

Factors affecting the merchandising of hardwood logs in the southern tier of New York

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Abstract

In many areas of the eastern United States, hardwood boles are sawn into logs and then separated by product before proceeding to future processing. This type of product merchandising is facilitated by large differences in the relative value of hardwood logs of different species and grades. The objective of this study was to analyze the factors influencing the distribution, consumption, and merchandising of hardwood logs. The study area was New York's southern tier, a region with relatively high timber quality and with domestic and international customers. The study examined 16 hardwood sawmills with annual production ranging from 1 million to over 20 million board feet per year. While the most important factors considered by these firms when purchasing stumpage are grade and species, transportation distance was also listed as important, but there was no correlation between mill size and procurement distance. In addition, all mills that purchased stumpage shipped their grade 2 and better logs to the mill or yard and then sold either all or part of the veneer and export grade sawlogs from the mill. Eleven mills used a large variety of species and all but one of these mills listed stumpage as their main source of logs. The five mills with specific species requirements had a propensity to purchase gate logs. If grade 3 and below grade logs were shipped to the mill, a large percentage were either resold (as pulpwood, pallet logs, or firewood) or utilized; the remaining were disposed of.

Logs are difficult products to classify in economic terms. In some cases, logs can be considered an intermediate product; a product manufactured within a production process. This notion is valid for products such as southern yellow pine timber that is shipped in tree-length form to mills that produce lumber, chips, and bark. In other cases, tree boles are bucked (sawn into logs) and separated by product before proceeding to future processing, with logs from an individual tree possibly being sold to several primary processors. This type of product separation is especially common in hardwood markets due to the irregular form of most hardwood trees, the diversity of hardwood species existing on an individual site, and varia-

tions in the use and value of different species and grades of hardwood logs.

Background

Normally, hardwood logs are classified by species and quality. Hardwood quality is not uniformly defined but traditionally has been characterized into three grades (Rast et al. 1973) and "below grade." The higher grade logs generally yield higher quality lumber. The

highest grades of hardwood logs are further separated by additional attributes (such as roundness, color, diameter, etc.) because some primarily hardwood processors are willing to pay for these separations. While the species and physical differences may define a hardwood log, it is the large differences in relative value that make it profitable to separate and merchandise hardwood logs.¹ An examination of this merchandising step may

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*Forest Products Society Member.

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Forest Prod. J. 54(11):98-102.

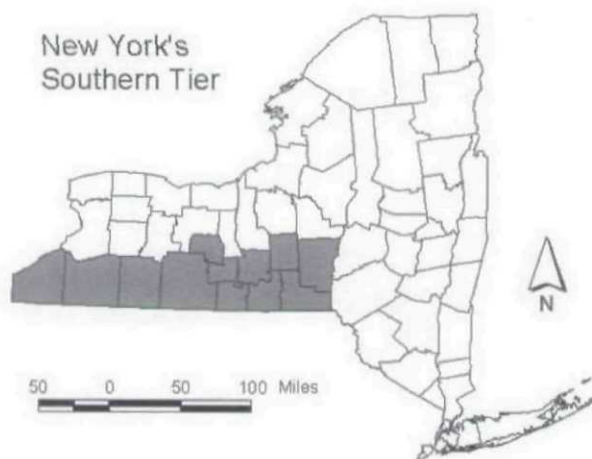


Figure 1. — New York's southern tier.

allow for a more complete understanding of the relationship between the price of hardwood lumber and hardwood stumpage.

Numerous studies have examined the backward linked relationship between timber sales characteristics and hardwood stumpage prices (Luppold 1984a, 1996, 1997; Holmes et al. 1990; Sendak 1992; Luppold and Baumgras 1995), between lumber prices and stumpage prices (Luppold 1984a, 1997; Kingsley and DeBald 1987; Luppold and Baumgras 1995; Luppold et al. 1998), and between exports and stumpage prices (Luppold 1984b, 1994, 1995; Buhler and Briggs 1988). In addition, the residual value method and the transactions evidence appraisal technique are common procedures for determining stumpage price and illustrate the backward link between the price of a final product (e.g., a delivered log) and stumpage price (Combes et al. 1989, Schuster and Niccolucci 1990, Klemperer 1996, Luppold 1996, MacKay and Baughman 1996, Rideout and Hesseln 1997, Dubois 1998, Bare and Smith 1999). However, none of these studies addressed how various parts of a hardwood tree are distributed to various end users or product markets.

As previously indicated, hardwood logs may be merchandised because

some end users desire logs with specific characteristics and are willing to pay for these differences. Face veneer² producers normally desire logs of highest quality and can pay a much higher price for such logs than most sawmills. High-quality hardwood veneer logs and sawlogs also can be exported to Europe, Asia, and other international markets. Some domestic sawmills specialize in specific species and products; other mills may have preferences for certain qualities such as color; while others will prefer such qualities as straightness and lack of defects. For example, the Sawlog Bulletin (bi-monthly) publishes lists of specific delivered log characteristics sought by individual sawmills. However, many, if not most, sawmills accept and process logs of nearly all species and most grades.

Under optimal market conditions, each log would be distributed to the end user offering the best price, and the number of possible end users generally increases with increased log size (Price 1989). However, most logs are purchased in bulk through timber sales, gate log purchases from independent logging firms, or as resale from other distributors. When considering the costs to transport each truckload, decisions must be evaluated in terms of the whole truckload rather than optimal use of each log. In addition, stumpage buyers may choose to leave certain low grade or below grade logs in the woods if the marginal cost of hauling these logs is lower than the value that can be obtained from these logs through further processing or resale (Jackson 1980).

Objective

The objective of this study was to analyze the factors influencing the distribution, consumption, and merchandising of hardwood logs. It was decided that it might be more useful to look at a relatively small geographic area in order to reduce the potential impact of regional variations in the log market. We have chosen to examine the log markets in New York's southern tier (Fig. 1). This area is of interest because of the relatively high-quality timber that is demanded by national and international customers and the diversity of the hardwood industry that utilizes this resource. Therefore, this study cannot be interpreted in broad geographic terms but may provide a baseline of concepts and ideas that can be extended to other regions.

Methods

Ideally, it would have been useful to examine the merchandising of hardwood logs by starting at the logging site and tracking the logs upward through the marketing chain. However, loggers were reluctant to cooperate for a variety of reasons, including slowing down the logging and loading process and the physical safety of the data collectors at logging sites. An alternative approach was to go to the most important log users in the region (hardwood sawmills) and work backwards into log and stumpage markets and forward through the log merchandising that occurs at the mill level.

A list of 42 mills that produce in excess of 1 million board feet (MMBF) per year and operate in New York's southern tier was constructed using the New York directory of primary wood-using industries (NYSDEC 1996). These mills were initially contacted through a letter and a phone call inquiring if they would participate in a telephone survey. The questionnaire was broken down into four parts and took approximately 1 hour to administer. The first part asked participants to rank log characteristics (e.g., species, grade, color, etc.) in order of preference, and market publications received by the mill (e.g., Northeast Logger, Sawlog Bulletin, Hardwood Market Report, etc.). The second part was used to obtain general information on the mill's size and production technology (e.g., headsaw, resaw, green chain, etc.). The third part asked for the main methods of procurement and the distances traveled to obtain logs. The final part

¹ For example, a January 2003 edition of the Sawlog Bulletin listed hard maple log prices in New York ranging between \$20 and \$6,500 per thousand board feet.

² Face veneer is veneer used in appearance applications such as furniture and paneling surfaces; whereas other hardwood veneer is produced from lower quality logs and is used as the interior of plywood material (core stock and cross banding).

Table 1. — Primary method of obtaining hardwood logs and distance of procurement area by sawmill grouping and size.

Group ^a	Size class ^b	Procurement method(s)	Most frequent procurement method	Maximum procurement distance
Multi-species mills	B	Stumpage/logs	Stumpage	250
	B	Stumpage/logs	Stumpage	200
	B	Stumpage/logs	Logs	100
	B	Stumpage/logs	Stumpage	50
	B	Stumpage/logs/own	Stumpage	60
	B	Stumpage/logs	Stumpage	100
	C	Stumpage/logs/own	Stumpage	100
	C	Stumpage/logs/own	Stumpage	100
	C	Stumpage/logs	Stumpage	80
Select-species mills	D	Stumpage/logs	Stumpage	100
	A	Stumpage/logs	Logs	200
	A	Logs ^c	Logs	50
	B	Stumpage/logs	Logs	100
	D	Stumpage/logs	Logs	200
	D	Stumpage/logs	Logs	200

^aMulti-species mills have a preference for most or all species. Select-species mills have a preference for a narrow range of species.

^bA = between 1 and 2.99 MMBF/year; B = between 3 and 5.99 MMBF/year; C = between 6 and 8.99 MMBF/year; and D = greater than 9 MMBF/year.

^cWill occasionally financially back purchases by an independent logger.

asked for information concerning the utilization and merchandising of logs.³ Sixteen firms agreed to participate. This response rate was due to difficulty in tracking down the appropriate contacts at the mills and small procurement personnel staffs with little available time. Of these 16 firms, a few operated more than 1 mill in the region. Since log grades and definitions are not uniform between mills, participating firms were faxed information on the log grades assumed by the study (Hanks et al. 1980) in order to obtain a consistent response. These grades were veneer/prime export (veneer/primex), grade 1, grade 2, grade 3, and below grade.

Analysis and results

Annual production for mills operated by responding firms ranged from 1 to 20 MMBF per year. To ensure anonymity, firms that operate multiple mills of similar size and with similar requirements were treated as one observation in **Tables 1** and **2**. We also ensured anonymity by aggregating mills into four capacity classes versus reporting precise production volumes. Even with the limited number of mills surveyed, there were some consistent responses by mills of similar size and species requirements regarding how logs were obtained and resold.

Respondents were first asked to rank the following factors in terms of importance for determining the probability of purchasing a particular sale: hardwood species and tree grades, knowledge of markets gained from reading trade publications, distance from the sawmill to the timber sale site, and special hardwood log attributes desired by the sawmill in question. It is not surprising that all responding sawmills chose tree grade and species as the most important factor in resource purchase decisions. Eight of the mills chose resource transportation distance as the second in their hierarchy of purchase factors (six of these sawmills produce at least 5 MMBF of hardwood-based products annually), while four others picked distance as the third most important purchasing factor. Market knowledge gained from trade publications had one vote for second, six votes for third, and a majority of eight votes for fourth. The fourth-place votes for market knowledge consisted of sawmills annually producing less than 9 MMBF of sawn hardwood products, suggesting that smaller sawmills place less emphasis on efficient stumpage appraisal in relation to procuring preferred stumpage qualities within competitive regional markets. While distance was rated relatively high in the hierarchy, the maximum procurement distance seems to vary considerably from mill to mill and is not correlated with mill size (**Table 1**). This finding indicates that specific log preferences by mill owners, ac-

cess to an interstate, or other factors also may influence the distance mills travel to procure logs.

The second major issue examined was how mills procured logs. There are many ways that mills obtain logs including: logs delivered to the mill by an independent contractor (gate logs), logs purchased at or near the logging site (curbside purchases), logs purchased from other mills (resales), direct stumpage purchase (stumpage purchases), harvests from own land (own), or financially backing an independent contractor with explicit right of refusal for logs of specific characteristics. While all firms surveyed indicated that they procured logs using more than one of these procedures, stumpage purchases or gate logs were listed as the main method of procurement (**Table 1**).

An initial examination of the responses to the log procurement questions produced perplexing results because both the smallest and two of the largest mills indicated gate logs as their primary source, while most of the mid-size mills indicated stumpage as the primary source. However, five of the six mills that listed gate logs as the most important source either used one species or had a fairly specific set of species used. Therefore, it was decided that the mills should be separated into two groups in **Tables 1** and **2**: mills that indicated a preference for most or all species (multi-species mills) and mills that indicated

³ The procedure for developing the telephone questionnaire can be found in Smalley (2002).

Table 2. — Disposition of different grades of logs received at the mill, by sawmill grouping and size.

Group ^a	Size class ^b	How logs are handled once at the mill				
		Veneer/primex	Grade 1	Grade 2	Grade 3	Below grade
Multi-species mills	B	Sold	Sawn	Sawn	Sawn	Sawn or sold as firewood
	B	Sold	Sawn	Sawn	Sawn	Sold for blocking
	B	Sold	Sawn	Sawn	Sawn	Sawn
	B	Sold	Sawn	Sawn	Sawn	Sawn/sold as firewood
	B	Sold/sawn ^c	Sawn	Sawn	Sawn ^d	Sawn ^d
	B	Sold/sawn ^e	Sawn	Sawn ^f	Sawn/sold ^g	Sold for pallets and firewood
	C	Sold	Sawn	Sawn	Sawn	Sold for firewood
	C	Sold ^h	Sawn	Sawn	Sawn/sold ⁱ	Sold as pulp or firewood
	C	Sold/sawn ^c	Sawn	Sawn	Sawn	Discarded
	D	Sold/sawn ^e	Sawn	Sawn	Sawn/sold	Sawn or used as boiler fuel
Select-species mills	A	NA ^j	Sawn	Sawn	Sawn	Sawn/sold as firewood
	A	Sold	Sawn	Sawn	Sawn/sold	Sawn into special products
	B	NA	Sawn ^k	Sawn	Sawn/sold ^l	Nothing
	D	Sold	Sawn	Sawn	Sawn/sold	Sold
	D	Sold	Sawn	Sawn	Sawn/sold	Sold

^aMulti-species mills have a preference for most or all species. Select-species mills have a preference for a narrow range of species.

^bA = between 1 and 2.99 MMBF/year; B = between 3 and 5.99 MMBF/year; C = between 6 and 8.99 MMBF/year; and D = greater than 9 MMBF/year.

^cRed oak logs sawn and maple and cherry logs are sold.

^dSaw what few logs arrive at mill. Below grade logs rarely go to the mill.

^eSome species of prime export logs that are not veneer are consumed by the mill.

^fApproximately 20 percent of grade 2 logs sold.

^g80 percent sold, the rest is sawn.

^hVeneer logs are not sold in the summer months.

ⁱAll low-value species sold.

^jNA = not applicable.

preference for a narrow range of species (select-species mills).

In an effort to track logs from the landing to the end users, firms were first asked to state if logs were shipped from the landing by log grade. Two of the five mills reporting gate logs as the primary source of logs did not provide information on this question. Of the remaining mills, 13 out of 14 mills indicated veneer/primex, grade 1, and grade 2 logs were shipped to the mill or yards.⁴ The one exception was a select-species mill that indicated veneer logs rarely go to the mill. For the most part, grade 3 logs go to multi-species mills. Select-species mills rarely ship grade 3 logs to the mill; however, if these logs are shipped to the mill they are usually sold. Multi-species mills will often ship below grade logs to the mill. Multi-species mills with an annual production greater than 8 MMBF per year indicated that below grade logs are sold as firewood, pallet logs, or pulp-

wood, given away, or otherwise used to a very limited extent. Multi-species mills with an annual production less than 6 MMBF per year have a greater tendency to use below grade logs, but they also sell them as firewood. Select-species mills rarely ship below grade logs to the mill.

All responding mills indicated that merchandising generally occurred at the mill or yard level and not at the landing (Table 2). Most of the multi-species mills surveyed with an annual production less than 9 MMBF per year sold veneer/primex logs. The multi-species mills surveyed with an annual production greater than 9 MMBF per year sold veneer logs; however, these mills indicated they used some of the prime export logs that were not quite good enough to be veneer. All select-species mills surveyed sold veneer/primex logs. However, most mills were very specific about selling cherry and hard maple veneer logs.

Both multi-species and select-species mills surveyed sawed grade 3 logs, though if markets existed for these logs they were sold. The multi-species mills

surveyed sold as firewood, pallet logs, and pulpwood; discarded; used in a very limited extent; or used as boiler fuel the below grade logs that reached the mill. Select-species mills surveyed with an annual production greater than 9 MMBF per year sold below grade logs that reached the mill as firewood, pallet logs, and pulpwood. Select-species mills surveyed with an annual production less than 3 MMBF per year either sold below grade logs that reached the mill as firewood or sawed them into specialty products. This suggested that the marginal cost of processing these logs often exceeded the value of the product that could be produced by sawing them.

Important considerations for future studies

While this study provided insight into the merchandising of hardwood logs, there are important issues not examined. In many areas in the eastern United States, there are markets for low grade roundwood such as pulpwood or oriented strandboard mills. Only 2 of the 16 responding firms indicated pulpwood markets for low grade logs. This low re-

⁴ Mills that indicated the use of yards were not identified in Table 1 in an effort to ensure anonymity of specific firms.

sponse could be the result of the declining pulpwood market in the Northeast at the time of this survey, the fact that we examined mill purchases versus loggers' activities, or the distance between the firms examined and active pulpmills and other low grade log users. For example, there are four mills within reasonable distance of the study area that take pulpwood. These are located in Deposit, NY; Johnsonburg, PA; Sunbury, PA; and Towanda, PA. A mill in Erie, PA closed in 2001-2002.

While most of the surveyed firms with no narrow species preference had a propensity to purchase stumpage, there may be numerous reasons why this type of behavior may not exist in all regions. For example, if a region has had traditionally well capitalized independent loggers as the primary purchasers of stumpage, then there may be less of a need for mills to purchase stumpage. Additional research is needed to determine what influences a mill propensity to purchase stumpage versus gate logs.

Summary and conclusions

Under optimal market conditions, individual logs would be distributed to users offering the highest price. Log merchandising is important because it offers a market mechanism that best approaches this optimality subject to real world considerations such as log separation and transportation costs. Through this process, greater returns to logging equipment and forest management are possible. Still, this important market process has not received much analysis as it applies to hardwood product markets. This study has started to reduce this knowledge gap by examining the factors influencing the distribution, consumption, and merchandising of hardwood logs in New York's southern tier. This region is especially interesting because it contains relatively high timber quality that is demanded by a variety of domestic and international customers.

Because of operational and safety reasons, it was decided to concentrate the study on the activities of larger sawmills within this region. An examination of 16 firms in New York's southern tier indicated mills primarily focus on species and quality when making procurement decisions. While the distance logs must travel also appeared to be important, there was no strong relationship between the size of the mill and the size of the procurement region. Firms that re-

quire specific species (select-species mills) tended to have a greater propensity to purchase gate logs, while mills that produce a broad range of species (multi-species mills) had a propensity to purchase stumpage.

When mills purchased stumpage, they shipped the grade 2 and higher logs from the sale site to the mill. All but one of the multi-species mills also shipped grade 3 logs to the mills, while the select-species mills had stipulations about grade 3 logs. While smaller multi-species mills tended to ship below grade logs to their mills, large select-species and multi-species mills showed a greater frequency of selling or discarding this material.

Every firm survey indicated that they sold all or part of the veneer/primex logs received at their mills. But several of the larger Group I firms processed some of these higher grade logs into lumber. While there were two firms that indicated they sell some of their grade 1 or 2 logs, these logs were, for the most part, processed into lumber. Smaller multi-species mills tended to saw grade 3 logs; large multi-species and select-species firms tended to either sell or saw these logs. Both types of mills indicated they intended not to process below-grade logs, preferring to sell, burn, or discard them, which suggests that the marginal cost of processing these logs exceeds the value of the lumber that could be produced.

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