



**Leveraging Resources:  
Log Values vs. Treatment Costs  
MFRC Webinar  
April 17, 2013**

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Bureau of Business and Economic Research  
The University of Montana**





- **Who We Are**
- **The research and public service branch of The University of Montana School of Business Administration.**
- **Mission – serve the general public, business, labor, and government by providing an understanding of the economic environment in which Montanans live and work.**





- **What We Do**
- **State & local economic analysis**
- **Survey research**
- **Health care industry research**
- **Manufacturing industry research**
  - **Forest industry research**





## ➤ **Forest Industry Research**

**1.State-level industry analysis**

**2.Removals from inventory Resource  
Planning Act Assessment & Timber  
Products Output (RPA-TPO)**

**3.Cost of forest management activities**

**4.Other related projects**





## **Cost of Forest Management Activities**

- **Need to estimate harvest and haul costs as well as the cost of other activities and the value of products that may be produced.**
- **Limited data on logging and haul costs and very limited regarding "Smaller Timber".**





## **Time and Motion, Engineering approach to estimating costs:**

**Often accurate but expensive, time consuming, equipment and location specific, and presents difficulties incorporating indirect costs such as administrative overhead. Important if evaluating new equipment.**





- **Attempt to produce an accurate inexpensive method of estimating and updating harvest costs and haul costs in Idaho and Montana.**
- **Expert Input System- based on interviews/surveys of logging contractors, truck operators, and logging managers who were asked to prepare bids on a series of harvest operations.**





**Prescriptions were presented for terrain suitable for ground-based systems (defined as  $\leq 35$  % slope), and for steeper ground ( $> 35$  percent slope) requiring skyline systems.**

**Costs were collected for the following specific activities or centers:**

**Planning and administration, felling, skidding or yarding, limbing and bucking, loading.**





**Respondents accounted for a substantial portion of timber harvested in the region.**

## **Mathematical Models:**

- **Variables- slope, skidding/yarding distance, volume per acre removed, tree size.**

**Basis for a simplified follow up survey on logging cost.**





- **Updating Logging Costs.**
- **On a two year cycle we are updating costs by asking logging professionals to examine our cost estimates for a representative but limited number of prescriptions, and indicate how our estimates compared to theirs.**
- **Additional information on, for example, the impact of lower volume per acre removed, tree size or skidding distance.**



# Estimating Harvesting Costs

Steven W. Hayes, CF, Charles E. Keegan III and Todd A. Morgan, CF

## Introduction

For more than five years the Bureau of Business and Economic Research at the University of Montana-Missoula has been conducting an ongoing logging cost survey to characterize Montana and northern Idaho timber harvest costs.

## Objectives

This study characterizes Montana and northern Idaho 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 2011 cost basis
- Quantifying the effects of tree size and skidding or yarding distances with a constant harvest volume per acre

## Methods

A survey was mailed to over 400 independent logging contractors and timber harvesting companies in Montana and northern 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 or Idaho's Associated Logging Contractors Inc. 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 with a silvicultural/harvest prescription and participants were asked to prepare a cost estimate or bid for each scenario (Table 1).

Table 1. Variables used to determine 2011 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 <sup>3</sup> (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, J.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

	\$ / Green Ton		\$ / MBF	
	2006	2009	2011	
Feller-buncher	\$6.70	\$6.65	\$6.52	\$40
Skidding 600'	\$4.80	\$5.37	\$4.92	\$31
Skidding 1,200'	N/A	\$7.29	\$6.07	\$38
Skidding 1,800'	N/A	\$9.18	\$7.19	\$45
Processing	\$6.30	\$6.39	\$6.06	\$38
Loading	\$3.60	\$3.20	\$3.40	\$21
Administration	\$1.30	\$1.34	\$1.29	\$8
Total	\$22.70	\$22.87	\$22.18	\$138



Figure 2. Cable System

	\$ / Green Ton		\$ / MBF	
	2006	2009	2011	
Hand-Felling	\$4.30	\$4.72	\$4.59	\$29
Yarding 800'	\$20.80	\$21.08	\$21.90	\$136
Yarding 1,600'	N/A	\$25.81	\$27.03	\$168
Yarding 2,000'	N/A	\$30.14	\$30.87	\$191
Processing	\$6.20	\$6.68	\$6.45	\$40
Loading	\$3.10	\$3.33	\$3.28	\$20
Administration	\$1.80	\$1.79	\$1.60	\$10
Total	\$36.20	\$37.60	\$37.81	\$235

Figure 3. Cut-to-length System

	\$ / Green Ton		\$ / MBF	
	2006	2009	2011	
Harvester	\$13.00	\$13.25	\$12.26	\$78
Forwarding 1,000'	\$9.48	\$9.61	\$8.67	\$54
Forwarding 2,000'	N/A	\$14.40	\$11.01	\$68
Forwarding 3,000'	N/A	\$17.81	\$14.69	\$91
Loading	\$3.50	\$3.50	\$3.60	\$22
Administration	\$1.50	\$1.50	\$1.28	\$8
Total	\$27.48	\$27.86	\$25.81	\$162



## RESULTS

- 2011 reported stump to loaded truck costs ranged from \$22 per green ton for ground based systems employing whole tree skidding to nearly \$26 for cut to length and \$38 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 generally more expensive than ground-based systems.

- 2011 reported logging costs were lower than previous survey based costs despite higher fuel costs.

- Lower harvesting costs are due primarily to attempts by loggers to continue operating in poor economic conditions.

- Loggers feel "The 2009/2011 rates are not sustainable and contractors are 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

- "... more down time from running older equipment. Depressed log values and high competition for work is forcing lower pay, does not adequately save for equipment upgrades, finding skilled operators a major concern. Need market recovery soon!

- 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.

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

- We have been operating without profit margins and are not able to attract the quality of employee we need with the wages, benefits and work security that we offer. We are trying to fill the slots with less qualified men to run our more advanced-computerized machines.





# Ground Based System

	\$/Green Ton			\$/MBF
	2006	2009	2011	
Feller-buncher	\$6.70	\$6.65	\$6.52	\$40
Skidding 600'	\$4.80	\$5.37	\$4.92	\$31
Skidding 1,200'		\$7.29	\$6.07	\$38
Skidding 1,800'		\$9.18	\$7.19	\$45
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Loading	\$3.60	\$3.20	\$3.40	\$21
Administration	\$1.30	\$1.34	\$1.29	\$8
Total	\$22.70	\$22.87	\$22.18	\$138





# Cable System

	\$ /Green Ton			\$ /MBF
	2006	2009	2011	
Hand-Felling	\$4.30	\$4.72	\$4.59	\$29
Yarding 800'	\$20.80	\$21.08	\$21.90	\$136
Yarding 1,600'		\$25.81	\$27.03	\$168
Yarding 2,000'		\$30.14	\$30.87	\$191
Processing	\$6.20	\$6.68	\$6.45	\$40
Loading	\$3.10	\$3.33	\$3.28	\$20
Administration	\$1.80	\$1.79	\$1.60	\$10
Total	\$36.20	\$37.60	\$37.81	\$235





# Cut-to-length System

	\$ /Green Ton			\$ /MBF
	2006	2009	2011	
Harvester	\$13.00	\$13.25	\$12.26	\$78
Forwarding 1,000'	\$9.48	\$9.61	\$8.67	\$54
Forwarding 2,000'		\$14.40	\$11.01	\$68
Forwarding 3,000'		\$17.81	\$14.69	\$91
Loading	\$3.50	\$3.50	\$3.60	\$22
Administration	\$1.50	\$1.50	\$1.28	\$8
Total	\$27.48	\$27.86	\$25.81	\$162





# Helicopter

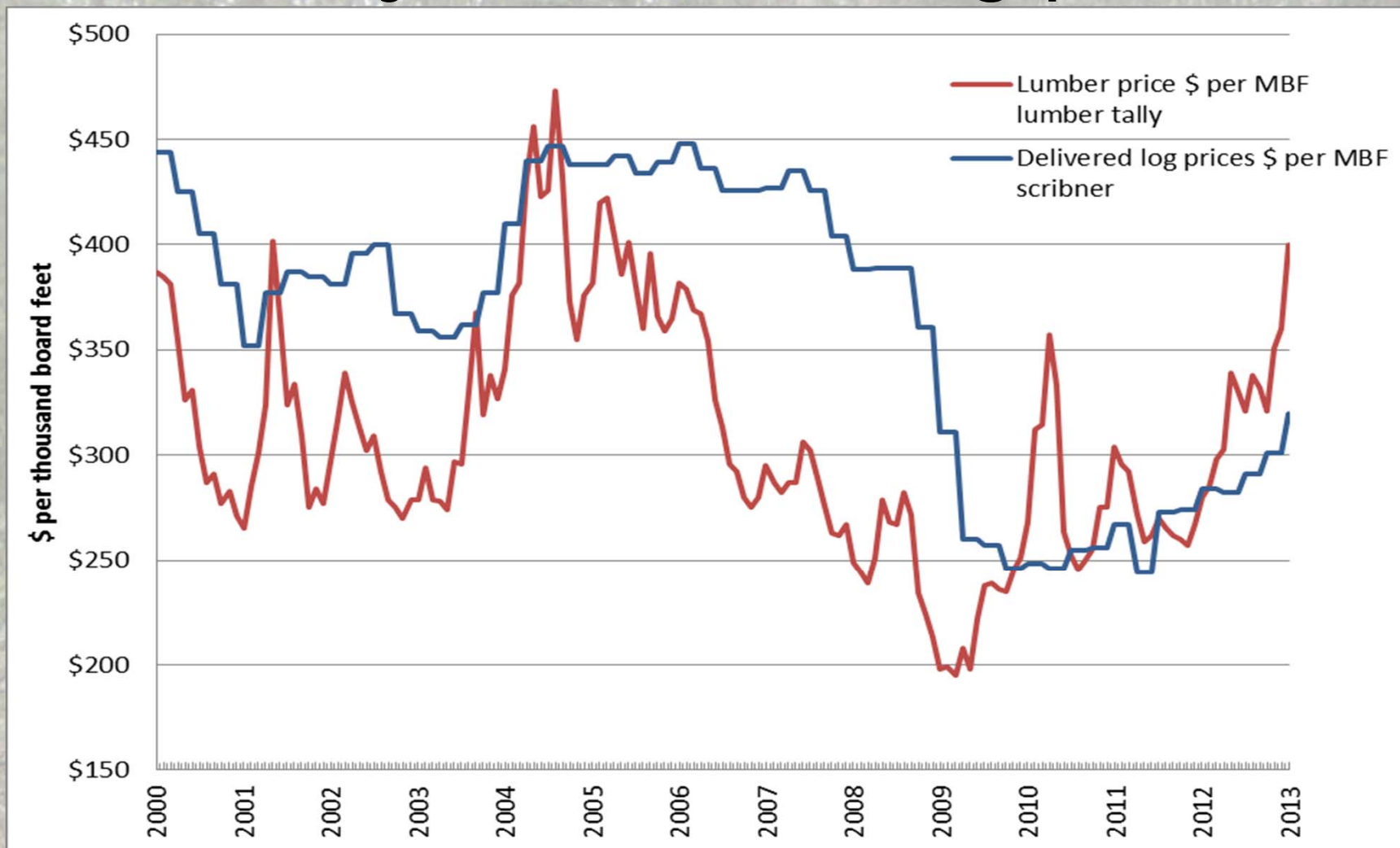


	\$/Green Ton		\$/MBF
	2006	2009*	
Hand-Felling	\$ 10.00	\$12.00	\$ 74
Flying 1,000'	\$ 50.00	\$48.00	\$ 298
Flying 2,000'		\$53.00	\$ 329
Flying 3,000'		\$58.00	\$ 360
Loading	\$ 3.50	\$5.50	\$ 34
Administration	\$ 5.00	\$3.00	\$ 19
Total	\$ 68.50	\$68.50	\$ 425





# Quarterly Lumber vs. log prices



Source: Random Lengths, BBER



**MONTANA SAWLOG AND VENEER LOG PRICE REPORT**

**BASED ON A SURVEY OF MILLS**

Price information is average price per thousand board feet (MBF),  
Scribner Decimal C log rule, delivered to the mill site.

SAWLOGS	WESTERN MONTANA		% Change
	1st QTR 2012	1st QTR 2013	
<b>Ponderosa Pine</b>			
yellow	\$328	\$368	12%
bull	\$300	\$338	13%
<b>Lodgepole Pine</b>	\$303	\$358	18%
<b>Douglas Fir</b>	\$285	\$358	25%
<b>Western Larch</b>	\$285	\$349	22%
<b>Engleman Spruce</b>	\$303	\$363	20%
<b>Subalpine Fir</b>	\$256	\$325	27%
<b>Grand Fir</b>	\$264	\$329	25%
<b>Western Red Cedar</b>	\$225	\$250	11%
<b>Hemlock</b>	\$285	\$310	9%
<b>White Pine</b>	\$288	\$344	19%
<b>VENEER LOGS</b>			
Douglas Fir	\$375	\$425	13%
Western Larch	\$375	\$425	13%
<b>AVERAGE 2011 LOGGING COST \$\$/MBF</b>			
Ground Based		\$138	
Cable		\$235	
CTL		\$162	
Helicopter		\$425	





## **Estimated Log Hauling Costs for Idaho and Montana**

- The goal of this project is to develop better estimates of log hauling costs and to get a better understanding of key variables and factors impacting log hauling costs.**





## Log Hauling Costs

- Following an engineering/cost analysis and discussion with individuals in the trucking and logging industry, researchers developed questionnaires to be administered to truckers and to entities contracting with truckers hauling logs.
- Operators responded to estimated costs developed for hauls of various lengths on paved and gravel roads. If the respondents' costs differed from BBER costs they were asked to supply their own cost estimates of operations.





## Haul Cost

A single cost per mile, for a range of haul distances, is not sufficient to estimate haul costs; in estimating costs it is necessary to account for loading and unloading (and other delays).

- Cost per day of operating a logging truck ranged from \$790 to \$880 given a 70 mile one way haul, \$3 diesel .
- At \$4 diesel the range increases to \$845 to \$945.





# Conventional Truck: cost/delivered ton

One-way Haul Miles	30	50	70	110	160	250
Diesel Cost						
\$3.00/ gal	\$6.89	\$8.95	\$11.14	\$15.12	\$20.47	\$27.64
\$4.00/gal	\$7.58	\$10.28	\$13.25	\$17.71	\$24.30	\$36.95
Increase	10%	15%	19%	17%	19%	34%





# Conventional Truck: cost/mile

One-way Haul Miles	30	50	70	110	160	250
Diesel Cost						
\$3.00/gal	\$0.23	\$0.18	\$0.16	\$0.14	\$0.13	\$0.11
\$4.00/gal	\$0.25	\$0.21	\$0.19	\$0.16	\$0.15	\$0.15
Increase	9%	17%	19%	14%	15%	36%





# Sawlog Harvest

Logging System	Average Logging Cost \$/MBF	Average Hauling Cost \$/MBF	Total Delivered Cost \$/MBF	Average Delivered Log payment \$/MBF	Estimated Payment to Landowner \$/MBF
Ground Based	\$138	\$110	\$248	\$344	\$96
Cable	\$235	\$110	\$345	\$344	<b>(-\$1)</b>
CTL	\$162	\$110	\$272	\$344	\$72
Helicopter	\$425	\$110	\$535	\$344	<b>(-\$179)</b>





# Pulp and Biomass Harvest

Value \$/ton		Diesel cost \$3.00 Gal			Diesel cost \$4.00 Gal		
	\$29.00						
Logging Cost \$/ton	Haul Distance	30	50	110	30	50	110
\$15	Haul cost	\$6.89	\$8.95	\$15.12	\$7.58	\$10.28	\$17.71
	Total cost	\$21.89	\$23.95	\$30.12	\$22.58	\$25.28	\$32.71
	Revenue	\$7.11	\$5.05	(\$1.12)	\$6.42	\$3.72	(\$3.71)
\$18	Haul cost	\$6.89	\$8.95	\$15.12	\$7.58	\$10.28	\$17.71
	Total cost	\$24.89	\$26.95	\$33.12	\$25.58	\$28.28	\$35.71
	Revenue	\$4.11	\$2.05	(\$4.12)	\$3.42	\$0.72	(\$6.71)
\$20	Haul cost	\$6.89	\$8.95	\$15.12	\$7.58	\$10.28	\$17.71
	Total cost	\$26.89	\$28.95	\$35.12	\$27.58	\$30.28	\$37.71
	Revenue	\$2.11	\$0.05	(\$6.12)	\$1.42	(\$1.28)	(\$8.71)





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