

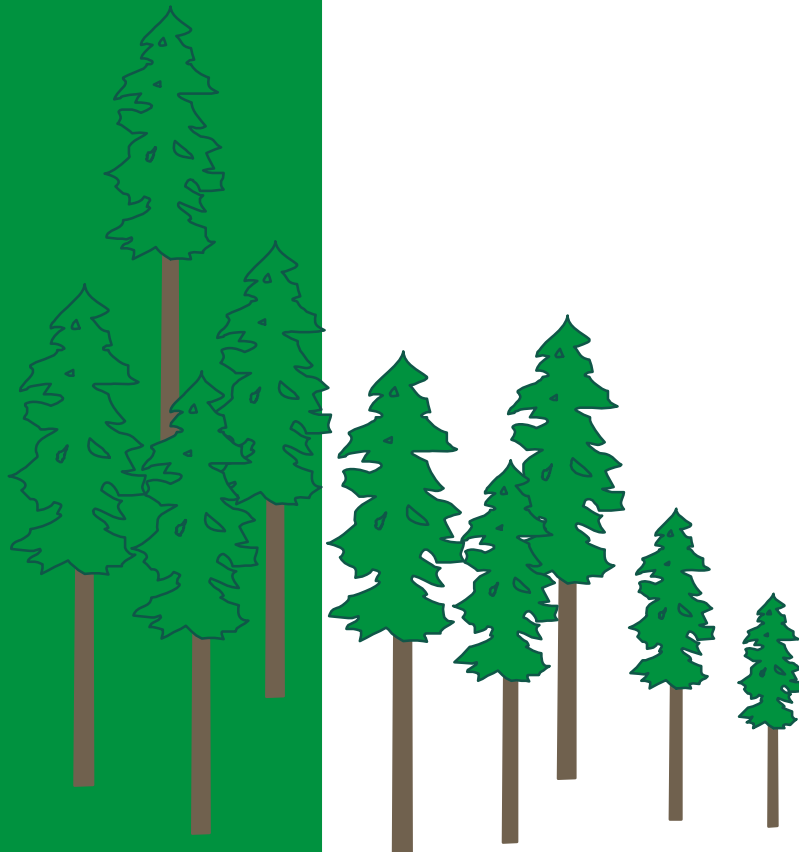


**BRITISH  
COLUMBIA**

Ministry of Forests  
and Range

# **COAST MARKET PRICING SYSTEM**

**Update - 2007**



**June 4, 2007**



Revenue  
Branch

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## 1. INTRODUCTION

The purpose of this paper is to provide a overview of the June 1, 2007 update to the Coast Market Pricing System (MPS).<sup>1</sup>

## 2. AUCTION DATASET

The auction dataset used in the update contains winning bids and data from 280 sales over the 5 year period January 1, 2002 through December 31, 2006.

## 3. EQUATIONS

With the new auction dataset, the 2004 equations were re-estimated using the new dataset. No other changes were made.

The results are the benchmark equations, shown below.

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<sup>1</sup> 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

Variable	2004 Equation		Benchmark Equations	
	Co-efficient	t-Statistic	Co-efficient	t-Statistic
Constant	-22.14	-3.72	-16.86	-3.58
Cruise Grades	3.46	2.10	1.09	0.49
2 <sup>nd</sup> Growth HemBal	-19.00	-4.28	-11.33	-3.58
3-Month Average Log Selling Price	0.78	12.81	0.67	14.57
*LN (Old Growth Hembal + 0.01)	-2.88	-4.76	-3.45	-6.06
Conventional Slope	-0.17	-3.15	-0.15	-3.39
Helicopter Logging	-40.09	-11.43	-31.51	-9.91
*LN (Volume per Hectare / 1000)	11.95	6.54	9.28	5.54
*LN (Number of Bidders)	10.07	6.82	9.21	10.55
Haul Distance	-0.03	-1.63	-0.03	-1.60
Barge Distance	-0.11	-4.11	-0.01	-3.75
<b>Number of Observations</b>	248		280	
<b>Adjusted R<sup>2</sup></b>	0.75		0.78	

\*LN means natural logarithm

### Number of Bidders Equation

Variable	2004 Equation		Benchmark Equations	
	Co-efficient	t-Statistic	Co-efficient	t-Statistic
Constant	0.24	0.37	-1.15	-1.52
Location	-0.01	-2.37	0.00	0.17
2 <sup>nd</sup> Growth HemBal	2.15	2.63	-0.018	-0.025
*LN (Volume / 1000)	0.83	4.07	0.65	3.67
Cable Yarding	-1.59	-4.48	-1.06	-2.95
2 <sup>nd</sup> Growth Fir	2.89	5.26	1.78	3.77
Predicted Bid	0.10	11.20	0.12	12.81
<b>Number of Observations</b>	248		280	
<b>Adjusted R<sup>2</sup></b>	0.52		0.49	

\*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. An annual dummy structure similar to the Interior MPS model was added. See appendix 1 for detailed statistics and definitions.

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

### Real Winning Bid

Variable	Benchmark Equation		Final Equation	
	Co-efficient	t-Statistic	Co-efficient	t-Statistic
Constant	-16.85661	-3.576727	16.52077	3.027440
Cruise Grades	1.089356	0.489522	na	na
2 <sup>nd</sup> Growth HemBal	-11.33010	-3.580703	na	na
<i>HemBal</i>	na	na	-13.00502	-3.949594
3-Month Average Log Selling Price	0.665606	14.57293	0.569370	11.85466
*LN (Old Growth HemBal + 0.01)	-3.448073	-6.059965	na	na
Old Growth HemBal			-9.925354	-3.159929
Conventional Slope	-0.146065	-3.387635	-0.135854	-3.086402
Helicopter Logging	-31.51344	-9.910126	-33.51514	-10.49840
*LN (Volume per Hectare / 1000)	9.277233	5.543587	10.62495	5.175727
*LN (Number of Bidders)	9.214474	10.55131	8.487801	9.273841
Haul Distance	-0.031057	-1.597013	na	na
Barge Distance	-0.007493	-3.745516	na	na
<i>Distance to Gambier</i>	na	na	-0.006078	-1.687202
<i>2003 Auctions</i>	na	na	0.172201	0.103176
<i>2004 Auctions</i>	na	na	1.397715	0.759638
<i>2005 Auctions</i>	na	na	-2.806444	-1.424231
<i>2006 Auctions</i>	na	na	-4.293652	-2.104400
<i>Location</i>	na	na	-0.059181	-4.630641
*LN (Piece Size)	na	na	5.031485	2.640742
<b>Adjusted R<sup>2</sup></b>	0.78		0.81	

\*LN means natural logarithm

### Number of Bidders

Variable	Benchmark Equation		Final Equation	
	Co-efficient	t-Statistic	Co-efficient	t-Statistic
<b>Dependant Variable</b>	Number of Bidders		*LN (Number of Bidders)	
<b>Explanatory Variables</b>				
Constant	-1.153333	-1.520512	-0.278565	-1.583862
Location	0.000374	0.166178	na	na
2 <sup>nd</sup> Growth HemBal	-0.017717	-0.024783	na	na
*LN (Volume / 1000)	0.650224	3.666294	0.21781	4.935450
Cable Yarding	-1.060090	-2.948561	na	na
Conventional Slope	na	na	-0.007917	-4.626630
2 <sup>nd</sup> Growth Fir	1.776777	3.770424	0.258622	3.472974
Predicted Bid	0.116026	12.80880	0.020258	11.03172
2003 Auctions	na	na	-0.220155	-3.392827
2004 Auctions	na	na	-0.272213	-3.905193
2005 Auctions	na	na	-0.561457	-5.786829
2006 Auctions	na	na	-0.282158	-3.365390
2 <sup>nd</sup> Quarter Auctions	na	na	0.163537	2.329619
1 <sup>st</sup> Quarter Auctions	na	na	0.211500	3.722447
District Average Number of Bidders	na	na	0.113698	4.746453
<b>Adjusted R<sup>2</sup></b>	0.50		0.60	

\*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: LN (Number of Bidders)).

#### 4. SPECIFIED OPERATIONS

The auction dataset used to develop MPS is comprised of 280 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	Current Adjustments	2007 Update
Skyline Logging	formula	same formula
Inland Water Log Transportation	formula	\$4.41/m3
Tree Crown Modification	\$53.50/tree (mature)	\$53.50/tree (mature)
	\$36.38/tree (2 <sup>nd</sup> growth)	\$36.38/tree (2 <sup>nd</sup> growth)
Clayoquot Sound Operating Costs	\$12.85/m3	\$6.11/m3
Helicopter Single Standing Stem Selection	\$37.78/m3	\$37.78/m3
Second Growth Coniferous Timber	\$3.67/m3	\$0.00
	\$1.84/m3	
De-stumping for Root Disease Control	\$0.00	\$1,114/ha

#### 5. TENURE OBLIGATION ADJUSTMENTS

As outlined in the Coast Tenure Obligations Adjustment paper (dated June 1, 2007), the adjustments are based on cost surveys.

The tenure obligation adjustments are shown below.

Tenure Obligation	Current Adjustments	2007 Update
Forest Planning & Administration Cost	\$12.96	\$9.43
Low Volume Cost	\$7.51	\$7.51
Road Development Cost	Appraisal Manual *	Appraisal Manual *
Road Management Cost	\$1.58-\$2.02	\$1.34
Road Use Charges	approved actuals	approved actuals
Basic Silviculture Cost	\$2.16-\$4.42 (based on district)	\$1.85-\$5.21 (based on district)
BCTS Infrastructure	\$0.00	For future implementation
Low Grade Adjustment	1 / (1- % low grade)	1 / (1- % low grade)
Return to Forest Management	1.093	1.075

#### 6. SUMMARY

The new equations, specified operations and tenure obligation adjustments will be used to calculate stumpage rates on the Coast, starting June 1, 2007.

**APPENDIX 1**

**FINAL ESTIMATED WINNING BID:**

Dependent Variable: Real Winning Bid

Method: Least Squares

Date: 03/29/07 Time: 08:31

Sample (adjusted): 272 582 **Jan02 - Dec06**

Included observations: 280 after adjustments

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.52077	5.457010	3.027440	0.0027
Hembal	-13.00502	3.292748	-3.949594	0.0001
3 Month Average Log Selling Price	0.569370	0.048029	11.85466	0.0000
Old Growth Hembal	-9.925354	3.141006	-3.159929	0.0018
Conventional Slope	-0.135854	0.044017	-3.086402	0.0022
Helicopter Logging	-33.51514	3.192404	-10.49840	0.0000
*LN (Volume per Hectare/1000)	10.62495	2.052841	5.175727	0.0000
*LN(Number of Bidders)	8.487801	0.915241	9.273841	0.0000
Distance to Gambier	-0.006078	0.003602	-1.687202	0.0927
2003 Auctions	0.172201	1.668994	0.103176	0.9179
2004 Auctions	1.397715	1.839976	0.759638	0.4481
2005 Auctions	-2.806444	1.970498	-1.424231	0.1556
2006 Auctions	-4.293652	2.040321	-2.104400	0.0363
Location	-0.059181	0.012780	-4.630641	0.0000
*LN(Piece Size)	5.031485	1.905330	2.640742	0.0088
R-squared	0.820746	Mean dependent var		41.14118
Adjusted R-square	0.811276	S.D. dependent var		18.64721
S.E. of regression	8.100779	Akaike info criterion		7.073881
Sum squared resid	17389.99	Schwarz criterion		7.268601
Log likelihood	-975.3433	F-statistic		86.66808
Durbin-Watson stat	1.750132	Prob(F-statistic)		0.000000

\* LN means natural logarithm

**FINAL NUMBER OF BIDDERS**

Dependent Variable: \*LN(Number of Bidders)

Method: Least Squares

Date: 03/29/07 Time: 08:33

Sample (adjusted): 272 582

Included observations: 280 after adjustments

White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-0.278565	0.175877	-1.583862	0.1144
*LN(Volume/1000)	0.217181	0.044004	4.935450	0.0000
Conventional Slope	-0.007917	0.001711	-4.626630	0.0000
2 <sup>nd</sup> Growth Fir	0.258622	0.074467	3.472974	0.0006
Predicted Bid	0.020258	0.001836	11.03172	0.0000
2003 Auctions	-0.220155	0.064888	-3.392827	0.0008
2004 Auctions	-0.272213	0.069705	-3.905193	0.0001
2005 Auctions	-0.561457	0.097023	-5.786829	0.0000
2006 Auctions	-0.282158	0.083841	-3.365390	0.0009
2 <sup>nd</sup> Quarter Auctions	0.163537	0.070199	2.329619	0.0206
1 <sup>st</sup> Quarter Auctions	0.211500	0.056818	3.722447	0.0002
District Average Number of Bidders	0.113698	0.023954	4.746453	0.0000
R-squared	0.612265	Mean dependent var		1.549783
Adjusted R-squared	0.596351	S.D. dependent var		0.663725
S.E. of regression	0.421687	Akaike info criterion		1.152807
Sum squared resid	47.65582	Schwarz criterion		1.308583
Log likelihood	-149.3929	F-statistic		38.47216
Durbin-Watson stat	2.054027	Prob(F-statistic)		0.000000

\* LN means natural logarithm

## VARIABLES AND DEFINITIONS

PREDICTED BID	The stumpage price for the cutting authority expressed in $\$/\text{m}^3$ .
3 MONTH AVERAGE LOG SELLING PRICE	Average coniferous log selling price estimate expressed in $\$/\text{m}^3$ . 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 <sup>ND</sup> GROWTH FIR	If selling price zone in the appraisal data submission is 52, then DFIR 2G is the fraction of the coniferous cruise volume that is Douglas-fir. If the selling price zone is not 52, then DFIR 2G = 0. DFIR 2G 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.
OLD GROWTH HEMBAL	The fraction of the coniferous cruise volume that is hemlock and balsam, if the selling price zone is not zone 52. If the selling price zone is 52, then HEMBALOG = 0. HEMBALOG 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	Non-helicopter selection volume per hectare is the cruise volume of coniferous timber per hectare for that part of the cutting authority area that will not be harvested by a helicopter selection method or helicopter single standing stem selection. Expressed in $\text{m}^3/\text{ha}$ and is rounded to 2 decimal places.
PIECE SIZE	The cruise coniferous net volume per 10 m log expressed in $\text{m}^3$ . PIECESIZE is expressed in $\text{m}^3$ 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. 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.
2003 AUCTIONS	If auction sold in 2003, then 2003 Auctions = 1
2004 AUCTIONS	If auction sold in 2004, then 2004 Auctions = 1
2005 AUCTIONS	If auction sold in 2005, then 2005 Auctions = 1
2006 AUCTIONS	If auction sold in 2006, then 2006 Auctions = 1
1 <sup>ST</sup> QUARTER AUCTIONS	If sold in January to March, 1 <sup>st</sup> Quarter Auctions = 1
2 <sup>ND</sup> QUARTER AUCTIONS	If sold in April to June, 2 <sup>nd</sup> 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 <sup>3</sup> , then VOL = 19 902. VOL is expressed in m <sup>3</sup> , 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.

**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
- are yarded by skyline.

#### ***b) In-Land 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.