

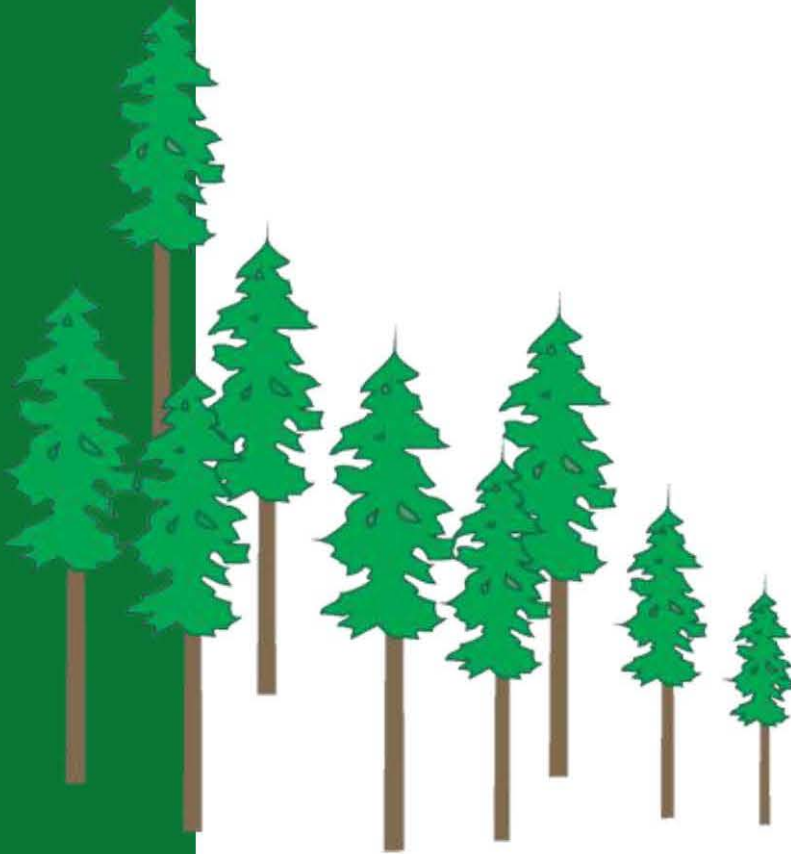


# COAST MARKET PRICING SYSTEM

Update – 2019

December 15, 2019

Timber Pricing  
Branch



## **1. INTRODUCTION**

The purpose of this paper is to provide an overview of the December 15, 2019 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 742 sales over the 13 year period July 1, 2006 through June 30, 2019.

## **3. FINAL EQUATIONS**

There were a number of changes in the 2019 Coast MPS Update. The total harvest volume variable was switched to North American housing starts. The BC domestic log price variable was replaced with North American lumber and veneer prices. These changes increase the sensitivity of the Coast MPS to global market conditions.

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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 (CAM)*. The *Coast Appraisal Manual* contains the policies and procedures referred to in Section 105 of the *Forest Act*.

### 3. ESTIMATED WINNING BID REGRESSIONS

#### 3.1.a) 2019 Winning Bid – Loss Factor Cruise

For cutting permits where the cruise data comes from a standard “Loss Factor” cruise.

Explanatory Variable	2019 Winning Bid	
	Coefficient	t-Statistic
Constant	-6.324762	-1.779786
Number of Bidders	3.328288	14.76378
Cedar Lumber High Grade	0.194639	15.82868
Cedar Lumber Mid Grade	0.079218	11.80979
Fir Lumber High Grade	0.591468	6.822195
Fir Lumber Mid Grade	0.320052	11.67531
Hemlock Lumber High Grade	0.236495	3.065992
Hemlock Lumber Mid Grade	0.107956	3.111623
Cypress Lumber High and Mid Grade	0.167118	6.959547
Old Growth LN(Volume per Log)	11.99493	3.750139
LN(Volume per Hectare/1000)	14.91337	6.160491
Conventional Slope	-0.298453	-7.395641
Heli Land Drop	-44.25338	-13.53965
Heli Water Drop	-38.80664	-9.021678
Location	-0.066291	-5.072056
Isolated	-11.13061	-7.493624
Lumpsum	-3.558864	-2.639049
North American Housing Starts	0.016965	10.25983
Export Share * Non-Cedar-Cypress	29.04502	4.191905
<b>Number of Observations</b>	742	
<b>Adjusted R<sup>2</sup></b>	0.7851	

Note: LN means natural logarithm

### 3.1.b) 2019 Number of Bidders – Loss Factor Cruise

	2019 NB	
Explanatory Variable	Coefficient	t-Statistic
Constant	-1.541262	-3.474961
Predicted Bid	0.052208	18.61191
District Average Number of Bidders	0.582728	7.586363
LN(Volume/1000)	0.283882	2.511778
Lumpsum	0.150773	0.885641
<b>Number of Observations</b>	742	
<b>Adjusted R<sup>2</sup></b>	0.4255	

Note: LN means natural logarithm

### 3.2.a) 2019 Winning Bid – Call Grade Net Factor Cruise

There is a second set of EWB regressions (and a second EWB equation in the CAM) for appraisals where the cruise data is derived from an alternative cruising method known as “Call Grade Net Factor”. In these regressions, the BCTS auction data also derives from Call Grade Net Factor cruises. This method is used for non-BCTS cruise based cutting permits. This second EWB equation is not new to Coast MPS in 2019 but in the past was only a rare exception and was omitted from this paper.

Explanatory Variable	2019 Winning Bid	
	Coefficient	t-Statistic
Constant	3.792144	0.731203
Number of Bidders	3.210268	10.31403
Cedar Lumber High Grade	0.151146	12.09187
Cedar Lumber Mid Grade	0.090459	10.05183
Fir Lumber High Grade	0.541003	7.612715
Fir Lumber Mid Grade	0.412957	12.61526
Hemlock Lumber High and Mid Grade	0.216161	7.054178
Cypress Lumber High and Mid Grade	0.14291	6.275535
Old Growth LN(Volume per Log)	24.3916	5.796067
LN(Volume per Hectare/1000)	17.52373	5.217281
Conventional Slope	-0.31438	-5.777845
Heli Land Drop	-43.8892	-9.268599
Heli Water Drop	-36.38732	-6.756539
Location	-0.065676	-3.672878
Isolated	-10.57105	-5.098717
Lumpsum	-7.329928	-4.37851
Export Share * Non-Cedar-Cypress	34.17332	3.006369
<b>Number of Observations</b>	522	
<b>Adjusted R<sup>2</sup></b>	0.7496	

Note: LN means natural logarithm

### 3.2.b) 2019 Number of Bidders – Call Grade Net Factor Cruise

	2019 NB	
Explanatory Variable	Coefficient	t-Statistic
Constant	-0.893003	-1.668095
Predicted Bid	0.053995	15.86777
District Average Number of Bidders	0.453127	4.870084
LN(Volume/1000)	0.268826	2.009297
Lumpsum	0.185139	0.985065
<b>Number of Observations</b>	522	
<b>Adjusted R<sup>2</sup></b>	0.4362	

Note: LN means natural logarithm

#### 4. SPECIFIED OPERATIONS

The auction dataset used to develop MPS is comprised of 742 auctions. There are some harvesting situations that are not well represented in the auction dataset (for example, inland water transportation) 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	December 2019 Update
Skyline Logging (over 600 metres)	Appraised as heli
Inland Water Log Transportation	\$10.25/m <sup>3</sup>
Tree Crown Modification	\$24.80/tree (old growth)
	\$16.25/tree (2nd growth)
Barging	\$10.67/m <sup>3</sup> to \$15.88/m <sup>3</sup>
Clayoquot Sound Operating Costs	\$8.98/m <sup>3</sup>
Ecosystem Based Management	\$7.69/m <sup>3</sup>
Haul Distance Above 100km	\$0.16/m <sup>3</sup> per km beyond 100km
High Development Cost (only applies to BCTS upset rates)	See Section 4.4.7 of the Coast Appraisal Manual

## 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.

<b>Tenure Obligations</b>	<b>December 2019 Update</b>
Forest Planning & Administration Cost	\$13.48/m <sup>3</sup>
Low Volume Cost	\$8.98/m <sup>3</sup>
Road Development Cost	See Section 5.3 of CAM
Road Management Cost	\$2.31/m <sup>3</sup>
Road Use Charges	Approved actuals
Basic Silviculture Cost	\$2.33-\$6.98/m <sup>3</sup>
BCTS Infrastructure	\$0.14/m <sup>3</sup>
Low Grade Adjustment	See Section 5.7 of CAM
Return to Forest Management	1.080

## 6. SUMMARY

The new final equation, specified operations and tenure obligation adjustments will be used to calculate stumpage rates for new appraisals on the Coast, starting December 15, 2019.



## APPENDIX 1 - MPS DECEMBER 2019 UPDATE FINAL REGRESSIONS

### A1.a) Final Loss Factor Winning Bid

Dependent Variable: WB\*153.2/CPI  
 Method: Least Squares  
 Included observations: 742

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.324762	3.553664	-1.779786	0.0755
NB	3.328288	0.225436	14.76378	0.0000
CEDAR*CE_HG*CEDAR_LUMBER_AMV*153.2/CPI	0.194639	0.012297	15.82868	0.0000
CEDAR*CE_MG*CEDAR_LUMBER_AMV*153.2/CPI	0.079218	0.006708	11.80979	0.0000
FIR*FI_HG*FI_VL_DM3*153.2/CPI	0.591468	0.086698	6.822195	0.0000
FIR*FI_MG*FI_VL_DM3*153.2/CPI	0.320052	0.027413	11.67531	0.0000
HEMLOCK*HE_HG*HE_LUM_SC*153.2/CPI	0.236495	0.077135	3.065992	0.0023
HEMLOCK*HE_MG*HE_LUM_SC*153.2/CPI	0.107956	0.034694	3.111623	0.0019
CYPRESS*(CY_HG+CY_MG)*CY_LUM_SCE*153.2/CPI	0.167118	0.024013	6.959547	0.0000
LOG(VPL)*OG_FR	11.99493	3.198528	3.750139	0.0002
LOG(VPH/1000)	14.91337	2.420808	6.160491	0.0000
CONVENTIONAL_SLOPE	-0.298453	0.040355	-7.395641	0.0000
HELI_LAND	-44.25338	3.268428	-13.53965	0.0000
HELI_WATER	-38.80664	4.301488	-9.021678	0.0000
LOCATION	-0.066291	0.013070	-5.072056	0.0000
ISOLATED	-11.13061	1.485344	-7.493624	0.0000
LUMPSUM	-3.558864	1.348540	-2.639049	0.0085
NA_STARTS_12MR	0.016965	0.001654	10.25983	0.0000
EXP_EXP_SHARE_12MR*(1-CEDAR-CYPRESS)	29.04502	6.928836	4.191905	0.0000
R-squared	0.790342	Mean dependent var	45.71748	
Adjusted R-squared	0.785122	S.D. dependent var	29.16314	

### A1.b) Final Loss Factor Cruise Number of Bidders

Dependent Variable: NB  
 Method: Least Squares  
 Included observations: 742

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.541262	0.443534	-3.474961	0.0005
WBF*153.2/CPI	0.052208	0.002805	18.61191	0.0000
DANB_742	0.582728	0.076813	7.586363	0.0000
LOG(VOL/1000)	0.283882	0.113020	2.511778	0.0122
LUMPSUM	0.150773	0.170242	0.885641	0.3761
R-squared	0.428644	Mean dependent var	4.396226	
Adjusted R-squared	0.425543	S.D. dependent var	2.474024	

## A2.a) Final Call Grade Net Factor Winning Bid

Dependent Variable: WB\*153.2/CPI

Method: Least Squares

Sample: 1 1017 IF IN\_LIVE=1 AND CGNF\_AVAIL=1

Included observations: 522

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.792144	5.186169	0.731203	0.4650
NB	3.210268	0.311253	10.31403	0.0000
CEDAR*CE_HG*CEDAR_LUMBER_AMV *153.2/CPI	0.151146	0.012500	12.09187	0.0000
CEDAR*CE_MG*CEDAR_LUMBER_AM V*153.2/CPI	0.090459	0.008999	10.05183	0.0000
FIR*FI_HG*FI_VL_DM3*153.2/CPI	0.541003	0.071066	7.612715	0.0000
FIR*FI_MG*FI_VL_DM3*153.2/CPI	0.412957	0.032735	12.61526	0.0000
HEMLOCK*(HE_HG)*HE_LUM_SC*153.2 /CPI+HEMLOCK*(HE_MG)*HE_LUM_SC *153.2/CPI	0.216161	0.030643	7.054178	0.0000
CYPRESS*(CY_HG+CY_MG)*CYP_LUM _SCE*153.2/CPI	0.142910	0.022773	6.275535	0.0000
LOG(VPL)*OG_FR	24.39160	4.208301	5.796067	0.0000
LOG(VPH/1000)	17.52373	3.358786	5.217281	0.0000
CONVENTIONAL_SLOPE	-0.314380	0.054411	-5.777845	0.0000
HELI_LAND	-43.88920	4.735258	-9.268599	0.0000
HELI_WATER	-36.38732	5.385498	-6.756539	0.0000
LOCATION	-0.065676	0.017881	-3.672878	0.0003
ISOLATED	-10.57105	2.073276	-5.098717	0.0000
LUMPSUM	-7.329928	1.674069	-4.378510	0.0000
EXP_EXP_SHARE_12MR*(1-CEDAR- CYPRESS)	34.17332	11.36698	3.006369	0.0028
R-squared	0.757305	Mean dependent var	47.12627	
Adjusted R-squared	0.749616	S.D. dependent var	29.81040	

## A2.b) Final Call Grade Net Factor Cruise Number of Bidders

Dependent Variable: NB

Method: Least Squares

Sample: 1 1017 IF IN\_LIVE=1 AND CGNF\_AVAIL=1

Included observations: 522

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.893003	0.535343	-1.668095	0.0959
WBF*153.2/CPI	0.053995	0.003403	15.86777	0.0000
DANB_742	0.453127	0.093043	4.870084	0.0000
LOG(VOL/1000)	0.268826	0.133791	2.009297	0.0450
LUMPSUM	0.185139	0.187945	0.985065	0.3251
R-squared	0.440496	Mean dependent var	4.632184	
Adjusted R-squared	0.436168	S.D. dependent var	2.440611	

## Appendix 2 - 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 $\$/m^3$ .
Cedar Lumber High Grade	A composite of cedar lumber prices (C\$/mfbm, net of duties) times the fraction of the coniferous net cruise volume that is cedar and grade D through H.
Cedar Lumber Mid Grade	A composite of cedar lumber prices (C\$/mfbm, net of duties) times the fraction of the coniferous net cruise volume that is cedar and grade U through I.
Fir Lumber High Grade	A composite of fir veneer and lumber prices (C\$/m <sup>3</sup> , net of duties) times the fraction of the coniferous net cruise volume that is fir and grade B through H.
Fir Lumber Mid Grade	A composite of fir veneer and lumber prices (C\$/m <sup>3</sup> , net of duties) times the fraction of the coniferous net cruise volume that is fir and grade U through I.
Hemlock Lumber High Grade	An index of hemlock lumber prices (Stats Can, 2010=100, net of duties) times the fraction of the coniferous net cruise volume that is hemlock and grade D through H.
Hemlock Lumber Mid Grade	An index of hemlock lumber prices (Stats Can, 2010=100, net of duties) times the fraction of the coniferous net cruise volume that is hemlock and grade I or J.
Cypress Lumber High and Mid Grade	Average cypress lumber export price (C\$/m <sup>3</sup> , net of duties) times the fraction of the coniferous net cruise volume that is cypress and grade D through U.
Old Growth LN(Volume per Log)	The natural logarithm of the volume per tree times the fraction of the coniferous volume that is old growth.
LN(Volume per Hectare/1000)	The natural logarithm of the coniferous volume per hectare divided by 1000.
Helicopter Land Drop	For land drop only: 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. HELILAND is in decimal form, rounded to 2 decimal places.
Helicopter Water Drop	As for “Helicopter Land Drop” but applies to the fraction that is water dropped.

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 of the CAM.
Conventional Slope	The average side slope (%) of the fraction of the cutting permit that is not helicopter yarded.
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 = 36,900. VOL is expressed in m <sup>3</sup> , rounded to the nearest whole number.
CPI	The BC Consumer Price Index approved by the director for use on the effective date of the appraisal, reappraisal or quarterly adjustment.
Location	The net cruise volume weighted average straight line distance measured in kilometres between the geographic centre of each part of a cut block and the nearest major 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.
Lumpsum	If the cutting authority is a cruise based competitive timber sale with a stand as a whole rate then LUMPSUM = 1, otherwise LUMPSUM = 0.
Export Share * Non-Cedar-Cypress	Export Share of non-cedar-cypress harvest (as published in monthly appraisal parameters) times the share of non-cedar-cypress.
North American Housing Starts	12 month total of housing starts in the US and Canada (as published in the monthly appraisal parameters)

## APPENDIX 3 - MORE DETAIL ON 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 – h 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**

- Applies where orders under Section 93.4 of the *Land Act* specific to Clayoquot Sound require a higher level of land use planning and/or different harvesting methods.

**d) 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.

**e) Ecosystem Based Management**

- Applies where orders under Section 93.4 of the *Land Act* specific to the Great Bear Rainforest and Haida Gwaii require a higher level of land use planning and/or different harvesting methods.

**f) Haul Distance Above 100km**

- A specified operation cost estimate for permits with haul distances greater than 100km from the cutting authority area to the appraisal log dump.

**g) BCTS High Development Cost**

- Allows an upset rate reduction for BCTS auction sales with development costs exceeding \$15.41/m<sup>3</sup>.

**h) Barging**

- Allows a specified operation of \$10.67/m<sup>3</sup> for that part of a cutting authority that is barged rather than towed. The specified operation is \$15.88/m<sup>3</sup> if the cutting authority is in Haida Gwaii.