



# California Logging Utilization, 2004

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## Introduction

The Bureau of Business and Economic Research at The University of Montana-Missoula conducted a statewide study of logging utilization in California during 2004. This study provides information to help resource managers and the general public estimate and better-understand impacts of logging on timber inventory in California.

## What is logging utilization?

Logging utilization studies characterize timber harvest operations and quantify the volume that is cut and delivered to mills versus killed and left in the forest. Information provided by these studies includes the following:

- volumes of growing stock left in the forest as logging residue from logging operations
- proportions of harvested material coming from growing stock and other sources
- diameter distribution of harvested trees
- descriptions of the harvesting techniques and equipment used by loggers.

Removals factors provided by logging utilization studies allow volumes received by mills to be converted into estimates of total removals from growing stock, including the volume of residue remaining in the forest following harvest.

## Methods

### Selection of logging operations:

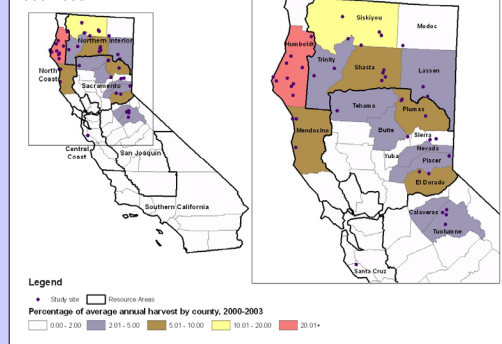
Annual timber harvest data for California (California State Board of Equalization 2001-2003, Morgan et al. 2004) was used to determine the percentage of the harvest that each of California's 58 counties and Resource Areas contributed to the total state harvest from 2000-2003. Logging operations were visited in each Resource Area according to the proportion they contributed to the total statewide harvest (Figure 1). Proportions of the annual harvest by ownership source and product type were also considered within the context of geographic location.

### Tree measurement at each logging operation:

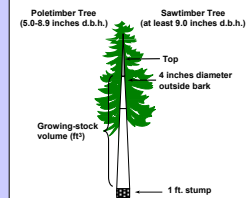
At each site, 30 felled trees that were at least 5.0 inches diameter at breast height were randomly selected for measurement. The following data were recorded for each tree to determine the sawlog, growing stock, and non-growing stock portions of each tree (Figure 2):

- Height and diameter outside bark (d.o.b.) of the stump
- d.o.b. at 1-foot above ground
- Diameter at breast height (d.b.h.)
- Length to 7-inch d.o.b. (end of sawlog portion of tree)
- Length to 4-inch d.o.b. (end of growing-stock portion of tree)
- d.o.b. at the end of utilization of each tree

**Figure 1**—Logging sites and average annual timber harvest by county, 2000-2003.



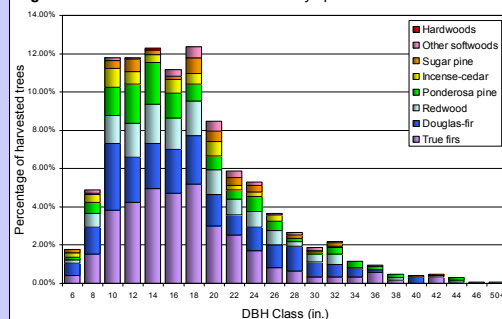
**Figure 2**—Growing-stock sections of softwood trees.



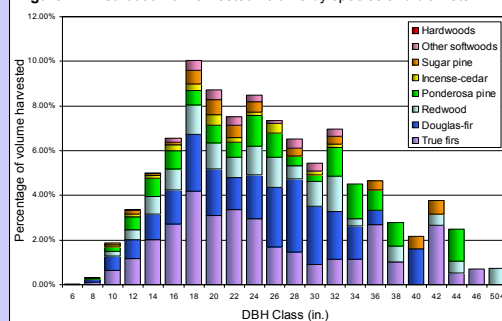
**Table 1**—Growing-stock removals factors for each cubic foot of material delivered to mills.

Non-growing stock product delivered to mills	0.0101
Growing-stock product delivered to mills	0.9899
Growing-stock logging residue	0.0615
Removals from growing stock	1.0514

**Figure 3**—Distribution of harvested trees by species and diameter.



**Figure 4**—Distribution of harvested volume by species and diameter.



## Results

1,230 felled trees at 42 California logging operations were measured from May through September 2004. The logging operations visited were representative of the range of tree species, ownerships, silvicultural prescriptions, and logging methods used in California.

**Removals Factors**—for every 1,000 cubic feet of green material delivered to mills, 1,051.4 cubic feet were removed from growing-stock inventory (Table 1). Of the 1,051.4 cubic feet removed from growing stock, 989.9 cubic feet were delivered to mills, and 61.5 cubic feet were logging residue ("under-utilized" material) left in the woods. 10.1 cubic feet of every 1,000 cubic feet delivered to mills was from non-growing stock portions of the trees ("over-utilized" material such as tops smaller than 4.0 inches d.o.b. and stumps cut shorter than 1 foot above ground).

**Diameter distribution**—harvested trees were between 6 and 54 inches d.b.h., with the majority between 10 and 18 inches d.b.h. (Figure 3). About 54 percent of harvested trees were less than 17.0 inches d.b.h., and almost 60 percent of harvested trees fell in the 10- to 18-inch diameter classes. However, trees in the 10- to 18-inch diameter classes accounted for just 27 percent of harvested volume (Figure 4). About 52 percent of the harvested volume was from trees less than 25.0 inches d.b.h.

**Logging methods & equipment**—Two felling methods were encountered in California: hand felling with chainsaws or mechanical felling using feller-bunchers or cut-to-length processing heads. Two types of yarding systems were observed: ground-based using tractor skidders and cable systems using skyline yarders. Helicopter yarding is also used but, due to safety concerns, no sites using the method were visited. Methods of log merchandising included hand-bucking with chainsaws and mechanical bucking with slide-boom (stroke) delimiters or cut-to-length processors.

## Literature Cited

California State Board of Equalization. 2001-2003. California timber harvests. Timber Yield Tax Program. [www.boe.ca.gov/proptaxes/timbertext.htm](http://www.boe.ca.gov/proptaxes/timbertext.htm). (May 12, 2004).

Morgan, T.A.; Keegan, C.E., III; Dillon, T.; Chase, A.L.; Fried, J.S.; Weber, M.N. 2004. California's forest products industry: a descriptive analysis. Gen. Tech. Rep. PNW-GTR-615. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 55 p.

## Acknowledgements

California Department of Forestry  
Cooperating California landowners  
USDA Forest Service, Pacific Northwest Forest Inventory and Analysis Program

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