



### FOREST RESOURCES ASSOCIATION INC.

600 JEFFERSON PLAZA, SUITE 350  
ROCKVILLE, MARYLAND 20852

PHONE: 301/838-9385

FAX: 301/838-9481



## IMPACT OF VARYING MILL DEMAND ON LOGGING PRODUCTION AND COST

*Surveys/Studies: production/costs*

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**INTRODUCTION:** The dynamics and characteristics of the wood market are key factors that affect capacity utilization of individual logging crews. These market characteristics include not only the number and type of wood receiving mills but also their wood procurement practices and approach. Of special importance is the stability of wood purchases experienced by wood producers within each wood area. As a part of a recent study examining unused wood production capacity for the Wood Supply Research Institute, we developed consistency ratings for wood purchases and usage by mills that can be used to benchmark mill performance and correlate with the production of their wood suppliers.

**WEEKLY MILL INFORMATION:** We had weekly woodyard data from 138 mills (lumber, chip, pulp, OSB, and plywood) located from Maine to Texas between April 2000 and December 2001. The information included the beginning and ending inventory, purchases, and usage. It also indicated if suppliers were on quota that week, whether the mill was attempting to reduce, hold, or build inventory, and if any factors restricted wood flow during the week (weather, mill outage, woodyard, etc.). They further indicated if mill consumption and direct wood purchases were below, at, or above the planned level for each raw material product.

**MILL CONSISTENCY RATINGS:** Mill raw material purchases are driven by mill usage. As mill usage varies, so can the purchases of raw material. This purchase variability can directly impact the production and, hence, the costs of the wood suppliers that deliver to the mill. Conversely, consistent levels of wood purchases create a more predictable market environment and reduce the costs to wood suppliers. The impact is typically greatest on the wood suppliers when the mill purchases drop below their average purchase level.

To quantify the level of market volatility faced by the logging production force, we developed two consistency ratings — the Purchase Consistency Rating (PCR) and Usage Consistency Rating (UCR). Each was determined using the semivariance or downside variability of mill purchases or usage, respectively. The semivariance is similar to a variance statistical measure, except that observations above the mean are given a deviation of zero instead of their actual positive deviation value. As we use the semivariance, the mean is the long-term average of wood purchase or usage levels for a given mill. If the weekly observation exceeds the mean value, the difference is positive and is replaced with a zero in calculating the semivariance. Thus, only below-target purchase levels that provide a negative deviation are used in the calculation. To obtain the consistency rating, we take the square root of the semivariance and divide it by the mean, multiply it by 100% (similar to a coefficient of variation), and then subtract it from 100 as follows:

$$\text{Consistency Rating} = 100 - \{(S / X) * 100\}$$

where X = mean and S = square root of the semivariance.

This same method was applied to develop consistency ratings for both purchase and usage levels for each participating mill on a quarterly basis. Higher consistency ratings were associated with less downside variability in a mill's purchases or usage. High values of each index indicate consistent performance with low downside risk.

## TECHNICAL RELEASE 03-R-2 / *continued*

**APPLICATION:** These consistency figures can be used in several ways, including:

Comparing PCR to UCR for an individual mill or group of mills: To a large extent, a mill's purchase pattern will reflect its usage trends. However, we found that some mills purchased more consistently than their usage. The procurement management in these cases is buffering the wood suppliers from the variability they should expect given the usage pattern of the mill. Dividing the PCR by the UCR gives a useful ratio (see Table). If this value is greater than 1, the purchases are more consistent than the usage. If it is less than 1, purchases are more variable. In better-managed woodyards, one would expect a value of 1 or more.

Comparing PCR and/or UCR with industry or company peer mills: For companies with multiple mill locations, these ratings can be compared between mills and to the company averages (see Table). If industry measures are available, as they were in our WSRI study, these comparisons can also be made.

Mill	Purchase Consistency Ratings, %			Usage Consistency Ratings, %			Ratio of Means
	Low	Mean	High	Low	Mean	High	
A	62.7	65.4	68.9	55.1	65.1	70.5	1.00
B	64.3	70.5	73.6	54.0	68.6	75.1	1.03
C	70.6	74.4	78.6	71.4	78.3	86.8	0.95
D	72.8	82.4	90.4	62.4	77.7	84.5	1.06
Company	62.7	73.1	90.4	54.0	72.3	86.8	1.01
Industry	44.5	81.5	96.3	49.2	82.1	97.6	0.99

Evaluating the impact of PCR on the production of wood suppliers: The WSRI study examined the impact of mill PCR values on the production of wood suppliers delivering to those mills. We found that the amount of production logging crews lost due to market causes (i.e., quota) was significantly correlated with the PCR values of the mills receiving their wood if they were not a preferred supplier. There was no correlation between lost production and the PCR for preferred suppliers, and this effect was not unexpected since the mill works to minimize their production variation.

These ratings are simple to calculate and use measures (purchases and usage) that are available and monitored weekly by most mills in the industry. Data on the production of wood suppliers are also often available and can be linked with mill measures to evaluate impacts on the wood supply system.

James R. Ulmer, Graduate Research Assistant  
W. Dale Greene, Professor  
Center for Forest Business

Daniel B. Warnell School of Forest Resources  
The University of Georgia  
Athens, Georgia 30602-2152  
706/542-6652

**COMMENT:** More detail on WSRI's comprehensive study is available in FRA's 27-page special report, Causes and Costs of Unused Wood Production Capacity in the Southern USA and Maine (02-A-5), available from FRA's national office for \$25 to FRA members, \$50 to others.

Reviewed by:  
Larry Davis  
Southeastern Technical Division Forester