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COST OF THINNING 50-YEAR-OLD DOUGLAS-FIR FOR PULPWOOD AT VOIGHT CREEK EXPERIMENTAL FOREST

EDITOR'S
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by
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Analyses of time and cost data gathered on the Voight Creek Experimental Forest[1/] from six thinnings in a 50-year-old stand of Douglas-fir showed that average skidding distance and diameter of average tree cut were the chief factors affecting the production time in thinning these pulpwood stands. Cut per acre had negligible influence. Contractors' production efficiency over a 3-year period averaged 2.65 man-hours per cord. Delivered-to-plant harvesting costs totaled $16.37 per cord of pulpwood, including allowances for landowner's expense.

The six 17-acre compartments (102 acres) comprising the sale area had all been thinned at least once prior to the observation period of 1959-61. During the period of record, 918 cords of 8-foot pulpwood were produced by two independent contractors of very similar efficiency, one using a two-man crew and the other a one-man crew. Both contractors used a power saw for felling and bucking, a horse for skidding, a forklift-equipped tractor for loading, and a dual-axle truck for hauling. Accurate man-hour and equipment time records were kept by each

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1/ Located in Pierce County, Washington; maintained jointly by St. Regis Paper Co. and the U.S. Forest Service.

contractor and made available for later analysis, although each contractor was actually reimbursed at a fixed rate per cord.

Skidding distance, average tree size, and cut per acre varied for all six compartments (table 1). Average skidding distance, computed as one-half the average distance between nearest road and back boundary of thinning area, varied from 153 to 350 feet. Average d.b.h. of trees cut ranged from 7.8 inches to 10.4 inches. Minimum diameter of trees cut was 6.0 inches, and utilization was to a top diameter of 4.0 inches d.i.b.

Records for each major operation were kept both in man-hours and dollar costs per 100 cubic feet (table 2), and the figures can be converted to per-cord values by multiplying by 0.75.[2/] Skidding was the most time-consuming operation (40.5 percent of total time) and felling and bucking the least (17.6 percent). Hauling took the largest share of the dollar cost (45.0 percent), and felling and bucking the least (12.0 percent). On the average, labor accounted for approximately 56 percent and equipment 44 percent of the dollar cost.

Simple regression analyses were made to test the effect of the independent variables of skidding distance, tree size, and cut per acre on production times for the various operations listed in table 2. Results obtained indicated that (per unit volume):

1. Skidding distance is the most important single factor affecting skidding time and total production time;

2. Diameter of average tree cut had no significant influence on total production time, but had significant influence on felling and bucking time--as tree size increased, felling and bucking time decreased;

3. Cut per acre had no significant influence on production time for any single operation or for all operations combined.

[2/] Cubic-foot volume was derived from a marked tree tally; cord volume was actual truck scale. The conversion factor, 0.75, represents the proportion of 100 cubic feet contained in 1 cord and was based on these figures.

Table 1.--Description of thinning compartments, including total production time in man-hours

Compartment	Year thinned	Average skidding distance	Average d.b.h. of tree thinned	Cut per acre	Production time per 100 cu. ft.
		Feet	Inches	Cu.ft.	Man-hours
B-1	1959	195	10.4	1,093	3.47
B-3	1959	153	9.9	536	2.76
C-2	1960	270	9.3	848	3.51
C-4	1960	313	9.5	510	3.86
A-3	1961	350	7.8	332	4.00
A-4	1961	175	8.7	702	3.58

Table 2.--Contractors' average production costs for all thinning operations

Operation	Man-hours		Cost of man-hours and equipment[1/]		Proportional cost	
	Per 100 cu.ft.	Percent of total	Per 100 cu.ft.	Percent of total	Labor	Equipment
			Dollars		-- Percent --	
Felling and bucking	0.62	17.6	1.95	12.0	83.6	16.4
Skidding	1.43	40.5	4.45	27.5	83.3	16.7
Loading	.65	18.4	2.50	15.5	67.1	32.9
Hauling[2/]	.83	23.5	7.27	45.0	29.7	70.3
Total	3.53	100.0	16.17	100.0	56.2	43.8

[1/] Hourly wage rate was $2.25 plus 13.6 percent allowance for payroll taxes.

Equipment hourly rates were:

Power saw	$0.50
Horse	.50
Forklift loader	2.25
Truck (per round-trip mile)	.30

[2/] 50 miles, round trip.

Average production cost was $16.17 per 100 cubic feet (table 2) or $12.13 per cord, based upon allowances for labor, supplies, equipment, depreciation, and taxes current during the period. These costs represent the contractors' actual expenses as reported during the periods under study.

However, in order to arrive at the final delivered cost of producing pulpwood, certain other expenses incurred by either the contractors or the landowner who employed the contractors should not be overlooked. Combining all these elements of cost into one listing, a fairly complete estimate of pulpwood harvesting costs was obtained:

Cost items	Costs per-- 100 cu.ft.	cord
Contractors:		
Direct labor, equipment, and taxes	$16.17	$12.13
Supervision and overhead	.67	.50
Profit and risk allowance[1/]	2.02	1.52
Landowner:		
Road allowance[2/]	1.64	1.23
Marking time and job supervision	1.00	.75
Profit and risk allowance[1/]	.32	.24
Total cost	21.82	16.37

[1/] 12 percent of listed costs for contractors or landowner.

[2/] Annual road charge per acre $2.38 divided by average annual cut per acre of 1.94 cords (1959-61 period). This charge was derived by application of table 11 from the publication: Worthington, Norman P., and Staebler, George R. Commercial thinning of Douglas-fir in the Pacific Northwest. U.S. Dept. Agr. Tech. Bul. 1230, 124 pp., illus. 1961.