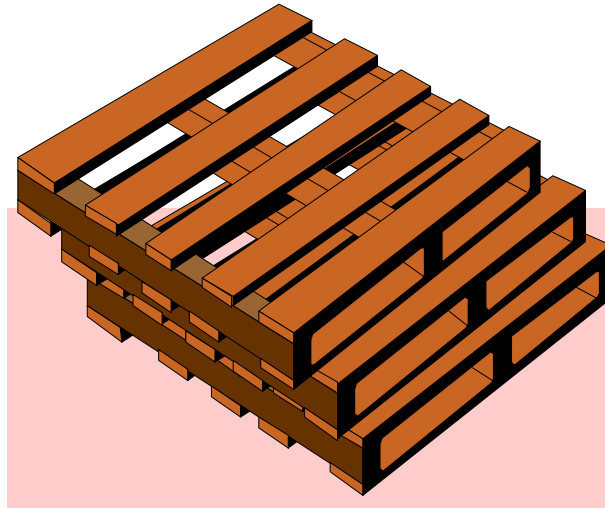


Wood: Wooden Pallets

COMMODITY PROFILE

North Carolina Department of
Environment and Natural Resources
DIVISION OF POLLUTION PREVENTION AND
ENVIRONMENTAL ASSISTANCE

MARKETS ASSESSMENT 1998



OVERVIEW

Wooden pallets are a universal and critical part of product transportation in the United States economy. These pallets are often durable enough to be reused many times, either directly or with minor repair. The pallet reuse and refurbishing industry has grown dramatically during the last decade and will keep expanding as discarded pallet generators look for alternatives to disposal. Large "third party" pallet management companies have also emerged with sophisticated systems for recovering and reusing wooden pallets. In addition, many generators are seeking source reduction alternatives such as "no pallet" shipping systems. Some are switching to higher quality wooden pallets and pallets made from plastic to take advantage of extended durability. Wooden pallet generation may flatten as these trends grow.

When a wooden pallet can no longer be reused or repaired, it can be managed like other waste wood (see *Wood Residues Commodity Profile*) and processed into

products such as mulch or boiler fuel. Many local governments in North Carolina accept pallets for grinding in their yard waste management programs, and many private recyclers also grind pallets that are no longer usable or repairable.

With many alternatives available, it is difficult to justify any landfill disposal of wooden pallets. Because of a growing and multi-faceted recovery infrastructure, a much higher diversion rate for pallets is possible. Moreover, a higher recovery and diversion of pallets will be an important part of the overall management of wood resources in the United States. The pallet industry is a huge user of wood: approximately 4.5 billion board feet of solid hardwood (or 40 percent of all hardwood lumber produced in the United States) and 1.8 billion board feet of softwood were consumed in the United States in 1992 for the production of pallets.¹ The pallet industry uses another 2.6 billion board feet in the form of recovered pallets.²

Figure 1. Wooden Pallet Generation Estimate for North Carolina (tons)^{3,4}

	1997	2002
Generation	433,665	474,863

Figure 2. Pallet Use of Wood Resources (billion board feet)⁵

	Total Wood	New Wood	Recovered
1992	7.89	6.89	1.0
1993	8.14	6.94	1.2
1995	8.6	6.32	2.28

SUPPLY

Generation

Wooden pallet generation estimates for North Carolina can be extrapolated from national survey data. Figure 1 shows estimated 1997 and projected 2002 wooden pallet generation. The projection is based on per capita growth from 1997 to 2002. However, as discussed below, wooden pallets may experience slower growth due to a number of factors, including movement in the industry to alternative materials.

One indication that wooden pallet generation is growing (in the absence of sales data) is found in total wood use figures in pallet manufacturing. Figure 2 shows total wood use increasing substantially between 1992 and 1995. The figure also shows, however, that recovered pallets are an increasing source of wood feedstock for the pallet industry.

A factor affecting wooden pallet generation is the potential of pallet users to switch to non-wood pallets. Wood pallets have market dominance, but movement toward alternatives is occurring. In particular, plastic and corrugated cardboard pallets may hold the most potential for capturing market share.⁶

Plastic pallets “enjoy perceived advantages...with regards to quality, durability, cost per use, handling safety, and overall performance” — which is perhaps why 37 percent of grocery distribution companies in a 1995 survey predicted they would be using plastic pallets by 1997.^{7,8} Although the initial cost of a plastic pallet is as much as five times higher than a wooden pallet, the cost per use factor appears to favor plastic. To take advantage of their durability, plastic pallets work best in “closed loop” distribution systems. Some industry observers see a bright future for plastic pallets, which may have a dampening effect on the generation of wooden pallets.⁹ Plastic pallets still face barriers, however, because of their initial high expense and because most pallets are used in open-loop situations.¹⁰

In contrast with plastic pallets, corrugated cardboard pallets work better in “open-loop” systems where durability and retrieval is not as important.¹¹ Corrugated pallets can readily be recycled with other corrugated packaging, thus relieving the generator of the management burden often entailed by wooden pallets. Almost a quarter of all pallets used by the health/pharmaceutical industry are corrugated.¹²

The emergence of large “third party” management companies in the pallet industry (see the *Demand* section below) may hasten the move away from wooden pallets, as these companies can more easily switch their pallet supply contracts to alternative manufacturers.¹³ The switch to alternative material pallets is part of a larger trend to get more quality and use out of single pallets, and at least one industry expert estimates that the overall effect will be a declining use of hardwoods in the manufacture of pallets.¹⁴

Recovery

National recovery surveys have documented the rapid rise of pallet recovery: from an estimated 65.8 million in 1992 to 83.3 million in 1993 to 171.1 million in 1995.¹⁵ The “yield” rate for recovered pallets is high: one survey found that private recyclers use approximately 87 percent of recovered pallet wood in making new or repaired pallets. They landfill less than one percent of their recovered stock.¹⁶

Figure 3 shows an estimate of pallet recovery in North Carolina in total and by sector. Recovery includes reuse, refurbishing, and conversion of pallets to products such as mulch and boiler fuel. Approximately 151,661 tons of pallets were recovered in 1997, or about 35 percent of the 433,665 tons of pallets generated.

Private sector recovery was estimated using data from a survey conducted by the Division of Pollution Prevention and Environmental Assistance (DPPEA). In 1997, 14 respondents reported recycling 62,942 tons of pallets, or

Figure 3. 1997 Pallet Recovery In North Carolina

	Tons	Percentage of generation
Total private sector recovery ^{17,18}	120,182 ¹⁹	27.7%
Reuse/refurbishing	104,558 ²⁰	24.1%
Other uses: mulch, boiler fuel	15,624	3.6%
Total public sector recovery	31,479	7.3%
Reuse/refurbishing	2,540 ²¹	0.6%
Other uses: mulch, boiler fuel	28,939 ²²	6.7%
Total Recovery	151,661	35%

about 15 percent of pallets generated in North Carolina. The average amount of pallets recycled per respondent (minus outliers) was 2,120 tons. Assuming that the 27 companies that did not respond recycle at the average rate, they would account for an additional 57,240 tons, or a total of 120,182 tons, which represents about 28 percent of the pallets generated in 1997. This figure may overestimate private sector recovery somewhat, because not all of these recyclers are dedicated pallet recyclers (i.e., for some of these companies, pallets represent a small portion of their recycling business).

North Carolina's pallet recycling infrastructure appears healthy. Forty-one companies in North Carolina's *Directory of Markets for Recyclable Materials* report that they accept pallets. The *1995-96 Buyer's Guide* from NWPCA (The National Wooden Pallet and Container Association) lists four additional recyclers, and the 1997 SIC code listings for North Carolina identify 78 companies in the 2448 code category (wooden pallets and skid). This list includes many of the recyclers in the *Directory of Markets*, but it also indicates that there may be more pallet recycling companies in the state than those in the *Directory*. Pallet recycling companies can be found throughout the state, and are well represented in urban areas, which presumably have higher pallet generation rates.

In addition to private pallet recyclers, local governments accept wooden pallets for mulching and composting. These entities cover many of the major metropolitan areas of the state, including the cities of Asheville, Greensboro, High Point, Winston-Salem, and Raleigh, and the following counties: Mecklenburg, Cumberland, Catawba, Cabarrus, Iredell, Gaston, and Pitt (as well as a number of other communities).

DEMAND

Market demand for pallets follows a management hierarchy of direct reuse, refurbishing (then reuse), and finally processing into other products (e.g., mulch, boiler fuel).

These varying levels of potential market uses mean a high degree of flexibility in the diversion of pallets from disposal. The trajectory of overall market demand through the early to mid 1990s is positive. Demand will continue to expand, and factors like third party management will encourage that trend.

Site visits to North Carolina pallet recycling companies by DPPEA staff in 1998 yielded anecdotal data that market demand will increase. Each of the seven companies visited indicated a desire to expand their consumption of discarded pallets. Expansion at three of these companies would more likely take place on the grinding side of their operations (rather than the pallet reuse / repair side).

Direct Reuse and Refurbishing

Pallet recycling has enjoyed tremendous growth in the 1990s. A national survey documented annual dollar growth rates in the pallet recycling business ranging from 12 to 26 percent between 1992 and 1995.³ Although the survey indicated some slowing of this growth, apparently only a small percentage of pallet recycling firms experienced no growth or negative growth. The survey also documented that many pallet recyclers are integrated, or "full service," companies that also manufacture new pallets.

Pallet recycling has grown for both environmental reasons and because of reactions to periods of high lumber prices.²⁴ Pallet users / generators are also driving recovery and durability issues. In addition, recycling appears to be good business for pallet companies as it is reportedly the most profitable sector of the industry.²⁵

A significant development in pallet recycling is the emergence of "third-party" management and "networks" of individual pallet companies, which expand marketing and sales and extend management reach over the pool

of discarded pallets. This development is in part a reaction to generator demands for pallet vendors to help manage discarded pallets. Generators actually rent or lease their pallets from the third-party management vendors rather than become “owners” of both the pallets and related disposal problems. The vendors in turn track pallets throughout their usage and retrieve them for reuse or refurbishing. As third party management develops, it will result in greater overall recovery of wooden pallets.

These developments signal a form of consolidation among pallet companies. The industry seems to be moving from many small, family operations to larger companies and networks that reduce the independent nature of individual firms.²⁶ Traditionally, the barriers to entry in pallet recycling have been relatively low and thus new pallet recycling companies have been able to develop quickly and fill a market niche.²⁷ As third party managers and larger companies develop, these barriers may increase.²⁸

A factor hindering pallet recycling is the lack of standardization of pallet sizes and quality. The most prevalent type of pallet $\frac{3}{4}$ 48”x40” in size and accessible from four sides $\frac{3}{4}$ has a high recycling and reuse rate due in large part to its widespread use. This pallet comes closest to being the industry standard. The many other size pallets constructed for specific uses are harder to market. The pallet industry has been attempting to increase standardization, a process that may be accelerated by the emergence of third party management.²⁹

Pallet recycling firms pay little or no money for recovered pallets, and may in some cases charge to take loads. Thus, discarded pallets generally have little market value, and generators have to rely on cost avoidance as the primary incentive to recycle or divert pallets from disposal. Pallet recyclers may set trailers at the facilities of large generators and cover the costs of transportation in exchange for receiving the pallets free. If generated loads contain many high quality, readily reusable pallets, recyclers may pay as much as \$2 per pallet (delivered to the pallet recycler). On the other hand, recyclers may charge as much as \$150 to take a load with many different-sized, “off-spec,” and low value pallets.

Smaller pallet generators in particular may need to pay private recyclers to take the discards or they may just take their discarded pallets to the nearest landfill. The average landfill tipping fee in North Carolina in fiscal year 1996-97 was \$26.75.³⁰ At an assumed 55 pounds per unit, a pallet costs around \$0.70 at the landfill gate, not counting the hauling or waste collection costs to get it there. Researchers at Virginia Tech University have produced a pallet re-

covery “business plan” model for landfills to encourage the salvaging of pallet wood at disposal facilities. Landfill diversion programs for pallets, especially when directed toward reuse and refurbishing, may be an excellent way to boost overall pallet recovery.³¹

In sales to users, recycled or rebuilt pallets enjoy a price advantage over new pallets. A typical new pallet can cost between \$7 and \$10, while a reused or refurbished pallet will cost \$3 to \$6. Pallet recyclers that can supply reusable and refurbished pallets that meet user specifications are in a good position to get the user’s business. Third party management companies may enjoy a competitive service advantage in this regard, especially since they supply higher quality, readily reusable pallets

Processed Pallets

Wooden pallets recovered by pallet recycling companies that cannot be directly reused or repaired are usually processed for other uses such as mulching, composting and boiler fuel. Although, as mentioned above, one study estimated that private recyclers reuse 87 percent of their incoming pallet wood for new pallets, anecdotal evidence from DPPEA site visits to in-state pallet recyclers indicates that figure may be high.

In contrast to pallet recyclers, landfills tend to consign discarded pallets directly to grinding operations. One recent study indicated that “approximately 41 percent of the pallet material recovered at municipal solid waste (MSW) landfills was used for fuel,” while another 38.4 percent went into mulch, animal bedding, composting, soil amendment, and material in particleboard. At construction and demolition debris (C&D) facilities, more than 38 percent of recovered pallet material was processed for fuel, while another 32.6 percent went for the other uses listed above.³²

Though widely used, mulch and boiler fuel markets for pallet wood are a low value outlet. Fuel consumers rarely pay over \$8 to \$12 per ton delivered. Mulch markets also yield little revenue, with the exception of material that has been upgraded through colorization. Approximately 58 percent of the MSW landfills recycling pallets simply give away ground or chipped material. Of those that sell ground or chipped pallets, the average sale prices was \$13.17 per ton.³³

Reuse will continue to be the higher value market for pallets, but fuel and mulch markets will play an important role in disposal diversion for the foreseeable future. For more information on markets for processed wood materials, see the *Wood Residues* report.

CONCLUSION

North Carolina's pallet recycling infrastructure appears healthy and growing. Similarly, market demand for pallets appears strong and will probably increase. Factors like third party management may decrease new pallet production and should also reduce pallet discards. Because of the growing and multi-faceted recovery infrastructure, a much higher diversion rate for pallets is possible. Moreover, a higher recovery and diversion of pallets will be an important part of the overall management of wood resources in the United States.

RECOMMENDATIONS

The following recommendations are intended to increase pallet recovery in North Carolina.

- North Carolina should implement a statewide MSW and C&D disposal ban on pallets by 2002.

This ban should not include pallets destined for recovery operations at landfills.

- Public landfills should establish incentives for generators to divert pallets away from disposal and to reuse / grinding markets.
- Generators of pallets should continue to seek source reduction and recycling alternatives, including the use of standard size, higher quality, and more durable pallets.
- Local governments should implement programs that help pallet generators find alternatives to disposal.
- The pallet industry should continue to work with its customers to institute standardization and quality standards (perhaps globally) that facilitate reuse and recycling. For their part, pallet buyers should become aware that demanding "cheap," low quality pallets usually increases pallet disposal.

¹ Bush, R. and Araman, P., "Use of New Wood materials for Pallet Containers is Stagnant to Declining," *Pallet Enterprise*, September 1997, pp. 34-38.

² Araman, P.A., et.al., "Potential Material Sources for Board Products: Used Pallets and Waste Wood at Landfills," Proceedings of the 31st International Particleboard and Composite Materials Symposium, Washington State University, April, 1997, p. 190.

³ Araman, P., et.al., "Municipal Solid Waste Landfills and Wood Pallets - What's Happening in the United States," *Pallet Enterprise*, February 1997, pp. 50-56.

⁴ Araman, P.A., et.al., "Potential Material Sources for Board Products," pp. 189-195.

⁵ Bush, R., Araman, P., and Reddy, V. "Pallet Recycling and Material Substitution: How Will Hardwood Markets Be Affected?," *Eastern Hardwoods: Resources, Technologies, and Markets*, Conference paper, Camp Hill, PA., April 21-23, 1997.

⁶ Araman, P.A. and Bush, R.J., "Changes and Trends in the Pallet Industry," *Hardwood Market Report*, March 14, 1998, pp. 11- 14. Pallets made from metal and presswood are also gaining applications, albeit more slowly than plastic and corrugated paper.

⁷ Scheerer, C., "Grocers Prefer Plastics When They Shop for Pallets, Survey Shows," *Pallet Enterprise*, October 1997, pp. 35-39.

⁸ *Ibid.*, p. 12

⁹ "Alternatives Shaping the Future?" *Pallet Enterprise*, October, 1997, pp. 54-55.

¹⁰ Correspondence from Philip Araman, Virginia Tech University, November 13, 1998

¹¹ Araman, op.cit., p. 12

¹² *Ibid.*, p. 12.

¹³ *Ibid.*, p. 13.

¹⁴ *Ibid.*, p. 13.

¹⁵ *Ibid.*, p. 14.

¹⁶ *Ibid.*, p.14.

¹⁷ Araman, P., et.al., "Municipal Solid Waste Landfills and Wood Pallets - What's Happening in the United States," *Pallet Enterprise*, February 1997, pp. 50-56.

¹⁸ Araman, P.A., et.al., "Potential Material Sources for Board Products: Used Pallets and Waste Wood at Landfills," Proceedings of the 31st International Particleboard and Composite Materials Symposium, Washington State University, April, 1997, pp. 189-195

¹⁹ This figure estimates total pallet recovery by extrapolating the average recovery per company (based on 14 responses to a survey of 41 companies) to the companies that did not respond.

²⁰ Using 87 percent usage estimate in Araman, op.cit., p. 14.

²¹ Reported by NC local governments in FY 1996-97 Solid Waste Management Annual Reports.

²² 38 counties and 20 municipalities also reported accepting pallets for producing mulch/compost in their FY 1996-97 Solid Waste Management Annual Reports. Although it is difficult to determine how much of the 554,000 tons of mulch/compost produced by local governments was made from pallet, a per capita extrapolation from Araman's landfill survey would put the number at 28,939 tons.

²³ Brindley, E., "Pallet Recycling – the World of Pallet Expansion," *Pallet Enterprise*, from Pallet Enterprise web site at <http://www.timberlinemag.com/enterprise/articles/Recycsu.htm>.

²⁴ *Ibid.*

²⁵ Bush, R., op.cit., p. 14. Article cites the National Wooden Pallet and Container Association as original source.

²⁶ See for example articles in *Pallet Enterprise*, August 1998, pp. 55-56.

²⁷ Ibid., p. 14.

²⁸ The issue of control of recovered pallets is demonstrated in the current controversies over a new law in Washington state. See LeBlanc. R., "Companies Seek to Change Washington State Pallet Law," *Pallet Enterprise*, October 1998, pp. 44-49.

²⁹ For example, see "The Race to Produce Pallet Reform: Chequered Flag or Pit Stop," *Pallet Enterprise*, September, 1995, pp. 10-12. Third party pallets have thicker parts but are generally the standard 48" x 40" in size.

³⁰ NC Department of Environment and Natural Resources, *North Carolina Solid Waste Management Annual Report, July 1, 1996 – June 30, 1997*, p.15. NC's average tipping fee is close to a national survey figure of \$21/ton average tipping fee for pallets and crates – see Powell, J., "Recovered Wood Processing: An Industry Profile," *Resource Recycling*, November 1997, p. 36.

³¹ Araman, P., Bush, R., Hammett, A.L., and Hager, E., "Wood Pallets and Landfills – Status and Opportunities For Economic Recovery and Recycling," presented at WasteCon/ISWA World Congress 1998, Charlotte, NC, October 26-29, 1998.

³² Araman, et.al., *31st International Particleboard/Composite Materials Symposium*, op.cit., p.189

³³ Ibid., p. 194.