

West Virginia logger characteristics

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Abstract

West Virginia licensed loggers were surveyed in 2001 and 2002 regarding their business, operational, and personal characteristics. They were also asked to rate their educational preferences from a supplied list of topics. An initial survey was mailed out in 2001 and a more intensive follow-up survey was mailed out to 1,055 licensed loggers in 2002. The survey was directed toward owners since West Virginia logging businesses must be licensed by law. In 2002, the total response rate was 10.2 percent with 6.2 percent submitting completed usable surveys. Results indicated that independent loggers of West Virginia averaged 47.8 years old with an average of 17.8 years in the logging business. The firm size was between 1 and 80 employees with an average of 8 employees. A firm of average size harvested 10 tracts with a weekly production of 51.8 thousand board feet (MBF) and a unit cost of \$116.6/MBF.

West Virginia is considered to be the third most forested state in the United States. The 2000 Forest Inventory and Analysis (FIA) data for West Virginia shows a net growth to removals ratio of 1.7:1 for all species combined (Widmann 2003). Oak and yellow-poplar accounted for 68.9 percent of the sawtimber removals in the year 2000. The state has 11,791,700 acres of timberland with an average volume of 6,038 board feet (BF) per acre. Logging occurred on 225,939 acres in West Virginia in 2001 (AF&PA 2002). Type of cutting practices used included: diameter limit cut (52%), selective cut (39%), clearcut (7%), and not specified (1%).

Historically, West Virginia forestland owners focused on removing sawtimber due to its relatively higher value and the lack of markets for low-grade material (Fajvan et al. 1998). The lack of markets for lower grade sawlogs and pulpwood limited landowner options in managing their forests. Diameter-limit sales were often used since markets for smaller, lower grade timber were limited.

Demand for logging services between 1990 and 1998 increased dramatically in West Virginia (Luppold et al. 1998). This was the result of two new oriented strandboard plants, two parallel strand lumber mills, and two rotary-cut hardwood plywood mills within or close to state lines. These new facilities used lower grade sawlogs or small-diameter trees that were previously left in the woods or utilized by smaller sawmills. According to the U.S. Census Bureau (2003), hardwood lumber production also increased, peaking at 798 million BF in 2000. The last few years have been financially challenging for the entire forest products industry, especially loggers (Milauskas and DeGeorge 2003). Profit margins and profitability have been at the lowest levels in years with many companies

showing negative or depressed returns. West Virginia forest products industry employment decreased by approximately 5 percent from 2000 to 2002 (Milauskas et al. 2002).

West Virginia's loggers operate under what would be considered relatively strict regulations in comparison to many other states. The Logging Sediment Control Act (LSCA) passed in 1992 by the state legislature requires all logging operations to obtain a timbering license from the West Virginia Division of Forestry (WVDof), operate with a certified logger on-site at all times, notify the WVDof of harvest operations, and be subject to the enforcement authority of the WVDof (WVDof 2002). According to the WVDof, approximately 1,055 loggers were licensed by the state to operate in 2002. The results of Best Management Practices (BMPs) evaluations over a 10-year period indicate an increasing trend of compliance (Wang et al. 2004). State certification requirements include: completion of courses in tree felling safety, first aid/CPR, and silvicultural BMPs. A survey by Egan et al. (1997) of West Virginia loggers regarding certifi-

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cation found 49 percent were satisfied with the program. Fifty-nine percent of loggers did not think that recertification every 3 years was necessary for loggers doing a good job.

Loggers also receive Sustainable Forestry Initiative (SFI) program training in a 2-hour module during recertification training. Recertification training is required every 3 years. The SFI Program training topics include: SFI awareness, regeneration, forest aesthetics, transportation safety, threatened and endangered species, and wildlife habitat management. This SFI Program training is conducted by industry foresters employed by companies following the American Forest & Paper Association (AF&PA) SFI program requirements. New SFI logger training and education guidelines or standards will require loggers to have business management training. A 1-day business management workshop for loggers is offered and cosponsored by the West Virginia University Appalachian Hardwood Center and the West Virginia Forestry Association.

Several logger studies have been conducted recently in the eastern United States. Loggers were surveyed in Georgia in 1987, 1992, and 1997 for systems used, products produced, productivity, and usage of training and technology (Greene et al. 1988, 1998, 2001). Ninety percent of loggers removed tree-length wood, while 74 percent removed log lengths, 14 percent shortwood, and 7 percent chips. In 1997, 70 percent of the product harvested was pine. Weekly production increased 98 percent from 1987 to 1997. In 1997, the mean production per firm was 51 thousand board feet (MBF), 59 loads, or 538 cords. The mean production per crew was 38 MBF, 45 loads, or 408 cords. The number of loggers using feller-bunchers and grapple skidders increased from 71 percent in 1987 to 90 percent in 1997. Clearcuts decreased from 82 percent of harvests in 1987 to 55 percent in 1997. The number of employees increased 11 percent from 1987 to 1997 with capital investment doubling. Labor productivity increased greater than 75 percent while production per unit of capital investment increased by only 2 percent. Total capital increased by over 102 percent in real dollars. The authors point to these facts as explaining logger financial difficulties in recent years. The average firm employed 9.8 employees including the owner, office workers, truckers, etc. Average workers-in-the-woods were 4.8 per firm with an average of 1.32 crews. Other results showed that 79 percent always used BMPs, 52 percent used a desktop computer, and 7 percent utilized e-mail. Owners cited their biggest problems as labor (35%), logging rates (29%), and quotas (11%).

Greene et al. (1998) interviewed 19 logging contractors and 140 of their employees in Georgia concerning demographics, attitudes, and experience with training programs. Fewer than half of the loggers had high school diplomas and almost none received any formal job training. The average contractor was 43 years old and had 19 years of logging experience. Employees averaged 37 years old and 15 years of experience. Most owners felt dissatisfied with their return on capital investment and only 16 percent felt their income was comparable to other similar investments. Benefits paid to employees included: ride to work (67%), paid vacation (58%), health insurance (45%), and retirement plan (19%). Eighty-four percent of employees desired the addition or improvement of a retirement plan. Employees rated improvement in benefits higher than increased income. Overall, the authors found Georgia's log-

ging employees very satisfied with their outside work environment.

Keefer et al. (2002) looked at the critical role that loggers play in Pennsylvania's forest industry. It was found that taking a single course in forest ecology and silviculture could help loggers make better management decisions regarding tree selection for removal. Loggers responding to the survey had a mean age of 43 years, logging career of 19 years, 3.5 employees, and annual production of approximately 1,300 MBF.

A recent study of Maine, New Hampshire, and Vermont loggers used focus groups and a survey to examine the status of the northern New England logging industry (Egan and Taggart 2004). They surveyed numerous logger and business attributes, attitudes, and preferences. Northern New England loggers had a mean education of 11.8 years, average age of 45.5 years, average logging experience of 23.3 years, and spent an average of 38.8 weeks per year logging. Only 21 percent of logging business owners provided vacation and 16 percent provided health insurance. Most loggers (69%) indicated they would not encourage sons or daughters to become loggers and only 51 percent indicated they would be in logging in 5 years. Most said they were logging because they enjoyed outdoor task oriented work. The overall results indicated that future recruitment of logging labor will be challenging and may depend on higher wages and benefits.

A previous survey of West Virginia loggers (Luppold et al. 1998) found the annual production of logging firms to vary between 5 MBF and 24,000 MBF. Companies were divided into two categories with two subcategories representing size (small or large) and products produced. Producers were classified according to products produced: sawlog, veneer, and peeler log (SVP); or sawlog, veneer, peeler log, and other material (SVPOM). Years in business ranged from 10.4 for small producers to 15.9 for large producers. Most large contractors worked full time (SVP: 86.7%; SVPOM: 88.1%) while approximately half of smaller producers (SVP: 50.8%; SVPOM: 53.5%) worked full time. The authors had difficulty with survey responses representing the number of employees. They speculated this was due to West Virginia's relatively high state worker's compensation rates and the growing trend toward contract cutting, skidding, or loading in order to avoid these payments. The number of employees in the larger company categories ranged from 2.9 to 5.9 per firm while responses from smaller firms were too few and incomplete for statistical analysis. Worker's compensation, regulation, and taxes in that order were found to be the greatest barriers to increased production. Smaller and larger companies cited skidder capacity as their most limiting production factor.

The current status of West Virginia logging companies, their needs, and how they are adapting to recent economic, regulatory, and technical challenges is of particular interest to researchers and the forest products industry. This study seeks to characterize and understand educational, operational, and profitability factors impacting West Virginia logging firms. Survey results will allow forestry educators, professionals and researchers to target areas that can maximize benefits to the logging industry. This information is critical in understanding how logging companies are operating in the present challenging environment and developing a database for the evaluation of future trends.

Materials and methods

A list of licensed West Virginia loggers was obtained from the WVDOF. An initial survey was mailed out in 2001 and a more intensive follow-up survey was mailed out in 2002 to 1,055 licensed loggers. Included with the 2002 survey was a cover letter informing the potential participants of their rights regarding human test subjects. West Virginia University Institutional Review Board and the U.S. Department of Health and Human Services requirements were followed. Potential survey respondents were informed that the survey was voluntary and that the results from any individual would be kept confidential. Postage-paid return envelopes were included with the survey.

The 2001 survey included 21 questions focusing on logger educational and training needs. This focus on logger training and education was deemed important in order to evaluate future logging extension programs. The 2002 survey included 33 questions developed by the authors. The authors examined recent logger surveys conducted in the eastern United States as an aid in developing the West Virginia questionnaire. The questions sought to obtain more detailed information on West Virginia logger business, educational, and operational characteristics. Some of the major question areas included: harvest locations, products harvested, employee characteristics, production, training needs, equipment configuration, owner characteristics, profitability, and employee benefits. Loggers were asked to list the three counties in which they most often harvested timber. Survey responses were input into computer files for analysis. Data were analyzed statistically in terms of owner, machine, and production by using the Statistical Analysis System (SAS).

Results

The 2001 completed survey response was 4.9 percent (52 respondents). In 2002, the total response rate was 10.2 percent (108 respondents) with 6.2 percent (65 respondents) submitting completed usable surveys. Approximately half of West Virginia's counties were mentioned by loggers in the 2002 survey for timber operations. Greenbrier and Randolph Counties had the largest representation at 15 and 12 percent. Geo-

Table 1. — *Logger training and education needs.*

Type	Prefer and strongly prefer (%)
Logging safety issues	80
Logging cost analysis	79
Forest and logging aesthetics	74
Logging regulations	70
Business management	67
Machine maintenance	57
Public relations and the media	54
Harvest planning and layout	54
Road location and construction	54
Timber cruising and marking	54
New technology and methods	52
General forestry management	47
Wildlife management and endangered species	43
Machine and truck operation	40
Supervisory training	36
Computers	25

Table 2. — *Summary statistics of logging firms in West Virginia.*

	Median	Mean	Standard deviation	Minimum	Maximum
Owner's age (yr)	48.0	47.8	8.9	27.0	67.0
Years in business	17.0	17.8	11.4	2.5	46.0
Work hours per week	40.0	41.2	8.8	8.0	60.0
Work weeks per year	50.0	46.8	10.0	6.0	52.0
Workers in the woods	3.0	4.8	6.7	0.0	45.0
Machine drivers	1.5	3.2	6.7	0.0	46.0
Total employees	5.0	8.0	12.4	1.0	80.0
No. of certified loggers	2.0	2.3	1.6	0.0	8.0
No. of crews	1.0	1.2	0.7	0.0	5.0

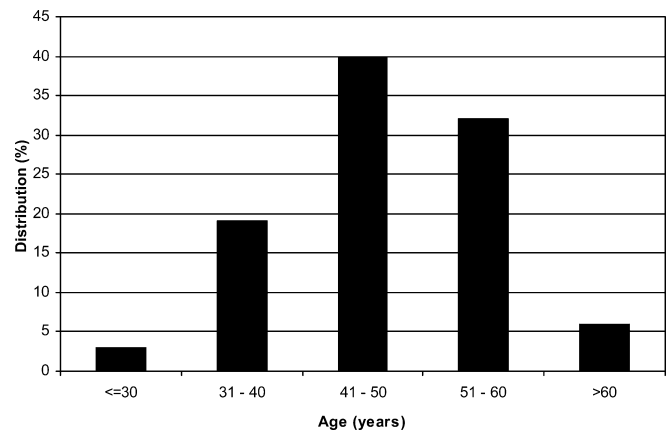


Figure 1. — *Distribution of loggers' ages in West Virginia.*

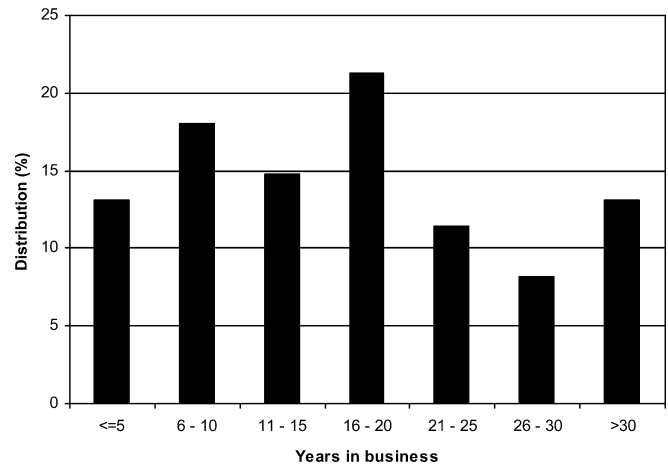


Figure 2. — *Distribution of years in logging business.*

graphically, timbered regions of the state were well represented.

Training and educational needs

Loggers were asked to indicate their training and educational needs preferences for 16 subjects in the 2001 survey (Table 1). Respondents were asked to indicate one of four rankings for a particular subject (low, medium, high, or very high priority). The top five subjects indicated (high plus very high rating) were: logging safety issues (80%), logging cost analysis (79%), forest and logging aesthetics (74%), logging regulations including BMPs (70%), and profitable business man-

agement (67%). Not surprisingly, loggers ranked computer training last with only 25 percent indicating this subject as a high or very high priority. Although most loggers would agree that computers are essential in their bookkeeping and accounting systems, many appear to separate these financial operations from their woods operations in their thinking. They tend to concentrate on areas that they perceive as directly affecting production.

The educational methods preferred by loggers were also investigated. Approximately half or more of the responding loggers preferred or strongly preferred to receive information or education by newsletters; forestry, trade, and logger association meetings; and magazines. Less popular were weekday workshops (7%), 1- or 2-day seminars (18%), evening workshops (23%), and weekend workshops (28%). These results indicate that loggers may fear losing production by attending weekday meetings.

Loggers were asked about their use of technology in their business. The majority (82%) used desktop computers and FAX machines (73%), while a small minority utilized laptop computers (9%). Most had internet access (62%) but only 34 percent utilized e-mail. Other technology applications cited by respondents were: global positioning systems (GPS) (11%), mapping software (11%), and data logger (2%). About half of the loggers indicated they were willing to use internet-based business tools (50%) and read an internet newsletter (45%).

Respondents were asked how often they followed BMPs. Eighty-nine percent checked "always." West Virginia loggers are required to follow BMPs by law. The loggers did indicate that recent training and/or meetings had improved their company's performance (82%). It can be assumed that much of this training dealt with BMPs since mandatory logger training is required every 3 years for logger certification in West Virginia. Despite these higher numbers on BMP use, only 46 percent said they used a written harvest plan.

Logging business owners' characteristics

Logging business owners averaged 47.8 years of age and had logged an average of 17.8 years with medians of 48 and 17, respectively (Table 2). Only 22 percent of respondents were age 40 or younger (Fig. 1). Almost 40 percent were between and including the ages of 41 to 50. About 70 percent of the West Virginia's loggers were in business for more than 10 years (Fig. 2). Most were high school graduates (63%) while 6 percent had a college degree and 8 percent had some college. The only forestry/trade organization that the majority belonged to was the West Virginia Forestry Association (95%). Each firm had an average of 1.2 crews and 8 employees while the size of the firm ranged from 1 to 80 employees with an average of 2.3 certified loggers. Firms averaged 4.7 woods workers, 3.2 truck drivers, 1.4 foremen, and 1.4 owners/managers. Eighty-one percent of employees had first aid training, with approximately 45 percent trained in BMPs and chain saw safety. The average firm employed 1.4 relatives.

Table 3. — Ages of logging machines in West Virginia.

Type	Median	Mean	Standard deviation	Minimum	Maximum
Chain saw	2.0	2.2	1.9	0.0	10.0
Feller-buncher	2.5	4.1	4.0	0.0	12.0
Skidder-cable	11.5	12.2	9.7	0.0	50.0
Skidder-grapple	2.5	3.2	3.8	0.0	15.0
Skidder-farm tractor	5.0	6.3	4.0	3.0	12.0
Skidder-dozer	5.5	6.9	5.5	1.0	23.0
Sawbuck	4.5	6.3	6.4	1.0	31.0
Knuckleboom loader	5.0	7.8	7.9	1.0	34.0
Mobile loader	17.5	16.9	12.0	2.0	34.0
Truck-tandem axle 10 wheel	10.0	12.0	9.6	1.0	30.0
Truck-tractor trailer rig	5.0	8.8	9.1	1.0	31.0
Lowboy trailer	5.0	11.0	10.1	1.0	34.0
Road building dozer	5.0	8.5	8.7	1.0	40.0

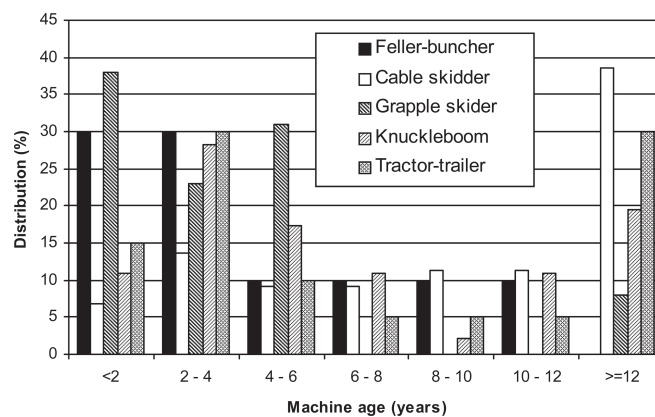


Figure 3. — Age distributions of major logging machines in West Virginia.

Logging business owners were asked to indicate what benefits they provided to their employees. Close to half of employers provided vacation (48%) and a ride to the work site (41%). Fewer employers provided medical insurance (26%), uniforms (7%), retirement plan (4%), dental insurance (4%), and a safety bonus (2%). Attracting and retaining employees in an industry lacking in health insurance and retirement coverage is challenging. Most in the logging industry do not feel that they can afford to provide such benefits to their employees.

Loggers were asked to indicate what they considered to be their largest barrier to increasing profit. Workers' compensation (23%), timber purchasing (23%), labor (18%), weather (10%), and regulations (7%) were the top five mentioned. Logger comments indicated that the labor area included problems with employee recruitment and work ethic. Regulations, taxes, breakdowns, and the economy received lesser mention.

Loggers were asked how they would spend any added revenue if logging rates increased. More than half would increase wages and benefits (60%) and purchase new equipment (54%). Fewer contractors would repair old equipment (32%), pay bills (10%), and hire new employees (10%). These figures indicate that logging business owners will be very cautious in expanding their operations if it requires hiring new employ-

Table 4. — Logging equipment per firm in West Virginia.

	Median	Mean	Standard deviation	Minimum	Maximum
Felling					
Chain saws	3.0	3.8	3.6	1	25
Feller-bunchers	1.0	1.5	1.3	1	5
Skidding					
Cable skidders	1.0	1.5	0.8	1	4
Grapple skidders	1.0	1.6	0.8	1	3
Delimiting and bucking					
Chain saws	2.5	3.3	2.3	1	10
Sawbucks	1.0	1.4	1.1	1	6
Loading and trucking					
Knuckleboom loader	1.0	1.3	0.9	1	5
Tractor-trailer rigs	1.0	1.8	1.3	1	5
Road building					
Bulldozers	1.0	1.5	1.3	1	9

Table 5. — West Virginia logger production statistics.

	Median	Mean	Standard deviation	Minimum	Maximum
Tracts harvested per year	5.0	10.4	19.7	1.0	124.0
Average size of harvested tracts (acres)	60.0	96.3	86.4	5.0	400.0
Weekly production (MBF)	32.5	51.8	64.8	3.8	275.0
Breakeven weekly production (MBF)	35.0	36.5	36.4	3.5	150.0
Cost (\$/MBF)	120.0	116.6	35.1	40.0	190.0

ees. Logging contractors may be more willing to invest in new equipment that can raise productivity rather than hiring additional employees or adding new crews.

Harvest and harvesting systems

Ninety percent of loggers produced log-length products in West Virginia. Very few loggers produced shortwood (8%), tree-length (2%), or chips (0%). Respondents were asked what harvesting method they used most often. The majority of loggers indicated they most often harvested thinning/diameter limit cuts (62%) with partial cuts/shelterwood/seed tree (27%), and clearcuts (9%) used less frequently. The 2000 FIA data for West Virginia indicated that loggers annually harvest 95 percent of their volume as hardwood and 5 percent as softwood (Widmann 2003).

Loggers indicated that 41 percent of their harvesting involved standing timber that they purchased. Loggers said that 61 percent of their hauling was handled by their own trucks. Fifty-eight percent of loggers indicated that they have attempted to negotiate cut and haul rates. The majority (63%) said they were sometimes successful, while 23 percent were never successful, and 15 percent indicated they were always successful. Only 48 percent indicated that their production was limited by quotas; those loggers indicated they were on quotas 40 percent of the time. Weather conditions during late 2001 and all of 2002 were very difficult for loggers, with most mills facing inventory challenges. We expected that quotas decreased in 2003 and 2004 due to these conditions.

Business owners listed average ages for utilized logging machines. Survey participants were instructed not to list spare equipment. The results in **Table 3** generally show an aging equipment fleet. Most of the major logging machines are un-

der 6 years old (**Fig. 3**). However, a relatively large portion of cable skidders, tractor-trailers, or knuckleboom loaders was more than 12 years old. Cable skidders, in particular, seemed relatively old at 12.2 years while loggers utilized newer grapple skidders (3.2 yr). Due to steep and difficult topography in most of West Virginia, cable skidders are considered essential on most logging jobs. Relatively newer feller-bunchers (4.1 yr) were utilized by logging businesses that owned these machines. Tracked feller-bunchers have recently found more acceptance by state loggers for safety and production reasons.

Two major types of harvesting systems were identified in the survey: manual felling and mechanized harvesting systems. Each firm has the capability of manual felling with chain saws and skidding with cable skidders, farm tractors, or other machines (**Table 4**). However, only 17 percent of them could perform mechanized harvesting with feller-bunchers and grapple skidders. Delimiting and topping were primarily done by using chain saws while 43 percent of bucking was done by sawbucks on the landings. Knuckleboom loaders accomplished 73 percent of the loading while trucking was done with tractor-trailers (51%) and shortwood and other types of trucks (49%).

West Virginia logging firms harvested about 10 tracts per year with an average tract size of 96.3 acres (**Table 5**). Weekly production averaged 51.8 MBF with owners indicating a breakeven production of 36.5 MBF. The survey asked loggers for their average logging cost without profit or trucking. Average unit costs were \$116.6 per MBF.

Conclusions

Survey results in certain categories were similar to other logger studies conducted in other eastern states. Average logger age was 47.8 in West Virginia while averaging 45.5 in northern New England, 43 in Pennsylvania, and 43 in Georgia. Health insurance was provided by 26 percent of West Virginia loggers, 16 percent of northern New England loggers, and 45 percent of Georgia loggers. Vacation was provided by 48 percent of West Virginia loggers, 21 percent of northern New England loggers, and 58 percent of Georgia loggers.

Logging business owners indicate in conversations that they cannot afford to pay much in the way of comprehensive benefits. One of the questions asked involved where they would invest additional revenue if logging rates increased. More than 60 percent said they would increase wages and benefits. Since labor (retention and work ethic) was listed in their top three factors limiting profit, loggers seem to be aware that this area is critical to improving their operating efficiency.

West Virginia loggers operate what seems to be a relatively older machine fleet compared to the loggers in other states.

The exceptions appear to be machines that have not been traditionally utilized in West Virginia but are seeing increasing use. Feller-bunchers and grapple skidders were the newest machines other than chain saws. As the safety and production benefits of these machines are accepted, it stands to reason that newer machine purchases will be made in these categories. Due to the steep terrain, however, chain saw felling and cable skidding will likely remain common.

The results from this survey will be used as a baseline for future comparative surveys in West Virginia. Logging trends regarding operational, educational, and business factors can then be examined and efforts made to improve logging firm performance. Based on survey results, future efforts in logger training and education will be directed toward safety, aesthetics, and business management issues.

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