

Tanoak Utilization: Coordination of Tanoak Recovery and Yield Studies  
and Knowledge Transfer

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## **Introduction**

A project was initiated to develop recovery, yield, and cost information on the manufacturing of lumber from the tanoak resource in northwest California and to disseminate this information to the forest products industry at large. The University of California Forest Products Laboratory in cooperation with the US Forest Service, Region 5, is coordinating the study that includes cooperation with the Arcata Economic Development Corporation (AEDC), the Mendocino Forest Conservation Trust (MFCT), and the Institute of Sustainable Forestry (ISF). This progress report covers the period of time from October 1, 1997 to August 30, 1998.

## **Background**

Many have suggested that the underutilized hardwoods of California are an untapped economic potential for many rural communities of northern California (Shelly 1995, Harold 1996, McDonald and Huber 1995, Mater 1994). California is a major consumer of hardwood lumber (20% of nation's production) but the hardwood lumber production industry in the state is almost non-existent; this is in spite of a hardwood resource of 12 billion cubic feet (about 25% of California's timber growing stock) (Bolsinger 1988). A recent survey of the hardwood industry in California revealed 22 hardwood sawmills (mostly portable mill operators) with a combined annual production of only about 3 million board feet (Shelly and Lubin 1996). The question of whether hardwood lumber production in California is economically viable is still unanswered.

Of the more than 20 California hardwood species with acceptable lumber properties, the tanoak of northwest California has some of the greatest potential to sustain a hardwood lumber industry. US Forest Service estimates of the size of the tanoak resource were about 2 billion cubic feet 10 years ago (Bolsinger 1988) and it has been increasing at a rate of about 3 to 4 percent per year since then. One recent estimate is that an annual harvest of approximately 48 million board feet could be sustained on the non-industrial private forestlands of Humboldt and Mendocino Counties (Hrubes et. al. 1995).

Fundamental to understanding the economic viability of hardwood lumber production is a thorough understanding of the expected lumber recovery and grade yield from the available resource. One of the major factors hindering the development of a tanoak lumber industry is the inability to prove that finished lumber can be produced profitably because of a lack of reliable conversion and cost data. An analysis of tanoak lumber production is proposed that will compare the production time, as well as the quantity and quality of lumber produced by different sawmill methods from a typical sample of the tanoak forest resource. This two-year study will involve processing enough timber to produce 70,000 board feet of lumber.

## **Project Objectives**

The specific objectives are:

- Design a work plan for studying tanoak lumber recovery and grade yield from the standing tree to kiln-dried lumber.

- Identify harvestable tanoak which is representative of the existing northwest resource.
- Harvest and process enough timber for 70,000 board feet of tanoak lumber using industry representative harvesting and manufacturing methods.
- Develop recommended drying procedures that consider the economic and lumber quality aspects of air-drying and kiln drying.
- Record all harvesting and manufacturing time and cost data.
- Calculate lumber recovery and grade yield results and analyze with respect to manufacturing methods employed.
- Distribute lumber produced to a variety of non-profit woodworking organizations or medium-sized furniture manufactures in the Mendocino and Humbolt county study region to produce demonstration products such as furniture, flooring and paneling for display at workshops, conventions, trade shows and county and state fairs.

## **Project Activity**

A project team of the following individuals was assembled to develop the study work plan; complete addresses are presented in Appendix B.

- John Shelly – University of California Forest Products Laboratory (UCFPL)
- Jim Anderson – California Department of Forestry (CDF)
- Bill Eastwood – Institute of Sustainable Forestry (ISF)
- Paul Harper – ISF
- Jim Hunter – Arcata Economic Development Corporation (AEDC)
- Don Nelson – Mendocino Hardwood Development Association (MHDA)
- Pete Passof – Mendocino Forest Conservation Trust (MFCT)
- William Senerchia – ISF
- Jeff Smyser – MHDA
- Robin Thompson – MHDA
- Jude Wait – ISF

Four team meetings were held at the locations indicated: 1/ December 17, 1997 – Laytonville, CA, 2/ January 28, 1998 – Piercy, CA, 3/ March 3, 1998 – Willits, CA, 4/ April 7, 1998 – Branscomb, CA. In addition the Principal Investigator (Shelly) met individually with representatives of MHDA (January 8, 1998) and ISF (August 24, 1998) to discuss project criteria specific to their respective sites. A Woods Team, including Thompson, Nelson, and Harper was set up to help Shelly work out specific details. These meetings were designed to define the scope of the project, develop the sampling and measuring procedure, and discuss the coordination and logistics of the project. The minutes from each team meeting are included in Appendix A of this report; the results of these meetings resulted in the study plan presented below.

## **Project Scope**

The goal of the study is to develop a reliable relationship between tanoak tree quality and lumber recovery and grade yield. To this end, a sample representative of the available

tanoak resource will be selected from three sites in a region of Northern California encompassing Mendocino, Humbolt, Trinity, and Del Norte counties. The trees will be selected, graded, and processed into dry lumber following accepted industry practice representative of the types of sawmill operations existing in the study region.

### ***Procedures for Selecting Study Trees and Producing Logs***

The sample trees are to be selected from an approved timber harvest site which is representative of a commercial harvest, with input from the landowner and Registered Professional Forester (RPF) responsible for the site. The criteria for selection of the study trees and the data to collect are described below. Data needs to be recorded for each tree. The timber to be harvested is to be selected by the RFP for each site, with input about study tree needs provided by the Woods Team. The leader of the Woods Team (Thompson) must grade each selected study tree and has the responsibility to insure consistent grading criteria and decisions between the three study sites. For the purposes of this study, merchantable length is defined as the length of the tree that can produce at least a grade 3, 8-foot log, to a minimum DIB of 8 inches at the small end.

Modifications to these procedures may be necessary depending on the specific conditions and limits of the various sites. These changes must be made in consultation with and pre-approval by the UCFPL Principal Investigator (Shelly).

The Woods Team is responsible for carrying out the fieldwork as defined below.

### **Site Information**

Describe the site by location, elevation, slope, soil type, forest type, and any other factors the Woods Team considers pertinent.

### **Study Trees**

- Minimum length -- 16 feet of merchantable bole
- One half of the total volume should be from trees in the 8 - 20 inch DBH (Diameter at Breast Height) range, One half should be greater than 20 inches.
- Each tree must be a Grade 3 or better, based on US Forest Service Hardwood Tree Grades (modified to allow an 8-inch top and an 8-foot log).
- Each tree must be marked with a unique number.

Select enough trees to yield 30 MBF tree volume, estimated to an 8 inch top (Scribner Decimal C): Attempt to have an equal number of trees above and below a 20-inch DBH, according to the following size classification.

8 inch - 20 inch DBH	= 15MBF
Greater than or equal to 20 inch DBH	<u>= 15 MBF</u>
TOTAL	= 30 MBF

## Field Bucking

Hauling merchantable length of tree (to 8-inch top) to mill site is preferred. The following criteria are to be used if bucking is necessary to facilitate the loading and hauling of the logs to the mill. If bucked sections meet Grade F3 criteria haul them to the mill, if not then record the cull volume left in the field. Note: any logs bucked in the field and hauled to the mill must be labeled with a tree and log number.

1. Target butt log length is at least 12 foot with 8 inches trim allowance.
2. Buck up to 4-foot from the butt to remove excessive butt crook.
3. Remove 8, 10, or 12-foot log from top.
4. Jump cut to remove excessive rot or cull.
5. Buck into logs, by 1-foot increments from an 8-foot minimum to straighten boles too crooked to easily haul.
6. Trim allowance for any field bucking:
  - 4-inches for 8 up to 12 foot sections.
  - 8-inches for 12 up to 16 foot sections.
  - 12-inches for 16-foot and longer sections.

## Sawmill Yard Procedure

- Weigh each truck load of logs.
- Boles can be stored at mill for up to 2 months but ends must be coated with a wax-emulsion end seal and they must be kept wet (under sprinklers).
- The log grader measures log lengths and marks the bole for bucking into logs according to the following criteria.
  1. Log lengths: 8 to 16 feet by 1-foot increments, with a 3" trim allowance (Target length is 12 foot).
  2. Buck to maximize straightness and have the longest logs from the butt section.
- Grade Logs: Use USFS log grades F1, F2, F3 and 3S for short logs that would otherwise meet a grade F1 or F2.
- Cull Volume -- Cull logs (less than 50% sound) will not be processed into lumber, but record length and DIB at both ends.
- Record amount of time required to buck, grade and sort 20 boles.
- Sort logs by grade and process each grade separately through the mill.

## Summary of Data to be collected

### *In the Forest:*

- Tree number (each tree must have a unique number).
- Any logs bucked in the field must be labeled with tree number and the position in the tree (e.g. 1-2 for tree number 1, -second log from the ground).
- Actual DBH (tape).
- DIB (estimated at 17 feet from ground) for Girard form class.
- Number of 16-foot logs, recorded to the half log.
- Actual merchantable length (to an 8" inch top).
- DIB at small end of merchantable length.
- Tree Grade (USFS Tree Grades F1, F2, F3, all determined from the butt log).

- Defect deduction (sweep, crook, rot and seam) as percentage of total volume, measured in grading section of butt log.
- Record notes related to problems encountered in harvesting, loading, and hauling, slash clean up.
- Record time it takes to complete each stage of the operation (e.g. grading, marking, cutting, loading trucks, hauling, clean up, and total harvest).

*At the Mill Yard:*

- Truck weight (net log weight).
- Log grade and size by tree; mark each log with a tree-log number sequence.
- Log length.
- DIB at both ends.
- Log grade (F1, F2, F3, 3S).
- Scaling deductions for log defects (rot, shake, checks, crook and sweep, worn holes, scars) by percentage of log volume.
- Time it takes to yard-process (buck, grade, sort) 20 boles.

## **Future Work**

Harvesting and grading arrangements are being finalized and sub-contracts are in progress with the MHDA and the ISF. Study trees at these two sites will be selected and graded in October 1998 and the logs will be graded and milled in November and December. Because of scheduling difficulties, the grading and harvesting activity at the third site has been postponed until spring weather allows harvesting to resume. The sub-contract with Arcata Economic Development Corporation will be initiated in November 1998. The final sampling, grading, harvesting, milling and drying procedures will be reported in the next progress report.

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## APPENDIX A

### *Project Planning Meetings*

The Tanoak Lumber Recovery and Yield Study was designed to coordinate the efforts of the Institute of Sustainable Forestry, the Mendocino Forest Conservation Trust, and the Arcata Economic Development Corporation with the UC Forest Products Laboratory. This project is funded by the USDA Forest Service. The meetings were a collaborative effort to identify the key issues for the study and to outline a methodology for data collection and analysis. Summaries of each of these meetings follow.

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#### **1<sup>st</sup> Planning Meeting – 12/17/97: Bailey’s Forest Supply, Laytonville, CA**

In attendance: John Shelly (UCFPL), Don Nelson (MFCT), Robin Thompson (MFCT), Pete Passof (MFCT), Jude Wait (ISF), Will Senerchia (ISF), Paul Harper (ISF)

The planning process was initiated by discussion of various issues that are important to the study design and what the study parameters should be for the project.

Issues discussed:

- Landowners, foresters and mill workers need to know the true value of trees and lumber. Exploring the relationship between tree grade and lumber yield would produce good information for this group. Valuable to be able to assess whether a grade 3 log is worth more as pulp chips or lumber.
- Quarter-sawn lumber is of higher value than plain or flat sawn.
- Sustainable quality and quantity of lumber is necessary for success; the potential for overrun and under-run must be presented to industry.
- ISF identified 300 plots in Humboldt County that have 45% below grade. Form of tree is definitely an important factor – of 80 MBF, only 5% were #1.
- Existing Timber Harvest Plans would be used to acquire study material. Fair stumpage price needs to be determined for study trees for timber purchase &/or donation to Regents of the UC.
- Study parameters to include,
  - Set site parameters for uniformity of sample
  - Estimate 16 MBF per site
  - Make no attempt to mix sample proportions for mill distribution
  - Data to be collected on an on-going basis

## **2nd Planning Meeting – 1/28/98: Institute for Sustainable Forestry, Piercy, CA**

In attendance: John Shelly (UCFPL), Don Nelson (MFCT), Robin Thompson (MFCT), Jude Wait (ISF), Will Senerchia (ISF), Paul Harper (ISF), Bill Eastwood (ISF), Jim Anderson (CDF), Jim Hunter (AEDC)

The second planning meeting for the Tanoak Lumber Recovery and Yield Study further refined the work plan for the project.

The following topics were discussed:

- Sampling method – choose one set of site parameters for the sample population. Cruise the selected regions and select grade 2 and 3 trees. A total of 90 MBF is needed; approximately 30 MBF of timber will be delivered to each of 3 mill sites.
- Timber will be purchased on a weight basis, delivered to the mill site. The price will be \$10/ton over the chip log price; adjustments can be made for timber donations. Timber will be no smaller than 8" top or 8' length. All bucking will be done at the mill, unless field bucking is required for loading purposes.
- One Woods Team and one Mill Team will undertake data collection. The two teams may have common members. It was decided that the woods team needs a landowner representative and that team members must be familiar with the appropriate hardwood grading rules. Specifics about data and guidelines for data collection still need to be decided, but should be similar to that normally collected in forest and mill operations. The intention is to create a database that can continue to grow after the current study is completed.
- Each tree will have a unique number. Diameter, taper and defect data will be collected.
- At the mill, logs will be bucked and graded, data recorded by tree number. Logs will be sorted by grade and batch weighed.
- Each board will have a unique number, linked to the log number. Lumber will be batch weighed by grade also.
- Slabs, bark, edging and sawdust will be calculated by weight difference; headrig sawdust will be estimated from kerf.
- Budget issues – All work coordinated and/or performed by MFCT, ISF and AEDC will be carried out under purchase order agreement with UCFPL. Records of time and cost details must be submitted with invoices.

### **3rd Planning Meeting – 3/3/98: CDF Ranger Unit, Willits, CA**

In attendance: John Shelly (UCFPL), Don Nelson (MFCT), Robin Thompson (MFCT), Pete Passof (MFCT), Bill Eastwood (ISF), Will Senerchia (ISF), Paul Harper (ISF), Jim Hunter (AEDC), Jim Anderson (CDF), Jeff Smyser (MFCT)

Discussion of project site parameters and study methodology continued at the 3<sup>rd</sup> meeting.

Issues discussed:

- Site selection should be based on continuing potential, as well as having sufficient merchantable material at the time. Good grade recovery is expected from log sizes larger than 20" DBH (butt), 15" DBH (top log), and 12" small end diameter for good grade recovery. However, the study needs to consider smaller sizes, which are more characteristic of the available resource.
- The Woods Team will be composed of Paul, Robin, Don, and an RFP and landowner to be selected. Pete Passof and Jim Anderson will review the team and procedures. It is estimated that the team will spend approximately two days per site, with the expectation that logging will occur in June '98.
- Lumber will be air dried, set on 5/8" Douglas-fir stickers, to be supplied by the study for each site.
- Ownership – the study will pay for the logs and the manufacturing processes. The lumber will be donated.
- Weather data should be monitored at each site, check with CDF to borrow portable weather station (Jim Anderson)
- ISF logger has a short logger truck and cannot haul tree lengths over about 24 feet.

### **4th Planning Meeting – 4/7/98 Harwood Mill, Branscomb, CA**

In attendance: John Shelly (UCFPL), Don Nelson (MFCT), Robin Thompson (MFCT), Art Harwood (Harwood Products), Jeff Smyser (MFCT), Will Senerchia (ISF), Paul Harper (ISF), Jim Hunter (AEDC)

The 4<sup>th</sup> planning meeting focused on outlining the procedures for the Woods Team for log procurement and data collection and some ownership issues.

Issues discussed:

- Tree and log specifications will be a minimum of 12" tree DBH, 8" small end log dib, 8' long. If possible and appropriate to the site and management objectives of the landowner, at least half of the volume should come from trees with a DBH greater than 20" and preferably, from a full range of diameter classes up to about 34". Only Grade 3 and better logs will be purchased. Grading criteria will be supplied to the landowner's representative

before marking the timber. The purchase of logs will be handled separately by each of the 3 groups (MFCT, AEDC, and ISF).

- Timber marking will be done by the RPF for each site. The woods team will provide silvicultural and grading advice if it is desired.
- The Woods Team will visit the site and collect data on the marked trees. The RPF should be present so that any recommendations for change in the mark to improve the sample can be discussed. The team member will also assign each tree a unique number and record the grade, DBH, dib at 17' (for form class), the number of 16' sawlogs to the nearest ½ log, and percent cull by log. Forest Service scribner form class tables will be used to calculate board foot volume.
- During the harvest, a team member with grading experience should be tallying trees as they are felled and bucked and numbering each log with a tree number and a log number (e.g. 14-2<sup>nd</sup>). Bucking to optimize grade will be very important at this stage. If whole tree lengths are being hauled, this task will be done at the mill.
- The volume of cull portions of any boles (not limbs) left in the woods or on the landing should be recorded.
- The logs will be hauled to one of three sites – MHDA logs will go to Harwood, ISF logs will go to Wild Iris and AEDC logs, from Hoopa, will go to Matt Galt. Logs will be sawn to maximize lumber grade.
- Cost issues:
  - Log storage estimated at \$20/MBF.
  - Hauling costs estimated at \$4000 for 28 MBF.
  - Per Jim Anderson, log cost estimated at \$155/MBF.
  - UC will pay for preparation of study material, which includes harvesting, bucking, grading, transportation, milling, drying, lumber grading, and all data collection.
  - Each non-profit cooperator arranges for landowner donation or purchase of timber.
  - At the study's conclusion, material is distributed to non-profit cooperators for distribution in marketing demonstration projects designed by each non-profit cooperator.
  - 30 MBF of tree volume may be needed to yield 20 MBF of green lumber that meet the study criteria.
  - Weigh truckloads of logs (at each site) for gross weight-to-lumber yield estimates.
  - Need an estimate of tree grade and amount of crook and sweep.

## **APPENDIX B**

### ***Project Team Members***

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