



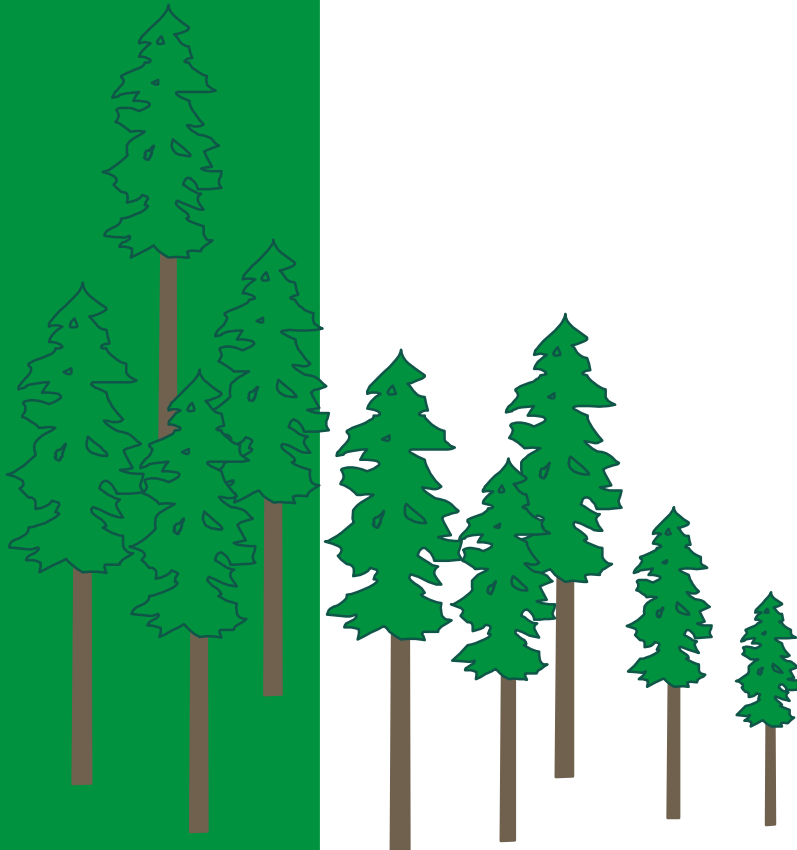
**BRITISH
COLUMBIA**

Ministry of Forests
and Range

COAST

MARKET PRICING SYSTEM

Update - 2009



January 15, 2009



Revenue
Branch

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1. INTRODUCTION

The purpose of this paper is to provide an overview of the January 15, 2009 update to the Coast Market Pricing System (MPS).¹

2. AUCTION DATASET

The auction dataset used in the update contains winning bids and data from 285 sales over the 5 year period January 1, 2004 through December 31, 2008.

3. EQUATIONS

With the new auction dataset, the 2007 equations were re-estimated using the new dataset. No other changes were made.

The results are the benchmark equations, on the following pages.

¹ This paper is not intended to provide the basis for calculating stumpage rates nor should it be used as guidance for interpreting the legal policies and procedures for calculating stumpage rates, which are contained in the *Coast Appraisal Manual*. The *Coast Appraisal Manual* contains the policies and procedures referred to in Section 105 of the *Forest Act*.

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Winning Bid Equation – 2007 and Benchmark

	2007 Equation		Benchmark	
Dependant Variable	Real Winning Bid		Real Winning Bid	
Explanatory Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	16.52	3.03	11.53	2.21
Hemba	-13.01	-3.95	-9.60	-3.45
3-Month Average Log Selling Price	0.569	11.85	0.708	11.52
Old Growth Hemba	-9.93	-3.16	-8.60	-3.16
Conventional Slope	-0.136	-3.09	-0.190	-4.22
Helicopter Logging	-33.52	-10.50	-37.03	-12.79
LN (Volume per Hectare/1000)	10.62	5.18	10.91	4.53
LN (Number of Bidders)	8.49	9.27	6.81	9.53
Distance to Gambier	-0.00608	-1.69	-0.00602	-1.66
2003 Auctions	0.172	0.10	N/A	N/A
2004 Auctions	1.40	0.76	N/A	N/A
2005 Auctions	-2.81	-1.42	-3.96	-2.82
2006 Auctions	-4.29	-2.10	-5.07	-3.53
2007 Auctions	N/A	N/A	0.00311	0.002
2008 Auctions	N/A	N/A	-7.25	-4.75
Location	-0.0592	-4.63	-0.0745	-5.77
LN (Piece Size)	5.031	2.64	3.72	1.74
Number of Observations	280		285	
Adjusted R²	0.811		.806	

Note: LN means natural logarithm

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Number of Bidders Equation – 2007 and Benchmark

	2007 Equation		Benchmark Equation	
Dependant Variable	LN (Number of Bidders)		LN (Number of Bidders)	
Explanatory Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.279	-1.58	-0.829	-3.12
LN (Volume/1000)	0.218	4.94	0.185	3.18
Conventional Slope	-0.00792	-4.63	-0.00593	-2.78
2 nd Growth Fir	0.259	3.47	-0.116	-1.06
Predicted Bid	0.0203	11.03	0.0235	9.37
2003 Auctions	-0.220	-3.39	N/A	N/A
2004 Auctions	-0.272	-3.91	N/A	N/A
2005 Auctions	-0.561	-5.79	-0.190	-1.69
2006 Auctions	-0.282	-3.37	0.0946	1.04
2007 Auctions	N/A	N/A	-0.201	-2.02
2008 Auctions	N/A	N/A	-0.282	-2.57
2 nd Quarter Auctions	0.164	2.33	-0.0217	-0.28
1 st Quarter Auctions	0.212	3.72	0.0318	0.42
District Average Number of Bidders	0.114	4.746	0.227	7.25
Number of Observations	280		285	
Adjusted R²	0.596		0.439	

Note: LN means natural logarithm.

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New variables were tested to see if they would improve the statistics, compared to the benchmark equations. Likewise, variables that were no longer significant were removed. See appendix 1 for detailed statistics and definitions.

The final equations, compared to the Benchmark Equations, are shown below.

Winning Bid – Benchmark and Final

Dependant Variable	Benchmark		Final Equation	
	Real Winning Bid		Real Winning Bid	
Explanatory Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	11.53	2.21	-4.47	-0.85
Hembal	-9.60	-3.45	-9.72	-3.88
3-Month Average Log Selling Price	0.708	11.52	0.789	15.19
Old Growth Hembal	-8.60	-3.16	N/A	N/A
Conventional Slope	-0.190	-4.22	-0.138	-3.30
Helicopter Logging	-37.03	-12.79	-33.29	-12.31
LN (Volume per Hectare/1000)	10.91	4.53	10.38	5.67
LN (Number of Bidders)	6.81	9.53	N/A	N/A
Number of Bidders	N/A	N/A	1.87	9.80
Distance to Gambier	-0.00602	-1.66	-0.00572	-1.69
2005 Auctions	-3.96	-2.82	-2.97	-2.18
2006 Auctions	-5.07	-3.53	-3.60	-2.68
2007 Auctions	0.00311	0.002	0.182	0.107
2008 Auctions	-7.25	-4.75	-7.30	-4.94
Location	-0.0745	-5.77	-0.0579	-4.75
LN (Piece Size)	3.72	1.74	N/A	N/A
LN (Piece Size) * Old Growth	N/A	N/A	4.39	2.14
Second Growth	N/A	N/A	6.12	3.72
Number of Observations	285		285	
Adjusted R²	.806		0.832	

Note: LN means natural logarithm

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Number of Bidders Equation – Benchmark and Final

Dependant Variable	Benchmark		Final Equation	
	LN (Number of Bidders)		Number of Bidders	
Explanatory Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.829	-3.12	-3.94	-4.05
LN (Volume/1000)	0.185	3.18	0.760	3.56
Conventional Slope	-0.00593	-2.78	-0.0225	-2.94
2 nd Growth Fir	-0.116	-1.06	-0.584	-1.40
Predicted Bid	0.0235	9.37	0.0989	10.05
2005 Auctions	-0.190	-1.69	-0.572	-1.31
2006 Auctions	0.0946	1.04	0.185	0.51
2007 Auctions	-0.201	-2.02	-1.11	-2.82
2008 Auctions	-0.282	-2.57	-0.714	-1.74
2 nd Quarter Auctions	-0.0217	-0.28	N/A	N/A
1 st Quarter Auctions	0.0318	0.42	N/A	N/A
District Average Number of Bidders	0.227	7.25	0.864	7.31
Isolated	N/A	N/A	-0.376	-1.24
Number of Observations	285		285	
Adjusted R ²	0.439		0.480	

Note: LN means natural logarithm

For both equations, the statistical accuracy and reliability was improved.

To implement the new equations in the *Coast Appraisal Manual*, the two equations are reduced to one equation. This is done by substituting the Number of Bidders equation into the Winning Bid Equation (and thereby eliminating the variable: Number of Bidders).

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4. SPECIFIED OPERATIONS

The auction dataset used to develop MPS is comprised of 285 auctions. There are some harvesting situations that are not represented in the auction dataset (for example, helicopter single standing stem selection) and therefore, a specified operation cost estimate is used in the calculation of stumpage rates. See Appendix 2 for definitions of each specified operation.

The specified operations are shown below.

Specified Operations	June 2007 Update	2009 Update
Skyline Logging	Same formula	Same formula
Inland Water Log Transportation	\$4.41/m ³	\$4.41/m ³
Tree Crown Modification	\$53.50/tree (old growth)	\$53.50/tree (old growth)
	\$36.38/tree (2 nd growth)	\$36.38/tree (2 nd growth)
Clayoquot Sound Operating Costs	\$6.11/m ³	\$6.11/m ³
Helicopter Single Standing Stem Selection	\$37.78/m ³	\$37.78/m ³
De-stumping for Root Disease Control	\$1,114/ha	\$1,114/ha
Ecosystem Based Management ²	\$2.75/m ³	\$2.75/m ³

² Introduced June 2008.

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5. TENURE OBLIGATION ADJUSTMENTS

As outlined in the Coast Tenure Obligations Adjustment paper (dated January 15, 2009), the adjustments are based on cost surveys.

The tenure obligation adjustments are shown below.

Tenure Operations	June 2007 Update	2009 Update
Forest Planning & Administration Cost	\$9.43	\$10.63
Low Volume Cost	\$7.51	\$7.51
Road Development Cost	Appraisal Manual *	Appraisal Manual *
Road Management Cost	\$1.34	\$2.13
Road Use Charges	Approved actuals	Approved actuals
Basic Silviculture Cost	\$1.85-\$5.21 (based on district)	\$2.50-\$8.79 (based on district)
BCTS Infrastructure	Identified for future implementation	\$0.57
Low Grade Adjustment	1/ (1-% low grade)	1/ (1-% low grade)
Return to Forest Management	1.075	1.073

6. SUMMARY

The new equations, specified operations and tenure obligation adjustments will be used to calculate stumpage rates on the Coast, starting January 15, 2009.

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APPENDIX 1 FINAL ESTIMATED WINNING BID

Dependent Variable: Real Winning Bid
 Method: Least Squares
 Date: 01/07/09 Time: 12:26
 Sample: Jan 04 – Dec 08
 Included observations: 285
 White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std Error	t-Statistic	Prob.
Constant	-4.465925	5.277494	-0.846221	0.3982
Hembal	-9.720090	2.505653	-3.879264	0.0001
3 Month Average Log Selling Price	0.788817	0.051942	15.18651	0.0000
Conventional Slope	-0.137692	0.041783	-3.295417	0.0011
Helicopter Logging	-33.29112	2.704899	-12.30771	0.0000
LN (Volume per Hectare/1000)	10.37716	1.831263	5.666671	0.0000
Number of Bidders	1.867788	0.190528	9.803240	0.0000
Distance to Gambier	-0.005716	0.003384	-1.688985	0.0924
2005 Auctions	-2.974993	1.363782	-2.181429	0.0300
2006 Auctions	-3.602480	1.345275	-2.677876	0.0079
2007 Auctions	0.181653	1.690784	0.107437	0.9145
2008 Auctions	-7.302649	1.479482	-4.935951	0.0000
Location	-0.057941	0.012210	-4.745557	0.0000
LN (PIECE_SIZE)* Old Growth	4.389866	2.055909	2.135243	0.0336
Second Growth	6.118586	1.643448	3.723018	0.0002
R-squared	0.840348	Mean dependent var		34.18484
Adjusted R-squared	0.832070	S.D. dependent var		17.29716
S.E. of regression	7.088246	Akaike info criterion		6.805949
Sum squared resid	13565.67	Schwarz criterion		6.998185
Log likelihood	-954.8477	F-statistic		101.5130
Durbin-Watson stat	1.945534	Prob(F-statistic)		0.000000

Note: LN means logarithm

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FINAL NUMBER OF BIDDERS

Dependent Variable: Number of Bidders

Method: Least Squares

Date: 01/07/09 Time: 12:43

Sample: Jan 04 to Dec 08

Included observations: 285

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std Error	t-Statistic	Prob.
Constant	-3.937296	0.971083	-4.054543	0.0001
LN (Volume/1000)	0.760137	0.213538	3.559727	0.0004
Conventional Slope	-0.022514	0.007648	-2.943670	0.0035
2 nd Growth Fir	-0.583878	0.418385	-1.395552	0.1640
Predicted bid	0.098920	0.009839	10.05426	0.0000
2005 Auctions	-0.571857	0.435892	-1.311924	0.1906
2006 Auctions	0.185399	0.362573	0.511343	0.6095
2007 Auctions	-1.109190	0.393288	-2.820300	0.0051
2008 Auctions	-0.713840	0.409696	-1.742363	0.0826
District Average Number of bidders	0.864128	0.118225	7.309165	0.0000
Isolated	-0.376016	0.302177	-1.244355	0.2144
R-squared	0.498131	Mean dependent var		4.396491
Adjusted R-squared	0.479815	S.D. dependent var		2.667090
S.E. of regression	1.923608	Akaike info criterion		4.184114
Sum squared resid	1013.873	Schwarz criterion		4.325087
Log likelihood	-585.2362	F-statistic		27.19596
Durbin-Watson stat	2.000848	Prob(F-statistic)		0.000000

Note: LN means logarithm

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VARIABLES AND DEFINITIONS

PREDICTED BID	Used in the Number of Bidders equation: The estimated winning bid for the cutting authority from the corresponding winning bid equation, expressed in $\$/m^3$.
3 MONTH AVERAGE LOG SELLING PRICE	Average coniferous log selling price estimate expressed in $\$/m^3$. This is based upon a consideration of log grades and species for the cutting authority area, and schedules of log market values collected and published by the Revenue Branch.
2 ND GROWTH FIR	If selling price zone in the appraisal data submission is 52, then 2 nd GROWTH FIR is the fraction of the coniferous cruise volume that is Douglas-fir. If the selling price zone is not 52, then 2 nd GROWTH FIR = 0. 2 nd GROWTH FIR is in decimal form, rounded to 2 decimal places.
HEMBAL	The fraction of the coniferous cruise volume that is hemlock and balsam. HEMBAL is in decimal form, rounded to 2 decimal places.
CONVENTIONAL SLOPE	The average side slope percentage for that part of the cutting authority area that will not be helicopter yarded.
VOLUME PER HECTARE	Cruised volume of coniferous timber per hectare. Expressed in m^3/ha and is rounded to 2 decimal places.
PIECE SIZE	The net coniferous cruised volume per 10 m log expressed in m^3 . PIECESIZE is expressed in m^3 and is rounded to 2 decimal places.
HELICOPTER LOGGING	The fraction of the total net cruise volume, including deciduous volume, of timber in a cutting authority area that must be helicopter yarded or yarded by skyline where logs are fully suspended more than 600 m in a straight line to the centre of the closest possible landing. This is calculated by dividing the total volume of timber that must be helicopter yarded or skyline yarded over 600 m by the total net cruise volume of the cutting authority area. HELI is in decimal form, rounded to 2 decimal places.
DISTANCE TO GAMBIER	POA distance is the average straight line distance, weighed by net cruise volume, between the geographic centre of each cutblock in the cutting authority area and Gambier Island.

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	GAMBIST is measured and rounded to the nearest kilometre. The Gambier Island co-ordinate is 49° 29' 09" and 123° 26' 44" W.
DISTRICT AVERAGE NUMBER OF BIDDERS	The average number of bidders for the forest district the cutting authority area is located within is listed in Table 4-2.
2005 AUCTIONS	If auction sold in 2005, then 2005 Auctions = 1
2006 AUCTIONS	If auction sold in 2006, then 2006 Auctions = 1
2007 AUCTIONS	If auction sold in 2007, then 2007 Auctions = 1
2008 AUCTIONS	If auction sold in 2008, then 2008 Auctions = 1
VOLUME	That part of the total net cruise volume in the cutting authority area that is coniferous timber except that where the cutting authority is a timber licence or is issued under a licence with an AAC greater than 10 000 m ³ , then VOL = 22 158. VOL is expressed in m ³ , rounded to the nearest whole number.
CPIF	The BC Consumer Price Index (P110000) approved by the director for use on the effective date of the appraisal, reappraisal or quarterly adjustment, divided by the base CPI of 109.3.
LOCATION	The net cruise volume weighted average straight line distance measured in kilometres between the geographic centre of each part of a cutting authority area and the nearest support centre that is closest to that part of the cutting authority area.
ISOLATED	Isolated = 1, if all parts of the cutting authority area are accessible by air or water only and is not serviced by public ferry service.
OLD GROWTH	If selling price zone in the appraisal data submission is not 52, then OLD GROWTH = 1, otherwise OLD GROWTH = 0.
SECOND GROWTH	If selling price zone in the appraisal data submission is 52, then SECOND GROWTH =1, otherwise SECOND GROWTH = 0.

APPENDIX 2 Specified Operations

If sufficient auction data is not available, the ministry will, for those identified situations, implement specified operations.

The specified operations will be used to adjust the MPS stumpage rate for the estimated incremental cost of the identified situation. The explicit assumption is that if a bidder was faced with a similar situation he or she would lower the bid by the extra cost incurred because of the identified situation.

The situations that may be eligible for specified operations adjustment will be determined according to the following principles:

- The expectation that a bid would be influenced by this situation;
- representation (number of samples, if any, in the auction data set);
- materiality of estimated cost differential (supported by verifiable financial data); and,
- statistical analysis (including the premise that other represented situations and variables in the MPS database and equations may serve as a proxy for the situation in question).

The ministry, after considering the above and any other relevant technical information, may or may not designate the situation as an identified situation eligible for a specified operations and, if eligible, specify the dollars per cubic metre adjustment.

The ultimate objective is to have a representative auction database and hence, few, if any, specified operations adjustments.

The following are identified as specified operations for the Coast MPS.

Cost estimates from the current Coast Appraisal Manual are used for a – f below.

a) Skyline Logging

For those areas within a cutblock that:

- are 600 metres or greater measured in a straight line horizontal distance from the centre of the closest possible landing or place where a landing may be located, and

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- are yarded by skyline.

b) Inland Water Transportation

- Where logs must be towed on Great Central, Owikeno or Powell Lake or other authorized inland water location.

c) Clayoquot Sound

- Recognizes the higher level of planning and engineering required by the scientific panel recommendations accepted by the government of British Columbia
- Applies to Hesquiat Peninsula, Esowista Peninsula and the islands sea and all waters draining into the Pacific Ocean from the height of land between Escalante Point and Quisitis Point.

d) Helicopter Single Standing Stem Selection

- Where single standing trees are marked, limbed, undercut, wedged, then broken from the stump and removed using a helicopter.
- Applies where this method is the only harvest method permitted on an area due to terrain and environmental constraints.

e) Destumping For Root Disease Control

- Where tree stumps must be pulled from the ground to prevent the spread of root disease to the new forest regeneration.

f) Tree Crown Modification

- To protect the standing trees adjacent a harvested area by trimming tree crowns to reduce sail area and decrease the potential for windthrow damage.

g) Ecosystem Based Management

- Applies where Section 93.4 of the *Land Act* requires a higher level of land use planning and/or different harvesting methods as described in the *Coast Appraisal Manual*.