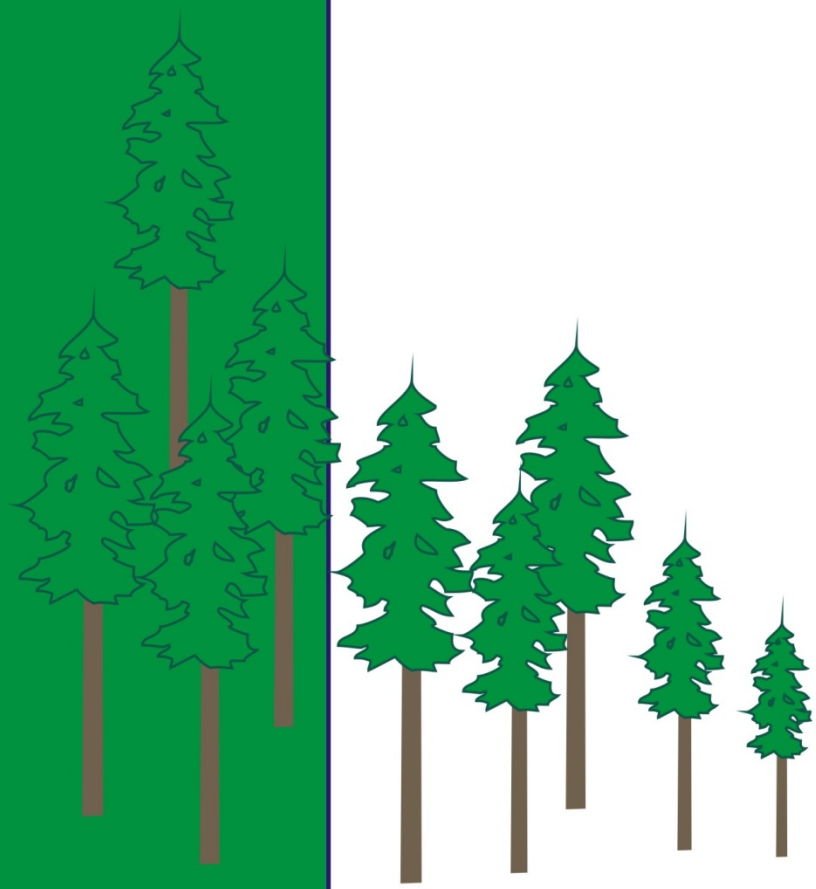
BRITISH COLUMBIA

Coast

MARKET PRICING SYSTEM

Update – 2012



July 1, 2012

Timber Pricing Branch

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Coast Market Pricing System – Update 2012

1. INTRODUCTION

The purpose of this paper is to provide an overview of the July 1, 2012 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 277 sales over the 5 year period January 1, 2007 through December 31, 2011.

3. EQUATIONS

With the new auction dataset, the 2009 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*.

Winning Bid Equation – 2009 and Benchmark

	2009 Equation		Benchmark	
Dependant Variable	**Real Winning Bid**		**Real Winning Bid**	
Explanatory Variable	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**
Constant	-4.47	-0.85	3.63	0.58
Hembal	-9.72	-3.88	-10.09	-3.52
3-Month Average Log Selling Price	0.789	15.19	0.647	10.99
Conventional Slope	-0.138	-3.30	-0.101	-2.12
Helicopter Logging	-33.29	-12.31	-26.65	-7.86
LN (Volume per Hectare/1000)	10.38	5.67	7.74	3.36
Number of Bidders	1.87	9.80	1.90	8.55
Distance to Gambier	-0.00572	-1.69	-0.00321	-0.76
2005 Auctions	-2.97	-2.18	N/A	N/A
2006 Auctions	-3.60	-2.68	N/A	N/A
2007 Auctions	0.182	0.107	N/A	N/A
2008 Auctions	-7.30	-4.94	-8.98	-4.59
2009 Auctions	N/A	N/A	-11.40	-4.91
2010 Auctions	N/A	N/A	-8.28	-3.52
2011 Auctions	N/A	N/A	-3.75	-1.69
Location	-0.0579	-4.75	-0.0567	-3.69
LN (Piece Size) *OG	4.39	2.14	3.96	1.46
Second Growth	6.12	3.72	4.33	1.98
Number of Observations	**285**		**277**	
Adjusted R^2	**0.832**		**0.724**	

Note: LN means natural logarithm

Number of Bidders Equation – 2009 and Benchmark

	2009 Equation		Benchmark Equation	
Dependant Variable	**LN (Number of Bidders)**		**LN (Number of Bidders)**	
Explanatory Variable	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**
Constant	-3.94	-4.05	-6.03	-6.90
LN (Volume/1000)	0.760	3.56	0.402	2.14
Conventional Slope	-0.0225	-2.94	-0.00816	1.21
2nd Growth Fir	-0.584	-1.40	-0.329	-0.96
Predicted Bid	0.0989	10.05	0.134	13.03
2005 Auctions	-0.572	-1.31	N/A	N/A
2006 Auctions	0.185	0.51	N/A	N/A
2007 Auctions	-1.11	-2.82	N/A	N/A
2008 Auctions	-0.714	-1.74	1.14	2.59
2009 Auctions	N/A	N/A	3.22	6.51
2010 Auctions	N/A	N/A	3.03	6.43
2011 Auctions	N/A	N/A	2.34	5.34
District Average Number of Bidders	0.864	7.31	0.767	7.73
Isolated	-0.376	-1.24	-0.623	-1.87
Number of Observations	**285**		**277**	
Adjusted R^2	**0.480**		**0.519**	

Note: LN means natural logarithm.

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

	Benchmark		Final Equation	
Dependant Variable	**Real Winning Bid**		**Real Winning Bid**	
Explanatory Variable	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**
Constant	3.63	0.58	-23.74	-4.12
Hembal	-10.09	-3.52	N/A	N/A
3-Month Average Log Selling Price	0.647	10.99	0.619	11.74
Cedar and Cypress	N/A	N/A	9.67	2.41
Cedar and Cypress 2007	N/A	N/A	30.21	6.67
Gambier Dist 400	N/A	N/A	-7.95	-1.58
Cruise Grades	N/A	N/A	6.27	3.90
Conventional Slope	-0.101	-2.12	-0.103	-2.65
Helicopter Logging	-26.65	-7.86	-25.63	-8.44
LN (Volume per Hectare/1000)	7.74	3.36	7.65	2.29
Number of Bidders	1.90	8.55	2.03	9.68
Distance to Gambier	-0.00321	-0.76	N/A	N/A
2008 Auctions	-8.98	-4.59	N/A	N/A
2009 Auctions	-11.40	-4.91	N/A	N/A
2010 Auctions	-8.28	-3.52	N/A	N/A
2011 Auctions	-3.75	-1.69	N/A	N/A
Location	-0.0567	-3.69	-0.0659	-4.53
LN (Piece Size)	N/A	N/A	2.24	1.12
LN (Piece Size) * Old Growth	3.96	1.46	N/A	N/A
Second Growth Fir	N/A	N/A	9.57	4.39
Second Growth	4.33	1.98	N/A	N/A
Number of Observations	**277**		**277**	
Adjusted R^2	**0.724**		**0.746**	

Note: LN means natural logarithm

Number of Bidders Equation – Benchmark and Final

	Benchmark		Final Equation	
Dependant Variable	LN (Number of Bidders)		Number of Bidders	
Explanatory Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-6.03	-6.90	-2.23	-2.83
LN (Volume/1000)	0.402	2.14	0.297	1.42
Conventional Slope	-0.00816	1.21	N/A	N/A
Second Growth	N/A	N/A	-0.339	-1.38
2^{nd} Growth Fir	-0.329	-0.96	N/A	N/A
Predicted Bid	0.134	13.03	0.0846	9.88
2008 Auctions	1.14	2.59	N/A	N/A
2009 Auctions	3.22	6.51	N/A	N/A
2010 Auctions	3.03	6.43	N/A	N/A
2011 Auctions	2.34	5.34	N/A	N/A
District Average Number of Bidders	0.767	7.73	0.821	7.53
4^{th} Quarter Auctions	N/A	N/A	0.412	1.31
Isolated	-0.623	-1.87	-0.604	-1.65
Number of Observations	277		277	
Adjusted R^2	0.519		0.400	

Note: LN means natural logarithm

For both equations combined, 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).

4. SPECIFIED OPERATIONS

The auction dataset used to develop MPS is comprised of 277 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	January 2009 Update	July 2012 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)	$46.18/tree (old growth)
	$36.38/tree (2nd growth)	$20.69/tree (2nd growth)
Clayoquot Sound Operating Costs	$6.11/m^3	$6.11/m^3
Helicopter Single Standing Stem Selection	$37.78/m3	$37.78/m3
De-stumping for Root Disease Control	$1,114/ha	$1,114/ha
Ecosystem Based Management	$2.75/m^3	$2.75/m^3

5. TENURE OBLIGATION ADJUSTMENTS

As outlined in the Coast Tenure Obligations Adjustment paper (dated July 1, 2012), the adjustments are based on cost surveys.

The tenure obligation adjustments are shown below.

Tenure Obligations	January 2009 Update	July 2012 Update
Forest Planning & Administration Cost	$10.63	$13.87
Low Volume Cost	$7.51	$7.51
Road Development Cost	Appraisal Manual *	Appraisal Manual *
Road Management Cost	$2.13	$1.46
Road Use Charges	Approved actuals	Approved actuals
Basic Silviculture Cost	$2.50-$8.79 (based on district)	$2.95-$8.97 (based on district)
BCTS Infrastructure	$0.57	$0.54
Low Grade Adjustment	1/ (1-% low grade)	1/ (1-% low grade)
Return to Forest Management	1.073	1.066

6. SUMMARY

The new final equation, specified operations and tenure obligation adjustments will be used to calculate stumpage rates on the Coast, starting July 1, 2012.

APPENDIX 1

FINAL ESTIMATED WINNING BID

Dependent Variable: RWB
Method: Least Squares
Date: 05/13/12 Time: 12:13
Sample: 1 407 IF IN_277=1
Included observations: 277

	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-23.73586	5.765840	-4.116635	0.0001
3 Month Average Log Selling Price	0.618969	0.052733	11.73778	0.0000
Conventional Slope	-0.102765	0.038792	-2.649110	0.0086
Helicopter Logging	-25.62948	3.035955	-8.441980	0.0000
Volume per hectare/1000	7.648986	3.346823	2.285447	0.0231
LN (Piece Size)	2.239848	2.007015	1.116010	0.2654
Location	-0.065929	0.014546	-4.532374	0.0000
Second Growth Fir	9.568803	2.181132	4.387080	0.0000
Cedar and Cypress	9.671943	4.008518	2.412848	0.0165
Cedar and Cypress 2007	30.20543	4.529478	6.668634	0.0000
Gambier Distance 400	-7.946460	5.024984	-1.581390	0.1150
Number of Bidders	2.026143	0.209316	9.679818	0.0000
Cruise Grades	6.269714	1.609550	3.895320	0.0001

R-squared	0.757209	Mean dependent var	26.25993
Adjusted R-squared	0.746173	S.D. dependent var	16.26407
S.E. of regression	8.194046	Akaike info criterion	7.090487
Sum squared resid	17725.59	Schwarz criterion	7.260567
Log likelihood	-969.0325	Hannan-Quinn criter.	7.158730
F-statistic	68.61279	Durbin-Watson stat	1.889913
Prob(F-statistic)	0.000000		

FINAL NUMBER OF BIDDERS

Dependent Variable: NB
Method: Least Squares
Date: 05/13/12 Time: 12:14
Sample: 1 407 IF IN_277=1
Included observations: 277

	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-2.229992	0.788153	-2.829390	0.0050
Predicted Bid	0.084551	0.008557	9.881340	0.0000
Second Growth	-0.338814	0.245770	-1.378584	0.1692
LN (Volume/1000)	0.297339	0.208764	1.424280	0.1555
District Average Number of Bidders	0.820752	0.108973	7.531671	0.0000
Isolated	-0.603627	0.365555	-1.651259	0.0998
4th Quarter Auctions	0.412406	0.314726	1.310364	0.1912

R-squared	0.413459	Mean dependent var	4.173285
Adjusted R-squared	0.400425	S.D. dependent var	2.560629
S.E. of regression	1.982752	Akaike info criterion	4.231794
Sum squared resid	1061.452	Schwarz criterion	4.323376
Log likelihood	-579.1035	Hannan-Quinn criter.	4.268540
F-statistic	31.72103	Durbin-Watson stat	1.536725
Prob(F-statistic)	0.000000		

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 Timber Pricing Branch.
SECOND GROWTH FIR	If selling price zone in the appraisal data submission is 52, then 2nd GROWTH FIR is the fraction of the coniferous cruise volume that is Douglas-fir. If the selling price zone is not 52, then 2nd GROWTH FIR = 0. 2nd GROWTH FIR is in decimal form, rounded to 2 decimal places.
CEDARCYPRESS	The fraction of the coniferous cruise volume that is cedar and cypress. CEDARCYPRESS 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.

CRUISE GRADES	If cruise is used as a source for any log grades for the appraisal then CRUISE GRADES = 1, otherwise CRUISE GRADES = 0
DISTANCE TO GAMBIER	POA distance is the average straight line distance, weighted by net cruise volume, between the geographic centre of each cutblock in the cutting authority area and Gambier Island. GAMBIST is measured and rounded to the nearest kilometre. The Gambier Island co-ordinate is 49° 29' 09" and 123° 26' 44" W.
GAMBDIST400	Where DISTANCE TO GAMBIER is equal to 400 or greater and district is not Haida Gwaii, GAMBDIST400 = 1, otherwise GAMBDIST400 = 0.
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
2009 AUCTIONS	If auction sold in 2009, then 2009 Auctions = 1
2010 AUCTIONS	If auction sold in 2010, then 2010 Auctions = 1
2011 AUCTIONS	If auction sold in 2011, then 2011 Auctions = 1
4^{th} QUARTER AUCTIONS	If auction sold in a 4^{th} quarter, then 4^{th} QUARTER 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 = 27 300. 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.
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 operation 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
- 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*.