%	\$361.64
18	25	189.8	89.8	9.3	71.7	2916	8060	116.6	322.4	56.4	11.1%	\$420.44
19	26	189.7	92.8	9.5	72.8	3064	8575	117.8	329.8	58.0	11.1%	\$437.29
20	27	189.7	95.8	9.6	73.9	3209	9029	118.8	334.4	59.5	11.1%	\$446.54
21	28	189.6	98.7	9.8	75.0	3350	9516	119.7	339.9	60.9	11.0%	\$461.60
22	29	189.5	101.4	9.9	75.9	3488	9786	120.3	337.4	62.2	10.9%	\$452.75
23	30	189.5	104.0	10.0	76.9	3623	10058	120.8	335.3	63.5	10.8%	\$449.80
23	30	110.0	70.6	10.9	76.9	2478	6817	82.6	227.2	41.8	9.4%	\$175.44
24	31	110.0	72.8	11.0	77.8	2585	7208	83.4	232.5	42.8	9.4%	\$322.25

Pacific Cascade Region Red Alder Establishment



Future Work?

- Continue to plant Red Alder
- Planting stock
- Continue to fine tune site selection
- Planting stock
- Continue to fine tune stocking levels
 - With help from HSC
- Planting stock
- Continue to harvest RA where feasible
- **PLANTING STOCK!!!**



Questions?

