



COAST MARKET PRICING SYSTEM

Update – 2020

December 15, 2020

Timber Pricing
Branch



1. INTRODUCTION

The purpose of this paper is to provide an overview of the December 15, 2020 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 773 sales over the 14-year period July 1, 2006 through June 30, 2020.

3. FINAL EQUATIONS

There were several changes in the 2020 Coast MPS Update. The bids on older timber sales were adjusted to reflect changes in the export fee-in-lieu policy. In older bids, prior to the policy change, the incremental export fees were netted out of the bids, holding the combined cost to the bidder constant. In other words, bidders would have bid less if they had faced the higher export fees.

The total harvest volume variable was reintroduced, and the North American housing starts variable changed to include Japanese housing starts. The total harvest, export share and housing starts variables are combined (indexed by their own averages) in the regression into a single variable representing these market factors. This was done to bring stability to all three of these variables. In the past, due to correlation between them, the variables had been quite volatile, even to the point of coming and going from the equation. A final change to these variables included an AAC adjustment to the harvest variable to ensure it acts as a proxy for market demand rather than supply shift.

The hemlock and fir lumber variables were changed with lumber composites from published prices replacing the lumber indexes from Statistics Canada, better representing the product mix for coastal BC producers.

Finally, a fibre recovery zone variable was added (where applicable) to recognize the policy shift between current implementation and the auction dataset.

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 (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) 2020 Winning Bid – Loss Factor Cruise

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

Explanatory Variable	2020 Winning Bid	
	Coefficient	t-Statistic
Constant	-7.846573	-1.843412
Number of Bidders	3.243097	12.56231
Cedar Lumber High Grade	0.182936	10.57047
Cedar Lumber Mid Grade	0.089813	12.81422
Fir Lumber High Grade	0.491451	5.676861
Fir Lumber Mid Grade	0.353717	12.86927
Hemlock Lumber High Grade	0.083281	3.292692
Hemlock Lumber Mid Grade	0.033381	3.169226
Cypress Lumber High and Mid Grade	0.162784	6.161816
Old Growth LN (Volume per Log)	8.406352	2.857394
LN (Volume per Hectare/1000)	17.78169	7.676286
Conventional Slope	-0.325558	-7.976768
Heli Land Drop	-45.2900	-13.02629
Heli Water Drop	-36.76184	-7.614129
Location	-0.071482	-5.209406
Isolated	-10.73236	-6.457448
Lumpsum	-4.565769	-3.54997
North American and Japanese Housing Starts / 1,691 + Harvest Volume / 17.67 + export share * Non-Cedar-Cypress / 0.3004	10.60095	8.14169
Number of Observations	773	
Adjusted R²	0.774843	

Note: LN means natural logarithm

3.1.b) 2020 Number of Bidders – Loss Factor Cruise

	2020 NB	
Explanatory Variable	Coefficient	t-Statistic
Constant	-1.6223	-3.798162
Predicted Bid	0.05263	18.18183
District Average Number of Bidders	0.565403	8.128487
LN(Volume/1000)	0.315597	2.520836
Lumpsum	0.147466	0.895077
FRZ*(1-Lumpsum)	-0.566157	-1.77848
Number of Observations	773	
Adjusted R²	0.421156	

Note: LN means natural logarithm

3.2.a) 2020 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.

Explanatory Variable	2020 Winning Bid	
	Coefficient	t-Statistic
Constant	-2.029303	-0.37332
Number of Bidders	3.113469	10.26339
Cedar Lumber High Grade	0.134936	9.744883
Cedar Lumber Mid Grade	0.083979	11.78591
Fir Lumber High Grade	0.425914	6.252799
Fir Lumber Mid Grade	0.399515	12.72938
Hemlock Lumber High and Mid Grade	0.047151	5.341207
Cypress Lumber High and Mid Grade	0.119119	5.564268
Old Growth LN(Volume per Log)	22.36505	5.704981
LN(Volume per Hectare/1000)	21.64514	7.253904
Conventional Slope	-0.374379	-7.4869
Heli Land Drop	-47.53823	-9.712032
Heli Water Drop	-35.51326	-5.494718
Location	-0.076796	-4.492105
Isolated	-9.597432	-4.664111
Lumpsum	-6.943917	-4.536888
North American and Japanese Housing Starts / 1,691 + Harvest Volume / 17.67 + export share * Non-Cedar-Cypress / 0.3004	9.109346	5.636586
Number of Observations	554	
Adjusted R²	0.771062	

Note: LN means natural logarithm

3.2.b) 2020 Number of Bidders – Call Grade Net Factor Cruise

	2020 NB	
Explanatory Variable	Coefficient	t-Statistic
Constant	-0.890863	-1.711229
Predicted Bid	0.052441	16.02698
District Average Number of Bidders	0.468432	5.293264
LN(Volume/1000)	0.257882	1.745332
Lumpsum	0.182686	0.962999
Number of Observations	554	
Adjusted R²	0.417439	

Note: LN means natural logarithm

4. SPECIFIED OPERATIONS

The auction dataset used to develop MPS is comprised of 773 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 2020 Update
Skyline Logging (over 600 metres)	Appraised as heli
Inland Water Log Transportation	\$11.83/m ³
Tree Crown Modification	\$28.14/tree (old growth)
	\$16.74/tree (2nd growth)
Barging	\$10.74/m ³ to \$15.15/m ³
Clayoquot Sound Operating Costs	\$9.15/m ³
Ecosystem Based Management	\$7.69/m ³
Haul Distance Above 100km	\$0.16/m ³ 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.

Tenure Obligations	December 2020 Update
Forest Planning & Administration Cost	\$13.27/m3
Low Volume Cost	\$9.15/m3
Road Development Cost	See Section 5.3 of CAM
Road Management Cost	\$2.32/m3
Road Use Charges	Approved actuals
Basic Silviculture Cost	\$2.13-\$4.75/m3
BCTS Infrastructure	\$0.14/m3
Low Grade Adjustment	See Section 5.7 of CAM
Return to Forest Management	1.081

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, 2020.

APPENDIX 1 - MPS DECEMBER 2020 UPDATE FINAL REGRESSIONS

A1.a) Final Loss Factor Winning Bid

Dependent Variable: WB_FILA_FINAL*155.3/CPI

Method: Least Squares

Date: 04/08/21 Time: 11:49

Sample: 1 1065 IF IN_2020_773=1

Included observations: 773

Huber-White-Hinkley (HC1) heteroskedasticity consistent standard errors
and covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.846573	4.256549	-1.843412	0.0657
NB	3.243097	0.258161	12.56231	0.0000
CEDAR*CE_HG*CEDAR_LUMBER_AMV* 155.3/CPI	0.182936	0.017306	10.57047	0.0000
CEDAR*CE_MG*CEDAR_LUMBER_AMV* 155.3/CPI	0.089813	0.007009	12.81422	0.0000
FIR*FI_HG*FIR_VL_HYBRID_NEW*155.3/ CPI	0.491451	0.086571	5.676861	0.0000
FIR*FI_MG*FIR_VL_HYBRID_NEW*155.3/ CPI	0.353717	0.027485	12.86927	0.0000
HEMLOCK*HE_HG*HEM_NEW_RL_AMV* 155.3/CPI	0.083281	0.025293	3.292692	0.0010
HEMLOCK*HE_MG*HEM_NEW_RL_AMV* 155.3/CPI	0.033381	0.010533	3.169226	0.0016
CYPRESS*(CY_HG+CY_MG)*CYP_LUM_ SCE*155.3/CPI	0.162784	0.026418	6.161816	0.0000
LOG(VPL)*OG_FR	8.406352	2.941964	2.857394	0.0044
LOG(VPH/1000)	17.78169	2.316445	7.676286	0.0000
SLOPE*(1-HELI)	-0.325558	0.040813	-7.976768	0.0000
HELI_LAND	-45.29000	3.476815	-13.02629	0.0000
HELI_WATER	-36.76184	4.828109	-7.614129	0.0000
LOCATION	-0.071482	0.013722	-5.209406	0.0000
ISOLATED	-10.73236	1.662013	-6.457448	0.0000
LUMPSUM	-4.565769	1.286143	-3.549970	0.0004
EXP_EXP_SHARE_12MR*(1-CEDAR- CYPRESS)/0.3004+HARV_AAC_ADJ/17.6 7+NAJ_STARTS_12MR/1691	10.60095	1.302058	8.141689	0.0000
R-squared	0.779801	Mean dependent var	46.70813	
Adjusted R-squared	0.774843	S.D. dependent var	28.95853	

A1.b) Final Loss Factor Cruise Number of Bidders

Dependent Variable: NB

Method: Least Squares

Date: 05/03/21 Time: 11:19

Sample: 1 1065 IF IN_2020_773=1

Included observations: 773

Huber-White-Hinkley (HC1) heteroskedasticity consistent standard errors
and covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.622300	0.427128	-3.798162	0.0002
WB_FILA_FIF*155.3/CPI	0.052630	0.002895	18.18183	0.0000
LUMPSUM	0.147466	0.164753	0.895077	0.3710
DANB_773	0.565403	0.069558	8.128487	0.0000
LOG(VOL/1000)	0.315597	0.125196	2.520836	0.0119
FRZ*(1-LUMPSUM)	-0.566157	0.318338	-1.778479	0.0757
R-squared	0.424905	Mean dependent var		4.384217
Adjusted R-squared	0.421156	S.D. dependent var		2.473928

A2.a) Final Call Grade Net Factor Winning Bid

Dependent Variable: WB_FILA_FINAL*155.3/CPI

Method: Least Squares

Date: 11/19/20 Time: 14:12

Sample: 1 1065 IF IN_CGNF=1

Included observations: 554

Huber-White-Hinkley (HC1) heteroskedasticity consistent standard errors
and covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.029303	5.435820	-0.373320	0.7091
NB	3.113469	0.303357	10.26339	0.0000
CEDAR*CE_HG_CG*CEDAR_LUMBER_A MV*155.3/CPI	0.134936	0.013847	9.744883	0.0000
CEDAR*CE_MG_CG*CEDAR_LUMBER_A MV*155.3/CPI	0.083979	0.007125	11.78591	0.0000
FIR*FI_HG_CG*FIR_VL_HYBRID_NEW*15 5.3/CPI	0.425914	0.068116	6.252799	0.0000
FIR*FI_MG_CG*FIR_VL_HYBRID_NEW*1 55.3/CPI	0.399515	0.031385	12.72938	0.0000
HEMLOCK*(HE_HG_CG+HE_MG_CG)*HE M_NEW_RL_AMV*155.3/CPI	0.047151	0.008828	5.341207	0.0000
CYPRESS*(CY_HG_CG+CY_MG_CG)*CY P_LUM_SCE*155.3/CPI	0.119119	0.021408	5.564268	0.0000
LOG(VPL_CONV)*OG_FR	22.36505	3.920268	5.704981	0.0000
LOG(VPH/1000)	21.64514	2.983930	7.253904	0.0000
SLOPE*(1-HELI)	-0.374379	0.050005	-7.486900	0.0000
HELI_LAND	-47.53823	4.894776	-9.712032	0.0000
HELI_WATER	-35.51326	6.463163	-5.494718	0.0000
LOCATION	-0.076796	0.017096	-4.492105	0.0000
ISOLATED	-9.597432	2.057720	-4.664111	0.0000
LUMPSUM	-6.943917	1.530547	-4.536888	0.0000
EXP_EXP_SHARE_12MR*(1-CEDAR- CYPRESS)/0.3004+HARV_AAC_ADJ/17.6 7+NAJ_STARTS_12MR/1691	9.109346	1.616111	5.636586	0.0000
R-squared	0.777686	Mean dependent var	48.21021	
Adjusted R-squared	0.771062	S.D. dependent var	29.32797	

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

Dependent Variable: NB

Method: Least Squares

Date: 05/03/21 Time: 11:23

Sample: 1 1065 IF IN_CGNF=1

Included observations: 554

Huber-White-Hinkley (HC1) heteroskedasticity consistent standard errors
and covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.890863	0.520599	-1.711229	0.0876
WB_FILA_FIF*155.3/CPI	0.052441	0.003272	16.02698	0.0000
LUMPSUM	0.182686	0.189705	0.962999	0.3360
DANB_773	0.468432	0.088496	5.293264	0.0000
LOG(VOL/1000)	0.257882	0.147755	1.745332	0.0815
FRZ*(1-LUMPSUM)	-0.670242	0.318537	-2.104126	0.0358
R-squared	0.422706	Mean dependent var		4.599278
Adjusted R-squared	0.417439	S.D. dependent var		2.443221

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 ³ , 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 ³ , 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 ³ , 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 ³ , then VOL = 36,900. VOL is expressed in m ³ , 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 and Japanese Housing Starts	12-month total of North American and Japanese Housing Starts, as published in the approved stumpage appraisal parameters.
Total Harvest	Rolling 12-month total Coast harvest volume, as published in the approved stumpage appraisal parameters.
FRZ	In a fibre recovery zone.

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 \$15.59/m³.

h) Barging

- Allows a specified operation of \$10.74/m³ for that part of a cutting authority that is barged rather than towed. The specified operation is \$15.15/m³ if the cutting authority is in Haida Gwaii.