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Comparison of Lumber Values for Grade-3 Hardwood Logs from Thinnings and Mature Stands

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Abstract

The value per M bf (thousand board feet) of the lumber sawed from Grade-3 logs, 8 to 11 inches in diameter, from thinnings was compared with that from a harvest of mature-stand cut. The species tested were red oak (*Quercus rubra* L.), yellow-poplar (*Liriodendron tulipifera* L.), and hard maple (*Acer saccharum* Marsh). The total lumber value for each species was greater for logs obtained from thinnings. The value per M bf of the lumber sawed from red oak and yellow-poplar logs from thinnings was significantly higher than that from mature stands.

Introduction

Several million acres of 40- to 60-year-old hardwood stands in the Northeast need thinning to improve crop-tree spacing and species composition. Past studies have shown that prescribed thinning of these stands yields from 2 to 4 M bf (thousand board feet) per acre of sawable bolts and logs (Craft and Baumgras 1978). Because most of the trees cut are small, the sawlogs recovered are predominantly Factory Grade 3 quality (Rast et al. 1973). But since most of the sawlogs are butt logs, the yield of No. 1 Common and Better lumber would be expected to exceed yields from Grade-3 logs recovered in harvest cuttings. This should make the lumber-value yields for Grade-3 logs from thinnings greater than yields for Grade-3 logs from mature stands. To test this hypothesis, we compared actual lumber-value yields from Grade-3 logs from thinnings and mature stands. Three species, yellow-poplar (*Liriodendron tulipifera* L.), red oak (*Quercus rubra* L.), and hard maple (*Acer saccharum* Marsh), were studied.

The Study

Sample-Log Selection

Factory Grade-3 logs were obtained from three tracts of upland hardwood timber. Sample logs from thinnings were from overstocked stands on both the Camp Creek State Forest and the Monongahela National Forest in West Virginia. The logs from mature stands were obtained from Georgia Pacific Corporation during a sawtimber harvesting operation on company land near Rainelle, West Virginia. All sample logs were obtained from stands with Site Class 70 to 80 for red oak.

During the thinning operation, tree length stems were skidded to a landing where they were bucked to produce the highest grade logs. Study logs were selected by taking the first five Grade-3 logs in each diameter class (8, 9, 10, 11) that were bucked at the landing.

The logs from mature stands were obtained in the order that they were bucked from full-length stems, and matched with the thinning sample by diameter class and length. All logs were hauled to our laboratory for processing.

Processing

All sample logs were scaled, numbered, and grade sawed into 4/4 lumber. The lumber from each log was graded by National Hardwood Lumber Association (NHLA) rules (National Hardwood Lumber Association 1982) and tallied separately. Lumber-grade yields for Grade-3 logs from thinnings (Table 1) and mature stands (Table 2) were tallied by species and grades. A further breakdown of the lumber yields by diameter class is shown in Tables 3, 4, and 5.

The value of lumber for each species (by log source) was determined by applying prices, by grade, to the appropriate volume yields. Prices (Table 6) used to establish these values of No. 2 Common and Better grades were from the October 3, 1981, edition of the *Hardwood Market Report*. Prices for 3A and 3B Common lumber were based on values obtained from several sawmill operators. Analysis of variance was used to test for differences in total value per M bf for logs from thinnings versus those from mature stands.

Table 1.—Lumber-grade yields for Grade-3 logs from thinnings, in board feet

Species	Net Int. ¼-inch log scale	Lumber tally	NHLA lumber-grade yields							
			FAS	1F	1C	2C	2A	2B	3A	3B
Red oak	555	696	21 (3.0) ^a	27 (3.9)	162 (23.3)	278 (39.9)	—	—	170 (24.4)	38 (5.5)
Hard maple	691	775	—	16 (2.1)	132 (17.0)	336 (43.4)	—	—	262 (33.8)	29 (3.7)
Yellow-poplar	642	769	20 (2.6)	10 (1.3)	86 (11.2)	—	322 (41.9)	216 (28.1)	107 (13.9)	8 (1.0)

^aPercent in parentheses; totals may not equal 100 due to rounding.

Table 2.—Lumber-grade yields for Grade-3 logs from mature stands, in board feet

Species	Net Int. ¼-inch log scale	Lumber tally	NHLA lumber-grade yields							
			FAS	1F	1C	2C	2A	2B	3A	3B
Red oak	562	639	11 (1.7) ^a	—	86 (13.5)	324 (50.7)	—	—	218 (34.1)	—
Hard maple	662	740	13 (1.8)	—	91 (12.3)	378 (51.1)	—	—	244 (33.0)	14 (1.9)
Yellow-poplar	648	746	—	—	34 (4.6)	—	263 (35.3)	305 (40.9)	99 (13.3)	45 (6.0)

^aPercent in parentheses; totals may not equal 100 due to rounding.

Table 3.—Lumber-grade yield by diameter class from red oak logs by harvest type, in board feet

Diameter class (inches)	Harvest type	Net Int. ¼-inch log scale	Lumber tally	NHLA lumber-grade yields					
				FAS	1F	1C	2C	3A	3B
8	Thinning	86	137	—	13	11	68	40	5
	Mature	88	101	—	—	5	47	49	—
9	Thinning	115	129	—	—	37	56	36	—
	Mature	111	127	—	—	13	52	62	—
10	Thinning	154	194	—	4	47	78	42	23
	Mature	165	184	—	—	37	80	67	—
11	Thinning	200	236	21	10	67	76	52	10
	Mature	198	227	11	—	31	145	40	—

Table 4.—Lumber-grade yield by diameter class from hard maple logs by harvest type, in board feet

Diameter class (inches)	Harvest type	Net Int. ¼-inch log scale	Lumber tally	NHLA lumber-grade yields					
				FAS	1F	1C	2C	3A	3B
8	Thinning	116	137	—	—	14	72	48	3
	Mature	109	138	—	—	16	81	41	—
9	Thinning	155	169	—	—	30	67	69	3
	Mature	147	152	—	—	30	74	48	—
10	Thinning	200	210	—	5	34	68	80	23
	Mature	191	211	7	—	15	93	96	—
11	Thinning	220	259	—	11	54	129	65	—
	Mature	215	239	6	—	30	130	59	14

Table 5.—Lumber-grade yield by diameter class from yellow-poplar logs by harvest type, in board feet

Diameter class (inches)	Harvest type	Net Int. ¼-inch log scale	Lumber tally	NHLA lumber-grade yields						
				FAS	1F	1C	2A	2B	3A	3B
8	Thinning	95	131	—	—	—	33	75	23	—
	Mature	101	130	—	—	—	33	87	10	—
9	Thinning	134	145	4	5	15	44	45	24	8
	Mature	135	177	—	—	14	55	73	35	—
10	Thinning	183	223	6	5	30	119	47	16	—
	Mature	180	200	—	—	15	88	71	26	—
11	Thinning	230	270	10	—	41	126	49	44	—
	Mature	232	239	—	—	5	87	74	28	45

Table 6.—Prices by grade and species, in dollars per M bf

Grade	Poplar	Red oak	Hard maple
FAS	420	540	430
1F	410	530	420
1C	283	400	340
2C	—	159	215
2A	175	—	—
2B	157	—	—
3A ^a	110	139	180
3B ^a	110	110	110

^aObtained from sawmill operators.

Results

The lumber value per M bf from Grade-3 logs from thinnings and mature stands was significantly different at or above the 90-percent level for red oak and yellow-poplar. For red oak, the lumber value per M bf for logs from thinnings was significantly higher than that for logs from mature stands at the 99-percent level. For hard maple, there was no significant difference in lumber values per M bf. However, the average lumber value per M bf for logs from thinnings was greater than that for logs from the mature stands in all species sampled (Table 7).

All of the logs from the mature stand were uppers, while the thinning operation yielded 28 butt logs and 32 upper logs.

Conclusions

Within the 8- to 11-inch-diameter classes, lumber cut from Grade-3 red oak and yellow-poplar logs obtained from thinnings yields a significantly higher value than similar logs harvested from a mature stand. For Grade-3 hard maple logs in the same diameter-class range, little difference in lumber values occurs in logs from the two sources. Thus, for red oak and yellow-poplar, sawmills should be able to use a higher proportion of Grade-3 logs from thinnings than Grade-3 logs from mature-stand harvests.

Literature Cited

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Table 7.—Average lumber value by diameter class, species, and source, in dollars per M bf

Diameter class	Red oak		Hard maple		Yellow-poplar		All species	
	Thinning	Mature	Thinning	Mature	Thinning	Mature	Thinning	Mature
8	197.76	156.73	212.21	218.90	153.89	158.94	187.95	177.96
9	219.61	173.87	220.45	216.08	180.05	160.24	206.70	183.40
10	218.76	198.61	216.50	216.69	194.81	168.02	210.02	194.44
11	274.08	206.01	238.78	217.46	193.39	153.98	235.41	192.48
All diameters	227.55	183.81	221.98	217.28	180.54	160.12	210.02	187.07

Emanuel, David M. **Comparison of lumber values for Grade-3 hardwood logs from thinnings and mature stands.** Res. Pap. NE-529. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station; 1983. 4 p.

The lumber value per M bf (thousand board feet) by species (red oak, yellow-poplar, and hard maple) obtained from Grade-3 logs from a thinning cut was higher than that from a mature-stand harvest operation. Red oak and yellow-poplar lumber values per M bf were significantly higher.

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