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LUMBER-GRADE RECOVERY FROM 110-YEAR-OLD DOUGLAS-FIR THINNINGS

By

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What lumber-grade and yield recovery is possible from thinnings in a low Site III, 110-year-old, young-growth Douglas-fir stand? A lumber-grade recovery study of sawtimber cut in recent thinning experiments at the Wind River Experimental Forest, Skamania County, Washington, gives some idea of the answer. The thinning experiments were designed to determine increment and yield of young Douglas-fir stands in the older age classes, which are approaching final harvest. As part of the study to determine whether such cuttings are justified economically, the lumber yield of timber cut in the experiment was explored.

The thinnings produced many small logs since marking was from below, with a minimum 10-inch-diameter tree utilized to a 6-inch top.[1/] A 1-day study was made on September 23, 1954, at the sawmill that cut and milled the thinnings. The mill, located on the Columbia River at Stevenson, Washington, was a 30-inch round-log Swedish gang, cutting a 1/4-inch saw kerf. One hundred and forty logs, which had been segregated in the mill pond, were sawed, and lumber yield and grade tallied by individual logs. Of these, ninety-eight 16-foot logs that were free from the sap rot associated with the 1953-54 bark beetle kill in this area were selected for analysis. These logs varied from 6 to 19 inches in diameter. All lumber was cut into 2-inch dimension.

1/ Steele, Robert W. Two commercial thinnings in century-old Douglas-fir. Pacific Northwest Forest and Range Experiment Station, Research Note No. 97, 5 pp. March 1954.

Overrun

Green lumber tally overran the scale by International 1/4-inch kerf by 7 percent, Scribner formula rule [2/] by 20 percent, and the Scribner Decimal C by 25 percent (fig. 1). This is the first published instance where mill scale overran the International rule so consistently for these log sizes. A rule that can estimate lumber content so closely (within 7 percent) for logs of such wide diameter range (6 to 19 inches) may deserve more recognition as an estimating device. The two Scribner rules were fairly consistent except for 6- and 7-inch logs. Here, the Decimal C rule departs from its consistent underestimation in all other log sizes to show for these two small sizes an approximate balance with actual lumber content; whereas by the formula rule ($V = 0.79D^2 - 2D - 4$) overrun for 6- and 7-inch logs is a continuation of the trend found for larger logs.

Lumber-Grade Recovery

No separation of logs by grades was attempted since previous studies [3, 4, 5, 6/] have indicated little difference in lumber quality due to log grade. Lumber-grade recovery varies but little (table 1) by log sizes, with the exception of the 6- and 7-inch classes, in which the percentage of No. 1 and better is well below the average. The average grade recovery for the larger logs was 52, 34, 11, and 3 percent for the No. 1 and better, 2, 3, and 4 common grades, respectively. These figures give

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2/ Bruce, Donald. A formula for the Scribner rule. Jour. Forestry 23: 432-433. 1925.

3/ Collins, Thomas E., and Thomas, David P. Portable band mill integrated with logging points way to greater utilization. Washington Institute of Forest Products. Bul. No. 13, 14 pp. Seattle, Wash. Jan. 1953.

4/ Matson, E. E., and Rapraeger, H. A. Fall Creek second-growth Douglas-fir thinning study. Pacific Northwest Forest and Range Experiment Station, Research Note No. 70, 13 pp. Nov. 1950.

5/ Thomas, David P. Semi-permanent band mill operation. Washington Institute of Forest Products. New wood-use ser. Circ. No. 25, 4 pp. Seattle, Wash. Feb. 1953.

6/ Worthington, Norman P. Lumber grade recovery and milling cost from second growth Douglas-fir of central western Washington. Timberman 50 (11): 58, 60, 62, 64, 66. Sept. 1949.

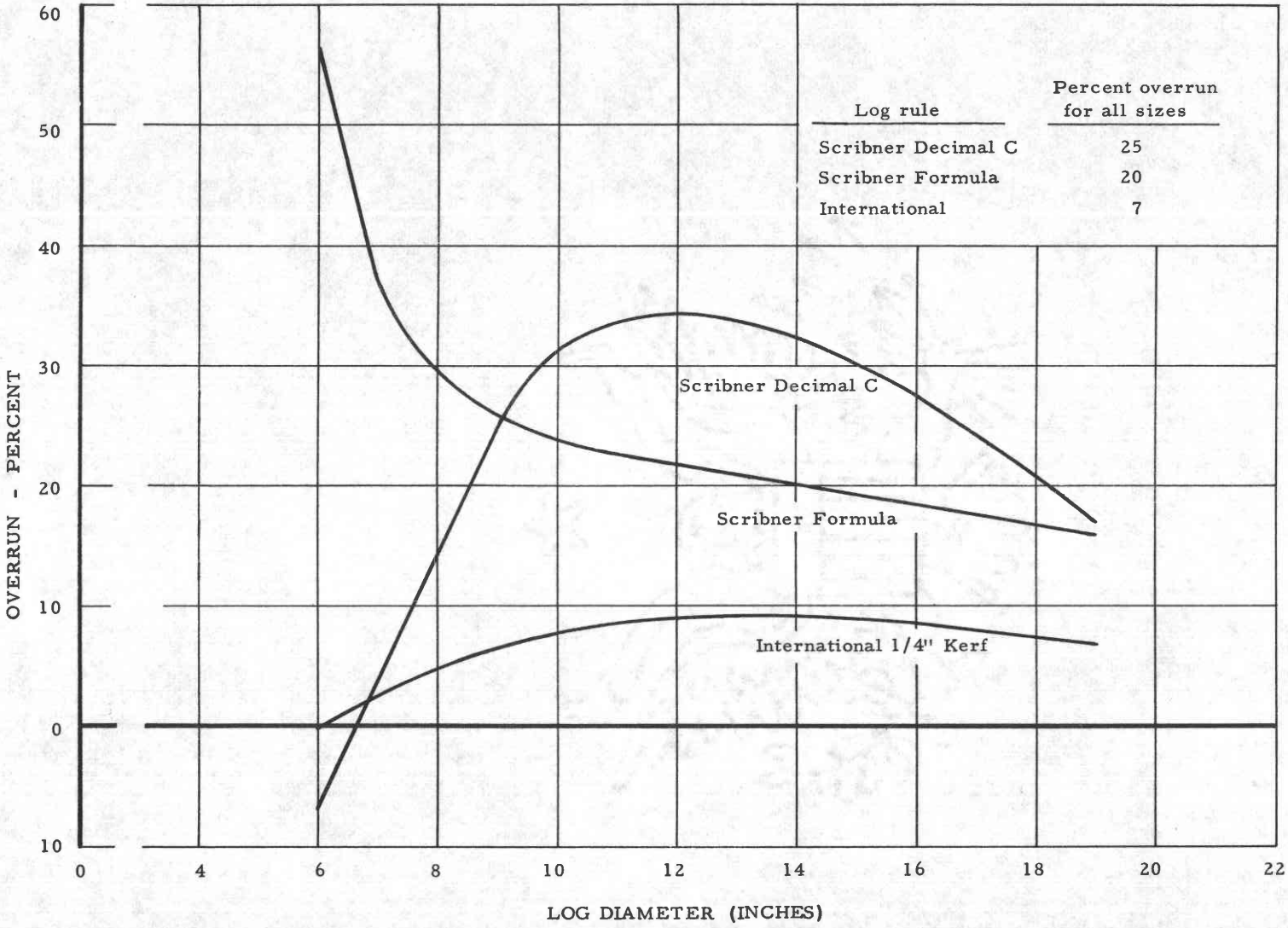

Figure 1.--Overrun by log rule and log size, 16-foot logs.

Table 1.--Scale data and lumber-grade recovery in percent of green chain tally

Log diameter	No. of logs	Log scale: Scribner: Dec. C 1/	Log scale: Scribner: Formula 2/	Log scale: Intern. 1/4-inch kerf 2/	Green lumber tally	Lumber-grade recovery: No. 1 & Btr.	Lumber-grade recovery: No. 2	Lumber-grade recovery: No. 3	Lumber-grade recovery: No. 4
Inch		Board feet				Percent			
6	5	100	65	100	107	28	40	27	5
7	12	360	266	353	342	39	39	17	5
8	9	270	273	352	304	45	38	13	4
9	9	360	373	456	451	50	36	10	4
10	5	300	282	330	399	53	35	9	3
11	4	280	292	331	396	55	34	8	3
12	10	800	922	1,030	1,058	56	33	8	3
13	7	700	740	819	854	57	32	8	3
14	9	990	1,091	1,203	1,383	57	32	8	3
15	7	980	1,022	1,116	1,232	57	32	8	3
16	5	800	849	921	975	56	32	9	3
17	11	1,980	2,079	2,253	2,474	55	32	10	3
18	3	630	666	716	758	54	32	11	3
19	2	480	477	511	568	52	33	12	3
Total or average 3/	98	9,030	9,397	10,491	11,301	52	34	11	3

1/ Logs scaled to nearest inch.

2/ Logs scaled in 1/10-inch classes.

3/ Recovery percentages are unweighted averages of percents by log size.

a reasonable estimate for any log 8 inches or over in diameter. This universal tendency of Douglas-fir young growth to show no increase in lumber quality with log size has been noted by all investigators in lumber-grade recovery studies. It is in contrast to the opposite trend of better quality with increasing log diameter prevalent in some other species--the pines, for example. This characteristic of Douglas-fir may tend to favor production of smaller logs. However, there is, of course, increased efficiency and reduction of costs in harvesting and manufacturing as log size increases.

Grade Comparison

Comparison of the Wind River lumber-grade recoveries with those of the studies listed in footnote 3 shows that the Wind River project fell far short in lumber quality (table 2). No. 1 common and better in the Wind River study made up 52 percent of the total output, compared to an average of 85 percent for the other studies; No. 2 common was 34 percent at Wind River, compared with 10 percent. These are highly significant differences, which may be explained in part by:

(1) The Wind River logs were from older trees, which produce more unsound black knots. Trees under 100 years normally produce a sap knot, a much less serious grading defect.

(2) Logs from the Wind River study were from lightly thinned stands, with a higher proportion of poor quality trees than in the other four projects.

Conclusion

This study showed that the International rule gives a close estimate of the yield of small 16-foot logs cut to a 2-inch dimension in a round-log gang using 1/4-inch saw kerf. Use of a narrow saw kerf might improve yields from small timber through less waste. Furthermore, such use might eliminate a need for subsequent surfacing since smoother lumber would be produced. Trees removed in a light low thinning produced only 52 percent No. 1 common or better lumber, compared to much higher percentages (85 average) in other studies. This may be because Douglas-fir young growth tends to develop unsound black knots after approximately 100 years. Lumber grades for small timber are apparently little influenced by log size. These last two tendencies, taken together, may have some bearing on the determination of rotation lengths for young-growth Douglas-fir stands.

Table 2.--Comparative green-lumber-grade recoveries of five studies of young-growth Douglas-fir

Project	Cutting method	Age of stand	Lumber tally	Lumber-grade recovery		
				No. 1 & Btr.	No. 2	No. 3
		Years	Board feet	Percent		
Wind River	Light thinning	110	11,301	52	34	14
Central western Washington	Clearcut	65	98,151	80	17	3
Semipermanent band mill	Clearcut	60	30,948	86	9	5
Portable band mill	Clearcut	100	49,190	87	7	6
Fall Creek	Medium thinning	90	48,910	89	9	2