Measures of Wood Resources in Lower Michigan: Wood Residues and the Saw Timber Content of Urban Forests

Sam Sherrill, Ph.D.
School of Planning
University of Cincinnati
Cincinnati, OH 45221

David MacFarlane, Ph.D.
Forest Measurements and Modeling Lab
Department of Forestry
Michigan State University
East Lansing, MI 48824

Study Purposes: Residue Survey

The purpose of the residue survey is to determine the kinds and number of companies that either generated or used eight types of wood residue and the amounts they generated in 2005.

The eight wood residue types are:

1. **Pallets, skids, and shipping crates**
2. **Dunnage**
3. **Edgings and cutoffs**
4. **Chips, shavings, and sawdust**
5. **Tree trunks, limbs, and stumps**
6. **Construction debris**
7. **Railroad ties**
8. **Utility poles**

An equally important purpose is to provide recommendations regarding sample design and the questionnaire to those considering conducting urban wood residue surveys.

Study Area

Fifteen hundred interviews were conducted in the early spring of 2006 with a random sample of businesses in fourteen counties that include and surround Detroit, Ann Arbor, and Lansing, Michigan.

Genesee
Ingram
Jackson
Lapeer
Lenawee
Livingston
Macomb
Monroe
Oakland
Saginaw
Shiawassee
St. Clair
Washtenaw
Wayne

Study Population, Sample Size, and Responses

Approximately one out of three businesses were randomly selected from the list of 20,101 businesses thought to be potential generators or users of wood residue.

The gross sample size is 7,007.

The sample was stratified by county to insure that each county was represented in the sample.

From over 16,000 separate telephone calls, 2,373 contacts were made.

1,500 agreed to be interviewed while 873 refused to participate.

Of the completed 1,500 interviews:

420 (28%) indicated that they either generated or used wood residue

1,080 (72%) stated that they did not do either.

Responses by Industry

Just over one-third of the respondents (36.2%) are in the construction industries.

Another one-fourth (26.7%) are in machinery manufacturing.

Along with companies in freight transportation (13.4%) and building materials (6.1%), these four industries account for just over 8 out of 10 (82.4%) of the respondents to the survey.

The rest are spread out over 16 other industry groups.

Types of Residue

Sufficient data were obtained on 5 of the 8 residues:

pallets, skids, and shipping crates,
edgings and cutoffs,
chips and shavings,
construction debris, and
tree trunks, limbs, and stumps.

Data collected on dunnage were insufficient for analysis.

Separate attempts were made to contact four railroad companies operating in the study area. Only two responded: neither could provide data on the number of ties replaced in the 14 counties in 2005.

Calls to Detroit Edison were not returned either, so there are no survey data on utility poles removed from service in 2005. *

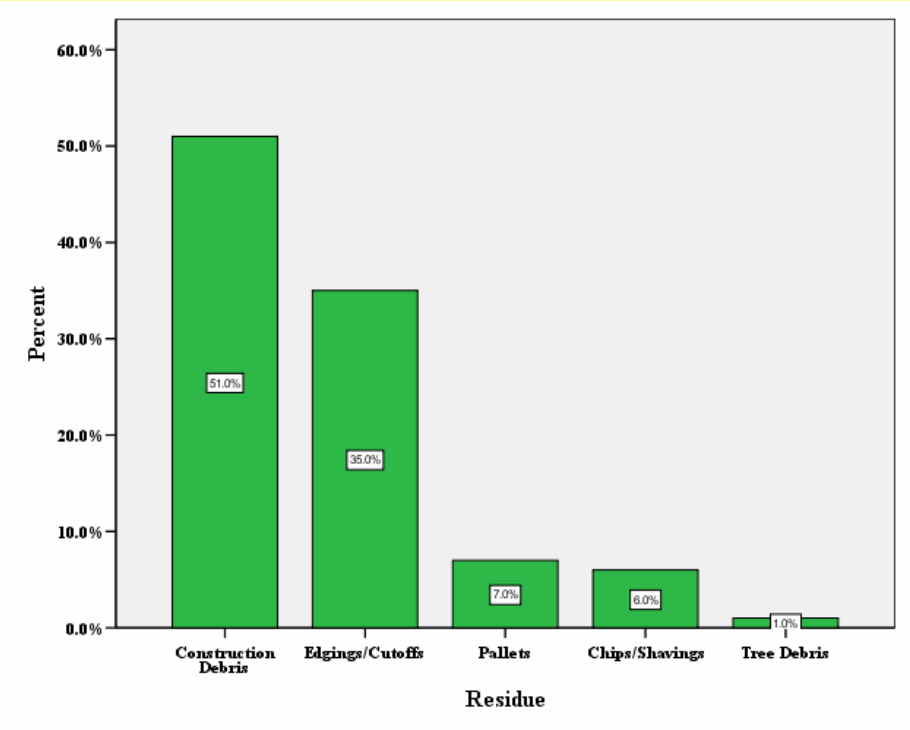
Residue Generated in 2005

Excluding railroad ties and utility poles, approximately 2,600 companies in total generated about 7.5 million cubic yards of residue in the fourteen county study area in 2005.

This amount would fill 354 football fields to a depth of 10 feet (the height of the crossbar on the goal posts).

About half (51%) was construction debris while just over one-third (35%) was edgings and cutoffs. The rest consisted of pallets (7%), chips and shavings (6%), and tree debris (1%).

Among those companies that paid for removal, the total was $8.8 million.



Residue Generated, Used, and Discarded in Landfills

Less than one-fifth (16%) of pallets were discarded while over four-fifths (84%) of pallets were reused or recycled.

Sixty percent of edgings and cutoffs were discarded as waste while the remaining 40% was reused.

Sixty-three percent of the construction debris was discarded while the remaining 37% went to other companies and individuals.

Just over half (52%) of chips and shavings were discarded while the rest was used.

For tree debris, 61% was discarded and 39% was used.

Residue	Total Amount Generated (cubic yards)	Percent Used	Total Amount Used (cubic yards)	Percent Discarded	Total Amount Discarded (cubic yards)	Of Total Amount Discarded, Amount Sent to Landfills (cubic yards)	Percent of Total Discarded Residue Sent to Landfills
Pallets, Skids, Shipping Crates	505,000	84%	424,000	16%	81,000	15,000	19%
Edgings and Cutoffs	2,646,000	40%	1,058,000	60%	1.588,000	675,000	43%
Chips, Shavings, Sawdust	480,000	48%	230,000	52%	250,000	108,000	43%
Construction Debris	3,828,000	37%	1,416,000	63%	2,412,000	1,302,000	54%
Tree Trunks, Limbs, Stumps	84,000	53%	45,000	47%	39,000	5,000	13%
Totals	7,543,000	42%	3,173,000	58%	4,370,000	2,105,000	48%

Residue Discarded

In total, just under 4.4 million cubic yards of residue were discarded as waste in 2005.

This is 58% of the total 7.5 million cubic yards generated.

Of the 4.4 million cubic yards discarded, just over 2.1 million cubic yards, or about 48%, ended up in landfills.

The rest was either burned or disposed of in other unspecified ways.

Of the total 7.5 million cubic yards generated, 2.1 million cubic yards, or 28%, went to area landfills.

Disposal by Type of Residue

Pallet, skids, shipping containers

A total of 420 companies generated about 3 million pallets in 2005.

> **Automobile manufacturers alone generated an estimated 1.9 million pallets. Probably 90% of these were reused or recycled.**
>
> **All the other companies generated about 1.1 million. About 84% were reused.**

Other companies spent less than $1 million in 2005 on disposal. They avoided removal costs by giving the pallets away. The large majority were taken by other companies.

In general, pallets are either repaired and reused or are ground into mulch. Many companies also reused their own pallets as pallets.

Edgings and Cutoffs

A total of 615 companies generated just over 2.6 million cubic yards of edgings and cutoffs.

Two-thirds of the companies are in the construction business.

Two-thirds of all the companies paid an estimated total of $1.4 million for removal. The remaining third paid nothing.

About two-thirds of all of the companies did make some use of their own edgings and cutoffs, the rest did not. The main uses were as building materials and heating fuel.

Disposal by Type of Residue

Chips and Shavings

Overall, 324 companies generated 480,000 cubic yards of chips and shavings.

Three-fourths of these companies were either in construction, wood products manufacturing, or industrial machinery manufacturing.

Just under half of chips and shavings were reused while just over half were discarded as waste.

Among those that disposed of their chips and shavings as waste, about three-fourths used landfills. About 1 out of 4 recycled, mainly as mulch.

About 4 out of 10 companies paid just under one-half million dollars to dispose the material they generated. The other 6 out of 10 either gave the material away or, in a minority of cases, were paid for it.

Disposal by Type of Residue

Construction Debris

An estimated 1,161 companies, mostly in building construction, generated about 3.8 million cubic yards.

Only one-third was reused, the other two-thirds were discarded.

Just over half of the discarded debris ended up in landfills.

Roughly half the companies did not reuse while the others did, mainly as building material.

Trees, Trunks, and Stumps

An estimated 96 companies generated about 84,000 cubic yards of tree debris.

Just over half were used while the rest was discarded. Just under half paid for removal.

Just over half made no use of the tree debris. Among those that did, the most frequent use was firewood.

There is no clear indication of whether more or less ash trees were removed in 2005 compared to the previous year.

Market for Wood Residue

Just over 6 out of 10 (62.4%) responding companies stated there was no market for their residue.

About 2 out of 10 (20.9%) thought a market either existed or was developing (the rest did not know).

The most frequently cited reason for no market is that wood cannot be separated from attached foreign material.

Among those who believed a market was developing, one-third indicated that identifying buyers was the principal impediment to further development.

Price volatility was not a problem for the residue market, nor was inadequate price information.

Sampling and Questionnaire Recommendations

1. **When defining the study population, the following SIC codes can be used:**

   tree service companies (SIC 0783)
   construction (SIC's 15, 16 and 17)
   machinery manufacturing (SIC 35)
   lumber and wood products (SIC 24)
   wood furniture (SIC 25)
   freight transportation (SIC 42)
   building supply and mobile home companies (SIC 52)
   food stores (SIC 54)
   home furniture stores (SIC 57).

2. **The sample should be stratified only by SIC codes to insure that potential generators and users of residue are drawn into the sample.**

3. **To insure an adequate number of responses by SIC, consideration should be given to disproportionate sampling among strata with few companies.**

4. **Companies that generate or accept substantial amounts of residue should be separately identified and selected for interviewing. The major examples in this study are the three major automobile manufacturers, railroad companies, and the major utility company.**

   To increase the likelihood that these companies will respond to calls and requests for data, senior governmental officials should make initial calls to company executives requesting their co-operation.

Recommendations

5. **Select a sample size at least sixteen times the target number of completed interviews with generators and users. Completed interviews with 1,000 generators and users would require a gross sample size of about 16,000 businesses.**

6. **The first question should begin by stating that ownership of the wood waste and responsibility for disposal are irrelevant: what counts is whether the respondent's company engages in work that produces wood waste or whether the company's business is to accept and process wood waste.**

7. **Respondents who give a negative answer to the first question should be asked how they are able to engage in their work without generating wood waste.**

8. **Questions should be added that directly request the amounts of residues companies send to landfills, burn, and otherwise discard as waste.**

9. **Pallets/skids and shipping crates should be covered by separate sets of questions.**

10. **Dunnage should be included only when warranted by the industry base of the urban area being surveyed.**