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Institut de recherche sur les feuillus nordiques Inc.
Northern Hardwoods Research Institute Inc.

Increasing Sawlog Yields II: Reconsidering Tree Bucking Practices in Hardwoods for Effective Sawlog Recovery.

July 2015

Technical Note

Resource Characterization

Introduction

With some hardwood log grades reaching high value, achieving high product recovery during tree bucking is critical to ensure getting the highest possible returns. But the task of maximizing product recovery is difficult due to the high variability in tree form in hardwoods and to operational constraints. Presence of external and internal defects can also quickly downgrade potential sawlogs into lower or pulp grades. This report presents the results of a bucking exercise aimed at evaluating the maximum potential sawlog recovery and comparing it to operational yield.

Highlights

- ***Trials conducted showed that focussing on bucking best practices could potentially increase sawlog recovery by 8% points.***
- ***Exploring different merchandizing strategies and product specifications could potentially increase sawlog recovery by up 35% points.***
- ***With the tools produced at the NHRI and providing training, management systems from forest products companies can be improved to achieve higher yields of sawlogs.***

Methodology

A total of 381 stems from three different sites were selected for the study in 2014/2015 to conduct the bucking exercise. All sample trees had a minimum DBH of 18 cm and were topped at 8 cm. Stems were selected with consideration of the prescribed harvesting treatment, but the priority was to represent all categories of species and DBH. Each stem was evaluated twice under two different scenarios to obtain the maximum potential yield and the operational yield (Table 1).

Scenario A — maximum potential yield: where each stem was assessed visually for dimensions, sweeps and defects, without cutting, to estimate the maximum potential sawlog yield. Measures of internal defects present at log end, such as decay, were obtained during the scenario B test, and used to retroactively adjust grading in scenario A.

Scenario B — operational yield: represents the operational yield produced by the company's machine operators.

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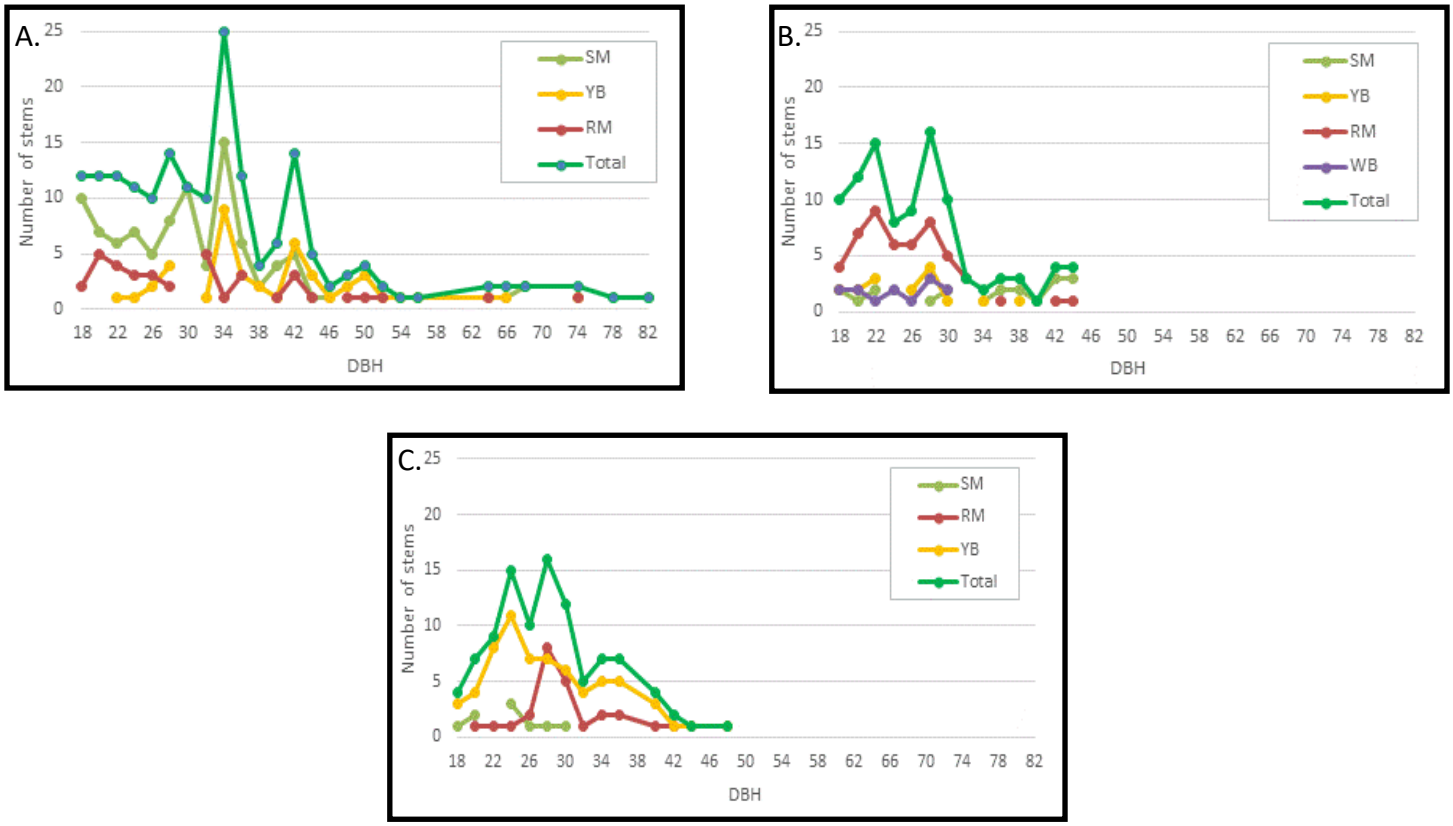
Table 1: Evaluation of each sample stem under 2 different scenarios.

Site	Number of	Scenario A:	Scenario B:
1	181	Visual evaluation (no cutting)	Bucked by Slasher
2	100	Visual evaluation (no cutting)	Bucked by Harvester
3	100	Visual evaluation (no cutting)	Bucked by Harvester

The 381 stems, from the three sites, covered four different species (Sugar Maple, Yellow Birch, Red Maple and White Birch) and DBH ranged from 18 to 82 cm (Figures 1).

Figure 1: DBH distribution of sampled trees for the three study sites A, B and C.



The Petro log classification system (Appendix 1) was used to grade potential logs under scenario A or bucked logs under scenario B. Products considered were F1, F2 and F3 sawlogs of 8 and 9 feet. Additionally, bolts of 6 and 7 feet were considered using Quebec Natural Resources Department specifications (Appendix 2) to maximise recovery. Remaining logs were classified as pulp logs or wood chip sections.

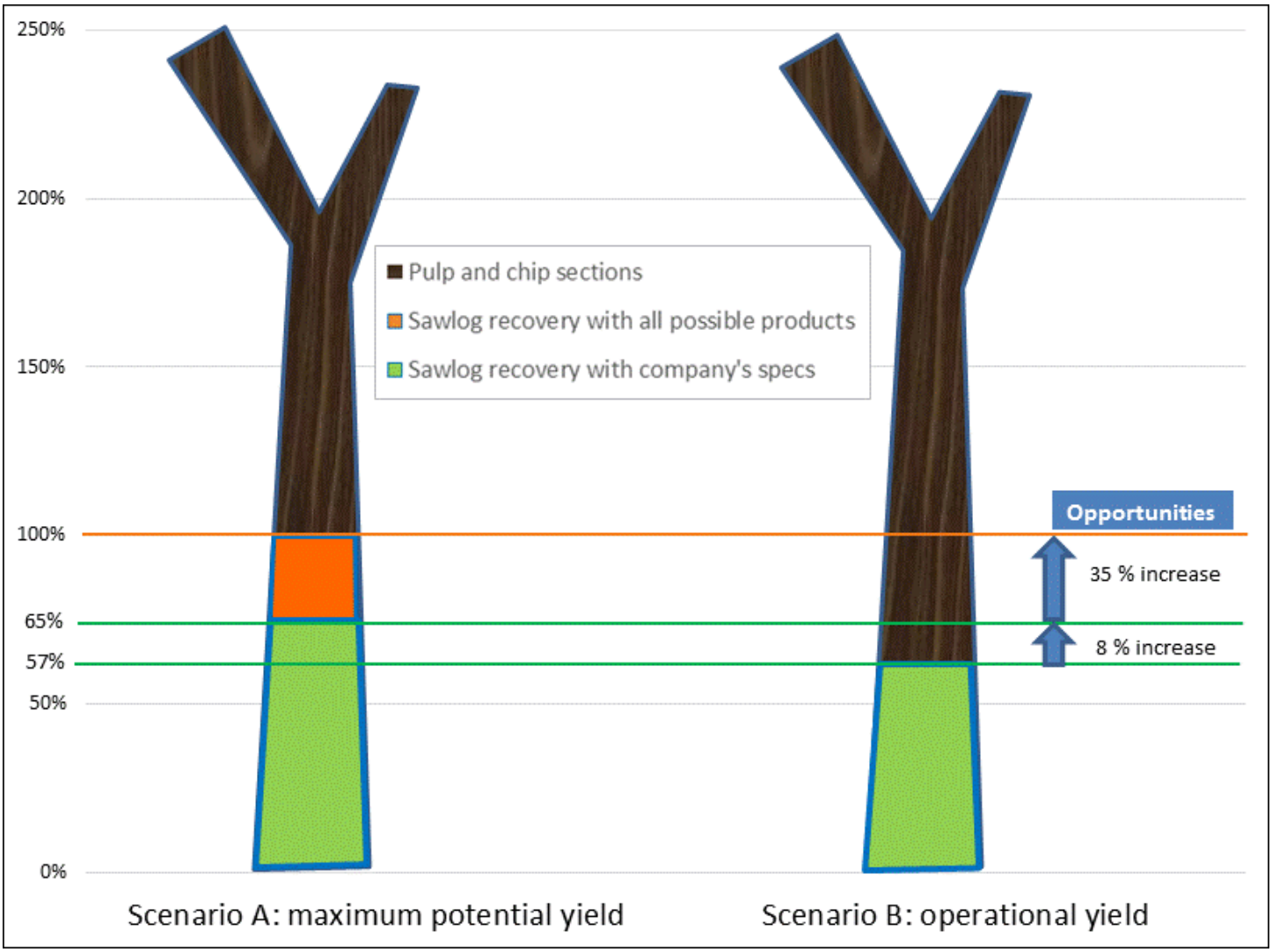
Results

Results from each of the three sites were evaluated separately, but are presented in a combined format to illustrate the general difference between the two scenarios evaluated: the maximum potential yield and the operational yield (Figure 2). Under the scenario A, the maximum potential yield was determined by considering all possible sawlog products, including small recovery bolts. The resulting maximum potential yield is set at a reference value of 100%.

Still under the scenario A, when considering only the products meeting each company's product specifications, the resulting potential yield is 65% of the reference value. This gap of 35% presents the opportunity of increasing product recovery by exploring different merchandizing strategies.

To evaluate the operational yield, with respective company's product specifications, under the scenario B, the operational yield is 57% of the reference value. Compared to the 65% potential yield, this gap of 8% represents the opportunity of increasing sawlog recovery by optimizing the operational bucking process and ensuring a tight management system.

Figure 2: Product yield under two different scenarios: maximum potential yield and operational yield.



Conclusion

Optimizing tree bucking in hardwoods is critical when aiming at obtaining the highest possible returns. A bucking exercise was conducted on three different sites to evaluate the maximum potential sawlog recovery and compare it to operational yield.

The performed bucking exercise showed that, for the three sites evaluated, product recovery could be increased by 8 percentage points by optimizing the operational bucking process and ensuring a tight management system.

The results also showed that an increase of 35 percentage points in product recovery is possible by adopting a merchandizing strategy that includes all products, including small recovery bolts.

References

Petro, F.J. and Clavert, W.W. 1990. La classification des billes de bois franc destinées au sciage. Forintek Canada Corp. SP519F.

Acknowledgement

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Appendices

Appendix 1: Petro log classification system.

Quality Criteria		F1 log			F2 log				F3 log
Position of log:		Butt log	Butt log and others		Butt log and others				Butt log and others
Minimum diameter (cm)		34-48	40-48	50 +	28	30 +			20 +
Minimum length (ft)		10			10	8-9	10	12 +	8 +
Clear sections	Minimum length (pi)	7	5	3	3				2
	Number	2			2			3	Unlimited
	Yield %	83%			67%	75%	67%	67%	50%
Sweeps	Less than 1/4 small end sound defects	15%			30%				50%
	More than 1/4 small end sound defects	10%			20%				35%
	Decay and sweeps	40%			50%				50%

Appendix 2: Quebec Natural Resources Department bolt specifications.

Quality criteria		Bolt
Minimum diameter (cm)		16
Minimum length (ft)		6
Clear sections	Length of sections (ft)	2
	Yield %	66%
Decay and sweeps	Less than 1/4 small diameter sound defects	10%
	More than 1/4 small diameter sound defects	5%