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Report on Prices of Standing Timber
Department of Natural Resources and Renewables
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INTRODUCTION

Crown stumpage rates are the prices paid for the right to harvest standing trees on Crown lands. It is the policy of the Nova Scotia Department of Natural Resources and Renewables (“the Department”) to set its Crown land stumpage rates consistent with fair market value.

In order to estimate the fair market value of stumpage in the Province, the Department commissions periodic surveys of buyers who routinely purchase stumpage from independent private land owners in a competitive marketplace. In years when a survey is not conducted, the Department generally updates its Crown stumpage rates set using the last completed private stumpage survey and market indices so that the Crown stumpage rates remain consistent with fair market value.¹

BACKGROUND

In September 2022, the Department issued a Request for Proposals with a proposed Statement of Work to identify firms eligible and qualified to conduct a Private Stumpage Survey on behalf of the Department. In all prior surveys, an arm’s length third party was selected to ensure statistical reliability of the dataset collected, maintain confidentiality of the transaction-level data, and provide rigorous verification of the underlying data. The Department engaged Deloitte LLP (“Deloitte”) to conduct the survey which collected transaction-level data from private buyers who routinely purchased stumpage from October 1, 2021 to September 30, 2022.

The Department previously commissioned surveys covering the following periods:

- January 1, 2008 to December 31, 2008; conducted by Nortek Resources Solutions, Inc. (“Nortek”)
- November 1, 2009 to October 31, 2010; conducted by Nortek “Summary Report of Survey Results and Prices for Standing Timber Sales from Maritime Private Woodlots 2009- 2010,”
- November 1, 2011 to October 31, 2012; conducted by Nortek
- April 1, 2015 through March 31, 2016; conducted by Deloitte.
- April 1, 2017 through March 31, 2018; conducted by Deloitte.

As in previous surveys, surveyed buyers of private land stumpage consisted of both mills and independent contractors located in Nova Scotia. The survey collected transaction-level data from private buyers covering the following product and species:

¹ Crown stumpage rates were last updated effective October 1, 2022 using this methodology.

Product and Species to be Surveyed		
Wood Type	Product Category	Species
Softwood	Sawlogs	Spruce-Jack Pine-Fir (SPF)
		Eastern White Pine (EWP)
		Hemlock
		Red Pine
		Other
	Veneer	SPF
		Other
	Studwood	SPF
		Other
	Boltwood	EWP
	Pulpwood – Grade 1	SPF
	Pulpwood – Grade 2	SPF
Pulpwood – Unsorted	Other	
Fuelwood/biomass	Any	
Hardwood	Sawlogs (unsorted)	All species except Poplar
	Sawlogs (hardwood #2 and better)	All species except Poplar
	Sawlogs (hardwood #3)	All species except Poplar
	Pallet logs/Sawlogs (hardwood #4)	Any
	Pulpwood	Any
	Veneer	Any
	Fuelwood/biomass	Any
	Firewood	Any
	Other	Any

This report summarizes the results of the 2021-2022 survey.

DATA COLLECTION AND VALIDATION

Prior to beginning the data collection, the Department collaborated with Deloitte to develop procedures for data collection and validation. The Department also provided Deloitte with contact information for known buyers of primary forest products within Nova Scotia. These buyers were identified using the Registry of Buyers database, which permits the Department to identify for Deloitte those buyers that would likely have private land stumpage purchases of all wood and species types that Deloitte was tasked with collecting and reporting.²

Deloitte contacted these identified buyers and additional purchasers of private land stumpage that these identified buyers referred to Deloitte. This resulted in 41 contacts, including to sawmills, independent wood contractors, pulp and paper mills, woodlot owners, woodlot cooperatives, and wood exporters.

Deloitte provided a definition of “transaction” to each survey participant. Using a data collection template, Deloitte collected the following information from survey participants:

- Seller name;
- Invoice number;
- Transaction date;
- Scale slip number;
- Scale slip date;
- Wood type;
- Product category;
- Product species;
- Amount paid;
- Volume;
- County of harvest.

Deloitte processed the data as it was returned.

Upon receipt of a completed survey, Deloitte reported that it scheduled and completed site visits. Through these site visits, Deloitte reported that it was able to review and reconcile survey data with source documents such as scale slips, payment invoices, signed contracts, accounting ledgers, and inventory management records. Deloitte reported to have verified physical and electronic source documents.

Prior to conducting each site visit, Deloitte developed the following three-step approach for verification and testing the survey response, adapted from internally recognized financial auditing standards:

1. Generate a random number for each transaction reported by the survey participant using MS Excel’s random number function.

² Because the Registry of Buyers database is compiled of reported purchases of primary forest products and not stumpage, the Department does not know the identity of parties to stumpage transactions and so the Registry is used as a starting point for Deloitte’s survey.

2. Sort the random numbers in ascending order and select two transactions per month for buyers of private softwood stumpage of > 50,000 m³ (reported) during the review period; or

Sort the random numbers in ascending order and select one transaction per month for buyers of private softwood stumpage of < 50,000 m³ (reported) during the review period.

3. Ensure the randomly generated sample contains at least one selection in each county in which the survey participant completed a transaction.

Deloitte reported to the Department that its sampling methodology ensures that transactions selected for on-site verification and testing are selected without bias and ensures that adequate coverage is attained on the basis of location, wood type, and time period.

The second component of Deloitte's testing procedures focused on identifying potential data validity risks associated with data management systems and processes employed by survey participants. Deloitte conducted interviews with respondents' staff during site visits. Questions during these interviews related to items such as:

- Order fulfillment processes, including technology platforms used for order fulfillment;
- Records management processes, including data entry, validation and extraction for use in the survey;
- Records management systems employed; and
- Methodologies to ensure that only in-scope transactions were collected.

As this was the third survey conducted by Deloitte since 2016 and many of the Survey Participants were the same, Deloitte reported that it had a high degree of familiarity with the accounting systems and internal processes used.

As part of its testing process, Deloitte validated several data elements to confirm that:

- The reported transactions³ were limited to purchases of stumpage by Survey Participants from unaffiliated private landowners;
- The reported value included only the transaction price for the private stumpage,⁴ excluded the payment of private silviculture fees, and excluded any non-stumpage charges that have been "bundled" in the Survey Participants' records;⁵
- The Department's official conversion factors⁶ were used by the survey participants to report transactions on a volume basis for those transactions invoiced on a weight basis; and
- The transactions reported in the survey reflected transactions maintained in the

³ As noted above, Deloitte provided a definition of "transaction" to each survey participant and verified that each survey participant followed a consistent definition of transaction as it was maintained in each survey participant's ERP system.

⁴ Deloitte's report establishes that Deloitte tied reported prices by each survey participant to the invoiced price or price paid and confirmed that these prices did not reflect bundled non-stumpage services.

⁵ The Forest Sustainability Regulations promulgated pursuant to the Forests Act provides that Registered Buyers who purchase more than 5,000 m³ of primary forest products in a year must contribute \$3.00/m³ to a Forest Sustainability Fund.

⁶ NSDNR's unit conversion table is contained at **Appendix A**.

Survey Participants' ERP system or records maintained in the normal course of business.

Verified surveys were combined into a single dataset to facilitate analysis and reporting.

OVERVIEW OF DATASET

After testing, validating, and formatting the raw survey data, the final survey volume included 402,481 m³ of private land softwood stumpage purchased in 10,613 transactions and 91,395 m³ of hardwood stumpage purchased in 2,847 transactions across the Province. The volume of stumpage was purchased through 19,454 individual transactions during the specified time period.

The composition of each of Nova Scotia's three regions, by county, is presented in the table below followed by the summary of survey results by region:

Nova Scotia Counties by Region		
Western	Central	Eastern
Annapolis	Colchester	Antigonish
Digby	Cumberland	Cape Breton
Kings	Halifax	Guysborough
Lunenburg	Hants	Richmond
Queens	Pictou	Victoria
Shelburne		
Yarmouth		

Regional Distribution of Surveyed Transactions and Volumes			
Region	Wood Type	Survey Volume (m³)	Survey Transactions (#)
Western	Softwood	128,001	3,448
	Hardwood	26,810	793
Central	Softwood	138,490	3,735
	Hardwood	9,194	391
Eastern	Softwood	135,990	3,430
	Hardwood	55,391	1,663

Because the 2023 Registry of Buyers Report and associated total private tenure harvest data is unavailable at the time of publication of this report, the Department intends to amend this report with an analysis of the volume coverage of the surveyed transactions as a share of total actual private land harvest. In reporting the survey results to the Department, Deloitte indicated that the survey database contained a significant number of Survey Respondents, number of total transactions, and regional dispersion to make the results representative of actual stumpage pricing within the Province during the period examined.

METHODOLOGY AND SURVEY RESULTS

The data collected in Deloitte's survey database included information such as wood type, product category, species, county of harvest, volume, and total stumpage paid.

Because the survey volumes are a sample of the total actual harvest volumes in Nova Scotia's three regions, the Department requested that Deloitte rescale the database so the adjusted sample quantity would reflect actual harvest volumes. Because the 2023 Registry of Buyers Report was unavailable at the time that Deloitte completed its work, the Department employed a historical four-year period for scaling the database to the actual harvest. Specifically, using the 2019, 2020, 2021, and 2022 Registry of Buyers Reports, the Department examined the county-specific harvest trends and calculated a county-specific multiplier for both hardwood and softwood species. The Department examined the share of each county as a percent of total harvest by wood type. In examining the county-specific harvest trends as a share of total harvest, the Department observed consistency and no significant outliers in a year-over-year comparison. The Department then calculated a weighted-average multiplier over the four-year period. Once the survey data are scaled, the adjusted volumes and values were weight-averaged to report the regional weighted-average prices.⁷ The Department considers the use of a historic period more representative for regional reweighting rather than using 2021 private harvest data because of the change in harvesting trends in 2022 relative to 2021.⁸

After applying regional reweighting, Deloitte next calculated a provincial weighted average stumpage price based on the total volume (m³) harvested for each product category and species. In order to account for potential outliers within the collected data and consistent with past surveys, the Department considered the types of trimming methods recognized in nearby jurisdictions, including by the New Brunswick Department of Energy and Resource Development and the Maine Forest Service, and instructed Deloitte to "trim," *i.e.*, disregard, all transactions falling below the fifth and above the ninety-fifth percentiles of the sample (5th/95th percentile method).⁹

To test the robustness and reliability of the dataset, Deloitte assigned each product category and species a confidence interval. The confidence interval was calculated using a 99% confidence level due to the quality of detail afforded by transaction-level data collected from the survey participants. The confidence interval is based on the sample mean and the sample standard deviation of the distribution of the sample mean, and represents a range of values within which Deloitte has 99% confidence that the true mean resides. The size of the confidence interval is determined by the variation of the sample (standard deviation) and the size of the sample (number of transactions in the database). The confidence interval is calculated as follows:

⁷ See **Appendix B** for a table of the softwood and hardwood multipliers as applied.

⁸ Deloitte noted to the Department that when conducting the stumpage survey, Deloitte noted a 12.7% overall decline in Total Private Tenure harvest reported in the Registry of Buyers Reports between 2017 and 2021. Deloitte indicated that if this trend were to continue in 2022 and 2021 data were used for the assessment of coverage, the volume coverage may be understated. The same issue would exist for regional reweighting and so the Department's methodology intends to smooth out this difference.

⁹ See **Appendix C** for a comparison of the database with and without trimming.

$$\text{Confidence Interval} = \mu \pm [Z_{\alpha/2} * (\frac{\sigma}{\sqrt{n}})]$$

Formula Inputs

μ	Mean stumpage price \$/m ³
$Z_{\alpha/2}$	The critical value of the normal distribution at 99% confidence level (2.576)
σ	Standard deviation of stumpage prices \$/m ³
N	Number of transactions in the sample

The results of the survey are presented in the table below. For certain transactions that did not have a sufficient number of observations, Deloitte redacted the data to protect the confidentiality of the survey participant and therefore, the Department does not have available to it an average unit price.

Type	Product Category	Species	Unit Price (\$/m ³)	Standard Deviation (\$/m ³)	Confidence Interval (\$/m ³)
Softwood	Sawlogs	SPF	36.40	7.00	0.47
		EWP	19.15	5.47	0.56
		Hemlock	13.81	4.95	0.68
		Red Pine	**	**	**
		Other	**	**	**
	Veneer	SPF	**	**	**
		Other	**	**	**
	Studwood	SPF	28.41	7.02	0.25
		Other	**	**	**
	Boltwood	EWP	**	**	**
	Pulpwood – Grade 1	SPF	11.34	1.62	0.08
	Pulpwood – Grade 2	SPF	3.70	1.75	0.25
	Pulpwood – Unsorted	Other	**	**	**
	Fuelwood/biomass	Any	2.67	1.29	0.24
Sawables (Sawlogs/Studwood)	SPF	29.87	7.63	0.24	
Sawables (Sawlogs/Studwood)	Other	17.09	5.76	0.46	
Hardwood	Sawlogs (unsorted)	All except poplar	29.37	3.80	0.73
	Sawlogs (#2 & better)	All except poplar	**	**	**
	Sawlogs (#3)	All except poplar	**	**	**
	Pallet logs/Sawlogs (#4)	Any	10.17	4.54	0.97
	Pulpwood	Any	9.68	3.24	0.19
	Veneer	Any	**	**	**
	Fuelwood/biomass	Any	5.72	2.01	0.27
	Firewood	Any	14.60	4.17	0.62
	Other	Any	**	**	**

THE DEPARTMENT'S CONCLUSIONS

The Department finds that the Deloitte survey process, methodology, and results provide a reliable basis to use for updating Crown stumpage prices in the Province.

The key findings are:

- The survey coverage appears reasonable. Although Deloitte could not assess the total volume coverage during the 2022 period because of data availability, the number of Survey Respondents, transactions, and surveyed volume across regions gives the Department confidence in the results. The Department intends to examine volume coverage when 2022 Registry of Buyers data become available.
- The 13,460 individual transactions represent consistent transaction types, averaging 37.9 m³ for each softwood transaction and 32.1 m³ for each hardwood transaction. These per-transaction volumes are consistent with prior surveys. Deloitte reports that it verified the reported transactions using the survey participant's ERP system and tied the invoices to scale slips, which gives the Department confidence that transactions were reported consistently and objectively.
- Prices in Nova Scotia are determined by the seller and buyer insofar as there is a meeting of the minds on what species and product type the seller is selling and what species and product type the buyer is buying.
- The survey database includes representative transactions for key product/species types. While for some product/species categories there were not a sufficient number of transactions to publicly reveal a price, the Department may employ other methods in setting Crown stumpage rates for these products consistent with fair market value.
- Deloitte found that survey participants reported volume data in the survey template using the Department's regulatory conversion factors in instances where it was necessary to convert weight on the invoice to volume for the survey template.
- Deloitte assured the Department that the survey results exclude all non-stumpage fees or expenses and that this was subject to on-site verification.
- Deloitte applied the Department's suggested regional reweighting approach to scale the survey to the actual distribution of transactions over an historic 4-year period because 2022 data were unavailable at the time the report was completed.
- The standard deviation and confidence intervals indicate that the Department should rely upon the unit price results.

**APPENDIX A
NSDNR UNIT CONVERSION TABLE**

Group	Product/Unit	Desc. Or Length (ft)¹	NS Conversion to m³ (multiply)
Softwood	Sawlog mfbm	Cut to Length	5.663
	Sawlog fbm	Cut to Length	0.005663
	Sawlog tonne	Tree Length	1.167
	Sawlog tonne	Cut to Length	1.167
	Studwood cord	8	2.322
	Studwood tonne	8	1.167
	Studwood m ³ (s)	8	0.641
	Studwood cord	10	2.265
	Studwood tonne	1	1.167
	Studwood m ³ (s)	10	0.625
	Pulp tonne	Chips	1.269
	Fuel tonne	Chips	0.817
	Pulp/Fuel tonne	Tree Length	1.167
	Pulp/Fuel cord	8'	2.209
	Pulp/Fuel tonne	8'	1.167
	Pulp/fuel m ³ (s)	8'	0.609
	Pulp/fuel m ³ (s)	Random Length	1.167
Softwood Other	Hemlock tonne	All	1.026
	Larch tonne	All	1.033
	White pine tonne	All	1.11

Group	Product/Unit	Desc. Or Length (ft)¹	NS Conversion to m³ (multiply)
Hardwood	Sawlogs mfbm	Cut to Length	5.663
	Sawlogs fbm	Cut to Length	0.005663
	Sawlogs m ³	Cut to Length	1
	Sawlogs tonne	Cut to Length	0.963
	Pulp/fuel tonne	Tree Length	0.963
	Pallet mfbm	8	5.663
	Pallet fbm	8	0.005663
	Pallet cord	8	2.209
	Pallet tonne	8	0.609
	Pallet m ³ (s)	8	0.963
	Pulp/fuel cord	8	1.926
	Pulp/fuel m ³ (s)	8	0.531
	Pulp/fuel tonne	8	0.963
	Veneer mfbm	All	5.663
	Veneer fbm	All	0.005663
	Veneer tonnes	All	0.963
	Other tonnes	All	0.963
	Pulp tonne	Chips	1.07

**APPENDIX B
REGIONAL REWEIGHTING MULTIPLIERS**

County of Harvest	Softwood	Hardwood
Annapolis	4.56	1.83
Antigonish	3.93	36.20
Cape Breton	2.09	5.01
Colchester	7.97	2.02
Cumberland	3.64	2.84
Digby	5.09	4.19
Guysborough	3.96	N/A
Hants	3.32	6.46
Halifax	2.26	3.41
Inverness	3.11	2.07
Kings	5.22	2.68
Lunenburg	5.53	5.37
Pictou	46.75	7.96
Queens	2.22	2.06
Richmond	1.59	2.24
Shelburne	0.80	0.90
Victoria	2.58	10.46
Yarmouth	N/A	N/A

APPENDIX C

COMPARISON OF WEIGHTED AVERAGE PRICES WITH NO TRIMMING AND WEIGHTED AVERAGE PRICES WITH TRIMMING

Wood Type	Product Category	Species	Average stumpage price	
			All data (no trimming) (\$/m ³)	5 th /95 th Percentile Method (\$/m ³)
Softwood	Sawlogs	SPF	36.00	36.40
		EWP	18.85	19.15
		HEM	13.64	13.81
		RP	**	**
		Other	**	**
	Veneer	SPF	**	**
		Other	**	**
	Boltwood	EWP	**	**
	Pulpwood Grade 1	SPF	10.93	11.34
	Pulpwood Grade 2	SPF	3.74	3.70
	Pulpwood Unsorted	Other	**	**
	Studwood	SPF	28.54	28.41
		Other	**	**
	Fuelwood/Biomass	Any	2.67	2.67
Sawables (Sawlogs & Studwood)	SPF	29.89	29.87	
Sawables (Sawlogs & Studwood)	Other	16.99	17.09	

Wood Type	Product Category	Species	Average stumpage price	
			All data (no trimming) (\$/m ³)	5 th /95 th percentile method (\$/m ³)
Hardwood	Sawlogs unsorted	All species except poplar	28.87	29.37
	Sawlogs (hardwood #2 or better)	All species except poplar	**	**
	Sawlogs (hardwood #3)	All species except poplar	**	**
	Pallet Logs/Sawlogs (hardwood #4)	Any	10.16	10.17
	Pulpwood	Any	9.60	9.68
	Veneer	Any	**	**
	Firewood	Any	14.54	14.60
	Fuelwood/Biomass	Any	5.82	5.72
Other	Any	**	**	