

BBER's Timber Harvest & Industry Information & Analysis

Todd Morgan, CF ; Steve Hayes, CF ; Michael Niccolucci

Forest Industry Research Program, Bureau of Business and Economic Research
(BBER)

University of Montana



Forest Land Taxation Advisory Committee

September 9, 2021

Bureau of Business and Economic Research

- The University of Montana, Missoula
- Research branch within College of Business
- Regional economic analysis
- Survey research
- Industry analysis
 - Health care
 - Manufacturing
 - Energy
 - **Forest products Industry**



Forest Industry Research Program



- **Sponsored research – mostly US Forest Service**
- **State level timber harvest & industry analyses**
- **Logging utilization studies**
- **West-wide timber product output (TPO) reporting**
- **Annual & quarterly Montana information**
- **Annual logging & hauling costs for FS Northern Region**
- **Other forest economics & timber related projects**



Montana Forest Industry Census

1976, 1981, 1988, 1994, 1998, 2004, 2009, 2014, 2018

- **Timber harvest & flow** volume, species, size, county and ownership, destination & uses.
- **Mill type**, location, capacity, equipment, employment.
- **Product** volume, sales and market locations.
- **Mill residue** volumes of bark & wood fiber uses.
- **Employment and labor income**





MONTANA SAWLOG AND VENEER LOG PRICE REPORT

Based on a survey of mills

October – December, 2019

The following information is a summary breakdown of recent past average prices reported by primary wood processors for logs of the various species listed. These prices are not necessarily a reflection of current market prices. Fair market prices may vary a great deal based on log size, length, quality, contract size and terms, and a number of other factors. All information reported is recent average price per thousand board feet (MBF), Scribner Decimal rule, delivered to the mill site.

SAWLOGS

SPECIES	EASTERN MONTANA		WESTERN MONTANA	
	Average Price Per MBF	Demand Next 60 Days	Average Price Per MBF	Demand Next 60 Days
Ponderosa pine				
Yellow	\$325	P	\$306	F
Bull	\$313	P	\$294	F
Lodgepole pine	\$424	G	\$392	G
Douglas-fir	\$429	G	\$392	G
Western larch	////////////////	////////////////	\$392	G
Engelman spruce	\$424	G	\$392	G
Subalpine fir	\$413	G	\$341	F/G
Grand fir	////////////////	////////////////	\$349	F
Western redcedar	////////////////	////////////////	\$367	P
Hemlock	////////////////	////////////////	\$368	G
White pine	////////////////	////////////////	\$351	F/G
Cottonwood	////////////////	////////////////	N/A	N/A

VENEER LOGS

SPECIES	STATEWIDE	
	Average Price Per MBF	Demand Next 60 Days
Douglas-fir	\$435	F
Western larch	\$435	F
Engelman spruce	\$380	F

Demand:
G = Good
F = Fair
P = Poor

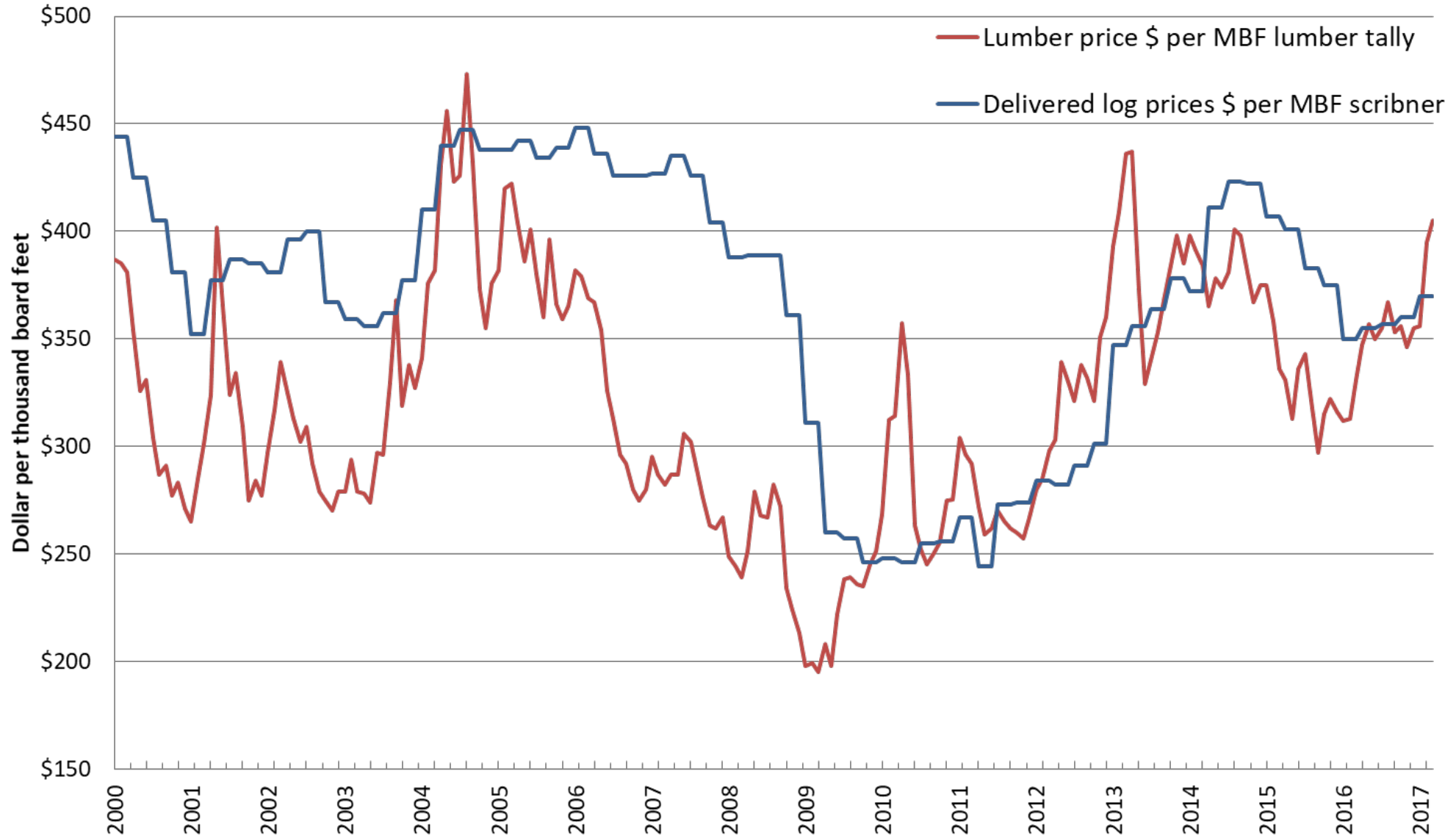


Delivered Log Prices

- Quarterly
- Since 1985
- Montana sawmills accounting for >90% of volume processed
- Online at: bber.umt.edu/FIR/F_LogPrice.asp

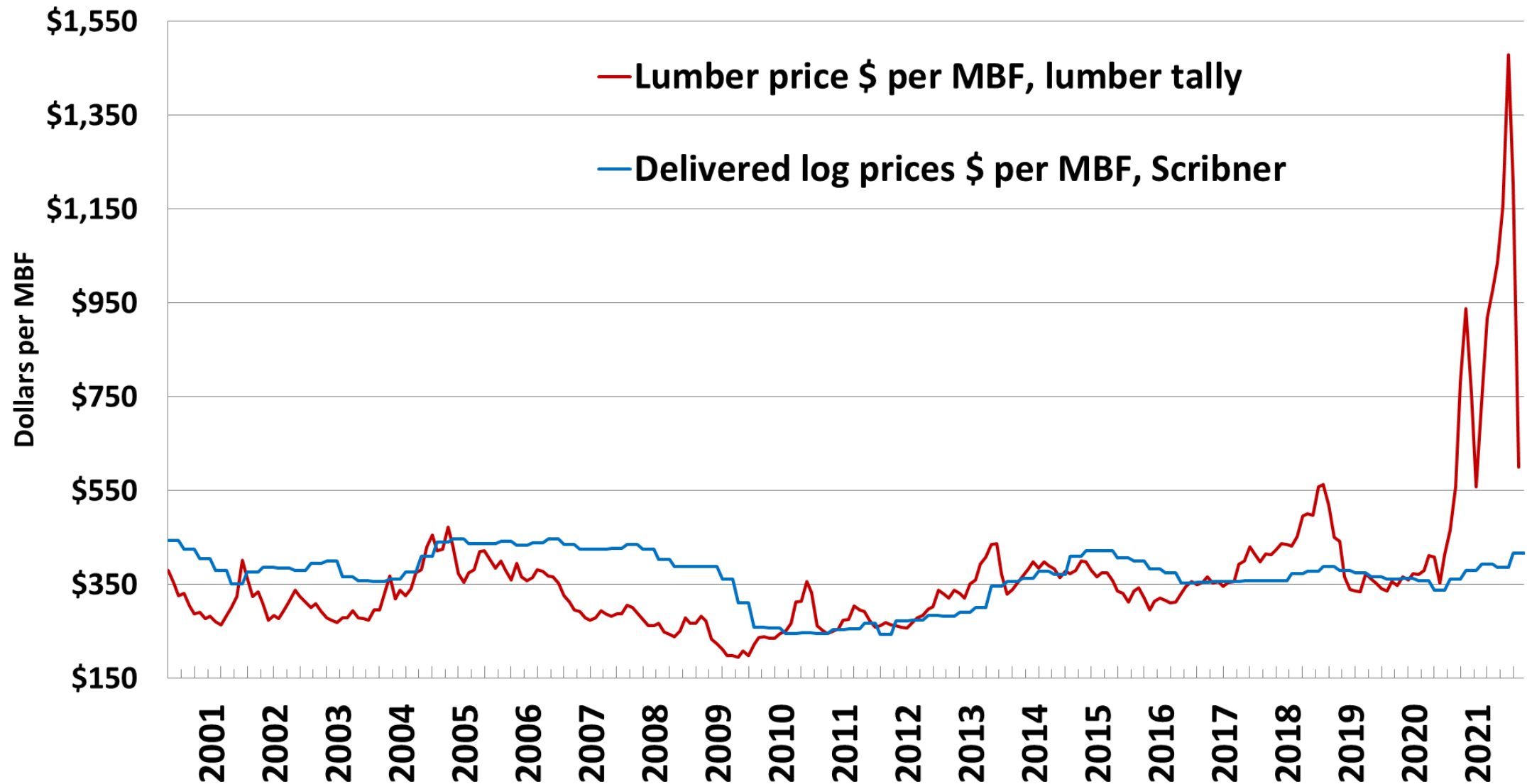


Lumber prices vs. delivered log prices 2000-2017



(Sources: Random Lengths; BBER)

Lumber prices vs. delivered log prices 2000-2021



Forest Service R-1 Timber Appraisal

Providing Timber Appraisal Equations for estimating fair market value of standing timber since January 2019.

Logging & Hauling Costs

Providing Logging & Hauling Costs to USDA Forest Service, Region 1 since 2005.

Timber Flow and Market Areas/Appraisal Zones

Used by USDA Forest Service (nationally) in regional economic analysis of timber industry impacts and to determine appraisal zones in Region 1 since 1991, and Region 4 since 2019.

Transaction Evidence Appraisal Equations

Peer reviewed in Western Journal of Applied Forestry, Canadian Journal of Forest Research, Appraisal Journal, Forest Industries



Why Estimate Logging Costs?



- To remain aware of impacts of changes and help maintain industry viability, managers and contractors must remain informed of operating costs.
- Is the current harvesting capacity adequate to meet future demand?
- Industry expressed needs:
 - Provide resource for assessing equipment types and entry costs
 - Provide equipment cost and price per unit volume data for negotiation tool/baseline guide for bidding or appraisal for extended industry



FOREST INDUSTRY
RESEARCH PROGRAM
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Logging Cost Studies

- **Machine Costing**
- **Time and Motion Studies**
- **Expert Opinion**



BBER Logging Cost Approach



(Harvest Cost Collection Approaches and Associated Equations for Restoration Treatments on National Forests; Keegan et. al, 2002. Forest Products Journal, vol. 52, no. 7/8)

Methods – Statistical Analysis of Expert Opinion Responses

- Regression analysis used to develop logging and haul cost models based on costs collected from experts
- Repeated measure design
 - Each respondent considered an observation and each scenario served as the repeated measure
- Very simple models. Tradeoff between survey complexity and development of a parsimonious model (model that accomplishes a desired level of prediction with as few predictor variables as possible).

Estimating Harvesting Costs

Introduction

The Bureau of Business and Economic Research at the University of Montana-Missoula is conducting an ongoing logging cost study to characterize Montana timber harvest costs.

Objectives

This study characterizes Montana timber harvest costs by:

- Updating stump-to-loaded truck cost estimates for several timber harvest systems using expert opinion derived costs
- Quantifying costs for increases or decreases in fuel, labor, insurance, parts and other cost factors affecting harvest to a 2019 cost basis
- Quantifying the effects of tree size and skidding, yarding, distances with a constant harvest volume per acre

Methods

2019 was the sixth time since 2009 the survey was mailed to over 400 independent logging contractors and timber harvesting companies in Montana and Idaho asking for cost estimates for several timber harvest systems. Contractors responding to the survey were offered continuing education credits through the Montana Logging Association and Idaho Associated Logging Contractors. Three scenarios; whole tree ground based (figure 1), whole tree cable/skyline based (figure 2), cut to length in woods processed (figure 3) were presented.

The Survey participants were presented with a silvicultural/harvest prescription and asked to prepare a cost estimate or bid for each scenario (Table 1)

Table 1. Variables used to determine costs included:

Average skidding distance	600 feet
Average yarding distance	800 feet
Average Forwarding distance	1000 feet
Average DBH removed	13 inches
Trees per acre removed	42 (partial cut)
Cubic foot volume of average tree	24
Volume removed per acre	1,000 ft ³ (30 green tons)
Overall harvest acres treated	40-80 acres

Literature Cited:

Keegan, C.E., and J. Halbrook. Harvest Cost, Employment and Labor Income Estimates for Montana's Forest Products Industry. 2006. Missoula, MT: The University of Montana, Bureau of Business and Economic Research.
Keegan, C.E., M.J. Niccolucci, C.E. Fiedler, I.G. Jones and R.W. Regel. 2002. Harvest Costs Collection Approaches and Associated Equations For Restoration Treatments On National Forests. Forest Prod. J. 52(7/8):96-99.

Figure 1. Ground Based System

All costs in 2019 dollars

	\$/Green Ton						\$/MBF	
	2009	2011	2013	2015	2017	2019	2017	2019
Feller-buncher	\$8.41	\$7.85	\$7.74	\$8.42	\$8.57	\$7.90	\$53.15	\$48.98
Skidding 600'	\$6.62	\$5.94	\$6.16	\$6.94	\$6.86	\$6.74	\$42.52	\$41.79
Skidding 1,200'	\$8.57	\$7.40	\$7.73	\$8.71	\$8.67	\$8.74	\$53.73	\$54.19
Skidding 1,800'	\$10.62	\$8.87	\$9.41	\$11.28	\$10.94	\$11.15	\$67.84	\$69.13
Processing	\$8.06	\$7.41	\$7.50	\$8.16	\$8.27	\$8.14	\$51.29	\$50.47
Loading	\$3.80	\$3.85	\$3.79	\$3.57	\$3.63	\$3.89	\$22.49	\$24.12
Administration	\$1.66	\$1.39	\$1.89	\$1.88	\$2.06	\$2.45	\$12.76	\$15.19
Total	\$28.56	\$26.44	\$27.08	\$28.98	\$29.39	\$29.12	\$182.21	\$180.54






Figure 2. Cable System



	\$/Green Ton						\$/MBF	
	2009	2011	2013	2015	2017	2019	2017	2019
Hand-Felling	\$5.77	\$5.40	\$4.97	\$4.80	\$5.32	\$5.59	\$32.99	\$34.66
Yarding 800'	\$25.79	\$24.96	\$22.28	\$23.42	\$23.33	\$21.79	\$144.64	\$135.10
Yarding 1,600'	\$30.65	\$30.76	\$24.56	\$27.08	\$28.12	\$26.43	\$174.35	\$163.87
Yarding 2,000'	\$35.28	\$33.49	\$26.02	\$30.04	\$30.46	\$29.17	\$188.84	\$180.85
Processing	\$8.15	\$7.56	\$7.39	\$8.32	\$8.51	\$9.00	\$52.77	\$55.80
Loading	\$3.79	\$3.73	\$3.66	\$3.85	\$3.95	\$5.27	\$24.48	\$32.67
Administration	\$2.11	\$1.84	\$1.81	\$1.78	\$1.81	\$2.85	\$11.21	\$17.67
Total	\$45.62	\$43.48	\$40.11	\$42.17	\$42.92	\$44.50	\$266.09	\$275.90

Figure 3. Cut-to-length System

	\$/Green Ton						\$/MBF	
	2009	2011	2013	2015*	2017*	2019	2017	2019
Harvester	\$15.73	\$13.47	\$15.72	\$16.70	\$16.50	\$16.56	\$102.31	\$102.67
Forwarding 1,000'	\$10.96	\$9.26	\$10.31	\$11.52	\$13.17	\$13.01	\$81.65	\$80.66
Forwarding 2,000'	\$16.05	\$11.88	\$15.94	\$13.55	\$15.34	\$14.50	\$95.10	\$89.90
Forwarding 3,000'	\$19.73	\$15.85	\$18.69	\$17.30	\$19.27	\$17.00	\$119.45	\$105.40
Loading	\$4.13	\$3.83	\$4.29	\$4.22	\$4.21	\$4.61	\$26.09	\$28.58
Administration	\$1.77	\$1.45	\$2.09	\$1.82	\$1.92	\$2.68	\$11.92	\$16.62
Total	\$32.58	\$28.01	\$32.41	\$34.26	\$35.80	\$36.86	\$221.86	\$228.53



All costs in 2019 dollars

* 2015 and 2017 CTL costs are calculated since no surveys were returned

RESULTS

• 2019 reported stump to loaded truck costs ranged from \$29.12 per green ton for ground based systems employing whole tree skidding to \$36.86 for cut to length and \$44.50 for cable systems based on Table 1 harvest characteristics.

• Results indicate that smaller-diameter trees and longer skidding/yarding distances tend to increase costs and that cable systems are more expensive than ground-based systems.

• 2019 reported logging costs were typically higher than 2017 but lower than some previous survey years based costs, despite higher fuel and other operating costs.

• Lower harvesting costs are due primarily to attempts by loggers to continue operating in a competitive economic market. With improving delivered log prices some increases in logging cost are expected.

• Loggers felt "The 2009/2011 rates are not sustainable and contractors were bidding to maintain a viable core business & crew at minimal profit levels."

• Because of the survey's simplicity and repeatability, results can be compared with previous (Keegan et al. 1995, 2002) and future cost surveys to examine the impacts through time of changing fuel costs, harvest characteristics, or other items of interest.

SURVEY RESPONSE COMMENTS

• "... our costs are way up; payroll and health insurance for our employees, fuel and repairs are taking all what we make; can't log for any less.

• Overall rates/costs are too low, especially with the cost of fuel and parts going up.

• Changes in fuel costs affect logging costs directly, 10% change in fuel = 2.5% change in logging costs.

• Sometimes there are a number of overlooked conditions that have more effect on expenses vs. production than the obvious ones of TPA/diameter/distance.

• Every job is so different that giving you our cost would be a wild guess.

• There are very few equipment operators left that can do the job right and that care about what they do. So with the cost of fuel, parts, labor, insurance and work comp you barely break even at the current logging prices. If you add in a new equipment payment you would go broke.

• Political policy and federal regulation has sent this industry into a deliberate yet totally unnecessary tailspin-shame-shame-shame!





Conventional Truck: cost/delivered ton

One-way Haul Miles	30	50	70	110	160	250
Diesel Cost						
\$1.80/gal	\$6.74	\$8.88	\$11.29	\$14.62	\$19.80	\$29.94
Decrease	-6%	-8%	-9%	-10%	-11%	-11%
\$3.00/ gal	\$7.20	\$9.65	\$12.36	\$16.31	\$22.25	\$33.76
\$4.00/gal	\$7.58	\$10.28	\$13.25	\$17.71	\$24.30	\$36.95
Increase	5%	7%	7%	9%	9%	14%

Residual Value (RV) Appraisal



	<u>\$ / MBF</u>
REVENUES	
Delivered Log Price	\$ 419.30
COSTS	
Stump to Mill Costs	
Stump-to-Loaded Truck Costs	\$ 250.60
Haul Costs	\$ 47.48
<u>Other Timber Sale Costs</u>	
Road Maintenance Costs	\$ 10.10
Brush Disposal Costs	\$ 25.18
Temporary Development (Roads) Costs	\$ -
Specified Road Costs	\$ 39.88
Non-sawtimber Adjustment	\$ -
Total Private and Forest Service Costs	\$ 373.24
ESTIMATED STUMPAGE VALUE (REVENUE - COSTS)	\$ 46.06
Minimum Rate or Required Reforestation	\$ 24.26
BREAKEVEN POINT	\$ 397.50

**Example sale:
Kootenai NF**

**Use of delivered
log prices & costs
to estimate fair-
market value of
standing timber**



MODEL RUN 6 TE EQ 21-2

VARIABLE NAME	ID	SALE QUANTITY	REGIONAL AVERAGE	DIFFERENCE	COEFFICIENT	DOLLAR
Actual Past Average Value	--					\$ 82.40
WWPA Lumber Price (\$ / MBF)	WWPA	361.350	491.15	-129.803	0.1186	\$ (15.39)
Stump to Loaded Truck Cost (\$ / Ton)	STPTR	24.860	30.96	-6.101	-1.4547	\$ 8.87
Haul Cost (\$ / Ton)	HAUL	7.970	12.64	-4.669	-1.7100	\$ 7.98
Average Total Defect (Percent)	ADEF	17.690	14.77	2.920	-0.4639	\$ (1.35)
Number of Bidders (#)	BIDDER_NUM	2.25	2.25	0.000	9.3189	\$ (0.00)
Market Area (EAST MT)	EAST_MT					
Market Area (WEST MT)	WEST_MT					
Market Area (MT)	MT	0.000	0.64	-0.640	0.0000	\$ -
Market Area (N ID)	N_ID	0.000	0.17	-0.170	21.9572	\$ (3.73)
Market Area (S ID)	S_ID	1.000	0.19	0.811	53.2124	\$ 43.16
Market Area (ID)						
Predicted Gross Value						\$ 121.93
Nonsawtimber Adjustment						\$ -
Road Maintenance Costs						\$ -
Environmental Protection Costs						\$ -
Temporary Development Costs						\$ -
Specified Road Costs						\$ -
Unusual Condition Adjustment						
Predicted High Bid (Cubic TE Equation: 21-2)						\$ 121.93
Rollback Factor (34% of Predicted High Bid)						\$ (41.46)
Advertised Rate						\$ 80.48

Sample R-1 Timber Appraisal Equation



Thank you!



Todd.Morgan@business.umt.edu

Steve.hayes@business.umt.edu

Michaelniccolucci@gmail.com

www.BBER.umt.edu/FIR



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