

Report on  
prices of

# STANDING TIMBER

April 1, 2017 – March 31, 2018

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Report on Prices of Standing Timber  
Department of Lands and Forestry  
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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 Lands and Forestry (“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 by reference to market indices so that the Crown stumpage rates remain consistent with fair market value.

## **BACKGROUND**

The Department previously commissioned a survey conducted by the accounting firm, Deloitte LLP (“Deloitte”) in 2016 to survey buyers of standing timber in the Province for the period April 1, 2015 through March 31, 2016. Prior to that survey, private stumpage surveys were conducted by Nortek Resource Solutions, Inc., most recently including “Survey Results and Prices for Standing Timber from Nova Scotia Private Woodlots for the Period 2008,” “Summary Report of Survey Results and Prices for Standing Timber Sales from Maritime Private Woodlots 2009-2010,” and “Survey Results and Prices for Standing Timber from Maritime Private Woodlots for the Period 2011-2012.” These surveys each reported private stumpage prices in Nova Scotia specifically, even though the cost of conducting the survey was shared among two provinces. For this report, the Department commissioned Deloitte to conduct a new survey of buyers of standing timber in Nova Scotia for the period April 1, 2017 through March 31, 2018, improving on certain aspects of the previous 2015-2016 survey.

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

<b>Product and Species to be Surveyed</b>		
<b>Wood Type</b>	<b>Product Category</b>	<b>Species</b>
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	
Sawables (Sawlogs & Studwood)	SPF	
Sawables (Sawlogs & Studwood)	Other	
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 Deloitte’s 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 softwood products within Nova Scotia. These buyers were identified using the Registry of Buyers database, which permitted 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.

Deloitte contacted these identified buyers and additional purchasers of private land stumpage that these identified buyers referred to Deloitte. This resulted in 20 survey participants. 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 scheduled site visits. Through these site visits, Deloitte reconciled survey data with source documents such as scale slips, payment invoices, signed contracts, accounting ledgers, and inventory management records. Deloitte verified physical and electronic source documents.

Prior to conducting the first site visit, the Department and Deloitte developed a sampling methodology from internationally recognized financial auditing standards – *9100 Reports on the Results of Applying Specified Auditing Procedures to Financial Information Other than Financial Statements* – and by accounting for the particular characteristics of the data to be tested. Once a survey was received and reviewed, the following three-step approach was applied to develop a testing sample:

1. Generate a random number for each transaction using MS Excel's random number function.
2. Sort the random numbers in ascending order and select the first two transactions per month for buyers of private softwood stumpage of > 50,000 m<sup>3</sup> (reported) during the testing period of April 1, 2017 – March 31, 2018; or

Sort the random numbers in ascending order and select the first transaction per month for buyers of private softwood stumpage of < 50,000 m<sup>3</sup> (reported) during the testing period of April 1, 2017 – March 31, 2018.

3. Ensure the randomly generated sample contains:
  - a. At least one selection in each county in which the survey participant completed a transaction;
  - b. At least one selection for each seller with whom the survey participant completed a transaction.

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 fulfilment processes, including technology platforms used for order fulfilment;
- Records management processes, including data entry, validation and extraction for use in our survey;
- Records management systems employed; and
- Methodologies to ensure that only relevant transactions were reported.

As part of its testing process, Deloitte also confirmed that:

- The reported transactions<sup>1</sup> 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,<sup>2</sup> and excluded the payment of private silviculture fees;<sup>3</sup> and
- The Department's official conversion factors<sup>4</sup> were used by the survey participants to report transactions on a volume basis for those transactions invoiced on a weight basis.

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

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<sup>1</sup> 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.

<sup>2</sup> 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.

<sup>3</sup> The Forest Sustainability Regulations promulgated pursuant to the *Forests Act* provides that Registered Buyers who purchase more than 5,000 m<sup>3</sup> of primary forest products in a year must contribute \$3.00/m<sup>3</sup> to a Forest Sustainability Fund.

<sup>4</sup> NSDNR's unit conversion table is contained at **Appendix A**.

## OVERVIEW OF DATASET

After testing, validating, and formatting the raw survey data, the final survey volume included 690,274 m<sup>3</sup> of private land stumpage purchased 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:

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

<b>Regional Distribution of Surveyed Transactions and Volumes</b>			
<b>Region</b>	<b>Wood Type</b>	<b>Survey Volume (m<sup>3</sup>)</b>	<b>Survey Transactions (#)</b>
Western	Softwood	224,979	5,961
	Hardwood	48,064	1,521
Central	Softwood	186,494	4,746
	Hardwood	113,441	3,991
Eastern	Softwood	101,529	2,424
	Hardwood	15,767	811

The Department estimates that the total survey volume covers approximately 34% of the total private stumpage transactions in the Province. On a regional basis when compared to the private land tenure reported in the 2017 Registry of Buyers Report, the survey coverage of the Western region accounted for 32% of the total volume of private land timber harvested in that region, the Central region accounted for 46%, and the Eastern region accounted for 22%. This regional dispersion of volume reported in the survey generally tracks the private land harvest reported in the Registry of Buyers Report.

## METHODOLOGY AND SURVEY RESULTS

The data collected in Deloitte’s survey database included information such as wood type, product category, species, county, volume, and total stumpage paid. Because the survey volumes were not a constant share of the total actual harvest volumes in Nova Scotia’s three regions, Deloitte employed a methodology whereby the survey data were rescaled so the adjusted sample quantity would match the actual harvest volumes from the 2017 Registry of Buyers Report. A county-specific multiplier was generated for both hardwood and softwood species by dividing the amount of the hardwood or softwood harvested in that county, as reported by the Registry of Buyers Report for that county, by the amount of hardwood or softwood reported in the survey database for that county. Once the survey data are scaled, the adjusted volumes and values were weight-averaged to report the regional weighted-average prices.

After applying regional reweighting, Deloitte next calculated a provincial weighted average stumpage price based on the total volume (m<sup>3</sup>) harvested for each product category and species. In order to account for potential outliers within the collected data, 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 (5<sup>th</sup>/95<sup>th</sup> percentile method).<sup>5</sup>

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:

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

### Formula Inputs

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

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<sup>5</sup> A comparison of results using a volume weighted average of the entire sample, versus a volume weighted average based of the 5th/95th percentile trimming method, is presented at **Appendix B**.



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 <sup>3</sup> )	Standard Deviation (\$/m <sup>3</sup> )	Confidence Interval (\$/m <sup>3</sup> )
Softwood	Sawlogs	SPF	29.48	3.72	0.20
		EWP	19.31	2.86	0.34
		Hemlock	17.28	2.28	0.62
		Red Pine	**	**	**
		Other	**	**	**
	Veneer	SPF	**	**	**
		Other	**	**	**
	Studwood	SPF	25.27	3.83	0.12
		Other	13.60	2.09	0.54
	Boltwood	EWP	**	**	**
	Pulpwood – Grade 1	SPF	10.79	1.51	0.15
	Pulpwood – Grade 2	SPF	5.13	1.19	0.18
	Pulpwood – Unsorted	Other	5.48	2.49	0.13
	Fuelwood/biomass	Any	3.29	1.58	0.35
Sawables (Sawlogs/Studwood)	SPF	26.12	3.90	0.11	
Sawables (Sawlogs/Studwood)	Other	18.64	4.16	0.41	
Hardwood	Sawlogs (unsorted)	All except poplar	26.26	5.28	0.36
	Sawlogs (#2 & better)	All except poplar	**	**	**
	Sawlogs (#3)	All except poplar	**	**	**
	Pallet logs/Sawlogs (#4)	Any	13.41	1.29	0.27
	Pulpwood	Any	9.48	2.60	0.11
	Veneer	Any	71.68	4.90	1.95
	Fuelwood/biomass	Any	**	**	**
	Firewood	Any	14.21	2.63	0.22
	Other	Any	**	**	**

## THE DEPARTMENT'S CONCLUSIONS

The Department finds that the Deloitte survey results provide a reliable basis to use for updating Crown stumpage prices in the Province. The key findings are:

- The survey coverage is robust, accounting for approximately 34% of the total private land harvest, 32% of total private land softwood harvest, and 41% of total private land hardwood harvest.
- The 19,454 individual transactions represent consistent transaction types, averaging 39 m<sup>3</sup> for each softwood transaction and 28 m<sup>3</sup> for each hardwood transaction. Deloitte reports that it verified the reported transactions using the survey participant's ERP system and tied the invoices to scale slips.
- 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.
- 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.
- The survey results exclude all non-stumpage fees or expenses.
- Deloitte altered its regional reweighting approach to scale the survey to the actual distribution of transactions.<sup>6</sup>
- The standard deviation and confidence intervals indicate that the Department should rely upon the unit price results.

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<sup>6</sup> Deloitte had regionally reweighted the 2015-2016 survey based upon the survey's regional distribution instead of the actual harvest regional distribution, as reflected in the Registry of Buyers Report. The Department's preference is to scale the survey to represent the actual population of harvested timber in the Province. Because the Department does not have access to the individual transaction-level data underlying that survey, the Department could not re-scale the data and generate a new weighted-average unit price for the various species and product categories examined in the 2015-2016 report.

**APPENDIX A**  
**NSDNR UNIT CONVERSION TABLE**

Group	Product/Unit	Desc. or Length (ft) <sup>1</sup>	NS Conversion to m <sup>3</sup> (multiply)
<b>Softwood</b>	Sawlog mbfm	Cut to Length	5.663
	Sawlog fbm	Cut to Length	0.005663
	Sawlog tonne	Tree Length	1.167
	Studwood cord	8	2.322
	Studwood tonne	8	1.167
	Studwood m <sup>3</sup> (s)	8	0.641
	Studwood cord	10	2.265
	Studwood tonne	1	1.167
	Studwood m <sup>3</sup> (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 <sup>3</sup> (s)	8'	0.609
	Pulp/fuel m <sup>3</sup> (s)	Random Length	1.167
<b>Softwood Other</b>	Hemlock tonne	All	1.026
	Larch tonne	All	1.033
	White pine tonne	All	1.11

## APPENDIX B

### COMPARISON OF WEIGHTED AVERAGE PRICES WITH NO TRIMMING AND WEIGHTED AVERAGE PRICES WITH TRIMMING<sup>7</sup>

Wood Type	Product Category	Species	Average stumpage price	
			All data (no trimming) (\$/m <sup>3</sup> )	5 <sup>th</sup> /95 <sup>th</sup> percentile method (\$/m <sup>3</sup> )
Softwood	Sawlogs	SPF	29.28	29.48
		EWP	19.20	19.31
		HEM	17.24	17.28
		RP	**	**
		Other	**	**
	Veneer	SPF	**	**
		Other	**	**
	Boltwood	EWP	**	**
	Pulpwood Grade 1	SPF	10.74	10.79
	Pulpwood Grade 2	SPF	5.24	5.13
	Pulpwood Unsorted	Other	5.67	5.48
	Studwood	SPF	25.08	25.27
		Other	13.95	13.60
Fuelwood/Biomass	Any	3.35	3.29	
Sawables (Sawlogs & Studwood)	SPF	25.94	26.12	
Sawables (Sawlogs & Studwood)	Other	18.43	18.64	

Wood Type	Product Category	Species	Average stumpage price	
			All data (no trimming) (\$/m <sup>3</sup> )	5 <sup>th</sup> /95 <sup>th</sup> percentile method (\$/m <sup>3</sup> )
Hardwood	Sawlogs unsorted	All species except poplar	26.08	26.26
	Sawlogs (hardwood #2 or better)	All species except poplar	**	**
	Sawlogs (hardwood #3)	All species except poplar	**	**
	Pallet Logs/Sawlogs (hardwood #4)	Any	13.37	13.41
	Pulpwood	Any	9.46	9.48
	Veneer	Any	71.88	71.68
	Firewood	Any	13.94	14.21
	Fuelwood/Biomass	Any	**	**
Other	Any	**	**	

<sup>7</sup> The \*\* denotes the redaction of data by Deloitte required to protect the confidentiality of survey respondents.