



## Sound Wood Residue Left After Experimental Cuttings in Old-Growth Redwood

KENNETH N. BOE

Use of sound wood in harvested old-growth redwood (*Sequoia sempervirens* [D. Don] Endl.) stands has steadily grown in recent years. The greater use has been achieved mainly by hauling to the mills the smaller diameter and shorter logs, rough logs, and those with considerable rot. And some wood has been split into grape stakes and other products. Now that the demand for wood chips is expanding, even more of the low quality and defective logs will be hauled to the mills. The extra dollars earned by chipping mill residues make it economically feasible to do this.

Nevertheless, a large quantity of sound wood residue still remains in cutover areas (fig. 1). If all or most of this wood could be used, such obvious benefits would result as: (a) reducing or eliminating slash disposal, (b) freeing and improving the ground for regeneration, (c) extending the timber supply, (d) getting the use of wood residue for human needs, (e) and vastly improving the esthetic appearance of the logged areas.

How much and what sizes of wood residue are there likely to be on a logged area before slash burning? Answers to this and similar questions will help the forest manager plan the types of machinery to be used, develop logging techniques, and decide what to do about initial processing, such as sawing or chipping on site or at permanent plants.

**ABSTRACT:** An estimate was made of the sound wood logging residue remaining after three different experimental cuttings on the Redwood Experimental Forest, north coastal California. The statistics on volume, size, and soundness classes are indicators of what to expect where similar volumes are harvested. The information can be useful to those planning use of logging residues, particularly in developing logging techniques and in deciding on machinery and what to do about initial processing.

**RETRIEVAL TERMS:** Slash utilization; redwood; Redwood Experimental Forest. Line Project: 1203.

A study was made of logging residue before slash burning on three experimental silvicultural cuttings on the Redwood Experimental Forest, Del Norte County, northwestern California. We found that the data obtained can serve as indicators of what to expect in residue, provided similar volumes are cut on stands having about the same initial volume and soundness characteristics, and provided minimum log specifications are alike.

### Methods

Before cutting, the old-growth stand had displayed variations typical of redwood growing on slopes in the northern part of its range. The stand descriptors on each block cut by a different method were tabulated (table 1).

Logging skills and practices that affected breakage were considered average to above average. Layouts were constructed for essentially all redwoods greater than 6 feet d.b.h. and smaller ones of high quality. Some trees were pulled by cable into layouts. A minimum of felling mistakes was made, such as trees missing layouts or tipping over backwards. Some breakage was caused by crossfelling a few whitewoods or by dropping rough-



**Figure 1.--Logging residue after clearcutting on the Redwood Experimental Forest. Slash burning is usually used to dispose of this residue.**

topped redwoods into short layouts.

Minimum specifications of logs or pieces were:

- Diameter..... 10 inches
- Length..... 16 feet
- Net scale in percent  
of gross scale..... 50 percent.

The piece samples were obtained on permanent randomly located plots. Dimensions of each piece were tallied under its appropriate length and soundness class. If less detail is acceptable, a piece may be recorded by its small end dimension and length class by dot and dash tally. The small end dimension could be set as the diameter of the inscribed circle of the sound wood. The final volume can be corrected by the area ratio (0.7854) of a circle to an inscribed square. A separate tally may be advisable for the

few pieces that are much wider than thick.

#### Logging Residue

There was an expected positive correlation of greater volume of residue with the largest volumes cut (table 2). Sound-wood pieces left on a logged area are often part of larger pieces with rot or other defect. The percent distribution of the volume by soundness and length classes (table 3) enables managers to estimate the volume of wood available under different intensities of use.

To plan for harvesting sound wood residue requires decisions about what kinds of machinery to use and what products possibly could be manufactured from the material. Such decisions can be made on the basis of number of pieces per acre, by smallest end dimension and length classes (table 4).

Table 1-- Characteristics of the old growth redwood stands

Item	Cutting methods		
	Clearcutting	Shelterwood	Selection
Volume per acre gross Scribner M bd. ft	239	152	287
Stand defect percent	27	24	27
Species composition			
Redwood percent	89	68	91
Whitewoods percent	11	32	9
Slope gradient (average for 500 ft) percent	15-60	20-75	30-60

Table 2--Logging residue as a proportion of volume logged. by cutting method

Cutting Method	Net volume logged per acre	Sound volume per acre of logging residue	Residue of net volume
	Cu ft <sup>1</sup>	Cu ft	Percent
Clear-cutting	18,420	5,815	31.6
Shelterwood	10,225	1,917	18.7
Selection	15,562	3,280	21.1

<sup>1</sup>Scribner board foot volume converted to cubic feet by factor of 8 board feet to 1 cubic foot

Table 3-- Volume distribution per acre of sound wood logging residue by cutting method, soundness, and length classes

CLEARCUTTING						
Soundness of piece classes (percent)	Sound volume per acre <sup>1</sup>		Proportion, by length class			
			2-4 ft.	6-10 ft.	12-18 ft	20 or more ft
	Cu.ft.	Percent	Percent			
25<50	1.141	20	0	4	3	13
50<75	1,402	24	1	5	9	9
75-100	3,272	56	7	25	16	8
Total	5,815	100	8	34	28	30
SHELTERWOOD						
25<50	344	18		1	4	13
50<75	374	20	2	6	9	3
75-100	1	62	8	21	19	14
Total	1	100	10	28	32	30
SELECTION						
25<50	923	28	1	3	11	13
50<75	836	26	2	11	8	5
75-100	1,521	46	10	21	12	3
Total	3,280	100	13	35	31	21

<sup>1</sup>Wood with old charred surfaces amounted to 5 percent of total volume on clearcutting, 9 percent on shelterwood and 8 percent on selection

<sup>2</sup>Less than 1 percent.

Table 4.--Number of wood pieces per acre on each unit by cutting method and size groups (all soundness categories combined)

CLEARCUTTING					
Smallest end dimension of sound wood (inches)	Pieces, by length class				
	2-4 ft.	6-10 ft.	12-18 ft.	20 or more ft.	Total
	Number per acre				
2 - 3	114.0	32.5	3.2	0	149.7
4 - 7	114.0	62.5	20.0	4.8	201.3
8 - 11	23.5	28.0	10.0	5.8	67.3
12 - 15	11.5	16.2	13.0	3.0	43.7
16 - 19	3.8	5.8	4.8	1.0	15.4
20 - 23	3.8	5.2	2.5	1.5	13.0
24 - 35	3.5	8.2	7.0	2.5	21.2
36 - 47	.2	2.0	.5	5	3.2
48 or more	.2	.8	.2	.2	1.4
Total	274.5	161.2	61.2	19.3	516.2
SHELTERWOOD					
2 - 3	95.5	54.0	9.8	1.2	160.5
4 - 7	105.0	75.2	28.0	7.2	215.4
8 - 11	12.8	20.0	7.0	4.2	44.0
12 - 15	4.5	10.8	8.2	3.8	27.3
16 - 19	1.2	2.8	2.0	1.0	7.0
20 - 23	.8	1.0	.8	0	2.6
24 - 35	.8	1.5	.5	.2	3.0
36 - 47	0	0	.5	0	.5
48 or more	0	0	0	.2	2
Total	220.5	165.2	56.8	18.0	460.5
SELECTION					
2 - 3	57.0	20.5	1.8	.5	79.8
4 - 7	119.5	48.5	12.2	4.0	184.2
8 - 11	20.5	25.5	9.0	3.8	58.8
12 - 15	9.5	13.5	6.0	2.0	31.0
16 - 19	2.8	5.2	3.0	.8	11.8
20 - 23	3.5	3.2	1.5	.8	9.0
24 - 35	5.0	5.2	2.8	1.0	14.0
36 - 47	1.5	2.0	1.2	.2	4.9
48 or more	.8	.5	0	.2	1.5
Total	220.1	124.2	37.5	13.2	395.0

*The Author*

KENNETH N. BOE is in charge of the Pacific Southwest Station's research in the silviculture of redwood and Douglas-fir forests with headquarters at Arcata, California. A native of Montana, he earned bachelor's and master's degrees in forestry at Montana State University. He joined the station staff in 1956.