



United States
Department of
Agriculture

Forest Service

Forest
Products
Laboratory

Research
Note
FPL-RN-0290



Urban Tree and Woody Yard Residues

Another Wood Resource

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Abstract

Urban tree and woody yard residues are an important component of the municipal solid waste (MSW) stream in the United States. In 2000, approximately 14.5 million tons of urban tree and woody yard residues was generated, nearly 7% of total MSW. Some woody residues are being recovered for recycling, composting, or other uses, but a large proportion is simply discarded. In total, urban tree and woody yard residues form a resource about as large or larger than the current timber harvest from National Forests. Materials from each of these two sources have distinctly different properties and, in general, are not interchangeable. Urban tree and woody yard residues are typically suited for low value products such as mulch, while National Forest timber is suited for high value solid wood and pulp products. In 2000, just over 12 million tons of timber was harvested from National Forests, compared to 14.5 million tons of urban tree and woody yard residues generated.

Keywords: yard trimmings, woody yard trimmings, wood waste, recycling, timber harvest, National Forest

Cover: Storm damage in the city of Durham, North Carolina.

August 2003

McKeever, David B.; Skog, Kenneth E. 2003. Urban tree and woody yard residues—Another wood resource. Res. Note FPL-RN-0290. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 4 p.

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Urban Tree and Woody Yard Residues

Another Wood Resource

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Urban Wood Residues in Municipal Solid Waste Stream

In the year 2000, 282.1 million Americans generated a total of nearly 210.4 million tons of municipal solid waste (MSW) (Table 1) (EPA 2002). Just over 25.1 million tons (12%) of this material consisted of yard trimmings (Fig. 1). Yard trimmings include all woody and herbaceous vegetative material such as grass, leaves, and tree and brush trimmings from residential, institutional, and commercial sources. In the first national inventory of urban tree residues, which was conducted in 1993, 11.6 million tons of residues was reported to be generated by forestry-related businesses¹ (NEOS Corp. 1994). We estimated that additional residue generated by households and others amounted to about 15% of that generated by professional forestry-related businesses. We calculated per capita rates of urban tree and woody yard residue generation and used these rates to estimate total generation for subsequent years. Thus, in 2000, we estimated that 14.5 million tons of wood chips, logs, stumps, tree tops, and brush was generated, 12.6 million tons by forestry-related businesses and 1.9 million tons by households and others (Table 1).

From 1996 to 2000, total MSW generation increased steadily from about 190 to 210 million tons (Table 1) (EPA 1999, 2002). Per capita generation increased from 1996 to 1999, but declined slightly in 2000. Because of legislation affecting the disposal of yard trimmings in landfills and the increasing use of mulching lawnmowers and backyard composting, estimates of yard trimmings between 1997 and 2000 were held constant at 25.1 million tons per year (EPA 2002). From 1996 to 2000, urban tree and woody yard residues increased slightly and herbaceous yard trimmings (total yard residues minus urban tree and woody yard residues) declined slightly (Fig. 2).

¹Forestry-related businesses include commercial tree care firms, municipal park and recreation departments, municipal and county tree care divisions, public utility maintenance departments, nurseries, orchards, landscapers, and others who provide professional tree-related services.

Overall, the generation of herbaceous yard trimmings, urban tree residues, and urban woody yard residues is affected by climate, geography, and population. Little or no information is available on the effects of these on the actual amount of residues generated at the individual State or municipality level. However, assuming that all U.S. cities have about the same per capita generation rate for urban tree and woody yard residues, population can be used as a basis for estimating total generation for several consolidated metropolitan statistical areas (CMSAs). In 1999, the latest year for which population data by metropolitan area are available, the New York–New Jersey–Long Island CMSA had 20.2 million residents (Bureau of the Census 2002) and generated an estimated 1 million tons of woody residues (Table 2). This is equivalent to about 7% of total urban tree and woody yard residues generated in the United States in 1999. The Los Angeles–Riverside–Orange County CMSA generated about 5% of this total (Table 2). Urban tree and woody yard residues generated in other representative CMSAs are reported in Table 2.

National Forest Timber Harvest

In 2000, nearly 13.4 million m³ of timber was harvested from National Forests in the United States (USDA 2002) (Table 3). This represents a decrease of almost 2.8 million m³ from 1999 and more than 6.2 million m³ from 1996. Reported timber harvest is a mixture of species, size classes, and ages. Therefore, the weight of the timber harvested must be calculated to compare timber harvest with the amount of urban tree and woody yard residues generated. The weight of wood is dependent on wood moisture content and specific gravity, which are in turn dependent on species, size class, and age. At 100% moisture content and 0.40 specific gravity, 1 m³ of wood weighs 800 kg (Forest Products Laboratory 1999). Since reported timber harvest excludes bark, the conversion factor of 800 kg/m³ was increased by 12% to 896 kg/m³ to account for the weight of bark. Based on this factor, the timber harvested from U.S. National Forests in 2000 weighed more than 12 million tons (Fig. 3). Because a constant conversion factor from volume to tons was used for the years 1996 through 2000, trends in the weight of timber harvested are identical to those for the volume of timber harvested.

Table 1—Woody yard trimmings generated, by population, 1993–2000^a

Year	Population ($\times 10^6$)	MSW generated		Yard trimmings in MSW		Urban tree + woody yard residues in yard trimmings ($\times 10^6$ metric tons)		
		Total ($\times 10^6$ metric tons)	Per capita (kg)	Total ($\times 10^6$ metric tons)	Per capita (kg)	All sources	Forestry related ^b	Household and others ^c
1993	259.9	191.5	737	30.2	116	13.3	11.6	1.7
1994	263.1	194.3	738	28.6	108	13.5	11.8	1.7
1995	266.3	191.8	720	26.9	101	13.7	11.9	1.8
1996	269.4	189.8	704	25.3	94	13.9	12.1	1.8
1997	272.6	198.8	729	25.1	92	14.0	12.2	1.8
1998	275.9	202.7	734	25.1	91	14.2	12.3	1.8
1999	279.0	209.5	751	25.1	90	14.3	12.4	1.9
2000	282.1	210.4	746	25.1	89	14.5	12.6	1.9

^aSources: Population, Bureau of the Census 2002; MSW and yard trimmings, EPA 1999, 2002; urban tree and woody yard residues, Forest Service estimates based in part on Neos Corp. 1994.

^bIncludes commercial tree care firms, municipal park and recreation departments, municipal and county tree care divisions, public utility maintenance departments, nurseries, orchards, landscapers, and others who provide professional tree-related services.

^cHouseholds and others assumed to generate approximately 15% of residues generated by forestry-related businesses.

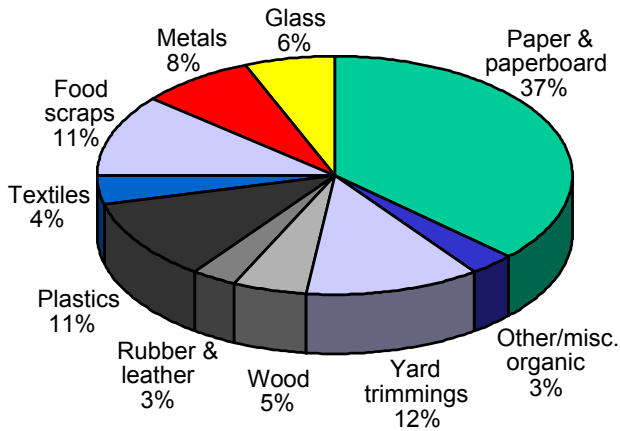


Figure 1—Municipal solid waste in the United States, by type, 2000.

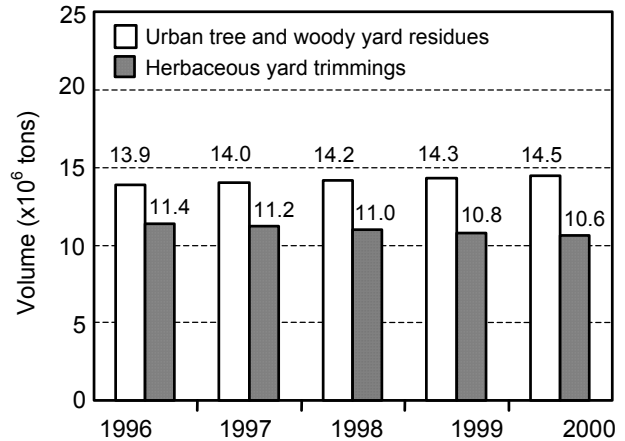


Figure 2—Composition of yard trimmings, 1996–2000.

Table 2—Estimated population and urban tree + woody yard residues generated, by combined metropolitan statistical area, 1999^a

Consolidated metropolitan statistical area	Population ($\times 10^6$)	% U.S. population	Urban tree + woody yard residues ($\times 10^6$ metric tons)
New York–New Jersey–Long Island	20.2	7	1.0
Los Angeles–Riverside–Orange County	15.1	5	0.8
Chicago–Gary–Kenosha	8.5	3	0.5
Philadelphia–Wilmington–Atlantic City	5.9	2	0.3
Dallas–Fort Worth	4.3	2	0.2
Miami–Fort Lauderdale	3.4	1	0.2
Total	57.4	21	3.0

^aSources: Population, Bureau of the Census 2002; urban tree and woody yard residues, Forest Service estimates based in part on Neos Corp. 1994.

Table 3—National Forest timber harvest and urban tree + woody yard residues generated, 1996–2000^a

Year	Timber harvest		Urban tree + woody yard residues	
	($\times 10^6$ m ³)	($\times 10^6$ metric tons) ^b	Total ($\times 10^6$ metric tons)	% timber harvest
1996	19.6	17.6	13.9	79
1997	19.4	17.4	14.0	80
1998	18.0	16.1	14.2	88
1999	16.2	14.5	14.3	99
2000	13.4	12.0	14.5	121

^aSources: Timber harvest, Forest Service 2002; urban tree and woody yard residues, Forest Service estimates based in part on Neos Corp. 1994.

^bBased on 896 kg/m³ of timber harvested.

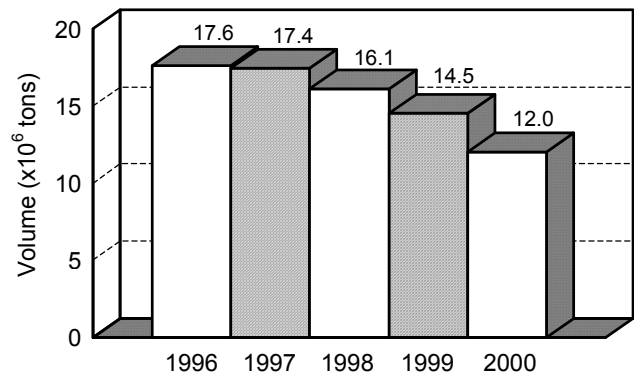


Figure 3—Timber harvested from National Forests, 1996–2000.

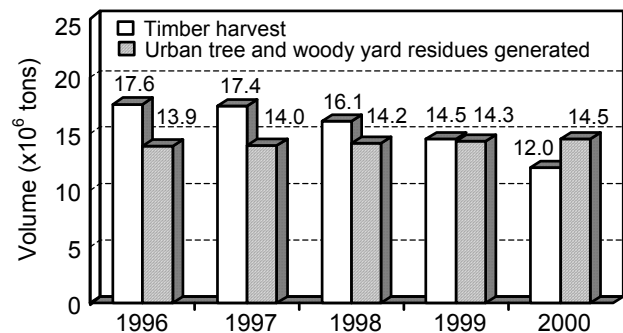


Figure 4—Timber harvested from National Forests compared with urban tree and woody yard residues generated, 1996–2000.

Comparison of Urban Wood Residues and Timber Harvest

In 2000, the estimated weight of urban tree and woody yard residues generated in the United States (14.5 million tons) was about one-fifth greater than the total estimated weight of timber harvested from U.S. National Forests (12.0 million tons) (Table 3, Fig. 4). This was the first year when estimated urban tree and woody yard residues exceeded National Forest harvest. From 1996 through 2000, the amount of urban tree and woody yard residues increased slowly from 13.9 to 14.5 million tons, while timber harvest fell from 17.6 to 12.0 million tons.

Estimates of urban tree and woody yard residues may be higher or lower due to uncertainty associated with the survey done by the NEOS Corporation (1994) and uncertainty in the portion of woody yard residues produced by “do it yourself” methods. Tonnage estimates of National Forest harvest may be higher or lower due to uncertainty in the factor to convert from cubic feet to weight of wood. Given these uncertainties, the difference between the amount of urban tree and woody yard residues generated and the National Forest harvest in 2000 may not be a significant.

Concluding Remarks

Urban tree and woody yard residues are an important component of metropolitan solid waste. The generation of urban tree and woody yard residues has increased slowly, while the timber harvest from U.S. National Forests has declined. Much woody residue is currently being recovered for composting, primarily to avoid landfill disposal. Based on constant per capita generation rates across all U.S. cities, six major U.S. metropolitan areas generated about one-fifth of all urban tree and woody yard residues in 2000, amounting to about one-fourth of the National Forest timber harvest. The amount of urban tree and woody yard residues generated annually and the volume of timber harvested from U.S. National Forests annually were compared to indicate the relative magnitude of each source and to show trends in each over time. Materials from each of these sources have distinctly different properties and are generally not interchangeable. Urban tree and woody yard residues are typically suited for low value products such as mulch, and National Forest timber is suited for high value solid wood and pulp products.

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