

## Structural Grading of Logs From Small-Diameter Trees

Determining the applicability of visual and mechanical grading techniques to logs from small-diameter trees will allow more efficient use of these logs in structural applications such as round-wood trusses, floor joists for log homes, and post and frame construction.

### Background

In the West, millions of acres of forestland have lost ecological integrity because of changes in vegetative structure and composition. Such stands are at significant risk for disease and insect attack, and ultimately at risk for catastrophic wildfire. Especially at risk are those stands containing high levels of fuel loading in Class 3 fire zones (Fig. 1). To restore ecological integrity, these stands must be thinned, but the cost of thinning traditionally outweighs the value of the material removed. Finding alternative, and higher value, uses for thinned material can help pay for mechanical thinning.

Alternative uses for logs from small-diameter trees are in structural applications such as round-wood trusses, floor joists for log homes, and post and frame construction. Advantages of using logs in the round form instead of sawing them into lumber include

- less susceptibility to warp,
- greater dimensional stability, and
- lower processing cost.

Properties are currently assigned to round timbers graded by visual methods. However, these rules were initially developed for larger diameter logs. How well visual rules predict properties of logs in the 4- to 7-inch diameter range is not well supported by data.

### Objective

The objective of this research is to evaluate the applicability of visual and mechanical grading techniques to logs from small-diameter ponderosa pine and Douglas-fir trees.

### Approach

The current study has three parts:

- Bending tests on tapered logs (FPL)
- Compression tests on tapered logs (FPL)
- Bending tests on logs machined to uniform diameter (University of Idaho)

All logs are undergoing nondestructive evaluation of stiffness and evaluation of visual growth characteristics.

### Expected Outcomes

- Assessment of the efficiency of the current visual grading system for predicting properties of logs 7-inches and less in diameter
- Recommended modifications to improve the visual grading system, if required
- Technical basis for a mechanical grading system for small-diameter logs
- Assessment of the effect of machining small-diameter logs to a constant diameter on mechanical properties and required grading procedures
- Evaluation of the use of mechanically graded small-diameter logs in roundwood engineered structures

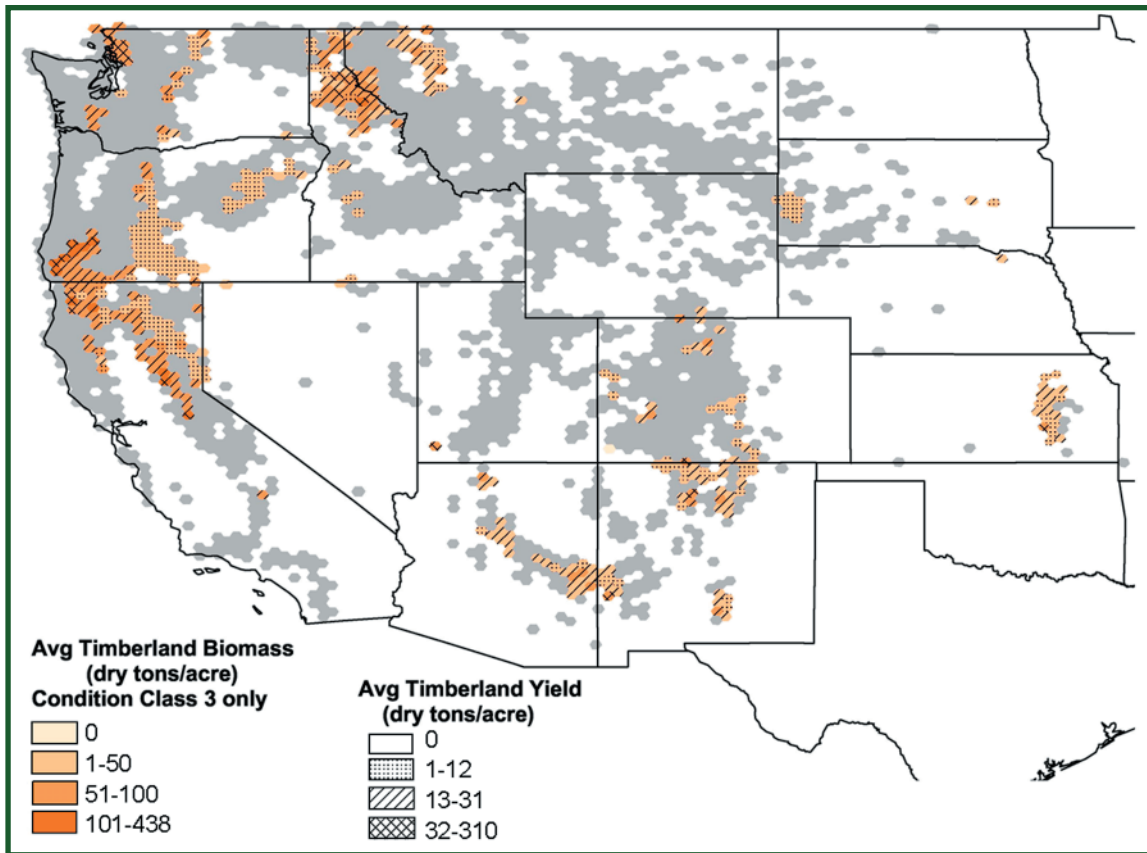


Figure 1. High-priority thinning opportunities (D. May, J. of Forestry, Feb. 2003).

## Timeline

Sampling for this study began in 2002. Testing is in progress and should be completed for both bending and compression during 2004. Published reports should be available in 2005.

## Cooperators

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- University of Idaho, Moscow, Idaho
- Timber Products Inspection Service, Vancouver, Washington

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