

The potential for developing alternate grading rules for birch lumber in Alaska

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Abstract

Alaska birch lumber is often characterized by small knots and other character defects that can reduce its value when graded according to conventional hardwood lumber grading rules. In this study 626 boards (2,782 board feet of lumber) were graded; first according to standard National Hardwood Lumber Association (NHLA) rules, and then a second time using an alternative rule that did not consider defects less than 0.5 inch in diameter to be grade-reducing defects. Mill locations included two sites in interior Alaska and two sites in south-central Alaska. With the alternative grading rule, average lumber value across all grades increased by \$138.31 per thousand board feet (MBF) (versus standard NHLA rules), an increase of more than 36 percent. The lower grades of lumber exhibited the greatest potential for upgrading, both in terms of volume and value. Nearly 74 percent of lumber in grades 2A, 3A, and 3B Common was upgraded as a result of the alternative grading rules, resulting in an overall increase in value of \$154.37 per MBF.

Within Alaska, paper birch forests predominate in the interior and south-central regions of the state. Alaska paper birch (*Betula papyrifera* var. *humilis*) occurs primarily in interior Alaska, while Kenai birch (*Betula papyrifera* var. *Kenaica*) is found in south-central Alaska as well as some interior locations (Anonymous 1976). Most of the birch lumber produced in Alaska is used within the state, and past uses have included kitchen cabinets, office furniture, fine woodworking applications, and gifts and crafts. Several outlets in the Fairbanks and Anchorage areas sell random-width Alaska birch lumber to retail customers, although this is a relatively small proportion of their total hardwood lumber sales. Approximately 20 sawmill facilities within Alaska manufacture

birch lumber on at least a part-time basis, with a combined capacity estimated to be less than 1 million board feet annually. Throughout this paper, "Alaska birch" will refer to all species and varieties of paper birch grown in Alaska, recognizing that this may not be consistent with other terminology that has been used.

Alaska birch lumber is often characterized by small knots and other character defects (including bark pockets, bird

pecks, and worm holes) that can reduce its value when graded according to conventional (NHLA) hardwood lumber grading rules. Very small knots that are barely noticeable to the casual observer still reduce lumber grade under normal grading rules. Recent research has shown that retail managers and consumers are willing to tolerate appearance variations in birch lumber as well as secondary products such as kitchen cabinets, and that clear lumber was generally lacking in overall appeal and desirable aesthetic qualities (Nicholls 2001, Donovan and Nicholls 2003).

The current study has been designed to consider certain characteristics of Alaska birch, including character marks, that could potentially result in higher lumber value if evaluated under different grading rules. An alternative grading rule was devised, which was essentially the same as standard NHLA rules with the exception that defects and character markings less than 0.5 inch in diameter were not considered to be grade-reducing defects. Therefore, during board grading, only those features 0.5 inch and larger were used to determine lumber grade. By comparing

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boards graded by standard NHLA rules with the same boards graded by the alternative rule, the potential increase in lumber value from this relatively minor change can be determined. The objectives of this study were to evaluate the grade and value of a volume of Alaska birch lumber under two grading scenarios: 1) graded according to standard NHLA rules; and 2) graded a second time according to the previously described alternative rule.

Character-marked cuttings can be defined as cuttings that may contain some minor defects on the exposed face, including stain, burls, pin knots, small bird pecks, and pin worm holes (Araman 1979). Research on the product development of character-marked products has indicated that substantial improvements in lumber yield are possible when character marks are included. Information from retail customers regarding the size, types, and locations of preferred character defects is also an important consideration for marketing character-marked products (Bumgardner et. al. 2001).

Standard NHLA grades enable lumber buyers and sellers to determine value, based upon appearance features, over a wide spectrum of lumber quality. Under conventional rules, lumber grades are determined by standard procedures that consider the number and size of defects as well as the percent of clear, usable cuttings within each board (NHLA 1998). Standard lumber grades, starting with the highest value, include: firsts and seconds (FAS), first 1 face (F1F), Select (Sel), No.1 Common, No. 2A Common, No. 3A Common, and No. 3B Common. By convention, the upper grades yield a greater percentage of the

board in relatively few large-sized clear cuttings, while the lower grades have more numerous, smaller cuttings, and a smaller percentage of clear wood.

Specialized NHLA grading rules have already been developed for some species so that common features are not classified as grade-reducing defects. In hickory, pecan, and rock elm, grading rules allow small bird pecks without penalty, with some limitations. A similar rule has been adopted for "black or brown spots or streaks" in basswood. More extensive specialized rules have been established regarding the sizes of allowable cuttings in black walnut and butternut lumber (NHLA 1998). The adoption of new rules to admit certain defects in Alaska birch would seem to be consistent with existing rules already in place to account for similar features in other species. Defects common to birch in Alaska include bark pockets, burls, small knots, and decay.

Procedures

Four hardwood sawmills within Alaska's birch-producing regions were visited in August 2001: two were located in the Interior region near Fairbanks, and two were located in the south-central region near Anchorage. A professional lumber grader from the NHLA performed the grading, and 626 boards were evaluated (2,782 board feet [BF]).

Boards were selected randomly from on-site inventories at each mill, and for three of the four sites this included kiln-dried lumber (green lumber was sampled at one mill). All four participating mills did have dry kilns, and most of their lumber was sold kiln-dried. Al-

though the focus of the study was to consider the lower grades of common lumber suitable for character-marked products, higher grade boards were included to the extent that they were part of current inventories. Random-width boards were selected for this study, and averaged 6.98 inches, with a range from 2.8 to 12.0 inches. All boards were 4/4 nominal thickness and 8 feet in length.

Boards were first graded according to standard NHLA grading rules, and then re-graded according to the alternate grading rule. Under the alternate grading rule, any defects less than 0.5 inch in diameter (including sound knots, stain, worm holes, checks, and splits) were not classified as grade-reducing defects. The primary comparison of interest for this study was the lumber value under standard NHLA rules vs. the value when graded according to the alternate rule. By definition, a board's value could not be less under the alternate grading rule than the standard rule, but could possibly be greater.

The following data was recorded for each board:

- number of small character features (less than 0.5 inch in diameter)
- number of large character features (greater than 0.5 inch in diameter)
- standard NHLA grade
- alternative rule grade

In the absence of published prices for birch lumber in Alaska, market value estimates were based upon the Hardwood Lumber Market Report from August 18, 2001 (Hardwood Market Report 2001). Values used were for rough-cut, green, 4/4 birch lumber from the Northern Hardwood Region. Market values were obtained for FAS, Select, 1 Common, 2A Common, and 3A Common grades. The market prices were average prices for "FOB Northern Mill Points" in truckload or carload quantities (**Table 1**).

The comments accompanying the market report indicated that "Reported pricing for WHITE BIRCH continues to range above the figures published for like grades and thicknesses of YELLOW BIRCH." However, it is not clear how much of a price difference would be warranted. It is recognized that the prices used in this research might not accurately reflect current Alaska markets.

Table 1. — Lumber volume and market value of Alaska birch lumber graded under NHLA rules and under an alternative rule.

Lumber grade	Volume		Current market prices ^a	Value	
	NHLA rules	Alternate rules		NHLA rules	Alternate rules
	----- (BF) -----		(\$/MBF)	----- (\$) -----	
FAS	49	252	840	41.16	211.68
F1F	59	84	835	49.27	70.14
SEL	23	47	820	18.86	38.54
No. 1 Common	327	951	615	201.11	584.87
No. 2A Common	802	928	430	344.86	399.04
No. 3A Common	978	394	295	288.51	116.23
No. 3B Common	543	125	220	119.46	27.50
Total	2,781	2,781	N/A	1,063.23	1,448.00

^a Hardwood Market Report, Vol. LXXIX, No.33, August 18, 2001. Current market prices are for random width and length, rough-cut, green, 4/4 lumber.

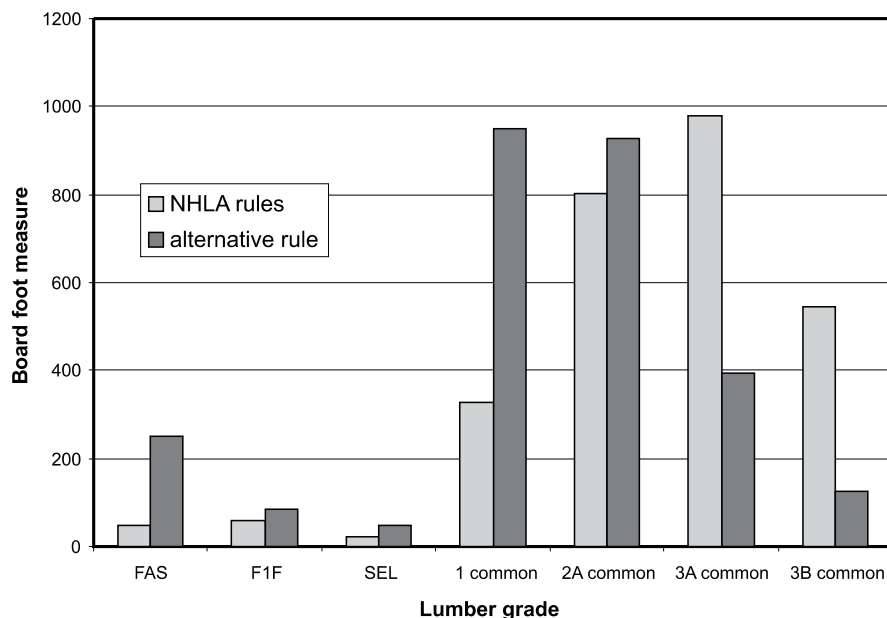


Figure 1. — Distribution of board grade for 622 Alaska birch boards graded under standard NHLA rules and under an alternative rule

Table 2. — Source and redistribution of volume by grades for Alaska birch lumber graded under NHLA rules and under an alternative rule.

Lumber grade	NHLA volume	Redistribution of volume due to alternate rule grading							Original value ^a	New value ^a	
		FAS	F1F	SEL	1 Com	2 Com	3A Com	3B Com			
		----- (BF) -----							----	(\$)	----
FAS	49	49	--	--	--	--	--	--	41.16	41.16	
F1F	59	42	17	--	--	--	--	--	49.27	49.48	
SEL	23	--	--	23	--	--	--	--	18.86	18.86	
No. 1 Common	327	80	25	9	213	--	--	--	201.11	226.08	
No. 2A Common	802	67	38	9	452	236	--	--	344.86	474.28	
No. 3A Common	978	4	4	3	220	498	249	--	288.51	432.00	
No. 3B Common	543	10	0	3	66	194	145	125	119.46	205.15	
Total	2,781	252	84	47	951	928	394	125	1,063.23	1,448.00	

^a Hardwood Market Rept., Vol. LXXIX, No.33, August 18, 2001. Lumber value is based upon current market prices for random width and length, rough-cut, green, 4/4 lumber.

Results and discussion

The results of this study indicate that there is considerable potential for improving the grade and value of Alaska birch lumber if small character markings are considered acceptable. The primary defects observed in this study included decay, bark pockets, burl, and wane. A comparison of yield by lumber grade and value is presented in **Table 1**.

Under standard NHLA grading rules, 16.5 percent of the total volume of the lumber sample graded No. 1 Common and better (458 BF); 28.8 percent graded

No. 2 Common (802 BF); and 54.7 percent graded No. 3 Common (978 BF No. 3A Common, and 543 BF No. 3B Common). The total value amounted to \$1,063.23 for an average of \$382.32 per thousand board feet (MBF).

Under the alternate grading rules, 48.0 percent of the total volume of the lumber sample graded No. 1 Common and better (1,334 BF); 33.4 percent graded No. 2 Common (928 BF); and 18.7 percent graded No. 3 Common (394 BF No. 3A Common, and 125 BF No. 3B Common). The total value amounted to \$1,448.00, for an average

of \$520.68 per MBF, an increase of 36.2 percent.

When considering the board foot volume in each lumber grade for NHLA vs. alternate grading rules, the most dramatic differences came within No. 1 Common, No. 3A Common, and No. 3B Common grades (**Fig. 1**). Information is also provided regarding the redistribution of board grades (from original grade to upper board grades) after the alternate rule was applied (**Table 2**). In this table, total BF volumes, by grade, for the alternate grading rule are presented in the bottom row. The lumber values for total BF volume are also presented for both NHLA rules (column labeled "Original value"), and for the alternate rule (column labeled "New value").

As a result of the alternate grading rule, the following observations were made (**Table 2**):

- There was relatively little opportunity to upgrade lumber in the upper grades (FAS, F1F, SEL), as shown by the increase of less than 2 percent of lumber value. By definition, lumber graded FAS under standard NHLA rules could not be upgraded under the alternate rule.
- Of the No. 1 Common lumber, 34.86 percent (114 BF) was upgraded. The resultant increase in value was \$24.97, the equivalent of an additional \$76.38 per MBF; a 12.42 percent increase.
- Of the No. 2A Common lumber, 70.57 percent (566 BF) was upgraded. The resultant increase in value was \$129.42, the equivalent of an additional \$161.37 per MBF; a 37.53 percent increase.
- Of the No. 3A Common lumber, 74.54 percent (729 BF) was upgraded. The resultant increase in value was \$143.49, the equivalent of an additional \$146.72 per MBF; a 49.73 percent increase.
- Of the No. 3B Common lumber, 76.98 percent (418 BF) was upgraded. The resultant increase in value was \$85.69, the equivalent of an additional \$157.81 per MBF; a 71.73 percent increase.
- For all grades combined, slightly more than 67.2 percent (1,869 BF) was upgraded. The resultant increase in value was \$384.78, the equivalent of an ad-

ditional \$138.31 per MBF; an increase of more than 36 percent.

Conclusions

Substantial improvements in lumber grade and value of Alaska birch were possible with slight modifications to the treatment of small defects and other character markings under existing NHLA grading rules. When boards were graded by the alternative grading rule, lumber value across all grades increased an average of \$138.31 per MBF versus standard NHLA rules.

As might be predicted, the lower grades of lumber (2A, 3A, and 3B Common) exhibited the greatest potential for upgrading, both in terms of volume and value. Nearly 74 percent (1,713 BF) of lumber in these grades was upgraded as a result of the alternative grading rule, resulting in an overall increase in value of \$358.59, the equivalent of an additional \$154.37 per MBF; an average increase of nearly 48 percent.

If grading rules that did not penalize small defects in Alaska birch lumber were adopted, substantial improvements

in overall lumber grade and value could be expected. Currently, most birch lumber sold in Alaska is done so on the basis of informal buyer-seller agreements rather than by conventional NHLA grade. Therefore, the possible adoption of an alternative grading rule as discussed in this paper is seen as a first step in a constructive process rather than something that would be immediately useful to Alaska birch lumber producers. The practical significance of these results could have importance for consumers who tolerate character markings to enhance products such as furniture or paneling. This could be most applicable to markets within the continental United States and overseas where lumber purchases would most likely be made based upon NHLA grades.

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9572 P & P: This study determined that small knots and other defects can have a significant influence on the value of birch lumber in Alaska, when graded by National Hardwood Lumber Association rules. This knowledge should be helpful in developing new markets for random-width lumber and other products manufactured from this resource.