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FOREST SERVICE

# Research Note



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PONDEROSA PINE LUMBER RECOVERY IN LAKEVIEW, OREGON AREA

by

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During January 1955, a study<sup>1/</sup> was made at the American Forest Products Corporation mill in Lakeview, Oregon, to determine the grades of lumber that can be expected from ponderosa pine timber grown in the Lakeview area of Oregon. All logs cut for a full week at this mill were scaled and graded and all the lumber produced was graded and tallied on the green chain by individual logs. The lumber was kiln dried, surfaced, and again graded. Lumber grades shown in this report are based on dry surfaced material.

The log rule used was developed by Dr. J. E. Lodewick in 1938 when he was a member of the Pacific Northwest Forest and Range Experiment Station. This rule, which is made a part of this report, is in general use in Oregon and Washington for appraising ponderosa pine timber. Grade 4 logs are the small tight-knotted type ordinarily obtained from young-growth timber. All logs in this study were from old-growth timber, therefore, few grade 4 logs were available.

Logs were sorted in advance of the study and an adequate sampling was obtained for all grades except No. 4. Table 1 shows the distribution of logs by size and grade.

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<sup>1/</sup>Cooperative project with American Forest Products Corporation, White Pine Lumber Company, Fremont Sawmill Company, Western Pine Association, Oregon Forest Products Laboratory and U. S. Forest Service participating.

Table 1.--Distribution of logs by diameter class and log grade

Diameter class	Number of logs						All log grades
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	
8-10					4	3	7
11-13					17	14	31
14-16		1		1	23	15	40
17-19			5	3	34	15	57
20-22	3	4	11		25	5	48
23-25	13	11	27		27	1	79
26-28	19	22	32		18	1	92
29-31	24	17	30		5	2	78
32-34	18	15	23		6		62
35-37	13	9	21		4	1	48
38-40	5	2	15		1		23
41-43	7	2	6				15
44-46		2	2				4
47-49		1	2				3
50-52			1				1
<b>Total</b>	102	86	175	4	164	57	588

As the logs entered the mill they were scaled and graded by a man from the Forest Service and one from Western Pine Association. It was possible to take every log as a test log since lumber passed directly from the 8-foot band headrig through the edger and then out to the green chain. Here the lumber was graded and marked according to Western Pine Association rules. Company personnel tallied the lumber by size and grade using a separate sheet for each log. Lumber was sorted by drying items, sent to the dry kilns where it was seasoned to a moisture content of 8 percent for the Select and Shop grades and 12 percent for the Common.

Dried lumber was sorted according to green grades and items and then surfaced and again graded and tallied. Green chain grades for individual logs were converted to shipping tally grades by applying a correction factor to compensate for the change in grade (degrade) and the loss in footage in drying and surfacing lumber.

All test logs were sawn under the regular commercial practice followed by the company. Each log was cut into lumber items that would produce the best financial return under present markets.

The 588 logs with a net log scale of 309,280 board feet produced 311,092 board feet of dry-surfaced lumber. On this basis overrun amounted to .6 percent, which is lower than obtained in average milling operations. As would be expected, overrun was highest on small logs and for lower quality logs. A bigger percentage of the lower grade logs were top logs, where taper is greatest, which contributes to overrun. Figure 1 shows overrun by log grades.

Lumber grade recoveries by log grades and diameter classes are shown in tabular and graphic form in tables 2, 3, 4, 5, and 6 and in figure 2.

A research note entitled, "Seasoning degrade in kiln drying ponderosa pine in south central Oregon" is being prepared. This report will show in detail the volume loss and degrade that developed when the lumber from this study was kiln dried and surfaced. Two kilns were used for drying the test lumber; one in which the Shop grades were seasoned was in rather poor condition, making it difficult to maintain adequate humidity levels. Therefore, the lumber dried in this kiln developed more degrade from surface checks than would be expected from a kiln in good condition.

In addition to the degrade, there was a 4 percent volume loss from green to dry surfaced condition (table 7). This loss was due to planer breakage and trim losses. As in degrade, the losses were highest in the better grade logs because these produced more of the upper grades of lumber which were dried to lower moisture levels than were the common grades of lumber.

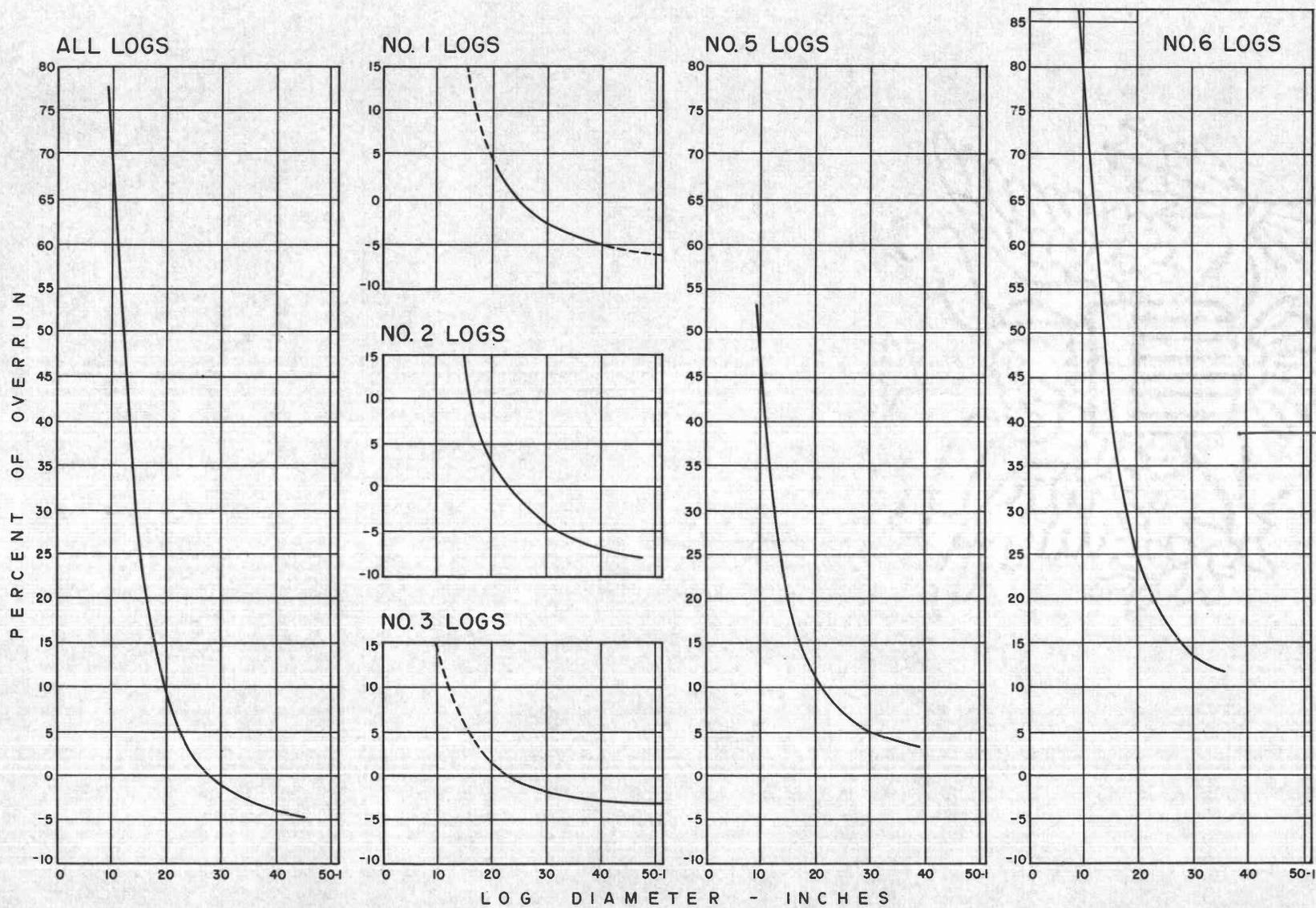


Figure No.1-- Overrun by Log Grades in Ponderosa Pine



Table 2.--Lumber recovery in percent (shipping tally basis)  
No. 1 ponderosa pine logs

Dia- meter class	B and Btr.	C	D	Mldg.	Pitch select	Total select	3 Clear	1 Shop	2 Shop	3 Shop	Total Shop	2 & Btr. Com.	3 Com.	4 Com.	5 Com.	Total Com.
(inches)																
20-22	4.2	15.3	23.0	1.9	1.1	45.5	.5	2.7	5.5	3.9	12.6	5.5	13.8	18.1	4.5	41.9
23-25	4.7	15.7	25.2	2.3	1.3	49.2	.4	2.1	5.6	3.8	11.9	3.8	12.6	17.9	4.6	38.9
26-28	5.3	16.4	26.7	2.7	1.4	52.5	.5	1.8	5.7	3.7	11.7	2.5	11.5	17.3	4.5	35.8
29-31	6.1	17.5	27.6	2.9	1.4	55.5	.6	1.9	5.7	3.6	11.8	1.7	10.3	16.4	4.3	32.7
32-34	7.0	18.9	27.9	3.1	1.4	58.3	.8	2.1	5.8	3.5	12.2	1.2	9.1	15.2	4.0	29.5
35-37	8.0	20.7	27.6	3.2	1.3	60.8	1.1	2.6	5.8	3.4	12.9	1.2	7.9	13.6	3.6	26.3
38-40	9.1	22.8	26.6	3.2	1.2	62.9	1.5	3.4	5.9	3.2	14.0	1.6	6.7	11.7	3.1	23.1
41-43	10.4	25.3	24.9	3.1	1.1	64.8	2.0	4.5	5.9	3.1	15.5	2.4	5.5	9.4	2.4	19.7

Table No. 3.--Lumber recovery in percent (shipping tally basis)  
No. 2 ponderosa pine logs

Dia- meter class	B and Btr.	C	D	MLdg.	Pitch select	Total select	3 Clear	1 Shop	2 Shop	3 Shop	Total Shop	2 & Btr. Com.	3 Com.	4 Com.	5 Com.	Total Common
(inches)																
14-16	2.4	8.3	30.5	2.1	1.7	45.0	.7	3.3	.1	.7	4.8	5.7	20.4	24.1	.0	50.2
17-19	2.8	10.5	28.0	2.1	1.5	44.9	.7	3.6	2.9	1.8	9.0	5.3	19.0	21.8	.0	46.1
20-22	3.2	12.2	25.8	2.1	1.4	44.7	.8	3.9	5.2	2.8	12.7	4.8	17.6	19.4	.8	42.6
23-25	3.5	13.5	24.1	2.2	1.2	44.5	.9	4.2	7.2	3.7	16.0	4.4	16.2	17.0	1.9	39.5
26-28	3.8	14.5	22.6	2.2	1.1	44.2	1.1	4.5	8.7	4.6	18.9	3.9	14.8	15.4	2.8	36.9
29-31	4.2	15.0	21.6	2.1	1.1	44.0	1.4	4.7	9.7	5.3	21.1	3.4	13.4	14.5	3.6	34.9
32-34	4.5	15.2	20.9	2.1	1.0	43.7	1.7	4.9	10.4	5.9	22.9	2.9	12.0	14.3	4.2	33.4
35-37	4.8	15.0	20.5	2.1	1.0	43.4	2.1	5.1	10.6	6.5	24.3	2.4	10.5	14.8	4.6	32.3
38-40	5.2	14.4	20.5	2.1	1.0	43.2	2.5	5.3	10.3	7.0	25.1	1.8	9.0	16.1	4.8	31.7
41-43	5.5	13.4	20.9	2.1	1.1	43.0	3.0	5.4	9.7	7.3	25.4	1.2	7.5	18.1	4.8	31.6
44-46	5.9	12.0	21.6	2.0	1.1	42.6	3.6	5.5	8.6	7.6	25.3	.7	6.0	20.8	4.6	32.1
47-49	6.2	10.2	22.6	2.0	1.2	42.2	4.1	5.7	7.1	7.8	24.7	.1	4.5	24.2	4.3	33.1

Table No. 4.--Lumber recovery in percent (shipping tally basis)  
No. 3 ponderosa pine logs

Dia- meter class	B and Btr.	C	D	Mldg.	Pitch select	Total select	3 Clear	1 Shop	2 Shop	3 Shop	Total Shop	2 & Btr. Com.	3 Com.	4 Com.	5 Com.	Total Common
(inches)																
17-19	.8	4.4	15.0	1.1	.8	22.1	.5	2.9	12.0	9.2	24.6	8.8	25.6	17.0	1.9	53.3
20-22	1.0	4.5	13.0	1.1	.7	20.3	1.2	5.1	15.1	9.1	30.5	7.5	21.7	17.4	2.6	49.2
23-25	1.3	4.5	11.4	1.0	.6	18.8	1.8	7.0	17.6	9.1	35.5	6.3	18.3	17.8	3.3	45.7
26-28	1.4	4.5	10.1	1.0	.5	17.5	2.3	8.4	19.6	9.3	39.6	5.2	15.4	18.3	4.0	42.9
29-31	1.5	4.5	9.3	.9	.5	16.7	2.8	9.5	20.8	9.6	42.7	4.2	12.9	18.8	4.7	40.6
32-34	1.6	4.5	8.9	.9	.4	16.3	3.0	10.1	21.5	10.0	44.6	3.4	10.9	19.4	5.4	39.1
35-37	1.6	4.4	8.9	.9	.4	16.2	3.2	10.3	21.5	10.6	45.6	2.6	9.4	20.1	6.1	38.2
38-40	1.5	4.4	9.2	.9	.4	16.4	3.2	10.1	21.0	11.3	45.6	2.0	8.4	20.8	6.8	38.0
41-43	1.4	4.3	10.0	1.0	.5	17.2	3.2	9.5	19.7	12.1	44.5	1.4	7.8	21.6	7.5	38.3
44-46	1.2	4.2	11.2	1.0	.6	18.2	3.0	8.5	17.9	13.1	42.5	1.0	7.7	22.4	8.2	39.3
47-49	1.0	4.1	12.7	1.1	.7	19.6	2.7	7.1	15.5	14.2	39.5	.6	8.1	23.2	9.0	40.9
50-52	.7	4.0	14.7	1.2	.8	21.4	2.3	5.3	12.4	15.4	35.4	.4	8.9	24.2	9.7	43.2

Table No. 5.--Lumber recovery in percent (shipping tally basis) No. 5 ponderosa pine logs

Dia- meter class	B and Btr.	C	D	Mldg.	Pitch select	Total select	3 Clear	1 Shop	2 Shop	3 Shop	Total Shop	2 & Btr. Com.	3 Com.	4 Com.	5 Com.	Total Com.
(inches)																
8-10		.2				.2	.1				.1	22.2	49.0	26.5	2.0	99.7
11-13		.3	.7		.1	1.1	.2	.3	.7	.9	2.1	18.8	44.9	30.1	3.0	96.8
14-16		.5	1.4	.1	.1	2.1	.3	1.4	3.1	3.1	7.9	14.5	39.6	31.9	4.0	90.0
17-19		.6	2.0	.2	.1	2.9	.4	2.4	6.8	6.3	15.9	10.3	33.7	32.1	5.1	81.2
20-22	.1	.6	2.5	.2	.1	3.5	.5	3.5	10.2	9.1	23.3	7.0	28.4	31.6	6.2	73.2
23-25	.1	.6	2.8	.3	.1	3.9	.7	4.5	13.4	11.5	30.1	4.6	23.5	30.6	7.3	66.0
26-28	.1	.7	3.0	.3	.1	4.2	.9	5.4	16.4	13.5	36.2	3.2	19.1	28.9	8.4	59.6
29-31	.1	.6	3.0	.3	.1	4.1	1.1	6.4	19.1	15.1	41.7	2.8	15.2	26.6	9.6	54.2
32-34	.1	.6	2.9	.2	.1	3.9	1.3	7.4	21.7	16.2	46.6	3.2	11.7	23.7	10.9	49.5
35-37	.1	.5	2.6	.2	.1	3.5	1.6	8.3	24.1	17.0	51.0	4.6	8.7	20.1	12.1	45.5
38-40	.1	.4	2.2	.2	.1	3.0	1.9	9.2	26.2	17.3	54.6	7.0	6.1	15.9	13.4	42.4

Table No. 6.--Lumber recovery in percent (shipping tally basis) - No. 6 ponderosa pine logs

Dia- meter class	B and Btr.	C	D	Mldg.	Pitch select	Total select	3 Clear	1 Shop	2 Shop	3 Shop	Total Shop	2 & Btr. Com.	3 Com.	4 Com.	5 Com.	Total
(inches)																
8-10			.2	.6	.2	1.0	.1	.3	1.6	.1	2.1	14.9	57.0	23.0	2.0	96.9
11-13			.5	.3	.1	.9	.1	.1	.6	1.2	2.0	10.1	44.0	35.1	7.9	97.1
14-16			.7	.1		.8	.1	.2	.8	2.5	3.6	6.2	32.9	43.8	12.7	95.6
17-19			.9			.9	.1	.4	2.2	4.2	6.9	3.1	23.9	49.0	16.2	92.2
20-22			1.0			1.0	.1	.8	4.8	6.0	11.7	.8	17.0	50.9	18.6	87.3
23-25				1.2		1.2	.1	1.4	8.6	8.2	18.3		11.4	49.4	19.7	80.5
26-28				1.4	.1	1.5	.1	2.2	13.6	10.6	26.5		7.9	44.4	19.7	72.0
29-31		.1	1.5		.2	1.8	.1	3.2	19.8	13.3	36.4		7.2	36.1	18.5	61.8
32-34		.2	1.6	.1	.3	2.2	.1	4.4	27.2	16.2	47.9		9.5	24.3	16.1	49.9
35-37		.2	1.7	.4	.4	2.7	.1	5.9	35.8	19.4	61.2		14.5	9.1	12.5	36.1

Table 7.--Summary of lumber recovery by log grades

Log grade	No. of logs	Log scale		Green lumber tally	Dry lumber tally	Pct. volume loss (green to dry)	Pct overrun (shipping tally)
		Gross	Net				
1	102	73,330	69,530	71,562	67,644	- 5.5	- 2.7
2	86	58,930	57,640	58,336	55,533	- 4.8	- 3.7
3	175	123,990	121,290	123,580	119,143	- 3.6	- 1.8
4	4	760	760	764	742	- 2.9	- 2.4
5	164	52,420	50,390	56,341	55,290	- 1.9	9.7
6	57	10,800	9,670	13,012	12,740	- 2.1	31.7
<b>Total</b>	<b>588</b>	<b>320,230</b>	<b>309,280</b>	<b>323,595</b>	<b>311,092</b>	<b>-3.9</b>	<b>0.6</b>

Ponderosa Pine Log Grade Descriptions  
As Reworded on November 1, 1938

Grade 1 Shall be smooth and surface clear without indications of knots near the surface, providing, however, that one pin knot is permissible any place on the log.

Grade 2 Shall be smooth and surface clear on three faces but with knots permissible on the fourth face; or shall be smooth and surface clear on the lower three-fourths of the length, above which a few knots are permissible; or shall be smooth and surface clear to within two feet of the upper end, above which any number of knots are permissible. In any case one pin knot is permissible on the clear portion of the log.

Grade 3 Shall display knots which may vary from small black knots to large sound or unsound knots but which are spaced at least three feet apart (longitudinally) when the knots are staggered or six feet apart when they are in solid whorls. The surface clear areas must aggregate at least 50 percent of the total surface of the log, provided that each clear area must be at least four feet long by one-fourth the circumference in width.

Grade 4 Shall display numerous small and medium-sized red (live) knots, provided, however, that black (dead) knots which in the grader's judgment will cut out sound beneath the surface (usually on black barked logs) are permissible. The size of the knots shall be proportionate to the size of the log. For a 12-inch log 2-inch live or 1-inch dead knots and for a 24-inch log 4-inch live or 2-inch dead knots are permissible. An average longitudinal spacing of not less than 2 feet shall be required for logs with maximum knot sizes.

Grade 5 Shall display numerous live and/or dead knots, the maximum size of which shall be proportionate to the size of the log. For a 12-inch log, 4-inch live and 2-inch dead knots, and for a 24-inch log, 5-inch live and 3-inch dead knots, and for a 36-inch log, 6-inch live and 4-inch dead knots are permissible. An average longitudinal spacing of not less than two feet shall be required for logs with maximum knot sizes.

Logs with larger knots shall also be admitted to this grade if their surface clear areas aggregate at least one-third of the total surface of the log, provided that each clear area must be at least three feet long by one-fourth the circumference in width.

Grade 6 Shall be rough, coarse or densely knotted logs unsuited to any of the previous grades.

General Considerations Foregoing specifications as to spacing between knots refer to distance between knot or limb edges rather than between center and center.

Defects for which deductions are made in scaling shall not be considered in determining log grades.

Standing trees shall be graded on the basis of 16-foot logs and each log shall be graded solely on the basis of its own grade characteristics; i.e., the grade characteristics of adjoining logs shall not be allowed to influence the grader's judgment.