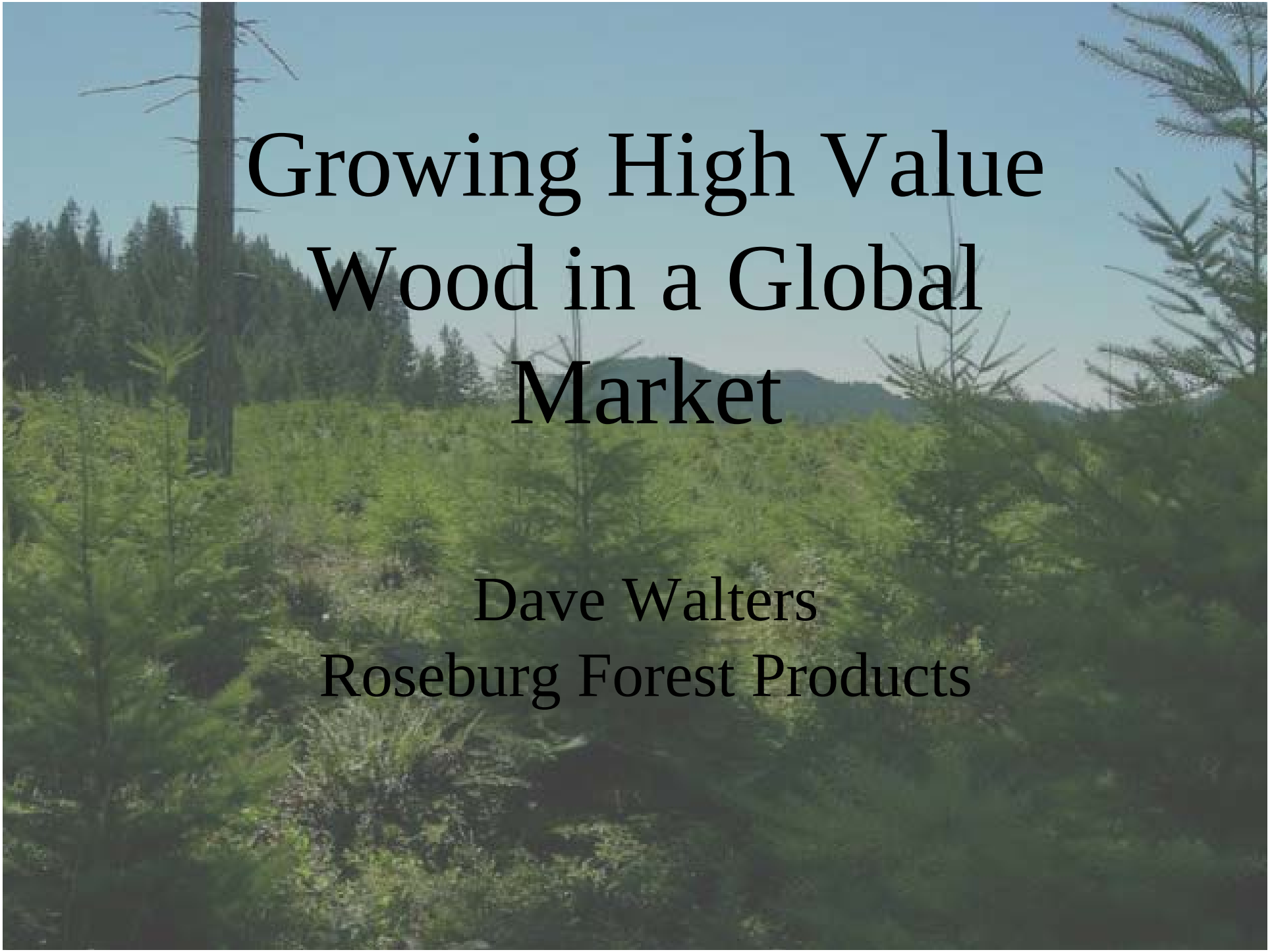

Growing High Value Wood in a Global Market

Dave Walters
Roseburg Forest Products

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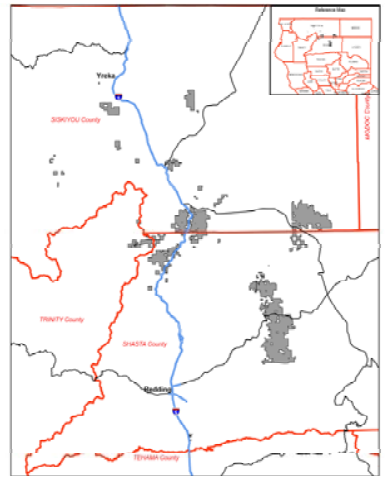
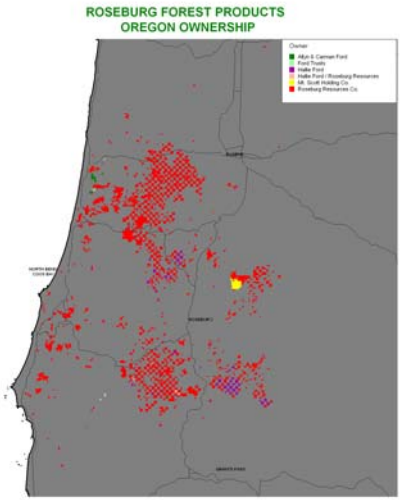
Overview

- **Background & Objectives**
- **High Value Wood**
  - **What is it?**
  - **Designated End Uses**
    - **Engineered Wood**
  - **Wood Quality**
  - **Value Relationships**
- **Growing Value**
  - **Silviculture**
  - **Tree Improvement**
- **Summary**





Timberland Management Objective

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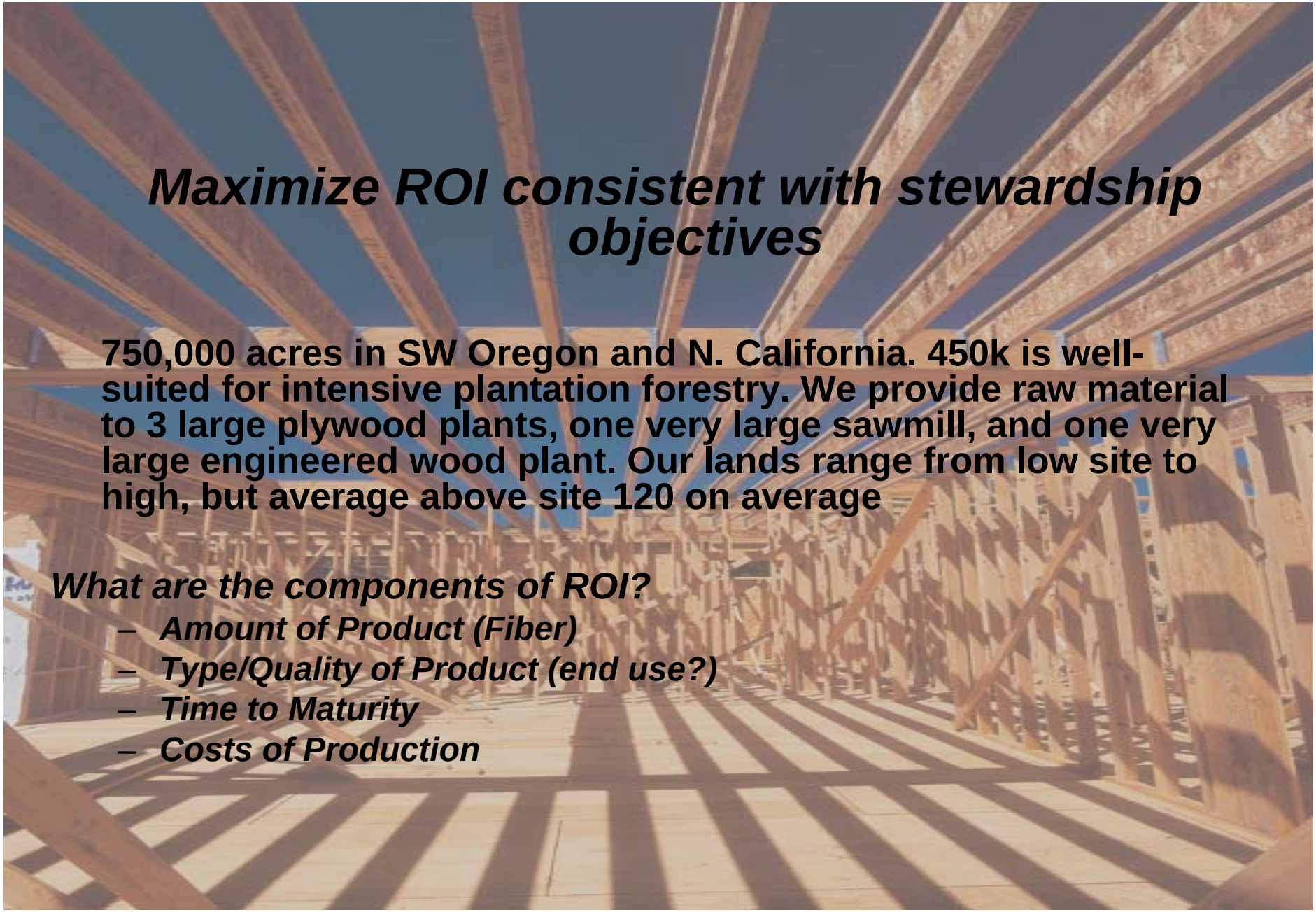

Maximize ROI consistent with stewardship objectives

750,000 acres in SW Oregon and N. California. 450k is well-suited for intensive plantation forestry. We provide raw material to 3 large plywood plants, one very large sawmill, and one very large engineered wood plant. Our lands range from low site to high, but average above site 120 on average

What are the components of ROI?

- ***Amount of Product (Fiber)***
- ***Type/Quality of Product (end use?)***
- ***Time to Maturity***
- ***Costs of Production***

Why are we concerned?

- Increasing Local Pressures
  - Labor costs
  - Environmental and Safety Regulations
  - Public Perception and Influence beyond regulatory requirements
- Changing Local Resources
  - Tree Size
  - Geographic Distribution
  - PNW Resource characteristics and those of global competition are becoming more similar…plantation forestry
- So, how do we compete
  - Growth - global competition can meet and/or beat us on GROWTH in many cases
  - Quality - historically, we have been able to offer a better product (log), at least as regards Douglas-fir

What is Wood Quality?

- A variable trait…defined by the requirements of each user/customer
- For RFP, high quality wood has characteristics that bring a value premium.
  - Visual Appearance
  - Strength Attributes
- Trends
  - Larger Diameter – premium declining
  - Clear Wood – premium not increasing
  - Ring count – less important
  - Strength – significant, particularly for engineered wood

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Do we…

- Manage to provide specific raw material for designated end uses? Or
- Create an end use (plants) which maximizes the return from the high value trees coming from our forest lands?
- As tree-growers, the latter has been presumed, but perhaps we need to consider how we produce our raw material
- Additional Challenge to answering yes on the 1st question – the end use is 50 years away

High Value – Wood Quality

Overview

	Opportunity to Increase Value			Effect on Trait (+,-,?)					
	Stud Mill	Plywood	EW	Faster Growth (IM, Fert)	Wider Initial Spacing	Thinning	Pruning	Shorter Rotations	Genetics
Basic Traits									
Strength (increasing MOE)	0	0	++	?	-	?	?	?	++
Density (increasing)	0	0	+	-	-	?	?	?	+
Knot Size (smaller)	0	+	+	?	-	-	+	+	+
Log Diameter (increasing)	-	+	0	?	+	+	?	-	++
Ring Count (increasing)	0	+	0	-	-	-	?	-	?
Form (decreasing taper)	+	0	0	?	+	-	?	?	+
Form (roughness, sinuousity)	0	+	+	-	-	?	+	?	+
%Juvenile Core (decreasing)	+	0	0	-	-	?	?	-	?

High Value – Wood Quality

Strength by Species

Species	Grade	Specific Gravity	MOE (x10^6)
Douglas-fir	Select Structural	0.50	1.9
Southern Yellow Pine	Select Structural	0.55	1.8
Spruce/pine/fir	Select Structural	0.42	1.5
Aspen	Select Structural	0.39	1.1

Source: National Design Specs, 2005, AFPA;Forest Products Journal 53(4);

- Stiffness is often expressed as an “E” Value, which is a representation of modulus of elasticity (MOE).
- MOE is correlated with density and can be measured by the speed with which sound travels through the wood

Strength

- Initially, we looked at older, tight-grain stands
  - little correlation with age and site
  - visual estimates of high MOE logs have given way to estimates using tools affectionately known as bongers. Example, HM-200
- Standing Tree Tools are being tested
  - early results indicate that this technology is in the early stages of usefulness
- Properly identifying high strength logs early in the supply chain is important

High Value - Wood Quality

Strength – Metriguard, cont.

- The Process
  - Logs are peeled and sorted at the veneer plant by strength characteristics.
    - Veneer with higher values are sent to EWP.
    - Veneer not used for EW generally used in plywood.
    - Optimal peel thickness for EW is different than for plywood
  - Sorting before peeling has large benefits. We are now “measuring” logs in the woods to reduce the amount of veneer that does not meet G grade.
  - Can we create stands that may be higher velocity via silviculture and/or genetics?

	Sorted & Peeled for Plywod	Sorted & Peeled for EW
Velocity (Mft/sec)	9-12	12+
Total G%	Low	High
Non-Metriguard	High	Low

Silviculture

- Stand Establishment
  - Site Preparation
  - The Seedling
  - Control of competing vegetation
  - Animal Damage Control
- Established Stand Density
- Spacing Control – Thinning
- Pruning
- Fertilization
- Timing of Harvest

Improving Value - Silviculture

Site Preparation

- Stand Establishment
  - **Site Preparation**
  - The Seedling
  - Control of competing vegetation
  - Animal Damage Control
- Established Stand Density
- Spacing Control – Thinning
- Pruning
- Fertilization
- Timing of Harvest

•Slash Disposal
  •Controlled Burns
  •Cat's or Excavators
•Remediate Logging Compaction
•Vegetation Control

Improving Value - Silviculture

The Seedling

- Stand Establishment
  - Site Preparation
  - **The Seedling**
  - Control of competing vegetation
  - Animal Damage Control
- Established Stand Density
- Spacing Control – Thinning
- Pruning
- Fertilization
- Timing of Harvest

- Large, vigorous seedlings
- Quality Control at nurseries
- High Standards
- Genetics – More Later

Improving Value - Silviculture

Control of competing vegetation

- Stand Establishment
  - Site Preparation
  - The Seedling
  - **Control of competing vegetation**
  - Animal Damage Control
- Established Stand Density
- Spacing Control – Thinning
- Pruning
- Fertilization
- Timing of Harvest

Improving Value - Silviculture

Animal Damage Control

- Stand Establishment
  - Site Preparation
  - The Seedling
  - Control of competing vegetation
  - **Animal Damage Control**
- Established Stand Density
- Spacing Control – Thinning
- Pruning
- Fertilization
- Timing of Harvest

Improving Value - Silviculture

Stand Establishment Summary

- Stand Establishment
  - **Site Preparation**
  - **The Seedling**
  - **Control of competing vegetation**
  - **Animal Damage Control**
- Established Stand Density
- Spacing Control – Thinning
- Pruning
- Fertilization
- Timing of Harvest

Primarily Increases Growth and reduces Wood Quality

- •Juvenile Wood “Core”
- •Core is generally a small amount of final rotation volume and an even smaller amount of usable final rotation volume

•Vital and Necessary

- •To beat the cost of time
- •To avoid fixing mistakes
- •Good Stewardship Goals

Improving Value - Silviculture

Initial Spacing

- Stand Establishment
  - Site Preparation
  - The Seedling
  - Control of competing vegetation
  - Animal Damage Control
- **Established Stand Density**
- Spacing Control – Thinning
- Pruning
- Fertilization
- Timing of Harvest

•Higher Densities May Improve Value by lowering rotation age
•More positive as
  •premium for log size declines,
  •Market and manufacturing capability shifts

Improving Value - Silviculture

Spacing Control

- Stand Establishment
  - Site Preparation
  - The Seedling
  - Control of competing vegetation
  - Animal Damage Control
- Established Stand Density
- **Spacing Control – Commercial Thinning**
- Pruning
- Fertilization
- Timing of Harvest

- Not likely to be an improvement in value
  - Rotation ages extended
  - Larger logs (no premium)
  - Larger knot sizes (?)
- May be necessary for scheduling or supply reasons.

Improving Value - Silviculture

Pruning

- Stand Establishment
  - Site Preparation
  - The Seedling
  - Control of competing vegetation
  - Animal Damage Control
- Established Stand Density
- Spacing Control – Thinning
- **Pruning**
- Fertilization
- Timing of Harvest

•Adds Value - perhaps more than 50% on the pruned blocks (lower 18’ of the tree bole), primarily through reduction in size and number of knots

•Challenging investment in NW – high labor cost, compound interest, and relatively slow growth of DF.

Improving Value - Silviculture

Fertilization

- Stand Establishment
  - Site Preparation
  - The Seedling
  - Control of competing vegetation
  - Animal Damage Control
- Spacing Control – Thinning
- Established Stand Density
- Pruning
- **Fertilization**
- Timing of Harvest

•Increased Growth
•Carrying Capacity may be increased (important for higher densities)
•Wood Quality Effects not very important
    •Increased Ring Width
    •Increase Sizes

Improving Value - Silviculture

Timing of Harvest

- Stand Establishment
  - Site Preparation
  - The Seedling
  - Control of competing vegetation
  - Animal Damage Control
- Established Stand Density
- Spacing Control – Thinning
- Pruning
- Fertilization
- **Timing of Harvest**

•Rate of compound interest
•Growth
•Logging cost (volume per acre & piece size)
•Product value change with stand development
•Market changes

•Wood Quality Effects
    •Longer ~ Larger

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Tree Improvement

- In southern pine and other competitors, the early focus was on wood quality improvement (form & density), with growth a *secondary* focus.
- In DF, emphasis has been more, almost exclusively, on growth than quality parameters. Why?
  - Douglas-fir is naturally a high-strength wood – high value
- Improvements in many species have reduced the differential in value between Douglas-fir and themselves
  - The competition with southern yellow pine leaves us little room to let the value slip
  - Given a value premium, we need to add strength and other wood quality/value traits to our genetics programs

Improving Value – Genetics

What is possible?

Program	Owner	Set	Parental_GID_F	Family	Latitude (UTM)	Departure (UTM)	Elevation (ft)	15-year-old Volume					
								Gain1 (%)	SE(Gain1)	Gain3 (%)	SE(Gain3)	Mean	% Signif. COI
50-3	13	6	54412	2212	4783200	506500	2600	**61.4**	12.8	**109.9**	14.8	93.3	1.2
50-3	5	3	54121	1921	.	.	.	**60.7**	11.9	**62.5**	14.9	75.9	2.1
50-3	13	6	54453	2253	4782900	506400	2800	**49.7**	11.4	**95.9**	15.8	86.8	7.9
50-3	7	5	54037	1837	4783020	501454	2700	**49.7**	12.9	**91.9**	14.9	89.1	3.9
50-3	5	2	54246	2046	4795100	534600	2570	**46.6**	11.4	**64.1**	15.7	82.5	2.9
50-3	7	9	54473	2273	4801620	497250	2800	**42.2**	12.9	**61.6**	16.6	97.1	3.8
50-3	7	9	54471	2271	4801600	497207	2800	**42.0**	12.9	**58.6**	15.0	95.1	4.7
50-3	5	3	54244	2044	4809600	535600	2600	**41.6**	13.6	**39.7**	16.0	72.5	7.2
50-3	5	13	54125	1925	4793700	552500	2970	**41.5**	14.8	**35.2**	18.0	82.6	3.0
50-3	5	2	54266	2066	4794800	534400	2502	**41.4**	13.4	**59.2**	15.7	82.4	3.2
50-3	5	11	54179	1979	4776400	505600	2680	**41.1**	13.6	**31.2**	16.1	85.6	3.7
50-3	5	2	54289	2089	4798100	526500	2970	**41.1**	14.1	**60.6**	17.0	77.7	3.4
50-3	33	9	54348	2148	4806500	498379	2690	**40.7**	14.1	**58.0**	17.1	94.5	7.9
50-3	5	12	54310	2110	4814800	529700	3000	**37.3**	13.8	**5.4**	16.5	69.4	6.7
50-3	33	10	54365	2165	4809740	506386	2000	**36.4**	13.3	**23.3**	15.6	78.6	5.5
50-3	13	7	54423	2223	4775000	500000	2600	**36.4**	13.1	**81.6**	15.3	87.4	3.4
50-2	13	5	53735	1735	4781900	504400	2700	**33.6**	13.3	**72.6**	15.7	80.8	7.8
50-3	7	1	54064	1864	4798270	506860	2620	**33.2**	14.2	**57.9**	17.0	79.3	4.4
50-2	13	7	53749	1749	4775900	498700	2300	**32.6**	14.5	**74.4**	17.7	90.0	6.9
50-3	7	1	54060	1860	4796800	507771	2520	**32.3**	13.5	**56.3**	15.9	79.3	2.8
50-3	5	13	54176	1976	4790100	532700	2930	**31.7**	14.9	**21.3**	18.1	77.1	4.3
50-3	7	7	54044	1844	4781480	499511	2650	**31.7**	13.6	**77.1**	16.2	84.9	8.1
50-4	5	12	54798	2498	4795000	522700	3140	**30.4**	14.1	**-5.3**	16.9	68.6	4.7
50-3	5	4	54264	2064	4804300	521700	2706	**29.1**	13.0	**31.9**	15.1	70.1	4.2
50-3	5	3	54171	1971	4794300	517200	2600	**28.3**	14.3	**24.1**	17.2	61.7	6.1
50-3	5	6	54481	2281	4788400	551000	3000	**28.3**	13.0	**67.3**	15.1	81.6	7.6
50-3	7	8	54052	1852	4805400	513601	2800	**27.4**	13.2	**57.4**	15.4	86.1	6.2
50-3	34	8	54404	2204	4809800	497600	2510	**26.7**	15.0	**58.6**	18.4	79.6	9.6
50-3	5	13	54177	1977	4793900	522000	2900	**26.4**	15.5	**16.1**	19.4	77.4	5.3
50-3	5	3	54193	1993	4794700	513800	2640	**25.8**	13.8	**16.2**	16.4	69.1	13.0
50-3	33	10	54373	2173	4809740	495178	1720	**25.7**	13.8	**12.1**	16.5	69.9	3.8

Improving Value – Genetics

Wood Quality

- Most Wood Quality Traits are highly heritable
- Most are difficult to assess
  - Selections made at young ages (5-15yrs)
- Wood Quality Selection Criteria
  - Density (vertical bonger, cores)
  - Roughness (visual assessment)
  - “Value Score”
- Selecting for Wood Quality *may* equate to selecting against growth – trade off may be difficult to assess

Summary

- **We have some ability to manage stands for specific end uses**
- **We can increase both quantity and quality of products coming off our land but the two often are negatively correlated**
  - **To effectively increase the quality may require us to sharpen our focus**
  - **Increase/expand knowledge and exploitation of tree genetics**

- **Suggested strategy**
  - **Douglas-fir is a high value building material, with existing silvicultural practices**
  - **Continue to invest in productivity gains**
  - **Use Genetics to maintain or enhance strength and other wood quality traits**
    - **Strength**
    - **Form**
  - **A trend towards managing stands at higher densities.**

- **Strive to maintain a reasonable, science-based operating climate**

Questions?

- **We have some ability to manage stands for specific end uses**
- **We can increase both quantity and quality of products coming off our land but the two often are negatively correlated**
  - **To effectively increase the quality may require us to sharpen our focus**
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  - **A trend towards managing stands at higher densities.**

- **Strive to maintain a reasonable, science-based operating climate**