United States
Department of
Agriculture

Forest Service

Pacific Northwest
Research Station

General Technical
Report
PNW-GTR-796
August 2009

The U.S. Glulam Beam and Lamstock Market and Implications for Alaska Lumber

Joseph A. Roos, Allen M. Brackley, and Daisuke Sasatani

Authors

Joseph A. Roos is a research associate and **Daisuke Sasatani** is a research assistant, University of Washington, Seattle, WA 98105; and **Allen M. Brackley** is a research forester, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Alaska Wood Utilization Research and Development Center, 204 Siginaka Way, Sitka, AK 99835.

Abstract

Roos, Joseph A.; Brackley, Allen M.; Sasatani, Daisuke. 2009. The U.S. glulam beam and lamstock market and implications for Alaska lumber. Gen. Tech. Rep. PNW-GTR-796. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 19 p.

In this study, glulam beam manufacturers in the United States and Canada were surveyed regarding their lamstock usage and glulam beam distribution channels. The respondents were divided into three subsets to measure regional comparisons: U.S. West, U.S. Central and South, and Canada. They were further divided into subsets based on annual sales figures. The research showed that the three main species used for lamstock lumber were Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco) in the U.S. West, southern yellow pine (*Pinus palustris* Mill.) in the U.S. Central and South, and spruce-pine-fir in Canada. Of all these species, southern yellow pine appears to be increasing its market share in both the treated and untreated categories. Of the companies surveyed, 42.9 percent indicated their usage of untreated southern yellow pine had increased, and 23.8 percent indicated their usage of treated southern yellow pine had increased. The importance of various lamstock attributes was also examined, and gluability was found to be the most important. Overall, manufacturers are using visually graded material as opposed to machine-stress-rated products. Distribution channels were also examined, and the results showed that larger companies tend to sell their glulam beams through building materials distributors and smaller companies sell more directly to builders. For the Alaska forest products industry, this research shows the feasibility of expanding the market for lamstock made from Alaska species by gaining a better understanding of the established glulam manufacturing industry. Alaska yellow-cedar is already being used as lamstock to manufacture glulam beams for exterior weather-exposed applications. A strong marketing campaign could increase the acceptance of these species in the glulam manufacturing market.

Keywords: Glulam, lamstock, Alaska, lumber.

Introduction

The closures of the Alaska Pulp Corporation's Sitka mill and the Ketchikan Pulp Corporation's mill in the 1990s caused the Alaska forest products industry to find new ways to compete with other resources in the global forest products market. In 1997, the Southeast Timber Task Force Report found that a majority of Alaska-produced lumber supply was rough green, whereas much of Alaska's lumber demand was for kiln-dried lumber (Morse 1997). A followup study conducted by the McDowell Group examined value-added forest products manufacturing in Alaska (McDowell Group 1998). The study noted that much of the lumber used in Alaska was imported from the Lower 48 States and there was potential to substitute Alaska forest products for some of these imported products. As of the year 2000, Alaska kiln-drying capacity only had an installed base of 94 thousand board feet (mbf) (Nicholls and Kilborn 2001). This limited capacity hindered Alaska sawmills' ability to supply lumber to regional markets, which demanded dried lumber certified by recognized lumber grading standards. In response to Alaska's lack of kiln-drying facilities, a federal grant program was initiated to increase Alaska sawmills' kiln-drying capacity. As of 2004, Alaska had an estimated 220 mbf of kiln-drying capacity (Nicholls et al. 2006). Brackley and Crone (2009) estimated the sawmill processing capacity for Tongass National Forest timber and found that in 2006, southeast Alaska sawmills were using only 13 percent of their total sawmill capacity. The excess capacity reflects both supply constraints and changing demand for Alaska forest products.

To help open more markets for Alaska timber, the Ketchikan Wood Technology Center conducted an in-grade testing program to evaluate structural values unique to Alaska species. The results of this program were updated strength values and three Western Wood Products Association (WWPA) grade marks for Alaska species of hemlock (*Tsuga heterophylla* (Raf.) Sarg.), yellow-cedar (*Chamaecyparis nootkatensis* (D. Don) Spach), and spruce (combined Sitka spruce [*Picea sitchensis* (Bong.) Carr.] and white spruce [*Picea glauca* (Moench) Voss]) (WWPA 2005). One potential use for Alaska species is as laminated stock (lamstock) lumber used to manufacture glued laminated (glulam) beams.

Glulam Beam Background

Glulam beams are engineered wood products constructed by gluing several layers of dimensional lumber together under pressure to form a single, structural member. Glulams can be constructed to specific design properties, including the required strength, length, and shape (e.g., arched). Glulam beams have a variety of residential construction applications including floor beams, headers, and roof beams (fig. 1). Additionally, glulam beams are used in commercial construction such as office buildings and schools, and industrial construction such as bridges and marinas (Adair 2007).

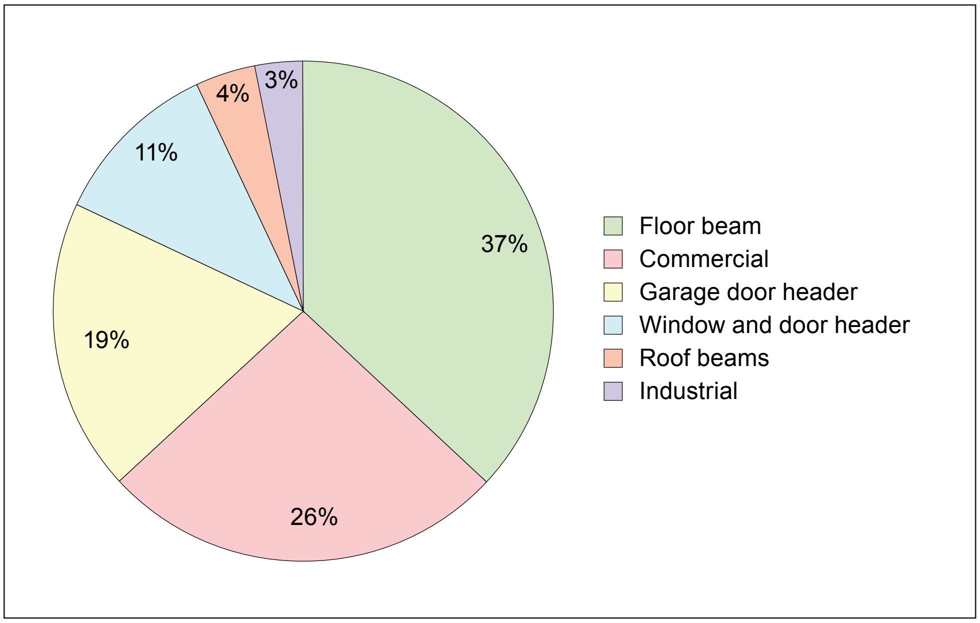

Figure 1—Glulam beam usage (Source: Adair 2007).

The American Institute of Timber Construction (AITC 2001) outlines the standard dimensions of structural glulam timber. Nominal 1-inch-thick boards are used when the bending radius of the finished member requires flexibility. Nominal 2-inch-thick lumber is used when a sharp bending radius is not required. The number of laminations determines the depth of the member (table 1). Nominal 1-inch laminations are surfaced to 3/4-inch net thickness. Nominal 2-inch laminations are planed to 1-3/8-inch net thickness for southern yellow pine (*Pinus palustris* Mill.) and a net 1-3/4-inch net thickness for western species. The nominal widths of finished glulam beams are from 3 to 16 inches for standard dimensions (table 2). Standard dimension for heavy timbers differ depending on the lamination size (table 3).

Table 1—Standard depths of members

Number of laminations	Net depth of nominal 1-inch laminations	Net depth of nominal 2-inch laminations	
		1-1/2 inch (western species)	1-3/8 inch (southern pine)
		Inches	
4	3	6	5-1/2
5	3-3/4	7-1/2	6-7/8
6	4-1/2	9	8-1/4
7	5-1/4	10-1/2	9-5/8
8	6	12	11

Source: AITC 2001.

Table 2—Standard width of members for structural laminated timbers

Nominal width	Western species	Southern pine
	Inches	
3	2-1/8 or 2-1/2	2-1/8 or 2-1/2
4	3-1/8	3 or 3-1/8
6	5-1/8	5 or 5-1/8
8	6-3/4	6-3/4
10	8-3/4	8-1/2
12	10-3/4	10-1/2
14	12-1/4	12
16	14-1/4	14

Source: AITC 2001.

Table 3—Standard dimensions for heavy timbers

Minimum nominal size		Minimum glued laminated net size			
		1-1/2-inch laminations		1-3/8-inch laminations	
Width	Depth	Width	Depth	Width	Depth
		Inches			
8	8	6-3/4	9	6-3/4	8-1/4
6	10	5-1/8	10-1/2	5 or 5-1/8	11
6	8	5-1/8	9	5 or 5-1/8	8-1/4
6	6	5-1/8	6	5 or 5-1/8	6-7/8
4	6	3-1/8	7-1/2	3 or 3-1/8	6-7/8

Source: AITC 2001.

Grading is particularly important for load-bearing members such as glulam beams. Glulams are made from high-strength lamstock lumber, which are laid up and glued together to form the beam. The grading system used for most lamstock is that of the American Institute of Timber Construction (AITC) Inspection Bureau Laminating Grades. The AITC designates laminating grades with an "L" with the exception of southern yellow pine, which is designated "N" (AITC 2004). Lumber is visually graded for strength properties based on characteristics such as knot size and slope of grain. The grade follows the letter (L1 being the highest grade) and the density can be designated with a letter (table 4). Lumber may be graded based on visual criterion or subject to nondestructive testing to obtain estimates of modulus of elasticity.

Table 4—American Institute of Timber Construction Inspection Bureau defect value limits for laminate grades

Lamination grade	Growth rate	Slope of grain	Proportion of cross section allowed to be knots	Allowable width of knot(s) on widest face, by piece size					Knot spacing
				2 by 4	2 by 6	2 by 8	2 by 10	2 by 12	
				Inches					
L1	Dense	1:14	1/4	7/8	1-3/8	1-13/16	2-5/16	2-13/16	Well spaced
L1CL	Close	1:12	1/4	7/8	1-3/8	1-13/16	2-5/16	2-13/16	Well spaced
L2D	Dense	1:12	1/3	1-3/16	1-13/16	2-7/16	3-1/16	3-3/4	Well spaced
L2	Medium	1:12	1/3	1-3/16	1-13/16	2-7/16	3-1/16	3-3/4	Well spaced
L3	Medium	1:8	1/2	1-3/4	2-3/4	3-5/8	4-5/8	5-5/8	Well spaced

Source: AITC 2004.

Glulam beams have become a leading alternative to solid wood and steel applications in construction. In 2007, glulam beam production in North America was estimated at 454 million board feet (mmbf). Of this figure, 428 mmbf was produced in the United States and 26 mmbf was produced in Canada (APA 2008). Production figures had been steadily rising, peaking in 2005, and then dipping slightly in 2006 and 2007 (fig. 2).

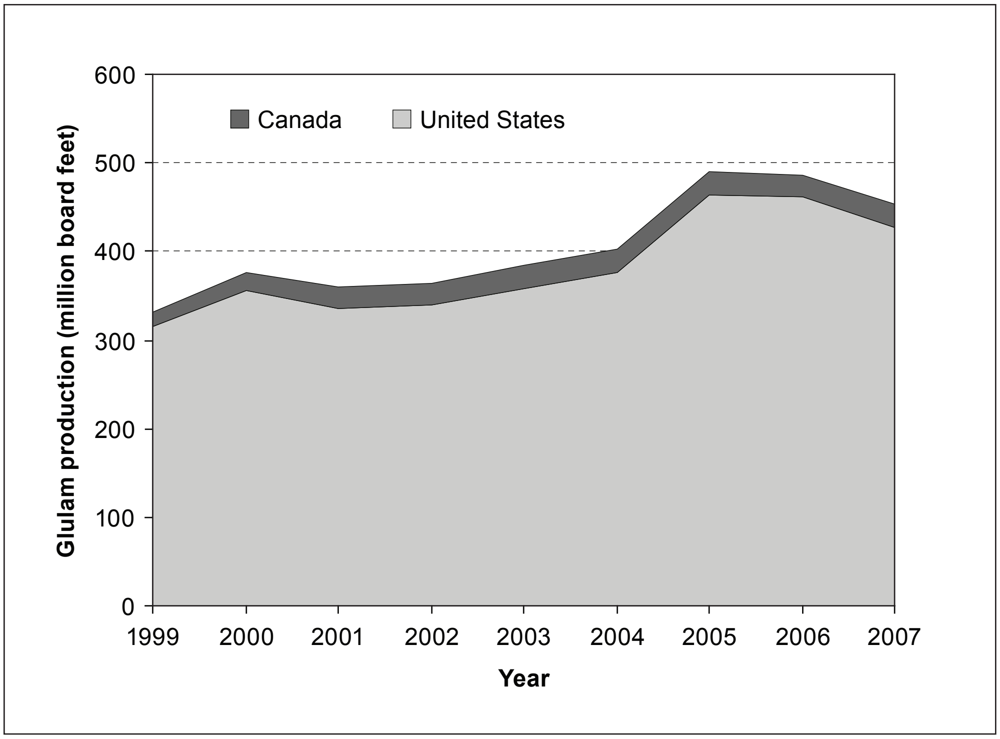

Figure 2—North American glulam production (Source: APA 2008).

A feasibility study by the University of Alaska concluded that it would probably be too costly to manufacture glulam beams in Alaska (Allen and Gorman 2003). However, subsequent studies have built on that feasibility study and researched options for Alaska lumber in the glulam market. Roos et al. (2008) found that 94.6 percent of the residential builders sampled in Alaska use glulam beams and that the glulam market is well established in Alaska. The focus of the study in the current report is researching the demands of glulam manufacturers in Canada and the Lower 48 States for the feasibility of making lamstock in Alaska and then shipping that product down to established glulam producers.

Methods

The data for this study were collected via a survey conducted in spring 2007. After a draft of the survey was completed, the survey was tested with industry representatives to assure question relevance and clarity. Revisions were made based on the test (app.). The sample frame was compiled from the AITC and the Engineered Wood Association member lists. Companies that did not manufacture glulam beams were removed from the sample frame. The total compiled sample frame was 38 companies. Before conducting the survey, respondents were notified by phone that they would be receiving a survey regarding glulam beams and that their participation would be appreciated. Two waves of the surveys were sent out. The first wave was a mail survey with a self-addressed stamped envelope. Three weeks later, an e-mail with a copy of the survey attached was sent to nonresponders requesting their participation. In cases where e-mail addresses were unavailable, the survey was faxed. A total of 21 surveys were completed for an effective response rate of 55 percent. The statistical analysis used SPSS statistical software.

Results

Demographics

Companies were divided into two subsets to examine company size differences. Large companies were defined as companies with U.S.$20 million and above in annual sales, and small companies were defined as companies with below U.S. $20 million in annual sales; about 62 percent of the sample was small companies (table 5).

Companies were also divided into three subsets to measure regional comparisons: U.S. West, U.S. Central and South, and Canada. The U.S. West category consisted of Washington, Oregon, California, Idaho, Montana, Nevada, Arizona, Wyoming, and Utah. The remaining U.S. States were defined as U.S. Central and South and all Canadian provinces were categorized as Canada. The resulting subsets broke down in the following way: 47.6 percent of the sample was in the U.S. West category, 38.1 percent was in the U.S. Central and South category, and 14.3 percent was in the Canada category (table 5).

Table 5—Study sample demographics

	Number of companies	Sample percentage
		Percent
Company size		
< U.S. $20 million	13	61.9
≥ U.S. $20 million	8	38.1
Company region		
U.S. West	10	47.6
U.S. Central and South	8	38.1
Canada	3	14.3

U.S. West = Washington, Oregon, California, Idaho, Montana, Nevada, Arizona, Wyoming, and Utah.

U.S. Central and South = the remaining U.S. States.

Species Utilization

Preliminary research showed that the three main species used for lamstock were Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco), southern yellow pine, and spruce-pine-fir (SPF). The percentage breakdown of species used in production depended on the region. For residential nonarchitectural beams, Douglas-fir was used primarily in the U.S. West, southern yellow pine in the U.S. Central and South, and SPF in Canada (table 6). The survey asked respondents to indicate if their usage of various species had increased, decreased, or remained the same (table 7). The results showed that 42.9 percent of respondents increased their use of southern yellow pine in 2006. This was similar to Douglas-fir, which had a 38.1 percent increase. However, 19 percent of the sample indicated that their Douglas-fir usage had decreased, whereas only 4.8 percent indicated their use of southern yellow pine had decreased.

Table 6—Species used for residential nonarchitectural beams

Species	U.S. West	U.S. Central and South	Canada
		Percent	
Douglas-fir	83.50	16.30	30.00
Southern yellow pine	15.00	35.60	6.70
Treated southern yellow pine	0	37.90	0
Spruce-pine-fir	0	7.86	58.30
Other	1.50	2.34	4.97

Table 7—Trends in species utilization for glulam production in 2006

Species	Increased	Remained same	Decreased	Never used
		Percent		
Douglas-fir/larch	38.1	28.6	19.0	14.3
Sitka spruce	0	0	4.8	95.2
Spruce-pine-fir	14.3	19.0	0	66.7
Southern yellow pine	42.9	19.0	4.8	33.3
Hemlock	0	4.8	0	95.2
Lodgepole pine	4.8	14.2	0	81.0
Ponderosa pine	4.8	9.5	0	85.7
White pine	0	4.8	4.8	90.4
Hardwoods	9.5	4.8	9.5	76.2

One of the goals of this research was to examine what species are being used for weather-exposed glulam applications (table 8). The choices were Alaska yellow-cedar, Port-Orford-cedar (*Chamaecyparis lawsoniana* (A. Murray) Parl.), treated Douglas-fir, treated southern yellow pine, and treated hemlock. According to the results, 23.8 percent of respondents indicated that their usage of southern yellow pine increased. This was followed by Alaska yellow-cedar at 14.3 percent. However, 14.2 percent of respondents indicated their use of Alaska yellow-cedar had decreased in 2006, and 9.5 percent of respondents indicated their use of Port-Orford-cedar had decreased. Further evidence of southern yellow pine's popularity was that no respondents indicated their usage of treated southern yellow pine decreased.

Table 8—Trends in species utilization for weather-exposed glulam beams in 2006

Species	Increased	Remained same	Decreased	Never used
		Percent		
Alaska yellow-cedar	14.3	28.6	14.2	42.9
Port-Orford-cedar	4.8	4.8	9.5	76.2
Treated Douglas-fir/larch	4.8	4.8	4.8	85.6
Treated southern yellow pine	23.8	19	0	57.2
Treated hemlock	0	0	0	10

The survey asked respondents to state the percentage of species used for residential and commercial glulam beam applications. These two categories were further broken down into architectural beams, where appearance is important, and nonarchitectural beams, where appearance is not important. Douglas-fir/larch (*Larix* Mill.) was chosen the most often for both the residential architectural beam category and the residential nonarchitectural beam category, with 50.1 percent and 38.5 percent, respectively (table 9). This was followed by untreated southern yellow pine.

The species chosen most often for use as commercial glulam beams was untreated Douglas-fir/larch (table 10). This species group was the most popular for both commercial architectural applications at 49.5 percent and commercial nonarchitectural applications at 46.8 percent. Southern yellow pine (untreated) was the second most popular for commercial glulam beams at 23 percent and 27.6 percent for commercial architectural and nonarchitectural categories, respectively. As with residential beams, treated southern yellow pine was the most popular for weather-exposed applications.

Table 9—Percentage of species used for residential glulam beams in 2006

Glulam beams	Residential architectural beam	Residential nonarchitectural beam
	Percent	
Alaska yellow-cedar	1.2	0.4
Port-Orford-cedar	0.2	0
Douglas-fir/larch (untreated)	50.1	38.5
Treated Douglas-fir/larch	5.7	0
Sitka spruce	0	0
Spruce-pine-fir	7.9	15.3
Southern yellow pine (untreated)	21.0	23.5
Treated southern yellow pine	9.6	17.7
Hemlock (untreated)	0	0
Treated hemlock	0	0
Lodgepole pine	0.3	1.0
Ponderosa pine	0	1.1
White pine	0.1	0
Hardwood species	0.1	0
Other softwoods	3.8	2.5

Table 10—Percentage of species used for commercial glulam beams in 2006

Glulam beams	Commercial architectural beam	Commercial nonarchitectural beam
	Percent	
Alaska yellow-cedar	2.6	0.5
Port-Orford-cedar	0.2	0
Douglas-fir/larch (untreated)	49.5	46.8
Treated Douglas-fir/larch	0.1	0.1
Sitka spruce	0	0.1
Spruce-pine-fir	8.13	11.13
Southern yellow pine (untreated)	23.0	27.6
Treated southern yellow pine	12.3	11.6
Hemlock (untreated)	0	0
Treated hemlock	0	0
Lodgepole pine	0.9	0
Ponderosa pine	0	0
White pine	0	0
Hardwood species	0.2	0.1
Other softwoods	3.07	2.07

Lamstock Attribute Importance

The survey asked respondents to rate the importance of various attributes when choosing lamstock (fig. 3). A seven-point Likert scale was used with 1 representing "not important" and 7 representing "extremely important." Overall, "gluability" was the most important attribute for selecting lamstock. This was followed by "little product waste" and "reliability of supply." This question was divided into inner-core lamstock and outer lamstock. The strength-related attributes in the survey were "high bending strength," "high tensile strength," and "minimal slope of grain." For all three of these attributes, the importance rating was higher for the outer lamstock than the inner-core lamstock.

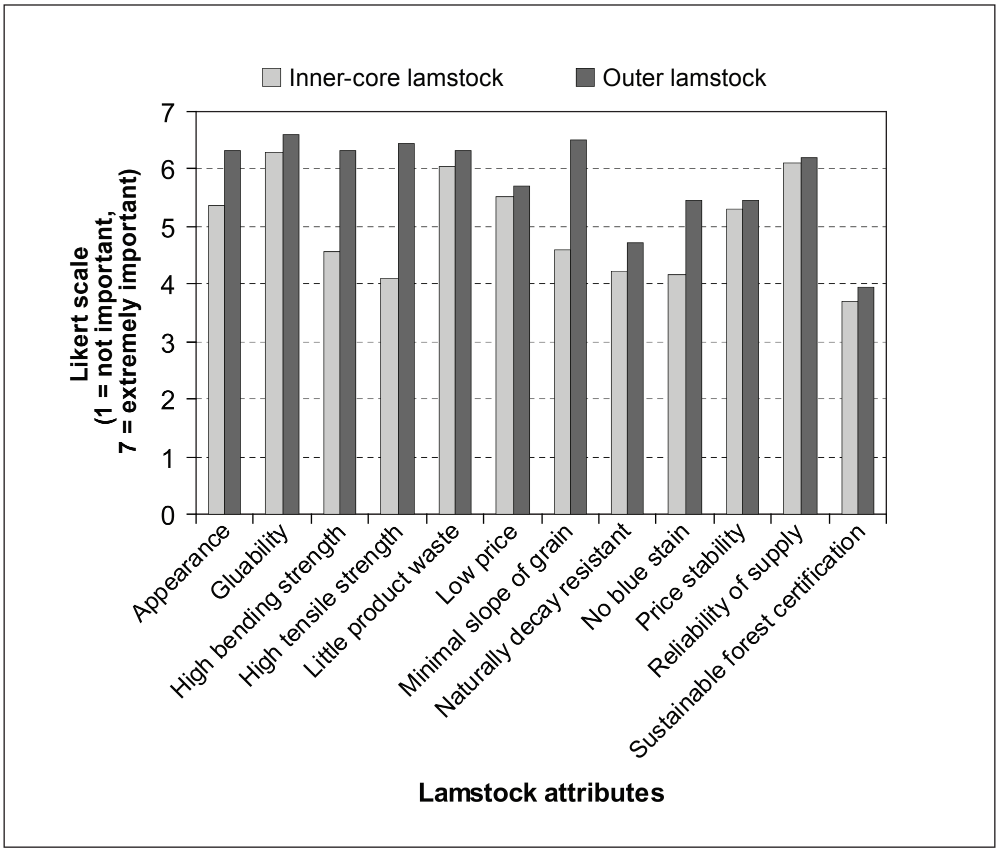

Figure 3—Lamstock attributes importance ratings.

Custom Versus Stock Glulam Beam Production

The questionnaire asked respondents to indicate the percentage of stock beams versus custom beams. These results differed depending on company size. Larger companies had a larger percentage of stock beams than custom beams (table 11). In contrast, smaller companies had a higher percentage of custom beams than stock beams.

Table 11—Percentage of stock beams versus custom beams

	< US $20 million	≥ US $20 million	Total
		Percent	
Stock beams	27.7	70.5	44.8
Custom beams	72.3	29.7	55.3

Lamstock Grading Methods

Lamstock can be graded by two methods: visual or E-rated. In visual grading, knot position and size is used to classify each piece as L1, L2, or L3. The assigned modulus of elasticity values for the previously listed grades are based upon destructive testing of a sample of material representative of the production from a geographic area. In E-rated grading, samples are nondestructively tested by mechanical procedures to determine the lumber stiffness (i.e., modulus of elasticity E) and these results are combined with the visual characteristics to determine the grade.

Preliminary research showed that the glulam industry is moving from visual grading toward E-rated grading. However, there was a question of how far E-rated grading has penetrated the industry. In this study, these results also differed depending on company size. Over half of the larger companies used E-rated grading, whereas smaller companies relied mostly on visual grading (table 12).

Table 12—Percentage of visually graded versus E-graded lamstock

	< US $20 million	≥ US $20 million	Total
		Percent	
Visually graded	71.9	45.6	61.9
E-rated	28.1	54.4	38.1

Distribution Channels

Distribution channels are an important component of marketing. This research examined both upstream distribution channels of suppliers and downstream distribution of sales channels. For upstream distribution, the results showed that purchasing directly from mills is the most popular lamstock supply channel (table 13). This was followed by purchasing from nonstocking dealer/agents. According to the respondents, lumber yards do not play a major role in supplying lamstock to glulam manufacturers. There was slight variation between small and large companies. Large companies tended to purchase lamstock directly from mills. In contrast, small companies purchased nearly equally from mills and from nonstocking dealer/agents.

Table 13—Lamstock purchase sources

	< US $20 million	≥ US $20 million	Total
		Percent	
Direct from mill	50.0	66.4	55.8
Dealers/agents (nonstocking)	49.2	33.6	36.1
Lumber yard	0.8	0	2.2

Overall, the most popular sales channel for glulam beams was building materials distributors, followed by direct sales to builders (table 14). However, in contrast to lamstock purchasing channels, sales channels differed widely with company size. Larger companies sold their glulam production mostly to building materials distributors, whereas smaller companies sold more directly to builders. It appears that direct contact and relationships with builders is a competitive advantage smaller companies use to compete against larger companies.

Table 14—Sales distribution channels

	< US $20 million	≥ US $20 million	Total
		Percent	
Retail outlet	7.2	0	4.4
Building materials distributor	24.9	66.3	40.7
Direct to builder	39.5	2.5	25.4
Lumber yard	6.3	3.8	5.2
Dealers/agents (nonstocking)	22.2	27.5	24.2

Conclusions

This research confirmed what preliminary studies had indicated were the main species used for lamstock lumber: Douglas-fir in the U.S. West, southern yellow pine in the U.S. Central and South, and SPF in Canada. One result that stood out was the increasing popularity of treated and untreated southern yellow pine. Of the companies surveyed, 42.9 percent indicated their usage of untreated southern yellow pine had increased (see table 7) and 23.8 percent indicated their usage of treated southern yellow pine had increased (see table 8). Other important results from the survey data analysis were:

- Gluability was the most important attribute when selecting lamstock. However, in selecting outer lamstock, strength attributes were also very important.
- Large companies produce more stock beams and small companies produce more custom beams.
- Overall, a majority of lamstock is still visually graded. Larger companies use E-rated grading more often than smaller companies.
- Mill direct and nonstocking agents are the most popular purchasing channels for lamstock.
- Large companies tend to sell their glulam beams through building materials distributors, whereas smaller companies make a higher percentage of their sales directly to builders.

This research defines what the glulam industry in the Lower 48 States is currently using for lamstock lumber and has implications for the Alaska forest products industry. By gaining a better understanding of the established glulam manufacturing industry, the feasibility of the market for lamstock made from Alaska species can be examined. The Allen and Gorman (2003) report showed that manufacturing glulam beams in Alaska would be too expensive, but results of this study show that there is potential for using Alaska species in lamstock production. There is potential for the lamstock to be made in Alaska, especially from Alaska yellow-cedar, and then shipped to the strong market of established glulam producers, especially those on the west coast.

Results showed that Alaska yellow-cedar is already being used as lamstock to manufacture glulam beams for exterior weather-exposed applications. Table 8 shows that 42.9 percent of the respondents have never used Alaska yellow-cedar. This indicates that 57.1 percent of the respondents have used Alaska yellow-cedar for glulam beams. On the other hand, the results showed that only 5 percent of the respondents had used hemlock or Sitka spruce to manufacture glulam beams.

Table 15—Alaska hemlock lamstock yields

Grade	Yield
	Percent
L1	28.5
L2	16.8
L3	16.6

Source: Green et al. 1999.

Pulpwood-quality Alaska hemlock logs, however, have shown high grades (strength values) and demonstrated potential to be used as high-quality structural lumber (Green et al. 1999). When graded as lamstock, approximately 28 percent made the highest (L1) grade (table 15). Alaska hemlock is stronger than other western hemlocks. Wood testing and analysis by the Ketchikan Wood Technology Center successfully showed the unique strength property of Alaska western hemlock (WWPA 2005). The assigned modulus of elasticity values for selected grades of Alaska hemlock are higher than lumber in other regions. Fiber stress in bending values, however, are slightly lower than those outside of Alaska.

The Ketchikan Wood Technology Center's in-grade testing program also resulted in WWPA grade marks for Alaskan yellow-cedar and Alaska spruce. Following these results, the Ketchikan Wood Technology Center researched whether or not these three species could be used as lamstock to produce glulam beams. The results of their glulam testing are pending. If results show that Alaska spruce and hemlock could be used for lamstock (Alaska yellow-cedar is already being used in the Lower 48 States), a strong marketing campaign would be needed to disseminate these results to lamstock buyers.

The three WWPA grade marks for Alaska species has opened the door to new forest products markets. The lamstock in glulam is often made from lumber with smaller dimensions (2 by 4 and 2 by 6), commonly produced from small logs, an asset that could be valuable for Alaska second-growth timber and thinned material. North American glulam manufacturers are already using yellow-cedar, and the strength properties of Alaska hemlock and spruce could potentially make them practical options for lamstock. A strong marketing campaign could increase the acceptance of these species in the glulam manufacturing market.

Metric Equivalents

When you know:	Multiply by:	To find:
Inches	2.54	Centimeters
Board feet, lumber scale	.0024	Cubic meters, lumber

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Appendix—Survey Sent to Glulam Beam Manufacturers

(1) Referring to the species listed below, please indicate whether your company's use of each material for lamstock has *Increased*, *Remained the Same*, or *Decreased* over the past two years.

Over past two years, my company's use of the following materials has…

Lamstock Material	**Increased**	**Remained the Same**	**Decreased**	**My Company Has Never Used This Product**
Alaska Yellow Cedar	☐	☐	☐	☐
Port Orford Cedar	☐	☐	☐	☐
Douglas-Fir / Larch (untreated)	☐	☐	☐	☐
Treated Douglas-Fir / Larch	☐	☐	☐	☐
Sitka Spruce	☐	☐	☐	☐
SPF	☐	☐	☐	☐
Southern Yellow Pine (untreated)	☐	☐	☐	☐
Treated Southern Yellow Pine	☐	☐	☐	☐
Hemlock (untreated)	☐	☐	☐	☐
Treated Hemlock	☐	☐	☐	☐
Lodgepole Pine	☐	☐	☐	☐
Ponderosa Pine	☐	☐	☐	☐
White Pine	☐	☐	☐	☐
Hardwood Species	☐	☐	☐	☐
Other Softwoods _____________	☐	☐	☐	☐

(2) How important do you consider the following material attributes for CORE lamstock?

Material Attributes for CORE lamstock

	Not Important			**Neutral**			**Extremely Important**
Gluability	1	2	3	4	5	6	7
No Blue Stain	1	2	3	4	5	6	7
Minimal Slope of Grain	1	2	3	4	5	6	7
Low Price	1	2	3	4	5	6	7
Reliability of Supply	1	2	3	4	5	6	7
High Tensile Strength	1	2	3	4	5	6	7
Sustainable Forest Certification (e.g. FSC, SFI)	1	2	3	4	5	6	7
Price Stability	1	2	3	4	5	6	7
Appearance	1	2	3	4	5	6	7
Little Product Waste	1	2	3	4	5	6	7
Naturally Decay Resistant	1	2	3	4	5	6	7
High Bending Strength	1	2	3	4	5	6	7

(3) How important do you consider the following material attributes for OUTER lamstock?

Material Attributes for OUTER lamstock

	Not Important			**Neutral**			**Extremely Important**
Gluability	1	2	3	4	5	6	7
No Blue Stain	1	2	3	4	5	6	7
Minimal Slope of Grain	1	2	3	4	5	6	7
Low Price	1	2	3	4	5	6	7
Reliability of Supply	1	2	3	4	5	6	7
High Tensile Strength	1	2	3	4	5	6	7
Sustainable Forest Certification (e.g. FSC, SFI)	1	2	3	4	5	6	7
Price Stability	1	2	3	4	5	6	7
Appearance	1	2	3	4	5	6	7
Little Product Waste	1	2	3	4	5	6	7
Naturally Decay Resistant	1	2	3	4	5	6	7
High Bending Strength	1	2	3	4	5	6	7

(4) For each of the applications listed below, please indicate the percentage used for glulam beams in 2006 (make sure they add up to 100% TOP to BOTTOM)

Glulam Beams	**Residential Architectural Beam**	**Residential Nonarchitectural Beam**	**Commercial Architectural Beam**	**Commercial Nonarchitectural Beam**
Alaska Yellow Cedar	____%	____%	____%	____%
Port Orford Cedar	____%	____%	____%	____%
Douglas-Fir / Larch (*untreated*)	____%	____%	____%	____%
Treated Douglas-Fir / Larch	____%	____%	____%	____%
Sitka Spruce	____%	____%	____%	____%
SPF	____%	____%	____%	____%
Southern Yellow Pine (*untreated*)	____%	____%	____%	____%
Treated Southern Yellow Pine	____%	____%	____%	____%
Hemlock (*untreated*)	____%	____%	____%	____%
Treated Hemlock	____%	____%	____%	____%
Lodgepole Pine	____%	____%	____%	____%
Ponderosa Pine	____%	____%	____%	____%
White Pine	____%	____%	____%	____%
Hardwood Species	____%	____%	____%	____%
Other Softwoods ____________	____%	____%	____%	____%
	100%	**100%**	**100%**	**100%**

(5) What percentage of your production is:

Stock Sizes ___________ %

Custom Sizes ___________ %

100%

(6) How is your lamstock graded?

Visual Graded ___________ %

E-Rated Graded ___________ %

Other___________ ___________ %

100%

(7) What percentage of your lamstock is purchased from the following sources:

Direct From Sawmill ______ %

Dealers/Agents (nonstocking) ______ %

Other___________ ______ %

100%

(8) What percentage of your glulam production is sold through the following distribution channels?

Consumer Retail Store ______ %

Building Materials Distributor ______ %

Direct to Builders ______ %

Lumber Yards ______ %

Dealers/Agents (nonstocking) ______ %

Other___________ ______ %

100%

(9) What was the volume of your production in 2006? _________mmbf

(10) What percentage of your total production was glulam beams in 2006? _____%

(11) What percentage of your glulam production was for exterior (weather exposed) beams in 2006? _____%

(12) What state or province is your company located in? ______________________

(13) How many company employees? ______

(14) Approximately what was your company's TOTAL sales revenue in 2006? (*Please check only one*)

- ☐ Under $500,000
- ☐ $500,001–$1,000,000
- ☐ $1,000,001–$2,500,000
- ☐ $2,500,001–$5,000,000
- ☐ $5,000,001–$7,500,000
- ☐ $7,500,001–$10,000,000
- ☐ $10,000,001–$12,500,000
- ☐ $12,500,001–$15,000,000
- ☐ $15,000,001–$20,000,000
- ☐ $20,000,001–$30,000,000
- ☐ Over $30,000,000

End of survey.
Thank you very much!

Pacific Northwest Research Station

Web site	http://www.fs.fed.us/pnw
Telephone	(503) 808-2592
Publication requests	(503) 808-2138
FAX(503) 808-2130	
E-mail	pnw_pnwpubs@fs.fed.us
Mailing address	Publications Distribution Pacific Northwest Research Station P.O. Box 3890 Portland, OR 97208-3890

U.S. Department of Agriculture
Pacific Northwest Research Station
333 SW First Avenue
P.O. Box 3890
Portland, OR 97208-3890

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