

Recycling and the Use of Wood Materials by the U.S. Pallet Industry

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ABSTRACT

Estimates of the use of new and recycled wood materials by the U.S. pallet industry are presented. The industry (including SICs 2441, 2448, 2449) consumed 4.74 billion board feet of solid hardwoods and 2.15 billion board feet of solid softwoods in 1992. The most common individual hardwood species were oak and yellow-poplar. Douglas-fir and southern yellow pine were the most commonly used softwoods. Approximately 65.8 million pallets (containing an estimated 1.03 billion board feet) were received for recycling in 1992 by firms included in SIC 2448. Of this total, 912 million board feet were used again in a pallet. The unlagged industry recycling rate for pallets was estimated at 13 percent in 1992 and 16 percent in 1993.

INTRODUCTION

Interest in pallet recycling has increased dramatically in recent years. Several factors have contributed to this trend. First, increased awareness of the environment and activities that affect the environment have caused a previously unconcerned public to question the use of new wood for pallets. Pallet producers, concerned with the availability and price of materials, have begun to look at used pallets as a raw material opportunity. Pallet users have turned to recycled pallets as a way to decrease their product handling costs. Finally, waste disposal costs are significant and increasing

attention is being paid to reducing the growing solid waste stream.

These trends, in conjunction with low barriers to entry, have resulted in industry growth. The National Wooden Pallet and Container Association (NWPCA) reports that pallet recycling is now the most profitable sector of the pallet industry and new pallet producers continue to enter the recycled market. At least two associations (NWPCA and the International Association of Pallet Recyclers) represent the interests of pallet recyclers and quality standards for pallet repair have been developed. An article in Pallet Enterprise (Brindley 1993) reported that pallet recyclers are generally optimistic concerning the future growth of their industry.

In spite of this interest and activity, we found that good estimates of the volumes of new and recycled materials used by the industry were not available. Consequently, the Center for Forest Products Marketing at Virginia Tech, in collaboration with the Southern Research Station of the U.S.D.A. Forest Service, began tracking wood use in the industry. We have been tracking the use of new wood material by the pallet and container industry annually since 1991. Our first study of recycling in the pallet industry covered 1992.

This paper presents the results of our study of wood materials (both new and used) utilized by the pallet and

container industry in 1992 and initial findings concerning use in 1993. We begin by discussing the use of new wood materials as this information helps to frame the discussion of recycling. We do not explain the methods used to arrive at our estimates. However, we would be pleased to provide this information to interested readers.

RESULTS

The Use of New Wood Materials

We estimate that firms in the U.S. wood pallet and container industry (Standard Industrial Classifications 2441, 2448, 2449) used 4.74 billion board feet of solid hardwoods in 1992. Lumber and cants accounted for 3.96 billion board feet (83.4% of the total) and the remaining volume consisted of pallet parts and shook. Total U.S. hardwood lumber production in 1992 has been estimated at 9.8 billion board feet (Pease et al. 1994). Using this figure, the pallet industry consumed a volume of hardwood equal to approximately 48 percent of total hardwood lumber production in 1992.

The pallet industry also uses considerable volumes of solid softwoods. We estimate that consumption was 2.15 billion board feet in 1992. Most (75.4%) of this use was in the form of lumber and cants rather than pallet parts or shook. It will come as no surprise to learn that pallets and containers are not a large part of the market for softwoods. With estimated total U.S. production of softwood lumber estimated at 34.5 billion board feet in 1992 (Pease et al. 1994), the pallet and container industry accounts for slightly more than 6 percent of production.

In addition to volumes, we investigated the species of solid wood used by the industry. We found that oak made up the largest portion of hardwood used by the industry during 1992 at 39.6 percent of the total (Figure 1). The general category of mixed hardwoods (hardwoods used without segregation by species) was also large at 33.4 percent of total use. Yellow-poplar use was 12.7 percent of the total and

alder accounted for 7.6 percent. Solid softwood use was dominated by southern pine (39.7% of total softwood volume) and Douglas-fir (28.8%). The remaining volume of softwoods used by the industry was split among several species including imported radiata pine.

The industry uses wood panel products in addition to solid wood. While much of this use is for containers, panel-deck pallets are also produced. The major panel products used by the industry are softwood plywood and (to a lesser extent) oriented strandboard and hardwood plywood. We estimate that the industry used 169 million square feet of softwood plywood, 20 million square feet of oriented strandboard, and 16 million square feet of hardwood plywood in 1992.

Many firms utilized a variety of materials to satisfy their customers' pallet and container needs in 1992. Hardwood lumber or cants were used by 66 percent of the firms in the industry and softwood lumber or cants were used by 59 percent. Softwood plywood was used by 39 percent of the firms and oriented strandboard by 13 percent. Hardwood plywood was used by only 3 percent of the firms in 1992.

The Use of Recycled Material

As mentioned, recycling has become a significant part of the pallet business. In fact we estimate that 44 percent of U.S. pallet manufacturers (SIC 2448) were involved in recycling during 1992. These firms received 65.8 million pallets (containing an estimated 1.03 billion board feet of wood) for recycling during 1992. Of this total, 912 million board feet were used again in a pallet.

The most common pallet received for recycling was the multiple-use grocery (GMA) type (61.3% of the pallets received). Other types of multiple-use pallets accounted for 23.2 percent of the total and single-use pallets (also called limited-use) accounted for 14.3 percent (Figure 2).

An important goal of our study was to determine how the pallets received by recyclers were utilized. We found that almost 15 percent (14.9% to be exact) were inspected, found not to need repair, and resold.

Technically, this may be reuse rather than recycling. Regardless of the term, this activity prevented the pallet from becoming an immediate disposal problem and helped to reduce the need for new wood pallets.

The largest proportion of pallets received for recycling (62.3%) were repaired and reused. Some pallets (14.0%) were un-nailed (disassembled) and 7.6 percent went directly to the grinder or chipper.

The reason pallets are disassembled is to allow the parts to be reused. Consequently, it is not surprising that 82.5 percent (by volume) of disassembled pallet parts were used to rebuild pallets in 1992. Another 10.2 percent were apparently unusable and were ground, chipped, hogged, or otherwise reduced to particles. Other uses of disassembled parts accounted for 7.2 percent of the total volume.

We estimate that 91.5 million board feet of pallet material was ground by the industry in 1992. Markets for this material were quite diverse. The largest portion (53.1%) was used directly as fuel, 12.3 percent was used as mulch, and 5.8 percent was used as bedding. This leaves 28.8 percent of the wood volume in the other category. A small amount of this material was landfilled. However, most was used in ways that included furnish (for particleboard, hardboard, paper, and molded wood products), pellets for wood stoves, soil amendments, and compost. Figure 3 provides information concerning the use of ground pallet material in the various regions of the United States.

Trends in the Use of New and Recycled Materials

Since we have data representing only a limited number of years, it may be too early to begin to speak of trends. However, we have seen some changes that are worth watching.

The use of new solid wood materials by the industry changed little from 1992 to 1993. The findings of our study concerning wood use by the pallet industry during 1993 suggest that the use of both solid hardwoods and solid softwoods increased by less than 2 percent. This relatively small increase in the use of new solid wood may be attributed, at least in part, to pallet recycling activity. In 1992, firms predicted increases in solid wood use of 6 to 8 percent over the following two years. However, this increase does not appear to be occurring.

In 1992, pallet and container manufacturers predicted decreased use of oriented strandboard and this change does appear to be taking place. Use of OSB in 1993 was down by approximately 9 percent as compared to 1992. The use of softwood plywood increased during this period.

The initial results of our 1993 study also suggest changes in the use of recycled materials. Perhaps the most significant is a 27 percent increase in the number of pallets received for recycling (to 83.32 million pallets in 1993). While the number of pallets increased, the percentage of new pallet manufacturers involved in recycling remained unchanged at 44 percent. This finding, along with anecdotal evidence that indicates a larger number of firms involved in pallet recycling, suggests that growth in the number of recyclers has occurred outside of the traditional industry (i.e., SIC 2448). The volume of wood contained in the pallets received for recycling in 1993 increased by 20 percent over 1992. Comparing this figure to the change in the number of pallets (27%) suggests changes in the mix of pallets received. In fact, we found that single-use pallets were a larger percentage of the total number received in 1993 than they were in 1992 (17.9% versus 14.3%). Demand for used pallets has become strong in some markets, resulting in firms accepting lower quality pallets in order to obtain the raw materials (i.e., used pallets) they need.

In general, pallet utilization (percent repaired, percent un-nailed, percent ground, etc.) changed little from 1992 to 1993. A slightly larger percentage of pallets were un-nailed in 1993 and the un-nailed parts were more likely to be ground. This finding may be, in part, a result of the changes in pallet types mentioned above. Changes were found in the marketing of ground pallet material. Pallet recyclers are becoming more successful at finding markets for this product. Results for 1993 indicate a drop of over 10 percent in the use of ground pallet material for fuel as compared to 1992. During the same period, increased amounts of ground material were marketed as bedding and mulch. In our 1993 study, we added a category for marketing ground material as furnish for wood-based products such as particleboard, hardboard, and paper (this use was reported under the other category in the 1992 study). Almost 22 percent of ground pallet material went to this market in 1993.

Comparisons to Other Materials

Solid wood accounts for 6.3 percent of the municipal solid waste stream (defined as waste from residential, commercial, institutional, and industrial sources) by weight and approximately 6.8 percent by volume (U.S. Environmental Protection Agency 1992). As such, it is interesting to compare the rate of recycling for wood and wood products to those of other materials.

Recovery of municipal solid waste (all materials) was approximately 17 percent in 1990 and was predicted to reach 20 to 30 percent by 1995 (U.S. Environmental Protection Agency 1992). However, recovery varies by material; recovery of aluminum was estimated at 38.1 percent while recovery of plastics was estimated at 2.2 percent. Solid wood recovery was estimated at 3.2 percent. In comparison, our data indicate that wood in pallets was recovered by the industry at an unlagged rate of approximately 13 percent in 1992 and 16 percent in 1993. Total wood recovery from pallets was undoubtedly greater for reasons described below.

STUDY LIMITATIONS

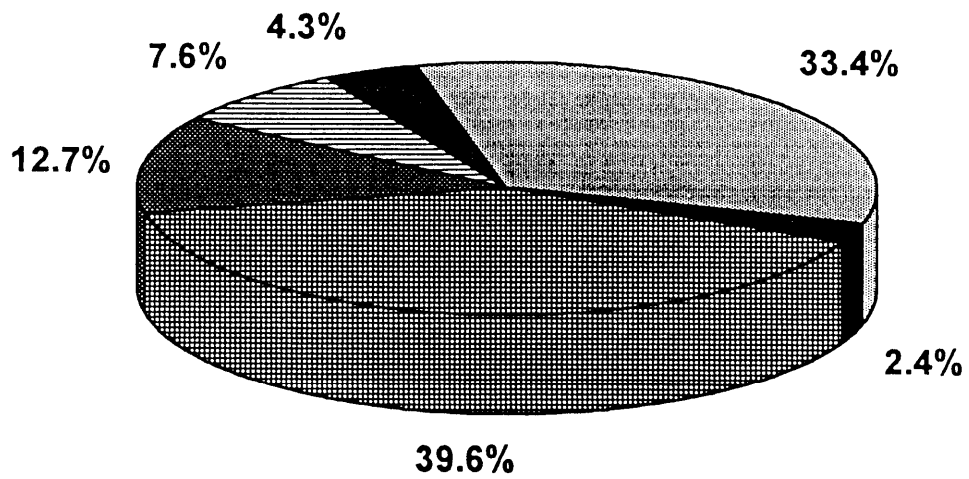
It is important to note that the results presented in this paper represent wood material use only within the pallet and container industry. When speaking of new wood materials, this includes establishments in Standard Industrial Classifications 2448 (Wood Pallets and Skids), 2449 (Wood Containers, Not Elsewhere Classified), and 2441 (Nailed and Lock Corner Wood Boxes and Shook). The results concerning pallet recycling are further limited to only manufacturers of pallets and skids (SIC 2448). This latter limitation was used because firms primarily involved in pallet recycling are classified under SIC 2448 and because initial investigations indicated that very little pallet recycling was conducted by firms in SIC 2449 or SIC 2441.

Because some pallet recycling and reuse takes place outside of the pallet and container industry the results should not be interpreted as representing all of the pallet recycling taking place in the United States. For example, pallet users may have in-house repair/recycling operations and some landfills grind pallets so that the wood can be reused. In addition, firms that conduct a considerable amount of pallet repair may report their business under an SIC other than 2448. This study does not cover pallet recycling in these situations and was not designed to cover such diverse activity. However, pallet recycling and reuse by landfills is the subject of a study currently underway at Virginia Tech in conjunction with the U.S.D.A. Forest Service.

ENDNOTES

1. For brevity, the term recycling is used in this paper to designate those activities that result in the reuse of a pallet or the wood in a pallet. These activities include: inspection and reuse; repair and reuse; chipping for mulch, animal bedding, and furnish; and use as fuel. Activities that result in no useful output (e.g., landfilling, burning without capturing the energy) are excluded.

Figure 1. Estimated Hardwood Lumber, Cant, Part, and Shook Use for Pallets and Containers by Species: 1992









 Oak	 Yellow-Poplar
 Alder	 Basswood/Aspen/Cottonwood
 Mixed Hardwoods	 Other Hardwoods

Figure 2. Types of Pallets Received for Recycling by the Pallet and Container Industry: 1992

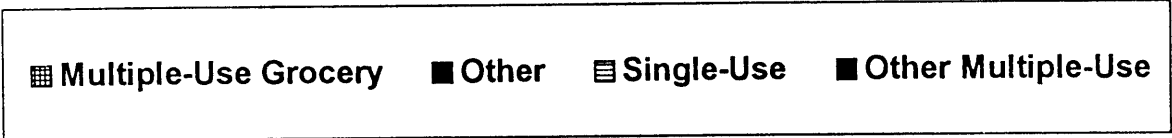
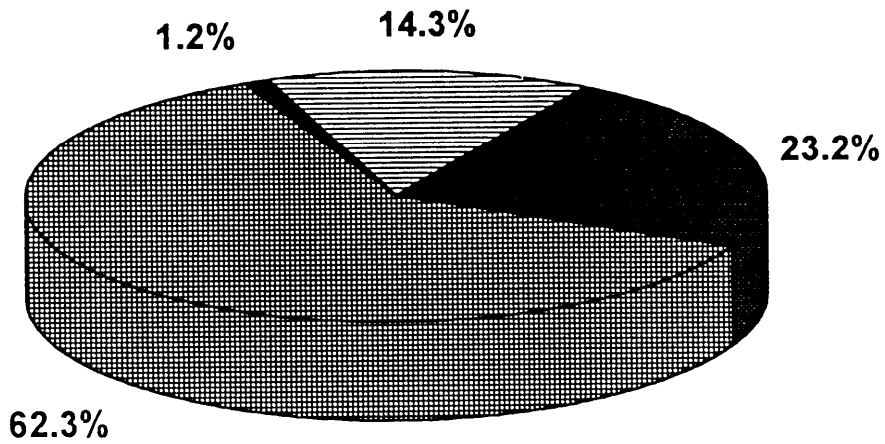
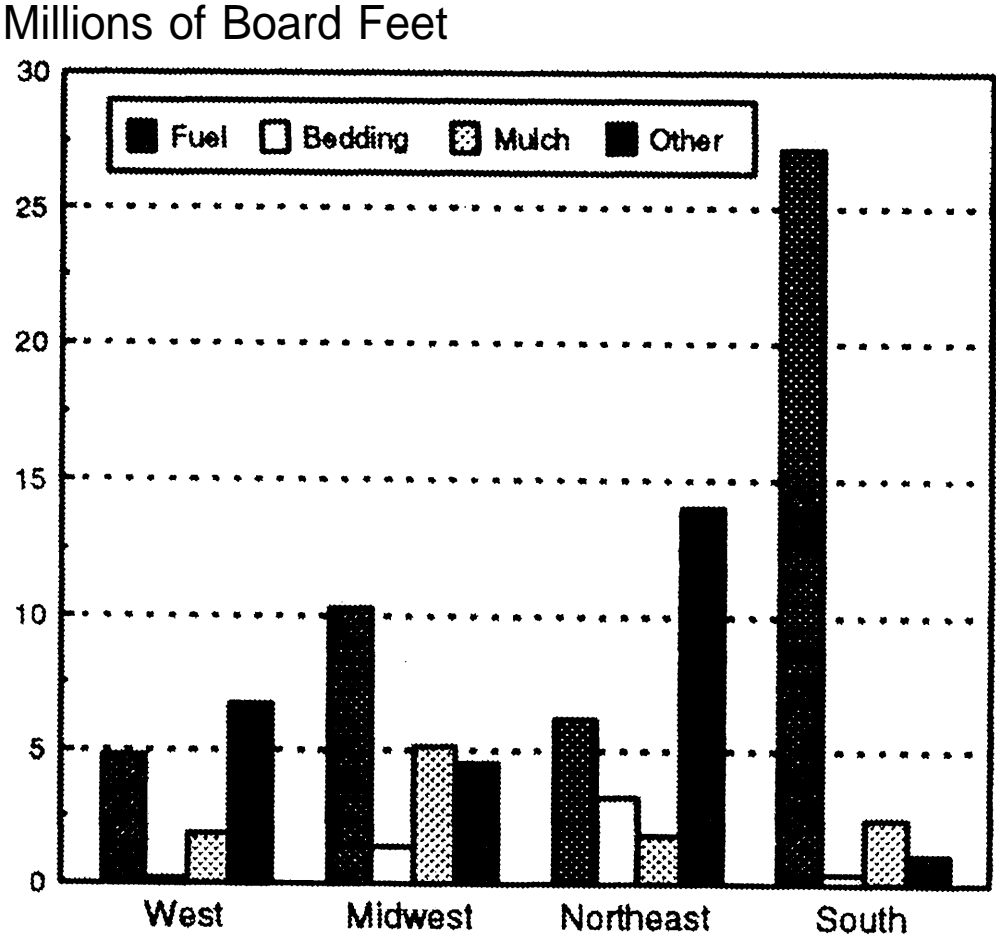


Figure 3. Use of Ground Pallet Material by Region of the United States.



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