Continuing Project

Quantifying silvicultural treatment effect on lumber quantity and quality in loblolly pine

CAFS 21.88

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FMRC Intensively Managed Plantation (IMP) trial

VIRGINIA TECH | FOREST MODELING RESEARCH COOPERATIVE

<u>3 Treatments</u>

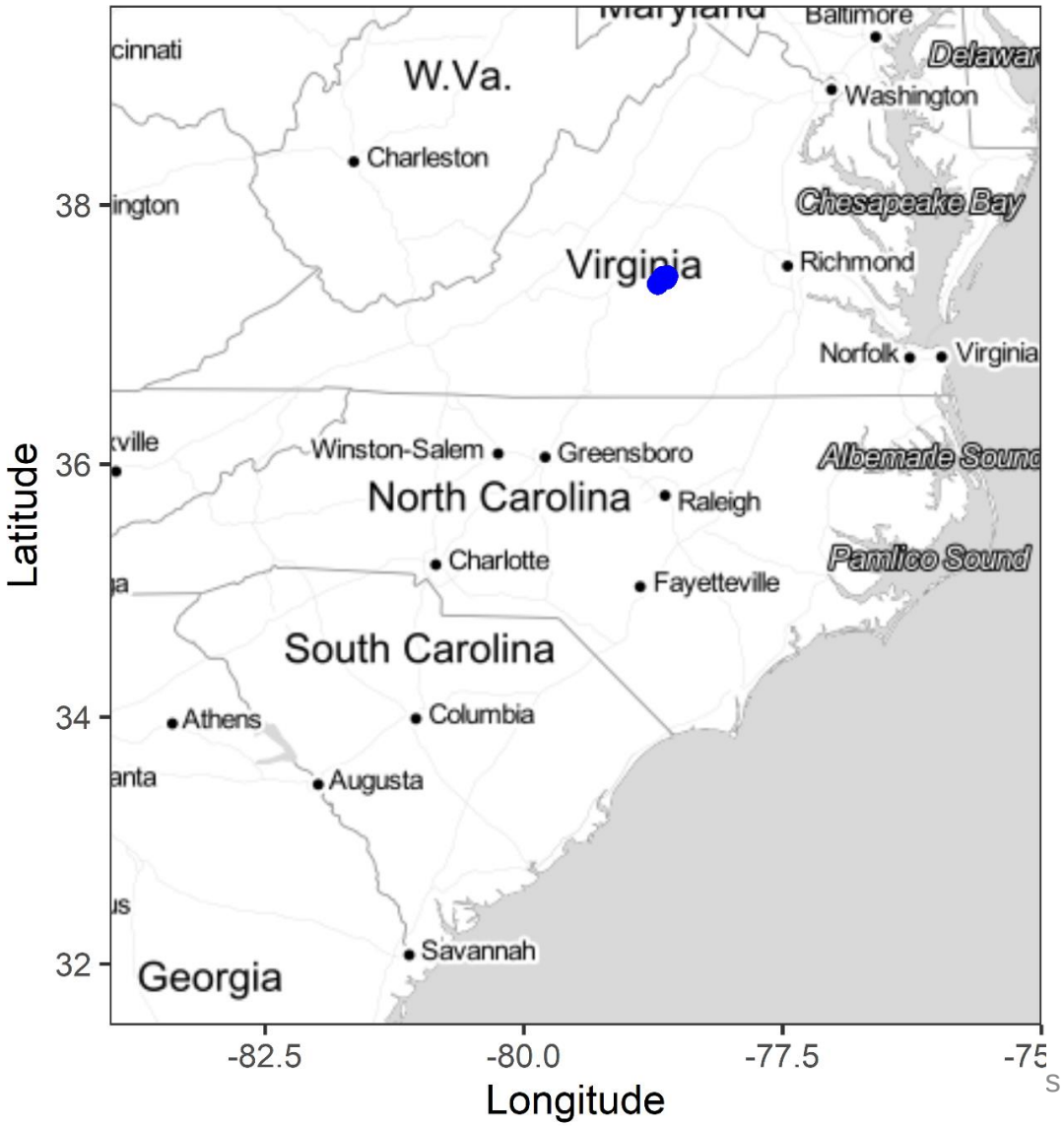
A. Control

B. Light thinning

C. Heavy thinning with pruning in butt log

Treatments applied when trees reached 40-46 ft

FMRC Intensively Managed Plantation (IMP) trial



<u>3 Treatments</u>

A. Control

B. Light thinning

C. Heavy thinning with pruning in butt log

<u>105 Total Trees</u>

5 Stands

7 Trees/Plot

Control treatment
Unthinned

Light thinning treatment ~1/2 trees removed

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Heavy thinning treatment + butt log pruning, ~¾ trees removed

Trees cut into 5 m logs

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Disks collected for whole-disk and ring-by-ring properties at 0,5,10,15 m height levels

Logs & resulting lumber tracked thru sawmill

- Treatment
- Stand
- Tree #
- Log #
- Position within log

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Lumber

Partnering mill only cuts 2×4 & 2×6 lumber
1099 total pieces cut
Lumber left in 16.6’ lengths for tracking

Lumber not graded or trimmed by mill

Lumber visually graded by certified SPIB graders in Athens

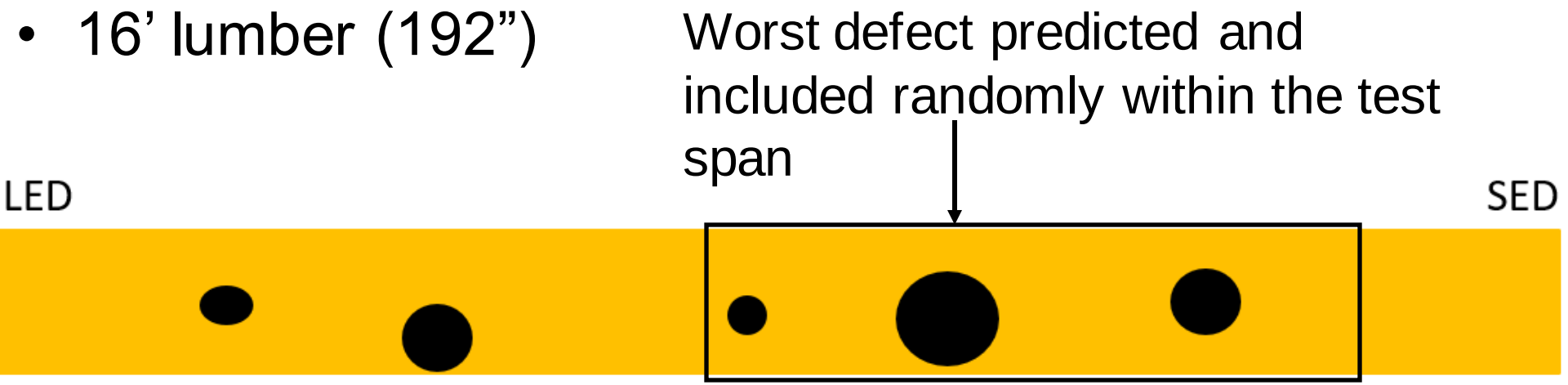
Ashlyn West, Daniel Carroll

Trimming decision made during grading

Record: grade as is, trimming decision (e.g. trim 2 feet tip), final grade, and reason for final grade

Lumber test span

- ASTM testing standards
- Span to depth ratio of 17:1
- 2×4 span to depth = 59.5”
- 2×6 span = 93.5”
- 16’ lumber (192”)



Non-destructive testing

Transverse vibration

- Metriguard E-computer
- Oscillation frequency mid-span

Acoustic velocity

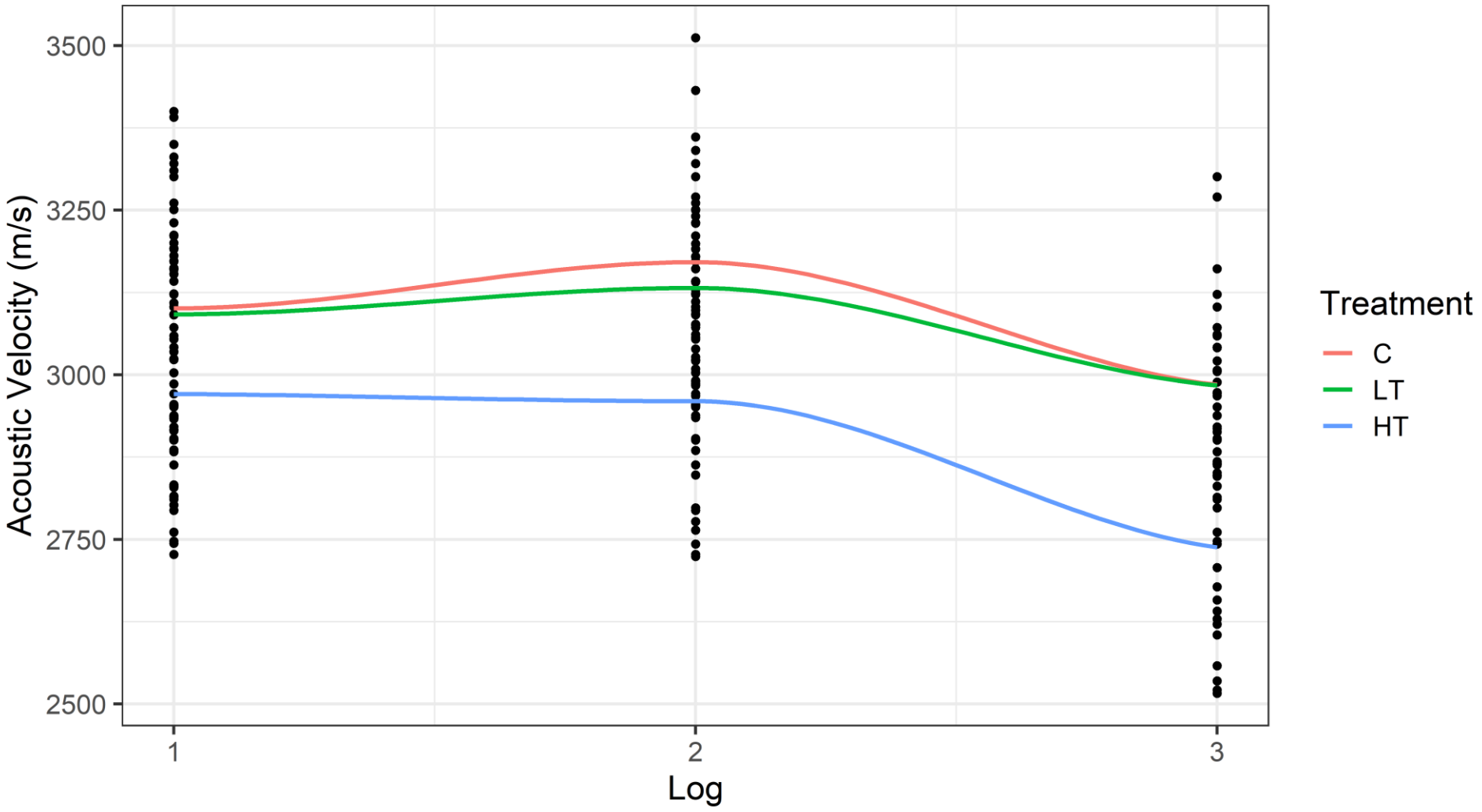
- Sound velocity via impact and microphone

- These measurements combined with density to yield dynamic MOE
- Estimate machine stress-rated grade for the lumber

Lumber imaging for knots later this summer and into fall

Destructive testing later this summer and into fall

Log acoustic velocity by treatment is ~neutral (LT) or negative (HT)



Log acoustic velocity by treatment is ~neutral (LT) or negative (HT)

Trt.	# of Logs	Log 1 AV (m/s)	Log 2 AV (m/s)	Log 3 AV (m/s)
Control	82	3,101	3,171	2,985
Light Thinning	91	3,092	3,132	2,984
Heavy Thinning + Pruning	93	2,971	2,960	2,738
Overall	266	3,055	3,086	2,885
PCL Study	244	3,425	3,423	3,219

Lumber yield by treatment (preliminary) FMRC scaling data to per acre basis

	2×4		2×6	
Treatment	MBF	Mean Grade[1]	MBF	Mean Grade[1]
Control	1.36	1.86	1.82	1.68
Light Thinning	1.37	1.91	3.38	1.44
Heavy Thinning + Pruning	1.14	2.23	5.4	1.41

[1]Mean grade is the average grade calculated
Select Structural = 0, No. 1 = 1, No. 2 = 2, No. 3 = 3, No. 4 = 4

Lumber dynamic MOE (million psi) by treatment (preliminary)

	2×4		2×6	
Treatment	Mean	Range	Mean	Range
Control	1.63	0.75-2.48	1.31	0.58-2.25
Light Thinning	1.70	0.72-2.75	1.39	0.58-2.37
Heavy Thinning + Pruning	1.63	0.92-2.65	1.34	0.53-2.31

Deliverables and Company Benefits

- We are working through the mountain of lab work for this and other projects
- Lumber quality and quantity information as a result of silviculture from a designed experiment
- Evaluation on the impacts of 2 thinning regimes relative to no thinning

Thank You and Questions?

- NSF CAFS
- Members of the Wood Quality Consortium, Forest Modeling Research Cooperative, and Plantation Management Research Cooperative
- Daniel Carroll and Ashlyn West from Southern Pine Inspection Bureau

- In loving memory of Harold Burkhart

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