



## Dynamics of the Hardwood Chip Market

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The hardwood chip market is an important element of wood fiber raw material supply for the pulp and paper industry and other pulp-based products such as fiberboard. Hardwood chips enter the chip market from two principal sources: (1) chips produced from wood residue byproducts at sawmills and (2) chips produced from pulpwood roundwood, primarily from chip mills and to a small extent from in-woods chipping operations. Chip mills are stand-alone facilities that convert pulpwood roundwood into chips for shipment to pulp mills; they are usually located *remote* from pulp mills. Large volumes of chips are also produced and utilized on site at pulp mills but do not enter into the chip market.

The hardwood chip market in the United States and particularly in the U.S. South has exhibited some interesting and remarkable behavior in recent years. Although overall U.S. consumption of pulpwood at pulp mills has declined since the mid-1990s, the receipts of hardwood chips at pulp mills have increased slightly. However, hardwood chip exports have virtually collapsed. Prices for hardwood chips in the South had generally declined from their peak in 1997, but they surged in 2002 and 2003, particularly prices for hardwood chips from *remote* chip mills. As discussed in this article, recent market trends for hardwood *sawmill* residue chips differ somewhat from trends for chips from *remote* chip mills, and the surge in prices for chips from *remote* chip mills appears to be related to the weather.

Slow growth in manufacturing, the value of the U.S. dollar, reduced exports, and shifting weather conditions are factors that have influenced the hardwood chip market in recent years. Ongoing U.S. economic recovery, shifts in currency exchange rates with a weaker dollar, and changes in the infrastructure of pulpwood supply are factors likely to *influence* dynamics of the hardwood chip market in the near future.

Slow growth in manufacturing and industry consolidation in the U.S. has contributed to diminished output of wood pulp and diminished demand for pulpwood since the mid-1990s. From around 1996 until last year, the dollar surged in value relative to foreign currencies, far above its historical

average, making foreign manufactured goods more competitive and placing U.S. manufacturers at a disadvantage. Thus, overall U.S. goods imports and the trade deficit in goods surged to record levels and U.S. industrial output declined. Consequently, since 1999 U.S. production of paper and paperboard (used heavily for packaging and advertising in manufacturing) has taken a downturn. This downturn followed a period of increased paper recycling in the 1990s, which also offset growth in wood pulp output. Thus, after increasing steadily throughout most of the 20th century, U.S. annual output of wood pulp has declined by about 13% since its peak in 1995 (data from *American Forest & Paper Association, AF&PA*).

Since the mid-1990s, a similar decline has occurred in total receipts of pulpwood at wood pulp mills (*Forest Resources Association, FRA*). Furthermore, U.S. exports of pulpwood have dropped significantly since the 1990s. Exports of hardwood chips have virtually collapsed, as shown by annual export data for the United States as a whole and the U.S. South in particular (*Fig. 1*).<sup>1</sup> The strong dollar and expansion of overseas hardwood fiber plantations such as eucalyptus plantations in South America and Asia have contributed to the declining demand for U.S. hardwood chip exports.

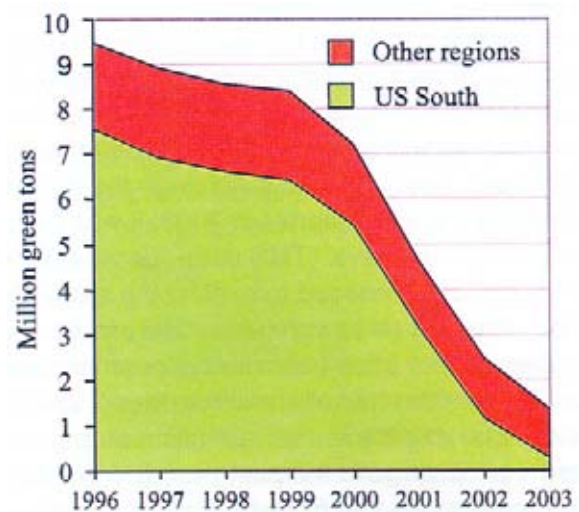


Fig. 1 - U.S. hardwood chip exports.

<sup>1</sup> 2003 estimate extrapolated from exports for the first 9 months of the year: based on trade data from U.S. Department of Commerce and ITC compiled by Irene Durbak. Forest Products Laboratory, Madison, WI.



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Although growth in demand for pulpwood has declined in recent years, the United States still remains by far the largest producer of wood pulp in the world, as well as the largest producer of pulpwood roundwood and wood chips. In 2002, U.S. pulp mills consumed roughly 223 million green tons of pulpwood, including roundwood and chips (FRA domestic pulpwood receipts data), and an additional 9 million green tons of pulpwood were exported (roundwood and chip export volume data from U.S. Department of Commerce).

Of the total demand in 2002, 36% was hardwood pulpwood in all forms (roundwood and chips): about half the hardwood demand (18%) was hardwood chips, including domestic receipts and export. Figure 2 shows the distribution of U.S. pulpwood supply and demand in 2002, including roundwood and chip receipts at domestic pulp mills and pulpwood exports (primarily chips; some roundwood).

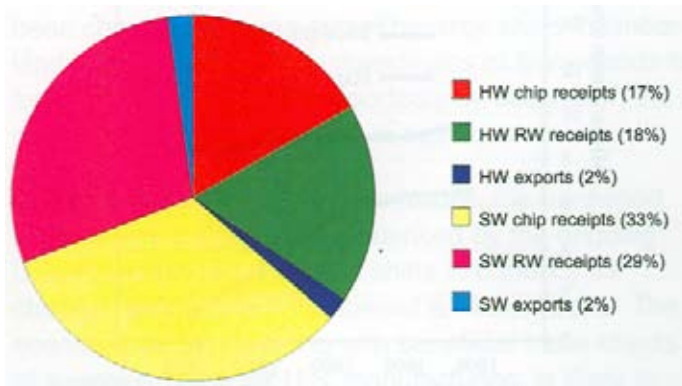


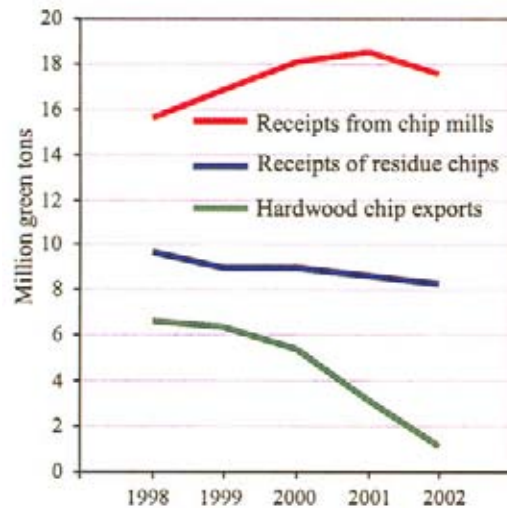
Fig. 2. U.S. pulpwood supply and demand, 2002 (232 million green tons). HW is hardwood, RW roundwood, and SW softwood.

The market for hardwood chips, which is located predominantly in the South, accounted for 73% of U.S. hardwood chip supply and demand in 2002. Thus, it is appropriate to examine in more detail the market trends for hardwood chips in the South as a leading example of dynamic trends in the U.S. hardwood chip market.

Since the late 1990s (at least up to 2001), an important shift in the Southern hardwood chip market has been expansion in the regional use of hardwood chips from remote chip mills and decline in use of residue chips (from sawmills) and hardwood chip exports. Figure 3 shows trends since 1998 in annual receipts of hardwood chips from chip mills and hardwood residue chips at Southern pulp mills, along with exports of hardwood chips from the South (receipts data from FRA reports; exports from U.S. Department of Commerce and International Trade Commission (ITC) trade data). The use of hardwood chips from

remote chip mills actually increased in the South from 1998 to 2001; this usage dipped in 2002, but it was still 13% higher than usage in 1998. Overall demand for hardwood chips (including exports) dropped by 15% in the South between 1998 and 2002, down from 32 million to 27 million green tons.

Fig. 3 -Annual Southern hardwood chip receipts at pulp mills and chip exports.



The trend in use of chips from remote chip mills in the South (+13% from 1998 to 2002) is quite divergent from the trend in the same period for hardwood sawmill residue chip use (-14%) and very divergent from the trend for hardwood chip exports (-83%). A number of technological and economic reasons are commonly cited for the expansion in use of chips from remote chip mills in the South, including the safety and efficiency of transporting chips versus logs to pulp mills, the reduction of the number of small remote log yards through the use of higher capacity and more labor-efficient chip mills, and a trend toward independent outsourcing of pulpwood supply. Despite declining demand for other categories of pulpwood, increased use of hardwood chips from remote chip mills cancelled out the drop in use of hardwood sawmill residue chips and resulted in a small net gain (+2%) for use of hardwood chips at pulp mills in the South between 1998 and 2002.

With increased use of hardwood chips from remote chip mills in the South, one might logically expect some relative strength in the market for hardwood chips from remote chip mills compared to other categories of pulpwood (which declined in use in recent years). Indeed, delivered pulpwood price trends for the South in recent years support that logic to some extent. For example, the delivered price for hardwood chips from remote chip mills in the South dropped by just 2% between 1997 and 2002, according to



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South-wide annual averages reported by *Timber Mart South (TMS)*, whereas delivered Southern Pine roundwood pulpwood prices declined more significantly, by 13% or nearly \$9 per cord. Pine pulpwood prices have been recovering somewhat in 2003, but the average third-quarter delivered pine pulpwood price was still well below 1997 levels.

The logic that increased use of hardwood chips contributed to relative strength in the hardwood chip market does not however, explain more recent market behavior of hardwood chips since 2002. The price of hardwood chips from remote chip mills in the South surged in 2002 and 2003, climbing to 22% above 1997 levels, even though use dropped slightly in 2002 (*Fig. 3*). Overall demand for hardwood chips has shown little evidence of recovery in 2003, making the recent surge in prices for hardwood chips from chip mills all the more remarkable. Furthermore, the price of hardwood *sawmill* residue chips has not exhibited nearly the same behavior as that of the price of hardwood chips from remote chip mills. South-wide average price for delivered hardwood *sawmill* residue chips dropped by 10% between 1997 and 2002. Although the price had recovered by the third quarter of 2003, it was still just 1% above the 1997 level (**TMS** data). Some additional insight is obviously needed to explain the surge in the price of hardwood chips from chip mills and to sort out the discrepancy in price behavior between hardwood chips from *remote* chip mills and hardwood *sawmill* residue chips, with the former exhibiting strong recovery and a price surge in the past year and the latter just barely recovering (+1%) from 1997 price levels.

Key to explaining the discrepancy in Southern hardwood chip price trends (between prices for chips from *remote* chip mills and residue chips from sawmills) is the fact that the South has been exposed to unusually wet weather conditions over the past year or so, which has contributed to a spike in hardwood roundwood pulpwood prices. *Figure 4* shows the deviation from normal precipitation levels from November 2002 to October 2003 (*National Oceanic and Atmospheric Administration*). The South and the eastern part of the country experienced well above average precipitation levels in that period (10% to 50% higher than normal precipitation).

This recent wet weather was a distinct shift from drier conditions that prevailed in the South for several years prior to 2002. This shift led to deterioration in hardwood pulpwood logging conditions and widespread reports of limited site access and downtime for logging operators, especially

on typical lowland or sloped hardwood sites in the South. Thus, harvest and supply of hardwood roundwood pulpwood (and supply of hardwood to remote chip mills) became sharply limited by wet weather from late 2002 to 2003. Consequently, although demands for both hardwood and pine pulpwood generally declined in the South (as noted previously), there was an exceptional surge in hardwood roundwood pulpwood prices over the past year as a result of supply limitations induced by wet weather. From 1997 to 2002, the South-wide average delivered hardwood roundwood pulpwood price dropped by 1%, but it surged to a gain of 16% by the third quarter of 2003, behavior fairly similar to that for hardwood chips from remote chip mills (**TMS** data). The price increases for hardwood are remarkable because both pulpwood stumpage and delivered pulpwood prices for hardwood have climbed higher than pine stumpage and delivered prices, an unprecedented phenomenon in the South where pine has historically always been higher in price than hardwood.

Since remote chip mills depend directly on roundwood pulpwood harvest for most of their raw material, it is logical to expect similar price behavior for hardwood chips from remote chip mills and hardwood roundwood pulpwood, which are directly affected by weather-induced supply shortages. In fact the accuracy of that logic is borne out by the correlations in recent price behavior. Conversely, the supply of hardwood residue chips from sawmills is at least two steps removed from timber harvest operations because it is dependent on sawmill log inventories and log processing rates. Thus, it is not surprising that the price behavior for hardwood *sawmill* residue chips differs from that for hardwood roundwood or chips from remote chip mills. Moreover, pulp mills vary in their utilization standards for wood raw material. There can be differences in utility of chips from different sources caused by variation in uniformity or size of chips, proportion of juvenile wood and mature wood, or species composition, which may sometimes affect the market value of *sawmill* residue chips versus chips from remote chip mills.

In the South, drier weather began to prevail in the autumn of 2003. However, since weather is notoriously difficult to predict, it remains to be seen how roundwood pulpwood prices will evolve along with the price of chips from chip mills. Recent reports suggest an easing of the weather-related supply crunch. The infrastructure of roundwood pulpwood supply has also been changed to some extent by large shifts in timberland ownership (primarily divestitures of timberlands by forest industry) and also reportedly by *declines* in the number of logging operators in business.



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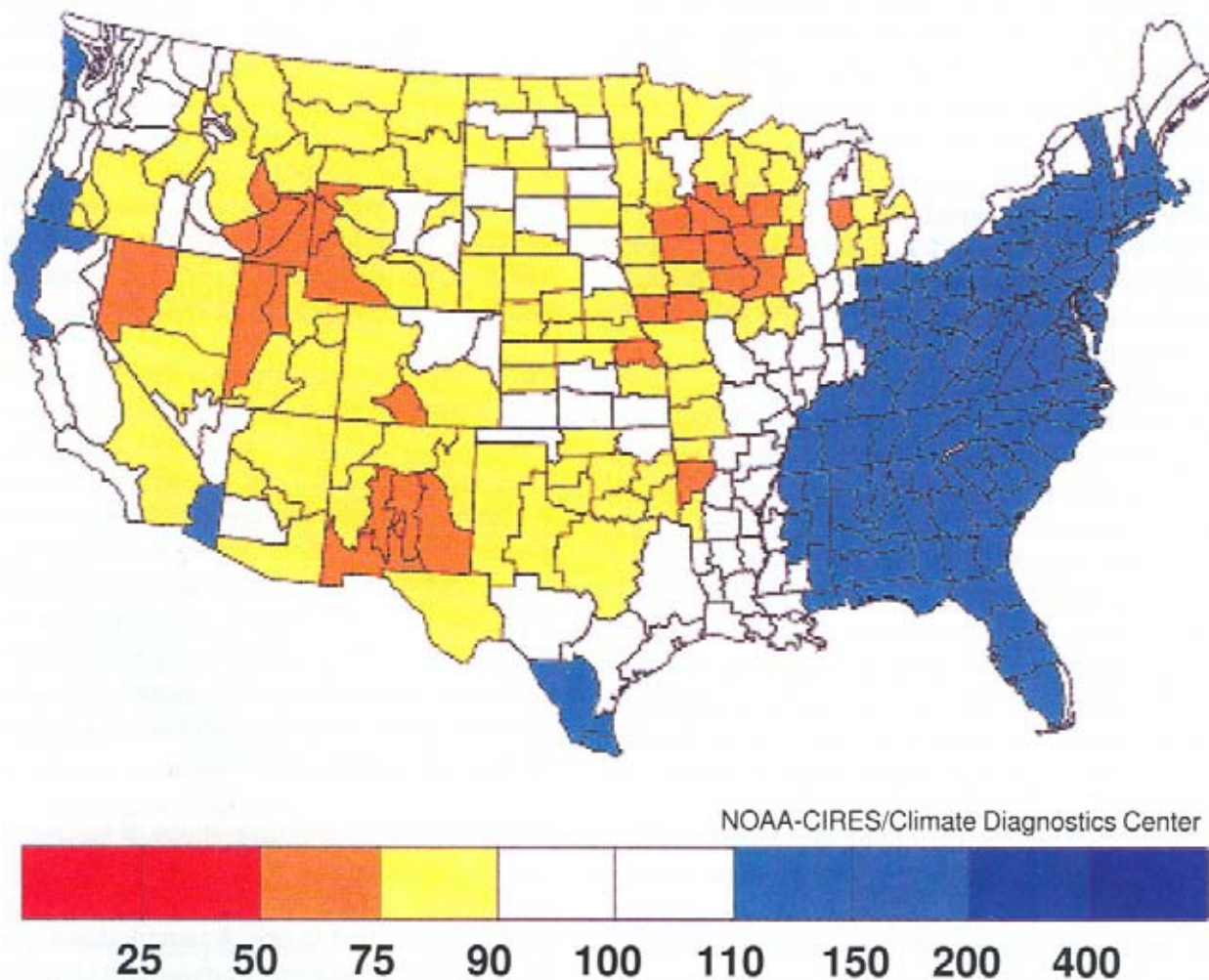


**Looking ahead into the near future**, the hardwood chip market is likely to be influenced by the ongoing U.S. economic recovery and shifts in currency exchange rates with a trend toward a weaker dollar. The economic recovery, along with beneficial trade effects of a weaker dollar for U.S. manufacturing, is likely to propel a gradual upturn in paper and paperboard demand, wood pulp output, and pulpwood demand. However, the U.S. manufacturing sector still has a large overhang of excess capacity, global economic growth is relatively slow, and U.S. manufacturers face stiff challenges from *global competitors*.

In summary, the increase in use of hardwood chips from remote chip mills in the South in recent years has leveled out, while other categories of pulpwood have generally declined in use. A remarkable surge in the price of hardwood chips from remote chip mills has occurred, primarily

in the past year, which is correlated to a surge in the price of hardwood roundwood pulpwood. The price surge would appear to be mainly a supply-side phenomenon, induced by unusually wet weather and harvest limitations over the past year, but it may also be due in part to increased use of hardwood chips from remote chip mills. Meanwhile, both the use of hardwood residue chips from sawmills and hardwood chip exports have declined since 1998, and the South-wide average price of residue chips from sawmills has just barely recovered since 1997 (up by just 1%). Although prices for hardwood roundwood pulpwood and chips from remote chip mills recently exhibited some fairly dynamic and interesting behavior, partly induced by unusually wet weather in the South, by late 2003 much of that price behavior had not yet filtered into the hardwood *sawmill* residue chip market.

Fig. 4 -Percent of normal precipitation, 1895-2000, Nov to Oct 2002-03



In: Hardwood Market Report. 7th Annual Statistical Analysis of the North American Hardwood Marketplace, Memphis, TN: H.E. (Gene) Parker. pp. 2-5