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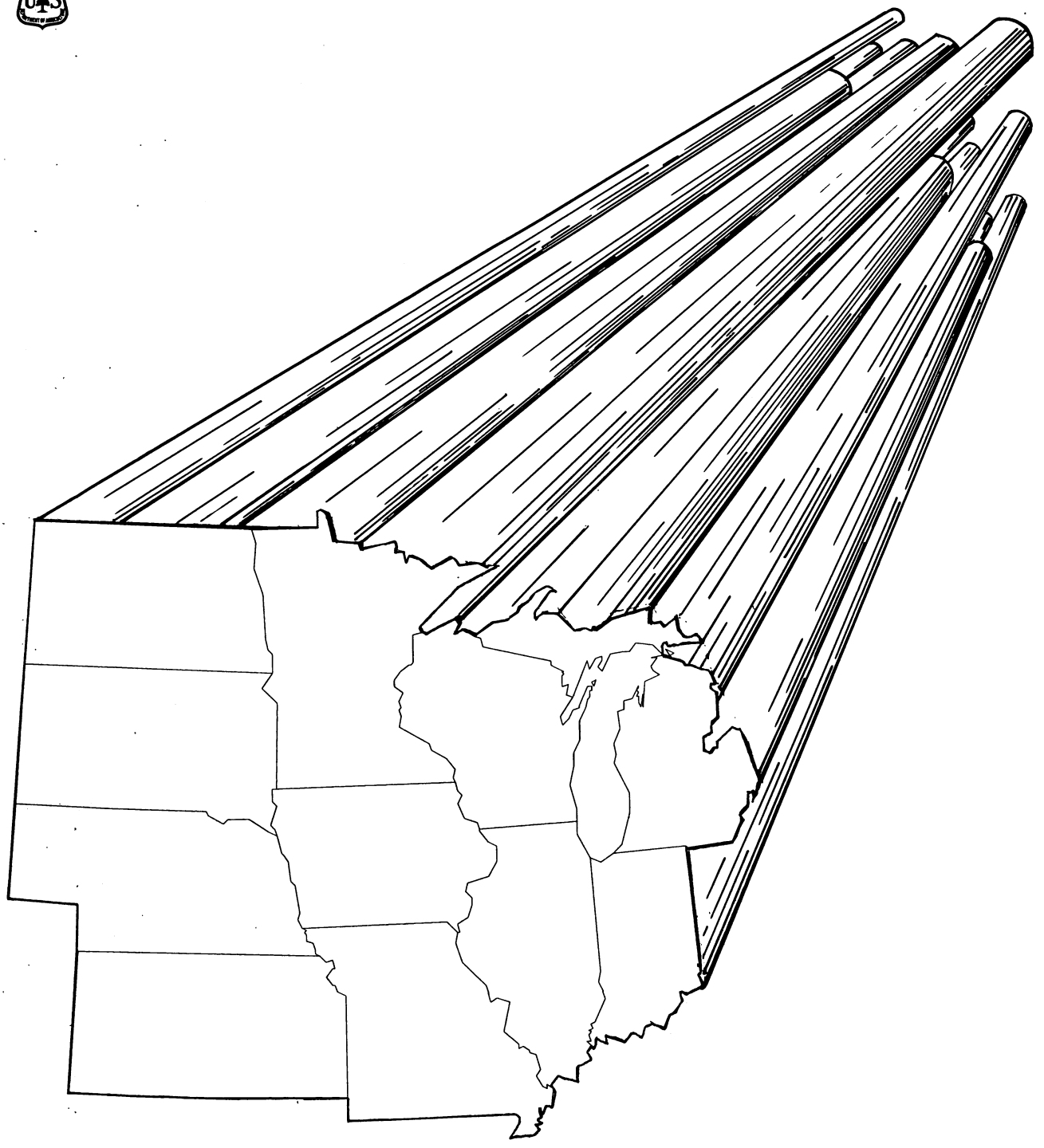
Pulpwood Production in the North-Central Region, 1993

Ronald J. Piva



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Pulpwood Production In The North-Central Region, 1993

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NOTE: This report includes all primary products made from reconstituted wood fiber. In addition to wood pulp, this includes particleboard and engineered lumber products[1] made from chips, shavings, wafers, flakes, strands, and sawdust. This report presents the production by county of the raw fiber material delivered to mills. Thus, these data report only that portion of the timber harvest used as raw material and do not necessarily reflect the volume of growing stock harvested.

Pulpwood constitutes more than half the industrial timber products harvested annually in the Lake States (Michigan, Minnesota, and Wisconsin) and is an important product in the Central States (Illinois, Indiana, Iowa, and Missouri) and the Plains States (Kansas, Nebraska, North Dakota, and South Dakota).

Current detailed information about pulpwood production[2] is necessary for intelligent planning and decisionmaking in wood procurement, forest resource management, forest industry development, and scientific studies.

Since 1979, we have included logs, bolts, and wood residue used in manufacturing flake board, wafer board, oriented strand board, and medium density fiberboard in this annual report. Engineered lumber was included in this report in 1992. Together, these products are called particleboards, and all mills manufacturing these boards will be called particleboard mills in this paper. Wood used at particleboard mills is identical or nearly identical to wood used at pulp mills; therefore, including this wood in our study provides a more accurate estimate of demand for pulpwood-like material.

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Particleboard mills were in their infancy before 1979 and used primarily aspen and wood residue. Therefore, data for these mills do not distort roundwood use trends for other species or preclude comparing 1993 survey results with those of 1978 and previous years.

Pulp and particleboard mills using North Central States timber in 1993 reported their pulpwood receipts[3] by species group and county of origin. This report presents the results of the survey, analyzes the data, compares results with those of 1992 or earlier years, and discusses trends in pulpwood production and use.

The Lake States, Central States, and Plains States are discussed separately because the timber types in each area are different, the flow of wood between the areas is nominal, and more detailed data on pulpwood production and receipts in the Central and Plains States might reveal the operations of individual mills. This is the 35th annual report of the pulpwood harvest in Lake States counties, the 34th annual report of the Central States harvest, and the 1st report of the pulpwood harvest in the Plains States.

Several mills purchase their pulpwood based on weight rather than volume. Conversion factors to convert green tons of pulpwood to standard cord equivalents are shown in the Appendix.

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[1] *U.S. Forest Products Laboratory. 1974. Wood handbook: wood as an engineering material. Agric. Handb. 72. Washington, DC: U.S. Department of Agriculture, Forest Service: 23-27. (Revised).*

[2] *Pulpwood production, determined from mill receipts, is the annual volume of pulpwood cut, plus the annual wood residue volume produced by sawmills, veneer mills, etc., used for pulp, particleboard, wafer board, oriented strand board, medium density fiberboard, or engineered lumber.*

[3] *Pulpwood receipts are the volume of wood received by mills in a specific State or region, regardless of the geographic source.*

LAKE STATES

Production

- Pulpwood production as a whole increased to 9.4 million cords[4] in 1993 from 8.9 million cords in 1992, a rise of 6 percent (table 1). Of each cord produced, 93 percent came from roundwood (including chips from roundwood) and 7 percent came from the residue[5] of wood-using plants (fig. 1).

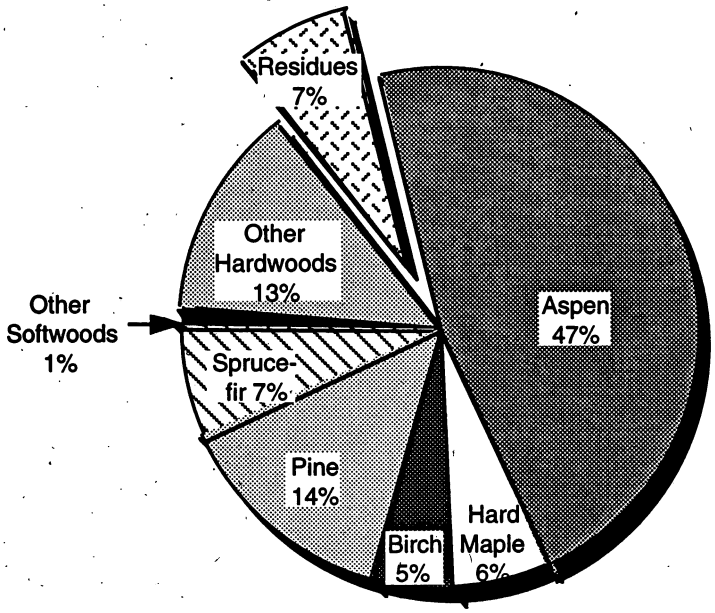


Figure 1.—*Lake States pulpwood production by species group, 1993.*

- Hardwoods constituted 78 percent of the total pulpwood production.

- Principal species of roundwood harvested were aspen (4.5 million cords), jack pine (817 thousand cords), hard maple (590 thousand cords), soft maple (493 thousand cords), and white birch (465 thousand cords).

- Aspen remained the dominant species of pulpwood roundwood harvested—51 percent of the total.

- Softwood roundwood production increased 3 percent to 1.93 million cords. Pulpwood production from softwood residue rose to 176 thousand cords, a 7-percent increase from the previous year (fig. 2).

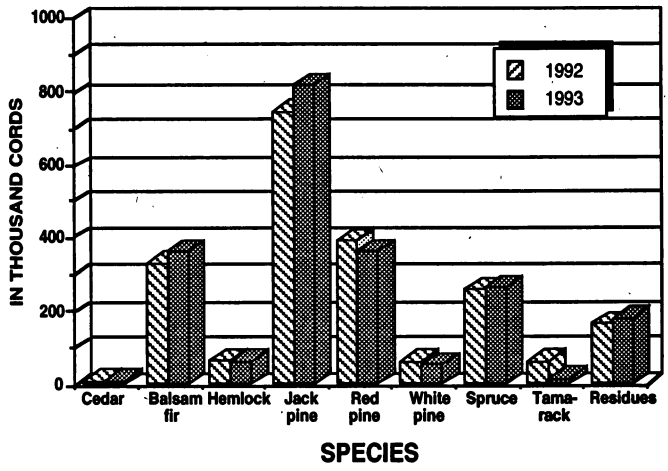


Figure 2.—*Softwood pulpwood production in the Lake States, 1991-1993.*

- Whole-tree-chip[6] (WTC) production, which comprises 6 percent of the total pulpwood production in the Lake States, increased 8 percent to 603 thousand cords (fig. 3).

[4]*All references to cords are in standard cords. A standard cord is 128 cubic feet of wood, bark, and air space.*

[5]*Residue is the byproduct from sawmills, veneer mills, cooperage mills, and other wood-using mills that is used for pulping and particleboard. Residue includes slabs, edgings, veneer cores, sawdust, fines, woodflour, and chips manufactured from slabs, edgings, and veneer cores.*

[6]*Pulpwood produced from chipping entire trees (all portions of the trees above ground, except the stumps).*

Table 1.--Production and imports of pulpwood, Lakes States, 1993 1/

(In standard cords, unpeeled)

Species and destination	Production by State 2/			Regional total	Imports			Total receipts
	Michigan	Minnesota	Wisconsin		Other U.S. 3/	Canada	Total imports	
Cedar								
Michigan	6,486	--	146	6,632	--	--	--	6,632
Total	6,486	--	146	6,632	--	--	--	6,632
Balsam fir								
Canada	4,577	775	--	5,352	--	--	--	--
Michigan	84,331	--	1,925	86,256	--	--	--	86,256
Minnesota	4,195	198,154	12,831	215,179	--	5,089	5,089	220,268
Wisconsin	7,822	68	46,664	54,553	--	--	--	54,553
Total	100,925	198,997	61,420	361,341	--	5,089	5,089	361,078
Hemlock								
Michigan	34,044	--	781	34,826	--	--	--	34,826
Wisconsin	3,244	--	22,403	25,647	--	--	--	25,647
Total	37,288	--	23,185	60,473	--	--	--	60,473
Jack pine								
Canada	--	9,824	--	9,824	--	--	--	--
Michigan	215,773	--	2,415	218,187	--	--	--	218,187
Minnesota	--	108,354	2,168	110,522	--	--	--	110,522
Wisconsin	80,572	9,831	388,216	478,619	--	--	--	478,619
Total	296,344	128,008	392,799	817,152	--	--	--	807,328
Red pine								
Michigan	60,094	--	1,070	61,163	--	--	--	61,163
Minnesota	--	18,085	2,500	20,584	--	--	--	20,584
Wisconsin	6,940	7,718	263,519	278,177	14	--	14	278,190
Total	67,033	25,803	267,089	359,925	14	--	14	359,938
White pine								
Michigan	16,100	--	358	16,458	--	--	--	16,458
Minnesota	--	2,389	--	2,389	--	--	--	2,389
Wisconsin	507	27	31,561	32,095	--	--	--	32,095
Total	16,607	2,416	31,919	50,942	--	--	--	50,942
Spruce								
Canada	8,317	3,452	--	11,769	--	--	--	--
Michigan	19,697	--	449	20,147	--	--	--	20,147
Minnesota	6,457	116,630	2,305	125,393	--	--	--	125,393
Wisconsin	32,648	37,812	31,535	101,994	--	--	--	101,994
Total	67,120	157,894	34,289	259,303	--	--	--	247,534
Tamarack								
Michigan	5,143	--	121	5,264	--	--	--	5,264
Wisconsin	472	2,547	7,251	10,270	--	--	--	10,270
Total	5,615	2,547	7,371	15,533	--	--	--	15,533
Total softwood roundwood								
Canada	12,894	14,050	--	26,944	--	--	--	--
Michigan	441,668	--	7,265	448,933	--	--	--	448,933
Minnesota	10,652	443,611	19,804	474,067	--	5,089	5,089	479,156
Wisconsin	132,205	58,002	791,148	981,355	14	--	14	981,369
Total	597,419	515,664	818,216	1,931,300	14	5,089	5,102	1,909,457
Residues, softwood								
Michigan	68,045	--	10,646	78,690	--	4,732	4,732	83,422
Minnesota	--	34,185	--	34,185	--	1,183	1,183	35,368
Wisconsin	3,636	1,278	57,740	62,655	80,235	16,769	97,004	159,658
Total	71,681	35,463	68,386	175,530	80,235	22,683	102,918	278,448
All softwoods								
Canada	12,894	14,050	--	26,944	--	--	--	--
Michigan	509,713	--	17,910	527,623	--	4,732	4,732	532,355
Minnesota	10,652	477,796	19,804	508,252	--	6,272	6,272	514,524
Wisconsin	135,841	59,281	848,888	1,044,010	80,249	16,769	97,017	1,141,027
Total	669,100	551,127	886,602	2,106,830	80,249	27,772	108,021	2,187,906

(Table 1 continued on next page)

(Table 1 continued)

Species and destination	Production by State 2/ Michigan	Minnesota	Wisconsin	Regional total	Imports Other U.S.3/	Canada	Total imports	Total receipts
Ash								
Michigan	21,915	--	2,260	24,175	--	--	--	24,175
Minnesota	--	606	--	606	--	--	--	606
Wisconsin	1,989	544	51,263	53,796	--	--	--	53,796
Total	23,904	1,150	53,523	78,577	--	--	--	78,577
Aspen								
Canada	--	25,102	--	25,102	--	--	--	--
Michigan	1,047,939	--	40,235	1,088,174	--	20,885	20,885	1,109,059
Minnesota	--	2,108,624	25,917	2,134,541	--	53,255	53,255	2,187,796
Wisconsin	93,903	50,920	1,062,566	1,207,389	--	--	--	1,207,389
Total	1,141,842	2,184,646	1,128,718	4,455,206	--	74,140	74,140	4,504,244
Balsam poplar								
Michigan	42,047	--	2,492	44,538	--	--	--	44,538
Minnesota	--	91,735	--	91,735	--	11,686	11,686	103,421
Wisconsin	130	4	1,969	2,103	--	--	--	2,103
Total	42,177	91,740	4,461	138,377	--	11,686	11,686	150,063
Basswood								
Michigan	35,551	--	3,955	39,506	--	--	--	39,506
Wisconsin	2,566	897	50,771	54,235	--	--	--	54,235
Total	38,117	897	54,726	93,740	--	--	--	93,740
Beech								
Michigan	40,346	--	3,970	44,316	--	--	--	44,316
Wisconsin	2	--	695	697	--	--	--	697
Total	40,348	--	4,664	45,012	--	--	--	45,012
White birch								
Michigan	172,915	--	71,441	244,356	--	234	234	244,590
Minnesota	--	9,877	--	9,877	--	--	--	9,877
Wisconsin	4,239	32,226	174,459	210,925	--	--	--	210,925
Total	177,154	42,104	245,900	465,158	--	234	234	465,392
Yellow birch								
Michigan	20,037	--	1,893	21,930	--	74	74	22,004
Wisconsin	268	--	12,868	13,135	--	--	--	13,135
Total	20,305	--	14,761	35,065	--	74	74	35,139
Cottonwood								
Michigan	1,117	--	--	1,117	--	--	--	1,117
Wisconsin	--	--	95	95	--	--	--	95
Total	1,117	--	95	1,212	--	--	--	1,212
Elm								
Michigan	3,520	--	741	4,261	--	--	--	4,261
Wisconsin	226	44	35,559	35,829	--	--	--	35,829
Total	3,746	44	36,300	40,090	--	--	--	40,090
Hickory								
Michigan	119	--	--	119	--	--	--	119
Total	119	--	--	119	--	--	--	119
Hard maple								
Michigan	333,587	--	52,176	385,762	--	821	821	386,583
Minnesota	--	1,004	--	1,004	--	--	--	1,004
Wisconsin	8,011	478	194,803	203,292	--	--	--	203,292
Total	341,598	1,481	246,979	590,058	--	821	821	590,879
Soft maple								
Michigan	283,617	--	27,221	310,837	--	--	--	310,837
Minnesota	--	17,519	5,492	23,011	--	--	--	23,011
Wisconsin	5,237	2,067	151,803	159,107	--	--	--	159,107
Total	288,854	19,586	184,516	492,956	--	--	--	492,956
Red oak								
Michigan	110,396	--	2,713	113,109	--	--	--	113,109
Wisconsin	3,253	--	92,542	95,795	--	--	--	95,795
Total	113,649	--	95,255	208,904	--	--	--	208,904
White oak								
Michigan	52,110	--	26	52,136	--	--	--	52,136
Wisconsin	718	--	32,629	33,347	--	--	--	33,347
Total	52,828	--	32,655	85,483	--	--	--	85,483
Other hardwoods								
Michigan	24,848	--	2,606	27,453	--	--	--	27,453
Wisconsin	679	2	13,997	14,678	--	--	--	14,678
Total	25,527	2	16,602	42,131	--	--	--	42,131

(Table 1 continued on next page)

(Table 1 continued)

Species and destination	Production by State 2/			Regional total	Imports			Total receipts
	Michigan	Minnesota	Wisconsin		Other U.S. 3/	Canada	Total imports	
Total hardwood roundwood								
Canada	--	25,102	--	25,102	--	--	--	--
Michigan	2,190,064	--	211,726	2,401,790	--	22,014	22,014	2,423,803
Minnesota	--	2,229,365	31,410	2,260,775	--	64,941	64,941	2,325,716
Wisconsin	121,220	87,182	1,876,019	2,084,422	--	--	--	2,084,422
Total	2,311,284	2,341,649	2,119,155	6,772,088	--	86,955	86,955	6,833,941
Residues, hardwood								
Michigan	159,072	--	14,675	173,747	14,682	1,413	16,096	189,843
Minnesota	--	76,231	3,318	79,548	--	178	178	79,727
Other 4/	--	--	1,364	1,364	--	--	--	--
Wisconsin	14,727	--	244,722	259,450	--	--	--	259,450
Total	173,799	76,231	264,078	514,108	14,682	1,592	16,274	529,019
All hardwoods								
Canada	--	25,102	--	25,102	--	--	--	--
Michigan	2,349,136	--	226,401	2,575,537	14,682	23,427	38,110	2,613,646
Minnesota	--	2,305,596	34,728	2,340,323	--	65,120	65,120	2,405,443
Other 4/	--	--	1,364	1,364	--	--	--	--
Wisconsin	135,948	87,182	2,120,741	2,343,871	--	--	--	2,343,871
Total	2,485,083	2,417,880	2,383,233	7,286,197	14,682	88,547	103,229	7,362,960
Total all roundwood								
Canada	12,894	39,152	--	52,046	--	--	--	--
Michigan	2,631,732	--	218,991	2,850,722	--	22,014	22,014	2,872,736
Minnesota	10,652	2,672,976	51,213	2,734,842	--	70,030	70,030	2,804,872
Wisconsin	253,425	145,185	2,667,167	3,065,777	14	--	14	3,065,791
Total	2,908,704	2,857,313	2,937,371	8,703,388	14	92,044	92,057	8,743,399
Total all residue								
Michigan	227,117	--	25,321	252,437	14,682	6,145	20,828	273,265
Minnesota	--	110,415	3,318	113,733	--	1,362	1,362	115,095
Other4/	--	--	1,364	1,364	--	--	--	--
Wisconsin	18,364	1,278	302,462	322,104	80,235	16,769	97,004	419,108
Total	245,480	111,694	332,464	689,638	94,917	24,275	119,193	807,468
All wood material								
Canada	12,894	39,152	--	52,046	--	--	--	--
Michigan	2,858,848	--	244,311	3,103,160	14,682	28,159	42,841	3,146,001
Minnesota	10,652	2,783,392	54,531	2,848,575	--	71,391	71,391	2,919,967
Other4/	--	--	1,364	1,364	--	--	--	--
Wisconsin	271,789	146,463	2,969,630	3,387,881	80,249	16,769	97,017	3,484,898
Total	3,154,184	2,969,007	3,269,836	9,393,026	94,931	116,319	211,250	9,550,866

1/ Table may not add to totals due to rounding.

2/ Vertical columns of figures under the box heading "Production by States" present the amount of roundwood cut or residue generated in each State.

3/ Mostly Western States.

4/ Pulpwood shipped to mills outside of region.

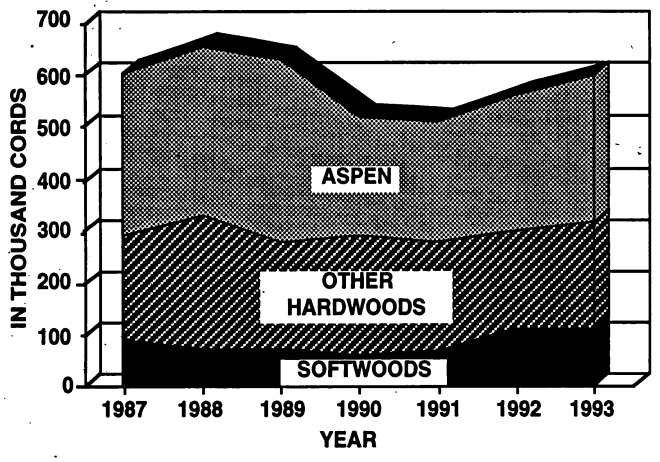


Figure 3.—*Whole-tree-chip production in the Lake States, 1987-1993.*

- Michigan is the major producer of whole-tree chips in the Lake States with 377 thousand cords (63 percent of the WTC production) (fig. 4).

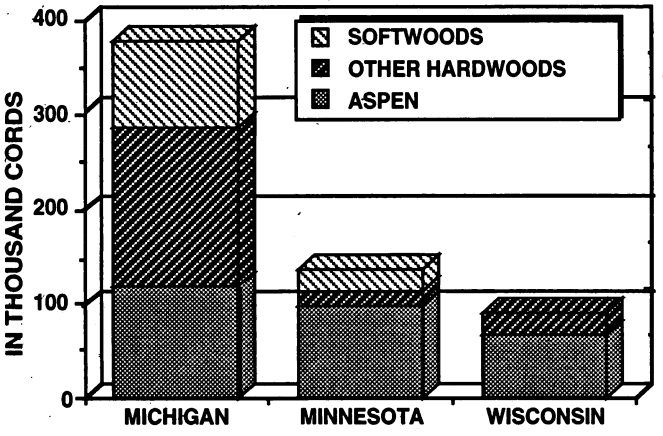


Figure 4.—*WTC production by State in the Lake States, 1993.*

- Aspen was the predominant species used in WTC in 1993 with 283 thousand cords, 47 percent of the total WTC production.

- Jack pine was the predominant softwood species used in WTC in 1993, making up 88 percent of the softwood WTC production and 16 percent of the total WTC production.

Michigan

- Michigan pulpwood production rose 10 percent to 3.2 million cords in 1993 (fig. 5).

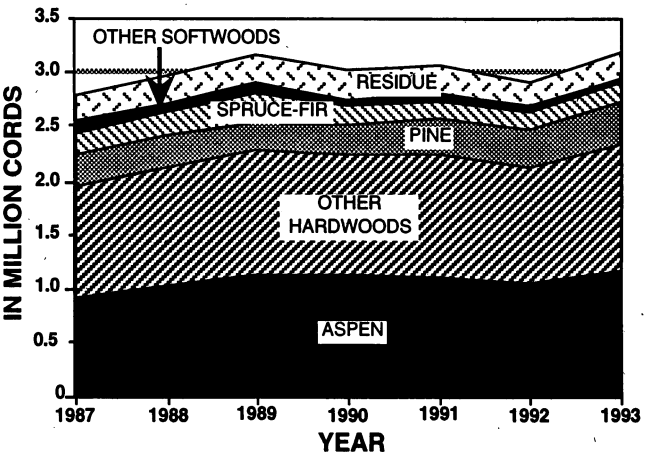


Figure 5.—*Michigan pulpwood production by species group and residues, 1987-1993.*

- The Western Upper Peninsula was the top producing region in the State with 36 percent of the roundwood harvested (fig. 6).

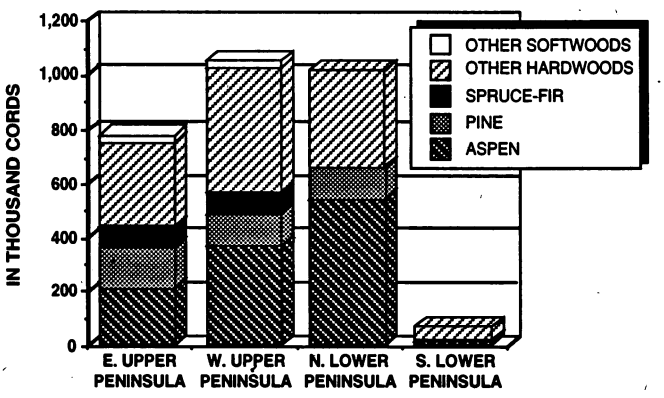


Figure 6.—*Michigan roundwood pulpwood production by Forest Survey Unit and species groups, 1993.*

- Marquette County in the Western Upper Peninsula was the top producer in the State with 301 thousand cords.

- Pulpwood production from roundwood decreased 5 percent for the Western Upper Peninsula, while it increased 8 percent for the Eastern Upper Peninsula, 29 percent for the Northern Lower Peninsula, and 65 percent for the Southern Lower Peninsula.

Minnesota

- Pulpwood production including residues increased 11 percent to 3.0 million cords in 1993 (fig. 7).

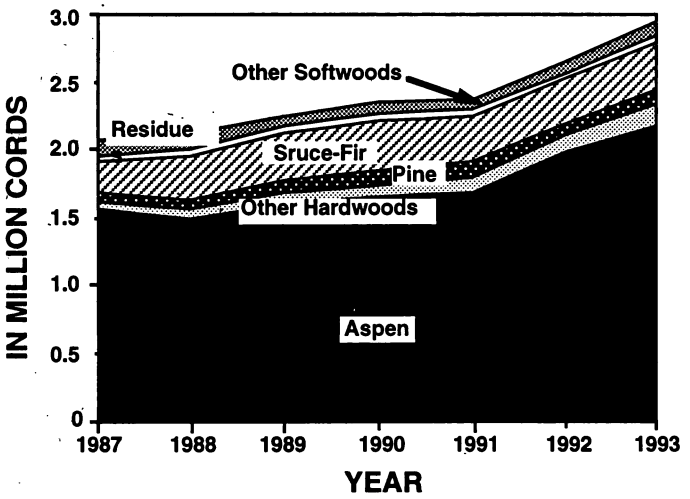


Figure 7.—*Minnesota pulpwood production by species group and residues, 1987-1993.*

- The Northern Pine Unit remains the top pulpwood producing area in the State with 1.34 million cords, followed by the Aspen-Birch Unit with 1.33 million cords (fig. 8).

- Aspen pulpwood production increased to a new high of 2.2 million cords, a 10-percent increase over the previous year.

- After declining in 1992, softwood roundwood production increased 9 percent or 44 thousand cords for 1993.

- St. Louis County in the Aspen-Birch Unit remains the top producing county with 665 thousand cords, a 23-percent increase from the previous year.

- Pulpwood production from roundwood increased 19 percent for the Central Hardwood Unit, 18 percent for the Aspen-Birch Unit, 15 percent for the Prairie Unit, and 3 percent for the Northern Pine Unit.

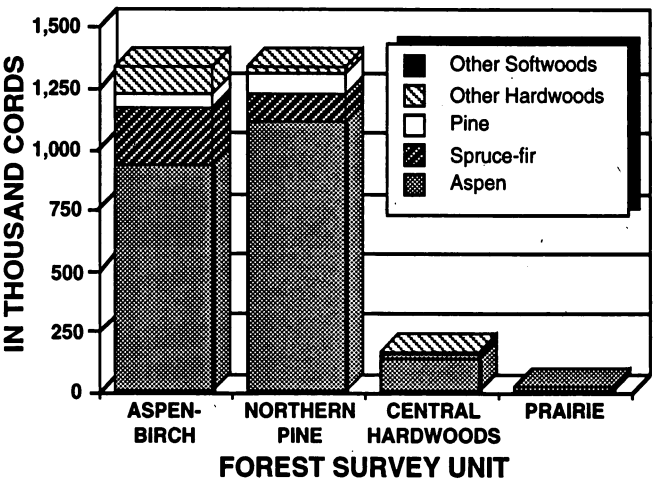


Figure 8.—*Minnesota roundwood pulpwood production by Forest Survey Unit and species group, 1993.*

Wisconsin

- Pulpwood production in Wisconsin decreased by 36 thousand cords, a 1-percent decline (fig. 9).

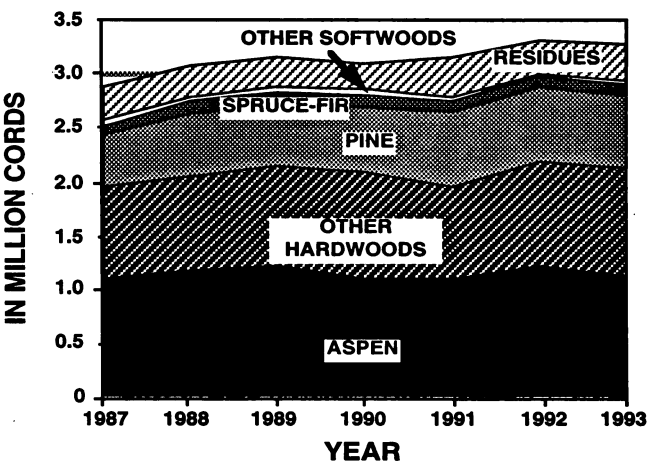


Figure 9.—*Wisconsin pulpwood production by species group and residues, 1987-1993.*

- Aspen harvests decreased 7 percent to 1.1 million cords in 1993.
- Pine pulpwood production in Wisconsin accounted for 24 percent of the total harvest.
- The Northwest and Northeast Units were the top pulpwood producing areas in the State with 1.2 million cords and 1.1 million cords, respectively (fig. 10).
- Bayfield County in the Northwest Unit was the top pulpwood producing county in the State with 199 thousand cords.

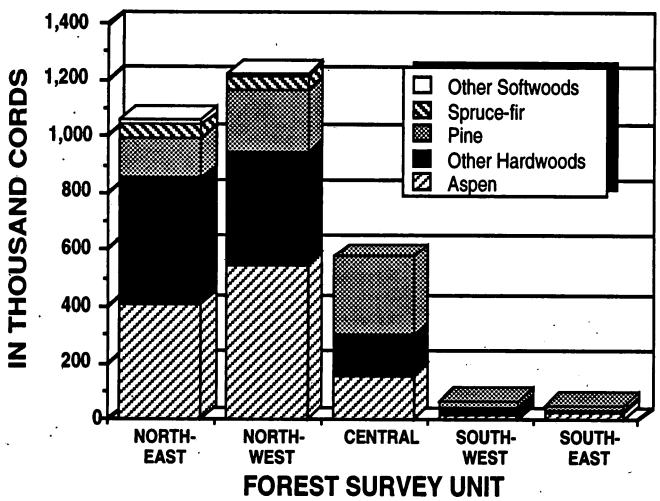


Figure 10.—*Wisconsin roundwood pulpwood production by Forest Survey Unit and species group, 1993.*

Harvesting Intensity

- In this report, we show the distribution of the harvest in two ways: first, the amount of pulpwood cut relative to the growing-stock volume in each of five major pulpwood species (fig. 11); and second, the amount of pulpwood relative to commercial timberland area (fig. 12).

Pulpwood harvesting was most intensive in the following areas by species: (100,000 cords or more)

Species	State	Survey Unit
Jack pine	Wisconsin	Northwest, Central
	Michigan	E. Upper Peninsula, N. Lower Peninsula
Red pine	Wisconsin	Central
Spruce	Minnesota	Aspen-Birch
Balsam fir	Minnesota	Aspen-Birch
Aspen	Minnesota	Aspen-Birch, Northern Pine, Central Hardwood
	Michigan	N. Lower Peninsula, E. Upper Peninsula, W. Upper Peninsula
	Wisconsin	Northwest, Northeast, Central
White birch	Wisconsin	Northeast, Northwest
Hard maple	Michigan	W. Upper Peninsula, E. Upper Peninsula
	Wisconsin	Northeast
Soft maple	Michigan	N. Lower Peninsula

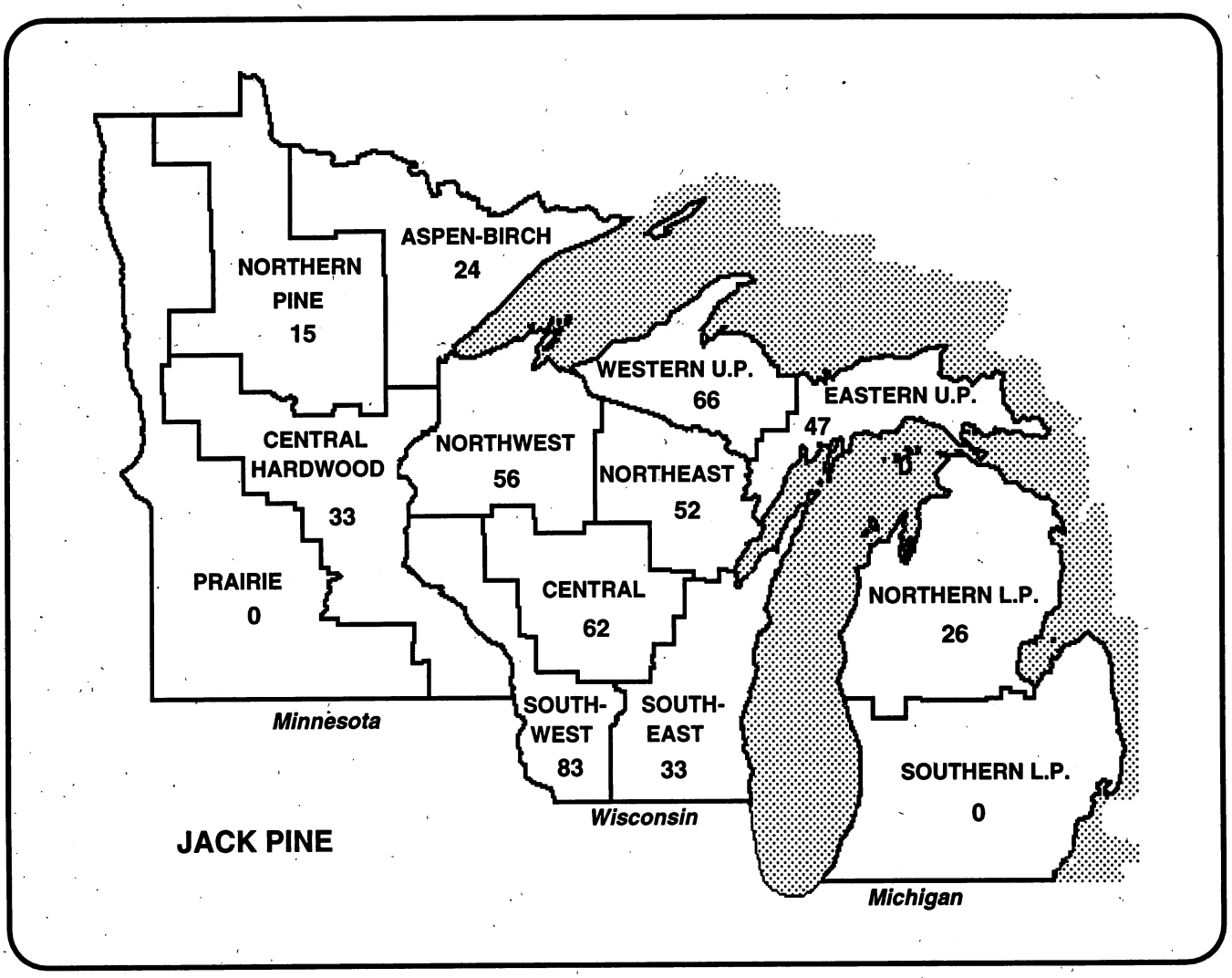
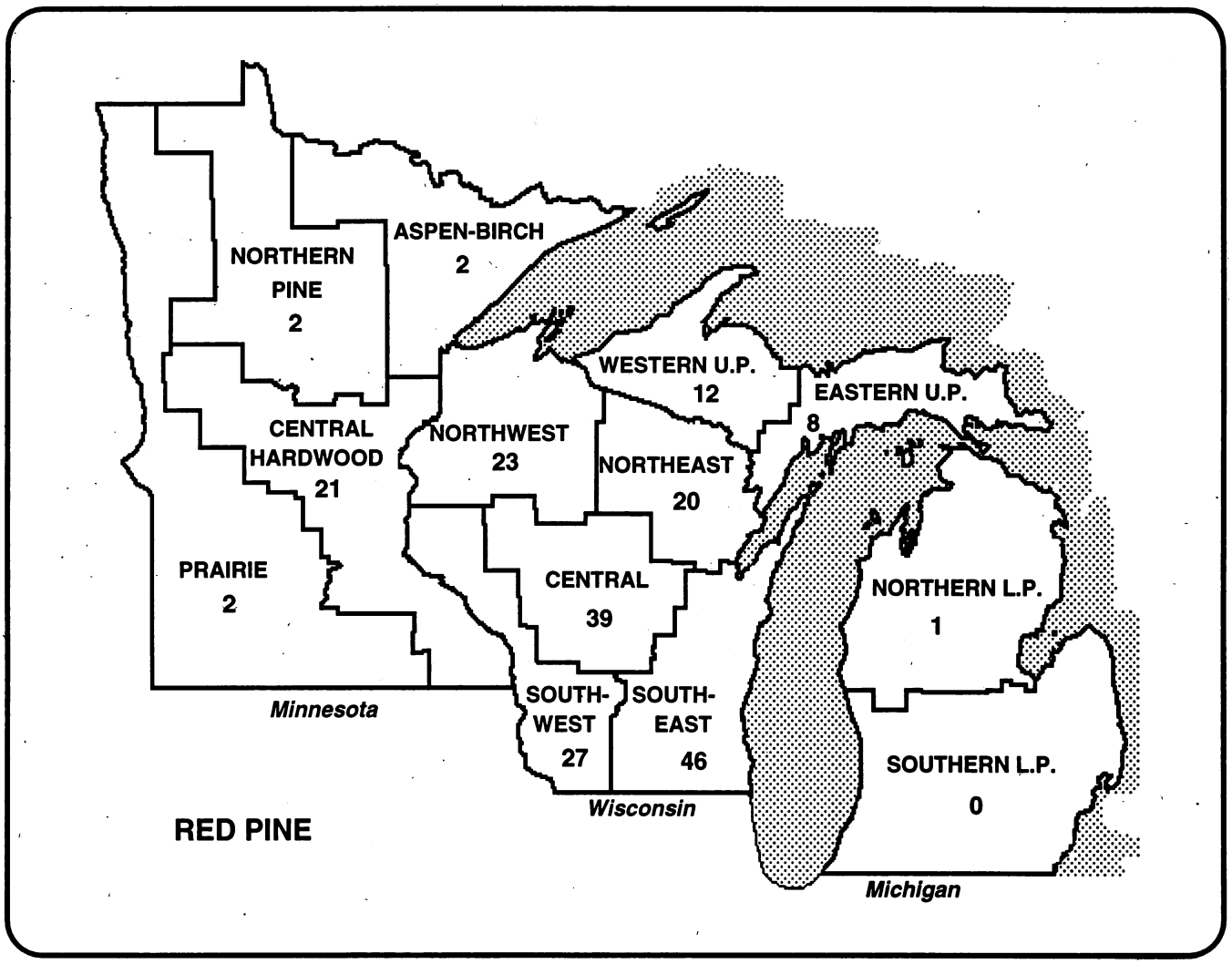
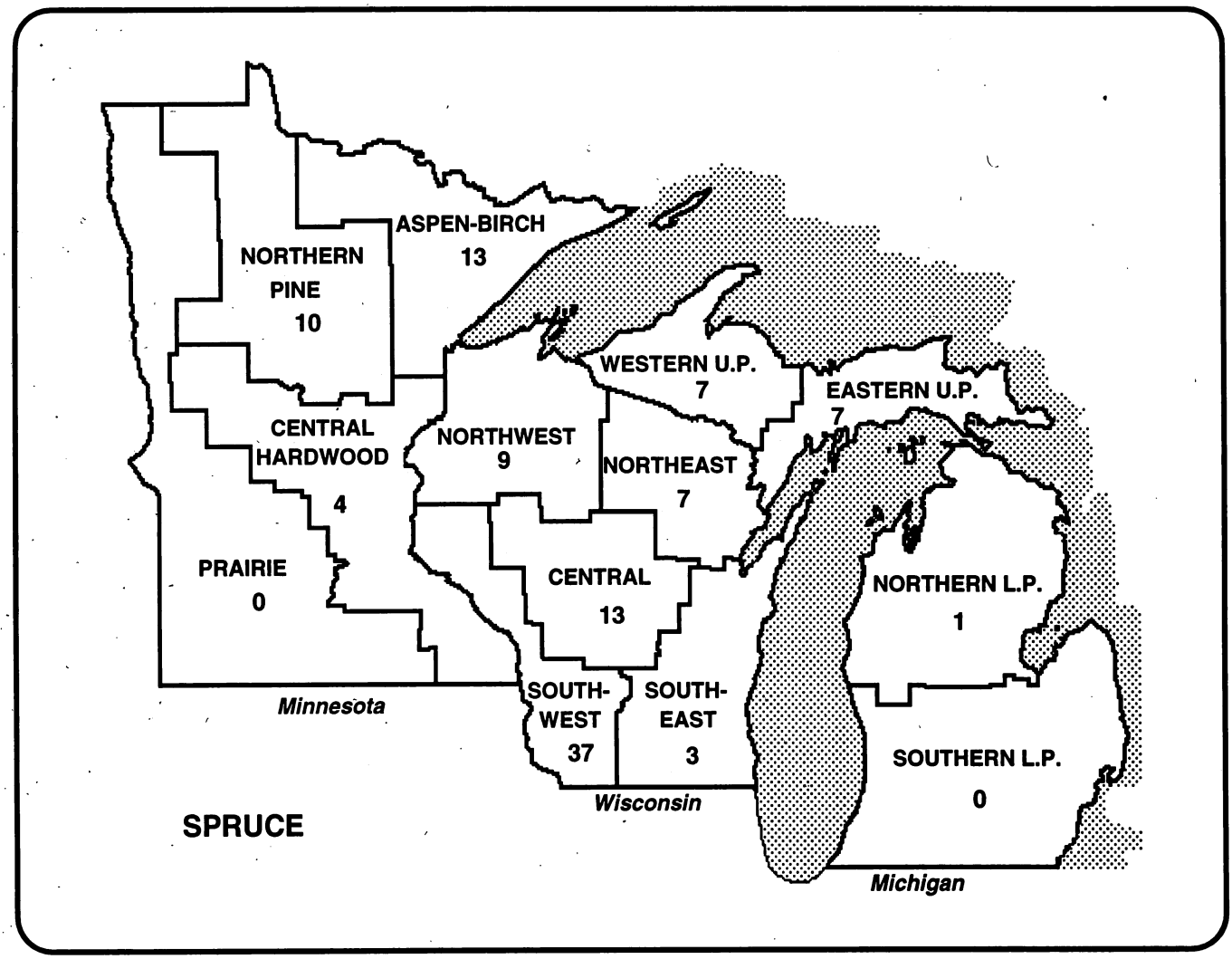


Figure 11.—*Cords of roundwood pulpwood (including chips from roundwood) harvested per 1,000 cords of growing-stock volume for each of five principal pulpwood species by Forest Survey Unit, 1993. Growing-stock volume was determined during the last forest inventory in each State.*


ASPEN-BIRCH
2
NORTHERN
PINE
2
WESTERN U.P.
12
EASTERN U.P.
8
CENTRAL
HARDWOOD
21
NORTHWEST
23
NORTHEAST
20
PRAIRIE
2
CENTRAL
39
NORTHERN L.P.
1
SOUTH-
WEST
27
SOUTH-
EAST
46
SOUTHERN L.P.
0
Minnesota
Wisconsin
Michigan
RED PINE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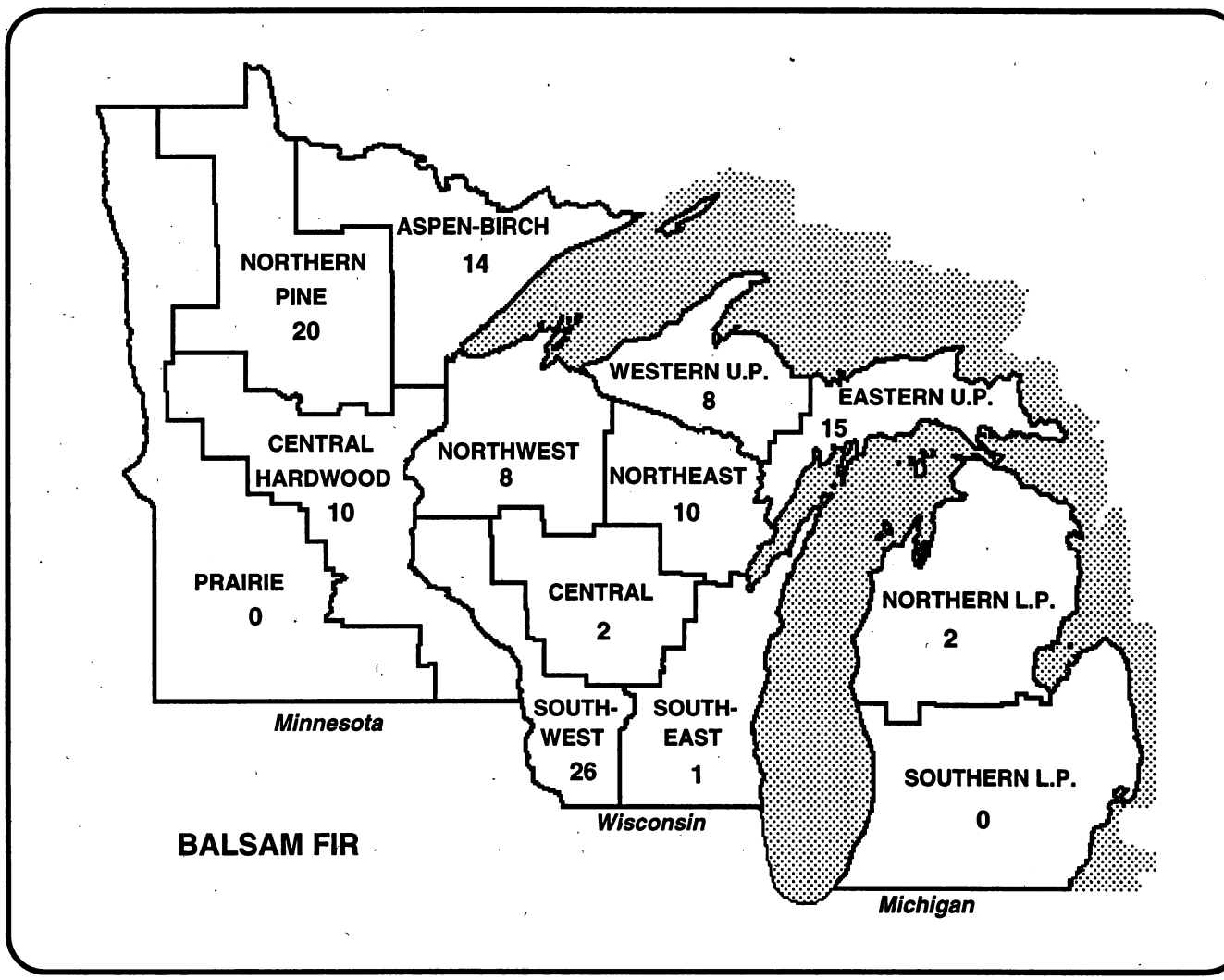
13
NORTHERN
PINE
10
WESTERN U.P.
7
EASTERN U.P.
7
CENTRAL
HARDWOOD
4
NORTHWEST
9
NORTHEAST
7
PRAIRIE
0
CENTRAL
13
NORTHERN L.P.
1
Minnesota
SOUTH-
WEST
37
SOUTH-
EAST
3
SOUTHERN L.P.
0
Wisconsin
Michigan
SPRUCE


ASPEN-BIRCH
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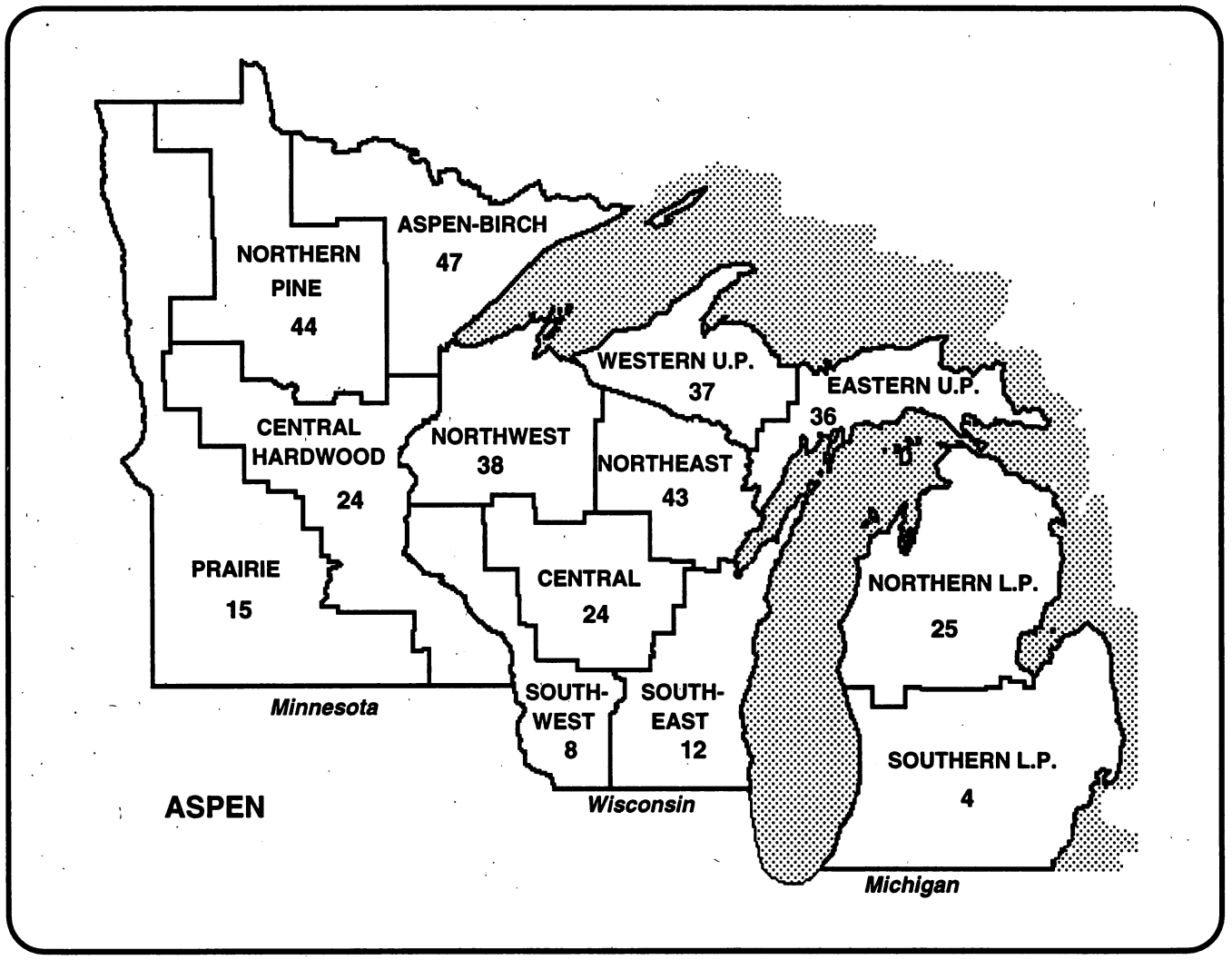
NORTHERN
PINE
20
WESTERN U.P.
8
EASTERN U.P.
15
CENTRAL
HARDWOOD
10
NORTHWEST
8
NORTHEAST
10
PRAIRIE
0
CENTRAL
2
NORTHERN L.P.
2
SOUTH-
WEST
26
SOUTH-
EAST
1
SOUTHERN L.P.
0
Minnesota
Wisconsin
Michigan
BALSAM FIR


ASPEN-BIRCH
47
NORTHERN
PINE
44
WESTERN U.P.
37
EASTERN U.P.
36
CENTRAL
HARDWOOD
24
NORTHWEST
38
NORTHEAST
43
PRAIRIE
15
CENTRAL
24
NORTHERN L.P.
25
SOUTH-
WEST
8
SOUTH-
EAST
12
SOUTHERN L.P.
4
Minnesota
Wisconsin
Michigan
ASPEN

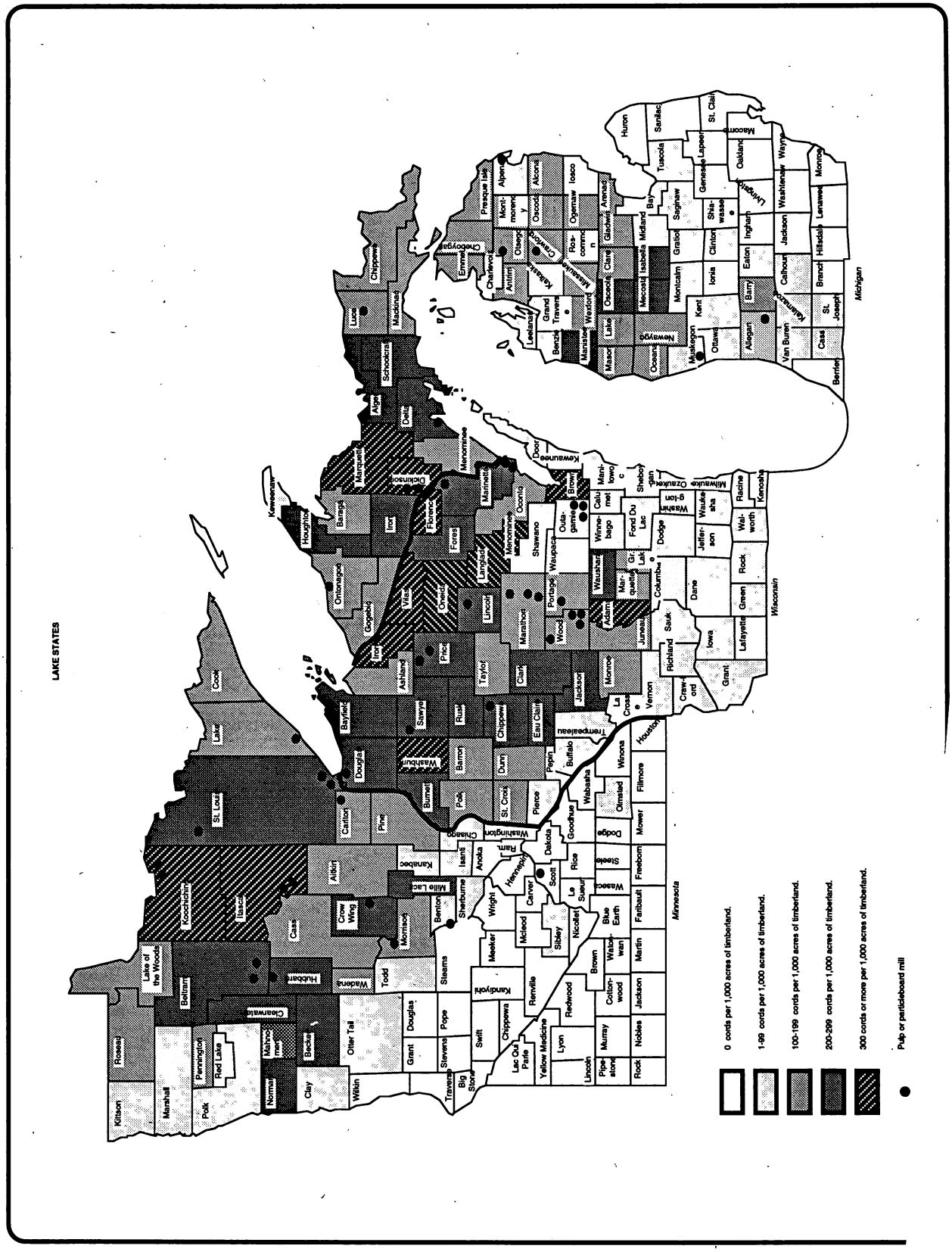


Figure 12.—*Cords of pulpwood cut per 1,000 acres of timberland in principal pulpwood-produci counties, 1993. Acres of timberland (stocking of trees greater than 16.7 percent) were deter during the last inventory in each State. Locations of active pulp and particleboard mills are*

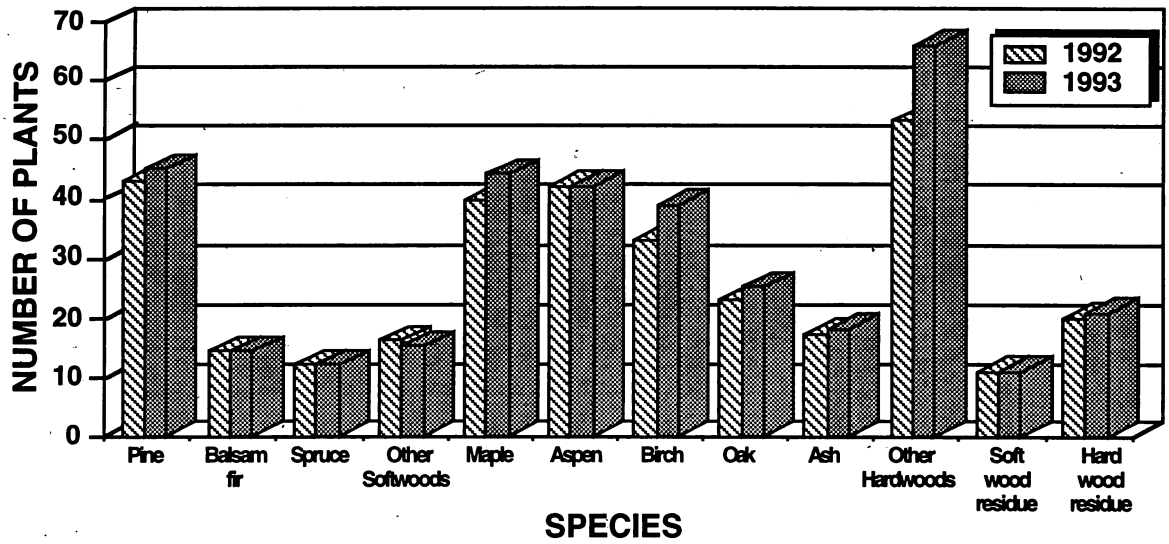


Figure 13.—*Numbers of industrial plants in the Lake States using a particular species or residue for pulping and particleboard, 1992-1993.*

RECEIPTS

- Thirty-four woodpulp and thirteen particleboard mills in the Lake States acquired 9.6 million cords of pulpwood in 1993, up 6 percent from 1992 (fig. 13).

- In 1993, Wisconsin supplied wood to 29 mills, Michigan supplied 28 mills, and Minnesota supplied 26 mills.

- Total imports of roundwood increased 228 percent, with Canada supplying nearly 100 percent of the volume.

- Softwood residue imported from Canada increased 252 percent in 1993 to 23 thousand cords. Softwood residue imported from States outside the region decreased 22 percent to 80 thousand cords. The main suppliers of the softwood residue from States outside the Lake States are Montana, South Dakota, and Wyoming.

- Total imports of all wood material increased 58 thousand cords, with Canada contributing 55 percent of the total import receipts.

Michigan

- Eleven Michigan mills consumed 3.1 million cords, up 12 percent from last year. Wisconsin provided more than 85 percent of the imported wood.

Wisconsin

- The 20 mills in Wisconsin consumed 3.5 million cords, a decrease of 14 percent from 1992. Of that total, 515 thousand cords were supplied by out-of-State sources—a decrease of 4 percent from last year.

Minnesota

- The 16 mills in Minnesota reported consuming an estimated 2.9 million cords, an increase of 12 percent over 1992. Wisconsin furnished 55 thousand cords, Michigan supplied 11 thousand cords, and Canada supplied 71 thousand cords.

Industry Trends and Analysis

Pulp Mills

In this section pulp mills include wood fiber products such as paper, paperboard, hardboard, insulation board, and medium-density fiber board. All of these products are manufactured from wood that has been reduced to individual fibers, small fiber bundles, or fiber parts that are subsequently formed into a mat.

- Of the 9.4 million cords of pulpwood produced in 1992, 6.8 million cords (73 percent) were used for wood fiber products (pulp). Of each cord used to produce pulp, 92 percent was roundwood and 8 percent was residues.
- Principal species harvested for pulp were aspen (2.4 million cords), jack pine (691 thousand cords), hard maple (563 thousand cords), and white birch (434 thousand cords).
- Aspen and other hardwoods are still the mainstays of the pulp mills in the region, but softwood use has increased steadily since 1988 (fig. 14).

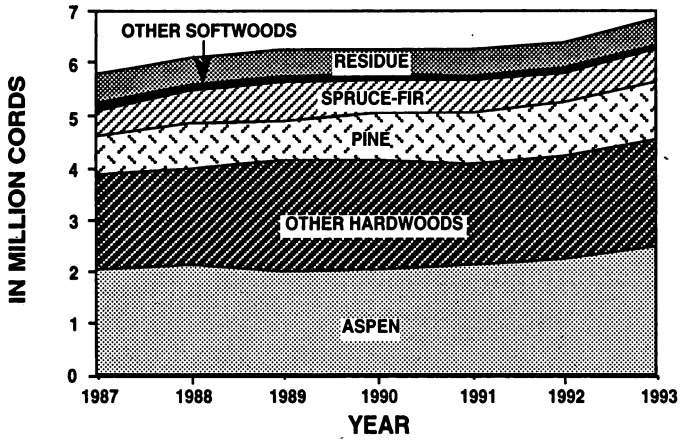


Figure 14.—*Pulpwood production in the Lake States for pulp by species group, and residues, 1987-1993.*

- Average daily woodpulp production was 21.8 thousand tons in 1993 (table 4). That total came from the following types of mills:

Type of mill	Average daily woodpulp production (Thousand tons)	Change from previous survey
Kraft	6.7	13% decrease
Sulfite	1.1	6% decrease
Groundwood mechanical	8.6	8% increase
Semi-chemical process	4.1	16% increase
Thermo-chemical and thermo-mechanical	1.3	included with groundwood-mechanical in previous survey

- Lake States pulpwood production for pulp mills in 1990-1993 was:

Species	Production			
	1990	1991	1992	199
	(Thousand cords)			
Roundwood				
Aspen	2,029	2,095	2,184	2,4
Softwoods	1,677	1,718	1,702	1,7
Other species	2,070	1,948	2,041	2,5
Residue	450	506	471	5
Total	6,226	6,267	6,398	6,8

Michigan

- Pulpwood production for wood fiber was million cords in 1993. Aspen was the m pulpwood species harvested in the State 565 thousand cords.
- Michigan mills imported 222 thousand of pulpwood for processing: 207 thous cords from Wisconsin and 16 thousan from Indiana and Canada combined. State of Michigan exported 13 thousa cords of wood fiber to other States out region.

Minnesota

- Pulpwood harvested for wood fiber products totaled 1.8 million cords in 1993. Aspen was the predominant species harvested in the State with 815 thousand cords.

- Mills in Minnesota imported 135 thousand cords for pulp products: 11 thousand cords from Michigan, 55 thousand cords from Wisconsin, and 70 thousand cords from Canada. Minnesota exported 104 thousand cords to Wisconsin and 39 thousand cords to Canada.

Wisconsin

- Pulpwood cut for wood fiber products totaled 2.9 million cords. Aspen was the main species harvested with 815 thousand cords in 1993.

- Wisconsin mills imported 422 thousand cords of pulpwood: 225 thousand cords from Michigan, 104 thousand cords from Minnesota, 80 thousand cords from Western States, and 13 thousand cords from Canada. Wisconsin exported 207 thousand cords to Michigan and 55 thousand cords to Minnesota.

Outlook

- While U. S. paper and paperboard production decreased 6.4 percent during 1993, the Lake States production of market pulpwood for wood fiber (pulp) mills increased 7 percent.

- Total output in the U.S. paper and paperboard for 1993 was 84 million tons (42 million tons of paper and 43 million tons of paperboard). The output of paper and paperboard in the North-Central Region was approximately 7 million tons or 8 percent of the total U.S. in 1993.

- Pulpwood consumption in the U.S. for 1993 totaled 105 million cords, a 1-percent increase from 1992. The pulpwood consumption in the North-Central Region was 6 percent of the total U.S. for 1993.

Particleboard Mills

Particleboard is a generic term for a panel manufactured from lignocellulosic material—commonly wood—essentially in the form of particles (as distinct from fibers). These materials are bonded together with synthetic resin or other suitable binder under heat and pressure by a process wherein the interparticle bonds are created wholly by the added binder and to which other materials may have been added during manufacture to improve certain properties. The many types of particleboard differ greatly in regard to size and geometry of the particle, the amount of resin (adhesive) used, and the density to which the panel is pressed. The major types of particles used for particleboard are shavings, flakes, wafers, chips, sawdust, strands, slivers, and wood wool (excelsior). Most particleboard in the U.S. is made from residues (shavings, sawdust, or chips), but some types require that roundwood (saw logs or pulpwood) be used. Wafer board is an example of a product requiring that the particles be cut from solid wood. A new product called engineered lumber was added to this generic term in 1992.

- Lake States loggers harvested 2.6 million cords of pulpwood in 1993 for particleboard products, up 1 percent from 1992. For every cord of pulpwood used in particleboard manufacture, 94 percent came from roundwood and 6 percent was residues from wood-using plants (sawmills, veneer mills, etc.).

- Principal species harvested for particleboard products were aspen (2 million cords), jack pine (126 thousand cords), and soft maple (75 thousand cords) (fig. 15).

- Total softwood roundwood used for particleboard products decreased 3 percent, but hardwood roundwood use remained practically the same.

- Total softwood residue use increased 4 percent, and hardwood residue use increased 46 percent.

- Annual production capacity of the Lake States particleboard and engineered lumber product plants is:

Particleboard and panel:

Company and product	Location	Production capacity (Million square feet 3/4-inch basis)
Georgia-Pacific - Particleboard	Gaylord, MI	227
Louisiana-Pacific - OSB*	Newberry, MI	55
Louisiana-Pacific - OSB*	Sagola, MI	180
Weyerhaeuser Co. - OSB*	Grayling, MI	180
Louisiana-Pacific - OSB*	Two Harbors, MN	65
Potlatch Corp. - OSB*	Grand Rapids, MN	165
Northwood Panelboard Co. - OSB*	Solway, MN	160
Potlatch Corp. - OSB*	Bemidji, MN	240
Potlatch Corp. - OSB*	Cook, MN	122
Louisiana-Pacific - Waferboard	Hayward, WI	230
Rodman Industries - Particleboard	Marinette, WI	22
Weyerhaeuser Co. - Particleboard	Marshfield, WI	60
All particleboard companies		1,706

Engineered lumber:

Company	Location	Production capacity (Thousand cubic feet)
Trus-Joist McMillian - PSL**	Deerwood, MN	10

* Oriented strand board ** Parallel strand lumber

- Lake States pulpwood production for particleboard mills in 1990-1993 was:

Species	Production			
	1990	1991	1992	1993
	- - - - - - - (Thousand cords) - - - - - - -			
Roundwood				
Aspen	1,840	1,786	2,050	2,028
Softwoods	140	158	157	152
Other species	103	148	183	204
Residue	126	194	142	175
Total	2,209	2,286	2,532	2,559

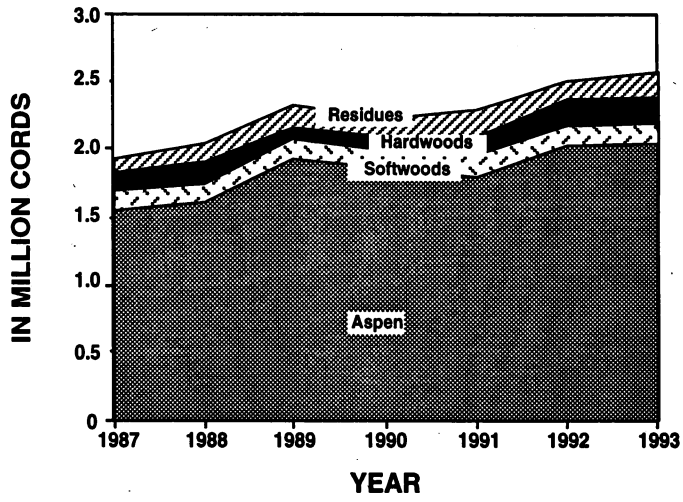


Figure 15.—*Pulpwood production for particleboard in the Lake States, 1987-1993.*

- National housing starts increased 7.1 percent in 1992 to 1.3 million units. A generally better economy, low mortgage rates, and stable housing prices accounted for the 1-percent increase in Lakes States pulpwood production for particleboard products.

Michigan

- Pulpwood harvested for particleboard products totaled 795 thousand cords in 1993, of which aspen totaled 541 thousand cords. Residues used for particleboard products added another 99 thousand cords.

- The particleboard mills in Michigan imported 34 thousand cords of aspen from Wisconsin and 21 thousand cords from Canada. Raw materials exported for particleboard production amounted to 11 thousand cords.

Minnesota

- Timber logged for particleboard products totaled 1.2 million cords (48 percent of the Lake States total). The predominant species cut was aspen with 1.1 million cords, or 94 percent of the total.

- The particleboard mills in Minnesota imported 1,202 cords from Canada. In 1993, raw materials exported from the State for particleboard manufacturing totaled 43 thousand cords.

Wisconsin

- Wisconsin produced 449 thousand cords of wood for particleboard manufacturing. The main species harvested was aspen with 349 thousand cords, or 78 percent of the total.

- The mills in Wisconsin imported 53 thousand cords of wood for particleboard manufacturing: 4 thousand cords of softwood residues from Canada, 11 thousand cords from Michigan, and 43 thousand cords of wood from Minnesota. Wisconsin exported 38 thousand cords to Michigan particleboard mills in 1993.

New Mills and Expansions

Major pulp mill expansion and new construction:

- Potlatch Corp., Cloquet, Minnesota, will rebuild the bleached kraft pulp mill, doubling its capacity by 1997.

- Louisiana-Pacific Corp. built an OSB (oriented strand board) plant in Tomahawk, Wisconsin, which was completed in 1993.

- Appleton Papers, Inc., Combined Locks, Wisconsin, expansion was completed in 1994.

- Georgia-Pacific has announced it will construct a medium density fiberboard (MDF) operation in Sault Ste. Marie, Ontario, Canada. The plant is scheduled for completion in 1995.

Idle, Closed, or Converted Mills

Major pulp mills idle, closing, or converting to recycled material:

- James River Corp., Green Bay, Wisconsin, closed sulphite pulp mill in 1992.

CENTRAL STATES

Production

- Pulpwood production in the Central States (Illinois, Indiana, Iowa, and Missouri) decreased 19 percent from 356 thousand cords in 1992 to 288 thousand cords in 1993 (fig. 16). Most of the decline was due to the 1993 flooding, which caused declines in pulpwood production for Iowa and Missouri of 21 and 28 percent, respectively.

- Hardwood residue from primary wood-using mills made up 73 percent of total production. Softwood residue from primary wood-using mills increased 11 percent from 1992.

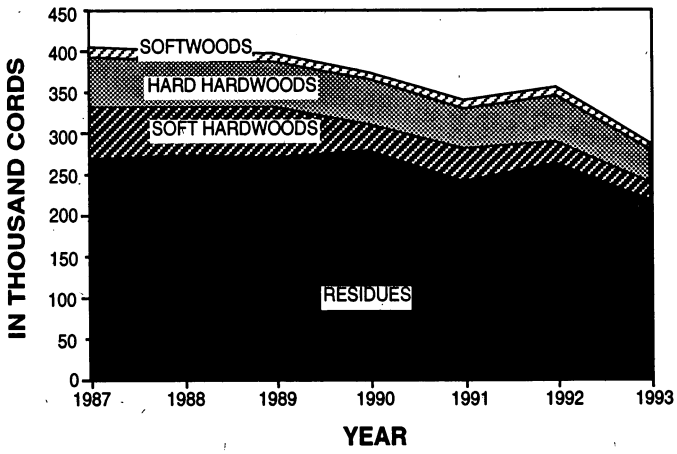


Figure 16.—*Pulpwood production in the Central States, 1987-1993.*

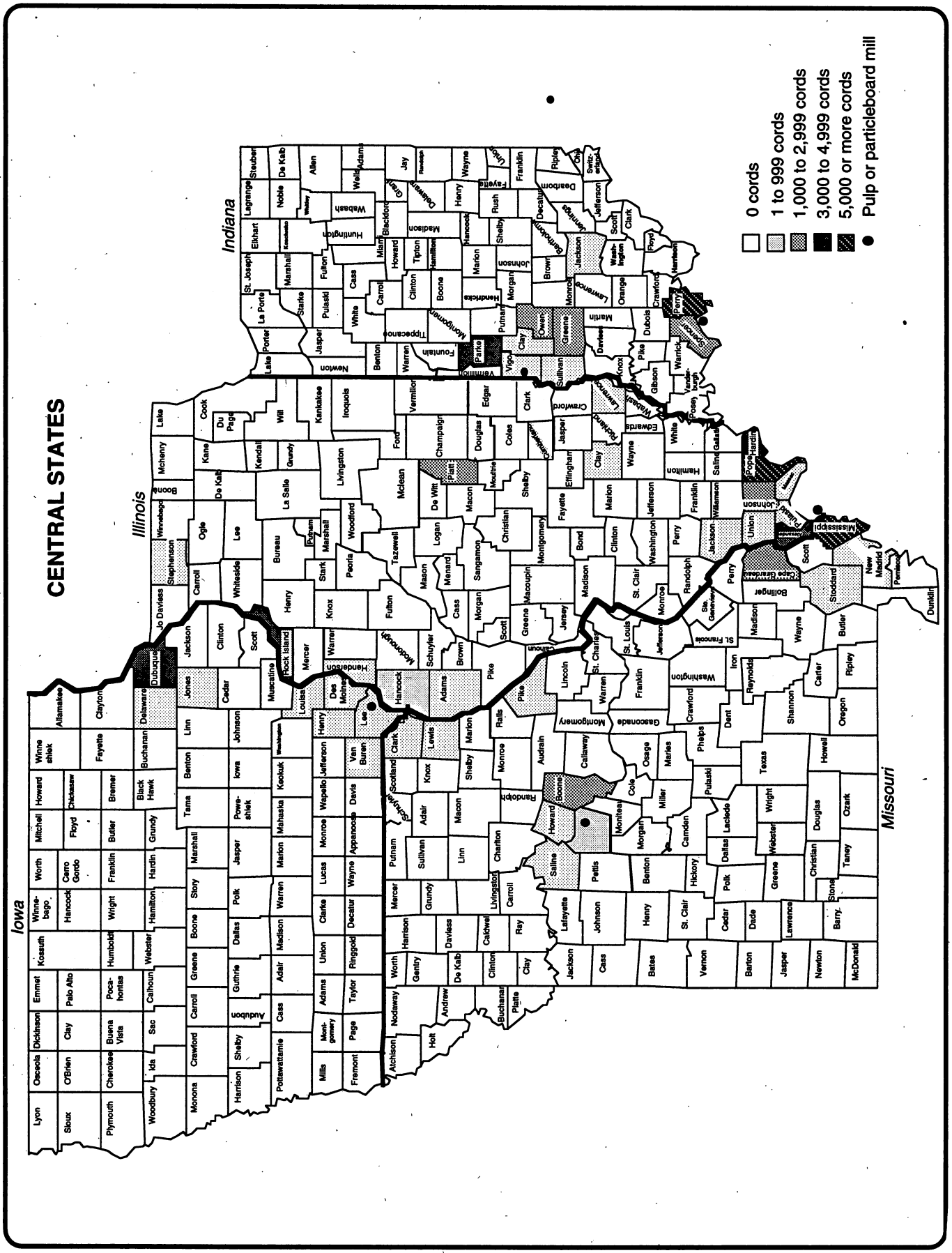


Figure 17.—*Production of pulpwood from roundwood (including chips from roundwood) in the Central States by counties, in standard cords, 1993. Locations of Central States and nearby pulp mills usi Central States pulpwood are shown.*

- Central States production for roundwood pulpwood was 71 thousand cords in 1993, down 23 percent from 1992. Pulpwood production from soft hardwood[7] roundwood dropped from 26 thousand cords in 1992 to 22 thousand cords in 1993 or 17 percent. Hard hardwood[8] production also decreased from 54 thousand cords in 1992 to 41 thousand cords in 1993 or 24 percent.

- Exports of roundwood and residues from the Central States decreased 21 percent to 190 thousand cords. Central States pulpwood was shipped to Kentucky, Wisconsin, Ohio, Oklahoma, and Michigan mills.

- Loggers harvested pulpwood in 16 counties of Illinois; 9 counties in southern Indiana; 8 counties in eastern Iowa; and 11 counties in northeast, central, and southeast Missouri (fig. 17).

- Whole-tree chips made up 8 percent of the pulpwood production for the Central States in 1993. The 22 thousand cords of whole-tree chips were a 56-percent increase from the 1992 volume.

Illinois

- Illinois produced 55 thousand cords of pulpwood in 1993, down 29 percent from 1992. Illinois contributes 19 percent of the total production in the Central States (fig. 18).

- Illinois does not have any primary woodpulp mills so all pulpwood harvested is shipped to plants outside the State.

Indiana

- Pulpwood production in Indiana accounted for 42 percent of the total pulpwood harvested in the Central States region in 1993, or 143 thousand cords, a 4-percent decline from 1992.

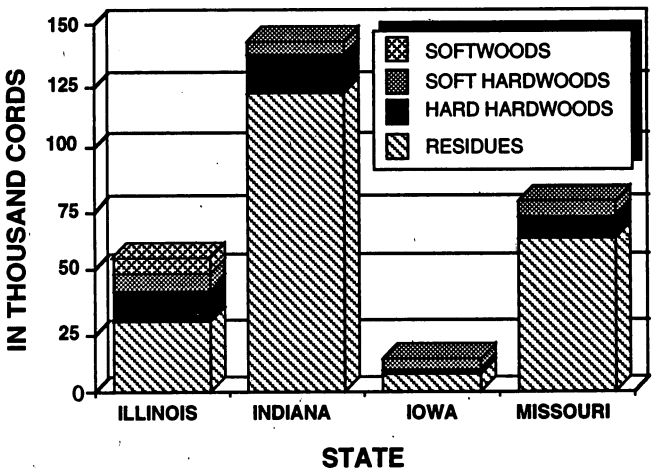


Figure 18.—*Central States pulpwood production by species group, 1993.*

- Pulpwood shipped to mills outside the North-Central Region totaled 81 thousand cords, 57 percent of the State's total pulpwood production. The remaining 43 percent was used by mills in the Central and Lakes States regions.

Iowa

- The total pulpwood production in 1993 was 13 thousand cords, 4 percent of the region's total.

- Production of soft hardwoods and hard hardwoods pulpwood increased 138 percent and 23 percent, respectively, leading to a total increase of 88 percent for all roundwood. Residues, on the other hand, decreased 26 percent.

Missouri

- Missouri is the second largest producer of pulpwood in the Central States region at 78 thousand cords or 27 percent of the region's total. Missouri pulpwood production decreased 33 percent from 1992.

- Missouri exported 94 thousand cords or 83 percent of the State's pulpwood production to mills outside the region, mainly in Kentucky and Oklahoma.

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[7]*Hardwood species with an average specific gravity of 0.50 or less.*

[8]*Hardwood species with an average specific gravity greater than 0.50.*

Receipts

- Pulp mills in three Central States received 99 thousand cords in 1993, down 14 percent from 1992.
- Hardwood residue decreased 14 percent, from 83 thousand cords in 1992 to 71 thousand cords in 1993.
- No softwoods were used for pulpwood for the 10th consecutive year in the Central States.

Industry Trends

- Average daily pulp production decreased 4 percent in 1993 to 812 tons (table 5).
- Mills in the adjacent States remain the dominant market for Central States pulpwood.
- Hardwood residue from sawmills continues to be the dominant form of pulpwood procured for Central States pulp mills.

PLAINS STATES

Production and Receipts

This is the first year that the Plains States have been included in this report. Consequently, trend data are not available.

- Pulpwood production in the Plains States was 114 thousand cords in 1993 and came from South Dakota and Kansas.
- Softwood residues accounted for most of the pulpwood production for the Plains States in 1993 (fig. 19).

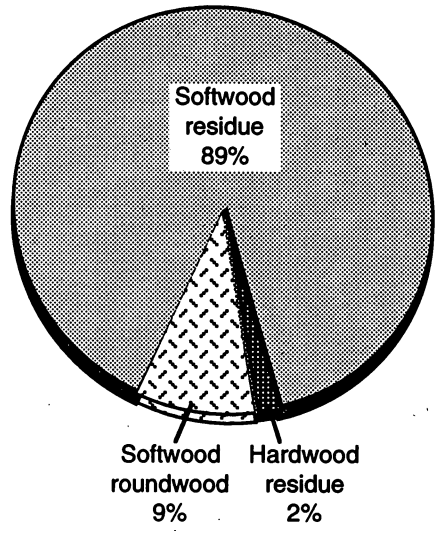


Figure 19.—*Plains States pulpwood production, 1993.*

- Fifty-two thousand cords of softwood residu from the Plains States were exported to Wisconsin in 1993. An additional 2 thousand cords of hardwood residues were sen Oklahoma.
- The Plains States imported 58 thousand cords of softwood residue from Wyoming i 1993.
- All of the pulpwood received in the Plains States was processed at Merillat Industri Inc. (particleboard) in Rapid City, South Dakota, which has a production capacity 95 million square feet 3/4 basis.

APPENDIX

Conversion Factors Used In The North-Central Region

Standard cords of green roundwood per green ton:

Species	Factor
Softwoods	0.4688
N. white cedar	.6329
Balsam fir	.4688
Hemlock	.4150
Jack pine	.4688
Red pine	.4688
White pine	.4777
Shortleaf pine	.3956
Spruce	.5014
Tamarack	.4291
Hardwoods	.3939
Soft hardwoods	.4171
Hard hardwoods	.3708
Ash	.4330
Aspen	.4291
Balsam poplar	.4083
Basswood	.5167
Beech	.3956
White birch	.4018
Yellow birch	.3723
River birch	.3871
Sweetgum	.3669
Yellow-poplar	.4219
Blackgum	.3779
Sycamore	.4083
Cottonwood	.4291
Elm	.4018
Hickory	.3701
Hard maple	.3617
Soft maple	.4083
Black cherry	.4688
Red oak	.3444
White oak	.3723
Black oak	.3444
Other hardwoods	.4777

Table 2.--Numbers of industrial plants in the Lake States using a particular species or residue for pulping or particleboard in 1993

Species and product form	Total Lake States	State		
		Michigan	Minnesota	Wisconsin
Roundwood				
Softwoods				
Cedar	2	2	--	--
Balsam fir	14	3	4	7
Hemlock	7	1	--	6
Jack pine	19	4	8	7
Red pine	16	3	6	7
White pine	10	2	1	7
Spruce	12	2	4	6
Tamarack	6	1	--	5
Total plants using softwoods 1/	21	4	10	7
Hardwoods				
Ash	18	8	1	9
Aspen	42	10	15	17
Balsam poplar	16	7	6	3
Basswood	16	8	--	8
Beech	10	7	--	3
White birch	25	9	6	10
Yellow birch	14	7	--	7
Cottonwood	4	1	--	3
Elm	9	4	--	5
Hickory	1	1	--	--
Hard maple	20	9	1	10
Soft maple	24	11	3	10
Red oak	16	9	--	7
White oak	9	5	--	4
Other hardwoods	10	4	--	6
Total plants using hardwoods 1/	45	11	15	19
Total plants using roundwood 1/	46	11	16	19
Residues				
Softwood	11	2	2	7
Hardwood	21	7	4	10
Total plants using residues 1/	21	7	4	10
Total plants 1/	47	11	16	20

1/ Some plants use more than one species, so numbers in columns are not additive.

Table 3.--Average daily production of active woodpulp mills in the Lake States by mill, location, and type of pulp produced, 1993

(In tons per 24 hours)

Company	Location	All types	Type of pulp					
			Sulfite	Kraft	Groundwood/ mechanical	Semi-chemical	Thermo-chemical	Thermo-mechanical
Michigan								
ABT Co.	Alpena	515	--	--	515	--	--	--
Champion International Corp.	Quinnesec	1,100	--	1,100	--	--	--	--
Mead Corp.	Escanaba	1,500	--	1,500	--	--	--	--
Menasha Corp.	Otsego	650	--	--	--	650	--	--
Packaging Corp. of America	Manistee	900	--	--	--	900	--	--
S. D. Warren Co.	Muskegon	250	--	250	--	--	--	--
Stone Container Corp.	Ontonagon	719	--	--	--	719	--	--
Total	7 mills	5,634	--	2,850	515	2,269	--	--
Minnesota							--	--
Blandin Paper Co.	Grand Rapids	1,230	--	--	1,230	--	--	--
Boise Cascade Corp.	International Falls	1,381	--	1,381	--	--	--	--
Certain-Teed Corp.	Shakepee	225	--	--	--	--	225	--
Georgia-Pacific Corp.	Bemidji	100	--	--	100	--	--	--
Georgia-Pacific Corp.	Duluth	325	--	--	325	--	--	--
Hennepin Paper Co.	Little Falls	100	--	--	100	--	--	--
International Bildrite, Inc.	International Falls	2,330	--	--	2,330	--	--	--
Lake Superior Paper Industry	Duluth	750	--	--	750	--	--	--
Potlatch Corp.	Cloquet	520	--	520	--	--	--	--
Sartell Paper Mill	Sartell	800	--	--	--	--	--	800
Total	10 mills	7,761	--	1,901	4,835	--	225	800
Wisconsin								
Appleton Papers Inc.	Combined Locks	575	--	--	--	575	--	--
Badger Paper Mills Inc.	Peshtigo	110	110	--	--	--	--	--
Consolidated Paper Inc.	Stevens Point	94	--	--	94	--	--	--
Consolidated Paper Inc.	Wisconsin Rapids	1,361	--	843	518	--	--	--
Cross Pointe Paper Corp.	Park Falls	360	360	--	--	--	--	--
Georgia-Pacific Corp.	Phillips	430	--	--	430	--	--	--
Georgia-Pacific Corp.	Superior	250	--	--	250	--	--	--
Georgia-Pacific Corp.	Port Edwards	260	260	--	--	--	--	--
Georgia-Pacific Corp.	Nekoosa	380	--	380	--	--	--	--
Globe Building Materials Inc.	Cornell	230	--	--	--	--	--	230
Mosinee Paper Corp.	Mosinee	285	--	285	--	--	--	--
Niagara of WI Paper Corp.	Niagara	700	--	--	700	--	--	--
Packaging Corp. of America	Tomahawk	1,300	--	--	--	1,300	--	--
Repap Wisconsin Inc.	Kimberly	1,250	--	--	1,250	--	--	--
Thilmany-International Paper	Kaukauna	450	--	450	--	--	--	--
Wausau Paper Mills Corp.	Brokaw	250	250	--	--	--	--	--
Weyerhaeuser Paper Co.	Rothschild	140	140	--	--	--	--	--
Total	17 mills	8,425	1,120	1,958	3,242	1,875	--	230
Lake States total	34 mills	21,820	1,120	6,709	8,592	4,144	225	1,030

Table 4.--Production and imports of pulpwood, Central States and Plains States, 1993 1/

(In standard cords, unpeeled)

Species and destination	Production by State 2/					Regional total	Imports			Total receipts
	Illinois	Indiana	Iowa	Missouri	Plains States		Lake States	Other U.S.	Total imports	
Roundwood										
Softwood										
Lake States	14	--	--	--	--	14	--	--	--	--
Northeastern States	7,019	344	--	213	--	7,576	--	--	--	--
Plains States	--	--	--	--	10,800	10,800	--	--	--	10,800
Total	7,032	344	--	213	10,800	18,389	--	--	--	10,800
Soft hardwoods 3/										
Central States	4,872	5,375	4,163	4,919	--	19,329	--	--	--	19,329
Northeastern States	1,397	--	--	1,183	--	2,581	--	--	--	--
Total	6,269	5,375	4,163	6,103	--	21,910	--	--	--	19,329
Hard hardwoods 4/										
Central States	2,554	4,118	1,831	294	--	8,796	--	--	--	8,796
Northeastern States	10,826	12,373	--	9,169	--	32,368	--	--	--	--
Total	13,380	16,491	1,831	9,463	--	41,165	--	--	--	8,796
Total roundwood										
Central States	7,425	9,493	5,993	5,214	--	28,125	--	--	--	28,125
Lake States	14	--	--	--	--	14	--	--	--	--
Northeastern States	19,242	12,718	--	10,565	--	42,525	--	--	--	--
Plains States	--	--	--	--	10,800	10,800	--	--	--	10,800
Total	26,681	22,211	5,993	15,779	10,800	81,464	--	--	--	38,926
Residues										
Softwoods										
Lake States	--	--	--	--	52,346	52,346	--	--	--	--
Northeastern States	--	159	--	3,697	--	3,855	--	--	--	--
Plains States	--	--	--	--	48,839	48,839	--	58,000	58,000	106,839
Total	--	159	--	3,697	101,185	105,040	--	58,000	58,000	106,839
Hardwoods										
Central States	17,507	37,978	6,727	7,576	--	69,788	1,364	--	1,364	71,151
Lake States	--	14,682	--	--	--	14,682	--	--	--	--
Northeastern States	10,436	68,255	--	50,275	--	128,966	--	--	--	--
Southern States	--	--	--	182	2,091	2,273	--	--	--	--
Total	27,943	120,915	6,727	58,033	2,091	215,708	1,364	--	1,364	71,151
Total Residues										
Central States	17,507	37,978	6,727	7,576	--	69,788	1,364	--	1,364	71,151
Lake States	--	14,682	--	--	52,346	67,028	--	--	--	--
Northeastern States	10,436	68,413	--	53,972	--	132,821	--	--	--	--
Plains States	--	--	--	--	48,839	48,839	--	58,000	58,000	106,839
Southern States	--	--	--	182	2,091	2,273	--	--	--	--
Total	27,943	121,073	6,727	61,730	103,276	320,748	1,364	58,000	59,364	177,900
All wood material										
Central States	24,932	47,471	12,720	12,790	--	97,913	1,364	--	1,364	99,277
Lake States	14	14,682	--	--	52,346	67,042	--	--	--	--
Northeastern States	29,678	81,131	--	64,537	--	175,345	--	--	--	--
Plains States	--	--	--	--	59,639	59,639	--	58,000	58,000	117,639
Southern States	--	--	--	182	2,091	2,273	--	--	--	--
Total	54,624	143,284	12,720	77,508	114,076	402,212	1,364	58,000	59,364	216,916

1/ Table may not add to totals due to rounding.

2/ Vertical columns of figures under the box heading "Production by States" present the amount of roundwood cut or residue generated in each State.

3/ Hardwood species with an average specific gravity of 0.50 or less.

4/ Hardwood species with an average specific gravity greater than 0.50.

Table 5.--Average daily production of active woodpulp mills in the Central States by mill, location, and type of pulp produced, 1993

(In tons per 24 hours)

Company	Location	All types	Type of pulp		
			Kraft	Groundwood/ mechanical	Semi-chemical
The Weston Paper and Mfg. Co.	Terre Haute, Indiana	550	--	--	550
Consolidated Packaging Corp.	Fort Madison, Iowa	182	182	--	--
Huebert Fiberboard, Inc.	Boonville, Missouri	80	--	80	--
Central States total	3 mills	812	182	80	550

Table 6.--Lake States pulpwood production by State of origin and destination, 1989-1993

(In thousand stand cords, unpeeled)1/

MICHIGAN

Year	Total production	Destination of pulpwood			
		Minnesota	Wisconsin	Michigan	Other
1989	3,112	(2/)	319	2,777	16
1990	2,982	1	313	2,645	23
1991	3,016	5	304	2,687	20
1992	2,877	3	323	2,533	18
1993	3,154	11	272	2,859	13
5-year average	3,028	4	306	2700	18

MINNESOTA

Year	Total production	Destination of pulpwood			
		Minnesota	Wisconsin	Michigan	Other
1989	2,263	2,110	116	2	34
1990	2,361	2,200	127	1	33
1991	2,391	2,269	101	--	21
1992	2,672	2,520	105	--	47
1993	2,969	2,783	146	--	39
5-year average	2,531	2,376	119	1	35

WISCONSIN

Year	Total production	Destination of pulpwood			
		Minnesota	Wisconsin	Michigan	Other
1989	3,161	89	2,799	272	1
1990	3,094	83	2,768	243	--
1991	3,146	69	2,799	274	4
1992	3,296	56	2,987	253	--
1993	3,270	55	2,970	244	1
5-year average	3,193	70	2,865	257	1

1/ Includes mill residues used for pulp.

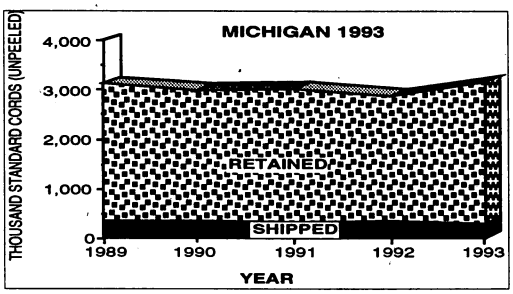
2/ Less than 500 cords.

Table 7.--Lake States pulpwood production by Forest Survey Unit and destination by State, 1993

(In thousand standard cords, unpeeled)

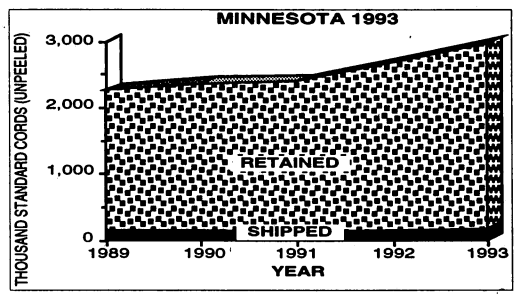
MICHIGAN

Unit	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other
Roundwood					
Eastern Upper Peninsula	778	690	--	81	7
Western Upper Peninsula	1,051	868	11	169	3
Northern Lower Peninsula	1,016	1,010	--	3	3
Southern Lower Peninsula	64	64	--	(1/)	--
Total	2,909	2,632	11	253	13
Residues	245	227	--	18	--
Total pulpwood	3,154	2,859	11	272	13



MINNESOTA

Unit	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other
Roundwood					
Aspen-Birch	1,330	--	1,221	71	39
Northern Pine	1,341	--	1,310	31	--
Central Hardwood	163	--	119	44	--
Prairie	23	--	23	(1/)	--
Total	2,857	--	2,673	145	39
Residues	112	--	110	1	--
Total pulpwood	2,969	--	2,783	146	39



WISCONSIN

Unit	Total production	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other
Roundwood					
Northeastern	1,053	195	(1/)	859	--
Northwestern	1,221	15	51	1,155	--
Central	575	(1/)	--	575	--
Southwestern	58	--	(1/)	58	--
Southeastern	30	9	--	21	--
Total	2,937	219	51	2,667	--
Residues	332	25	3	302	1
Total pulpwood	3,270	244	55	2,970	1

(1/) Less than 500 standard cords, unpeeled.

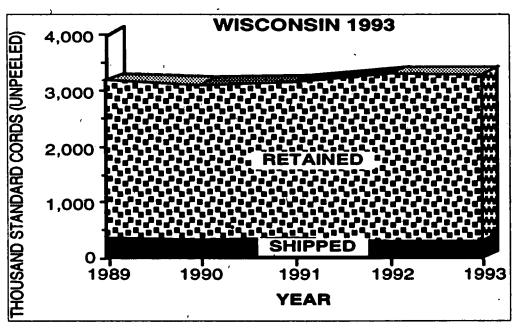


Table 8.--Lake States annual pulpwood production from roundwood by species, State, and Forest Survey Unit, 1989-1993

(In thousand standard cords, unpeeled)

MICHIGAN

Unit	All species1/					Pine					Spruce				
	1989	1990	1991	1992	1993	1989	1990	1991	1992	1993	1989	1990	1991	1992	1993
Eastern Upper Peninsula	768	747	760	720	778	53	99	109	129	149	66	29	22	26	27
Western Upper Peninsula	1,044	989	1,045	1,101	1,051	70	87	88	124	115	48	36	40	43	39
Northern Lower Peninsula	986	935	923	788	1.016	131	113	112	111	116	1	1	1	1	2
Southern Lower Peninsula	54	46	35	39	64	(2/)	(2/)	(2/)	(2/)	(2/)	--	--	--	--	--
Total	2,852	2,717	2,763	2,648	2,909	254	299	309	364	380	115	66	63	70	67

MINNESOTA

Aspen-Birch	986	1,014	979	1,129	1,330	66	58	55	49	56	130	137	110	115	125
Northern Pine	1,106	1,152	1,209	1,299	1,341	63	76	98	68	81	33	43	31	30	33
Central Hardwood	89	106	106	136	163	3	4	10	14	20	(2/)	(2/)	(2/)	1	1
Prairie	3	4	12	20	23	(2/)	(2/)	--	(2/)	(2/)	--	--	--	--	--
Total	2,184	2,276	2,306	2,584	2,857	132	138	163	131	156	163	180	141	146	158

WISCONSIN

Northeast	1,090	1,075	1,055	1,117	1,054	149	152	145	141	141	27	32	17	18	13
Northwest	1,139	1,127	1,097	1,201	1,221	120	162	211	203	225	16	15	15	20	19
Central	586	595	549	574	575	246	262	277	276	277	2	1	1	2	1
Southwest	38	53	63	81	58	25	34	50	47	34	(2/)	(2/)	(2/)	1	1
Southeast	16	16	20	26	30	10	10	13	16	15	(2/)	(2/)	(2/)	1	(2/)
Total	2,869	2,866	2,784	2,999	2,937	550	620	696	683	692	45	48	33	42	34
Total Lake States	7,905	7,859	7,853	8,231	8,704	936	1,057	1,168	1,178	1,228	323	294	237	258	259

1/ Includes a small quantity of cedar not shown elsewhere in the table.

2/ Less than 500 cords.

(Table 8 continued on next page)

(Table 8 continued)

MICHIGAN

Unit	Balsam fir					Hemlock					Tamarack				
	1989	1990	1991	1992	1993	1989	1990	1991	1992	1993	1989	1990	1991	1992	1993
Eastern Upper Peninsula	88	51	63	44	55	23	31	28	18	17	4	5	5	4	3
Western Upper Peninsula	51	33	37	36	44	19	24	20	18	20	2	3	4	3	2
Northern Lower Peninsula	4	2	3	3	3	(2/)	1	(2/)	(2/)	--	--	--	--	--	--
Southern Lower Peninsula	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	143	86	103	83	101	42	56	48	36	37	6	8	9	7	6

MINNESOTA

Aspen-Birch	118	117	106	104	114	--	--	--	--	--	2	2	3	1	2
Northern Pine	80	80	90	81	84	--	--	--	--	--	3	2	1	1	1
Central Hardwood	1	(2/)	(2/)	2	2	--	--	--	--	--	--	--	(2/)	--	--
Prairie	--	--	--	--	11	--	--	--	--	--	--	--	--	--	--
Total	199	197	196	187	199	--	--	--	--	--	5	4	4	2	3

WISCONSIN

Northeast	38	37	31	29	30	36	32	26	22	17	2	4	3	2	2
Northwest	28	27	33	32	31	5	4	5	5	4	2	4	3	2	5
Central	1	1	(2/)	(2/)	1	2	2	2	2	1	1	1	(2/)	(2/)	(2/)
Southwest	--	(2/)	--	(2/)	(2/)	--	(2/)	--	(2/)	(2/)	--	--	--	(2/)	--
Southeast	--	(2/)	(2/)	(2/)	(2/)	--	(2/)	(2/)	(2/)	(2/)	--	--	--	--	--
Total	67	66	64	61	61	43	38	33	29	23	5	9	6	5	7
Total Lake States	409	349	363	331	361	85	94	81	65	60	16	21	19	14	16

2/ Less than 500 cords.

(Table 8 continued on next page)

(Table 8 continued)

MICHIGAN

Unit	Aspen					Birch					Other hardwoods				
	1989	1990	1991	1992	1993	1989	1990	1991	1992	1993	1989	1990	1991	1992	1993
Eastern Upper Peninsula	171	220	210	200	211	107	82	66	61	64	233	226	257	238	248
Western Upper Peninsula	364	369	368	367	373	120	103	82	86	81	357	333	406	424	375
Northern Lower Peninsula	553	515	510	460	545	52	43	41	35	51	245	259	256	178	299
Southern Lower Peninsula	16	12	6	7	13	(2/)	(2/)	(2/)	(2/)	2	38	34	29	32	49
Total	1,104	1,116	1,094	1,034	1,142	279	228	189	182	197	873	852	948	872	972

MINNESOTA

Aspen-Birch	616	632	643	782	925	21	21	10	18	27	34	44	52	60	82
Northern Pine	909	928	959	1,073	1,105	2	1	2	6	11	17	22	28	125	27
Central Hardwood	81	94	84	110	131	1	1	1	1	3	4	7	11	8	6
Prairie	3	4	12	20	23	--	--	--	--	--	--	--	--	--	(2/)
Total	1,609	1,658	1,698	1,985	2,185	24	23	13	25	42	55	73	91	193	115

WISCONSIN

Northeast	437	409	414	452	405	146	136	137	147	129	254	272	282	306	316
Northwest	573	520	513	554	544	151	149	107	134	114	243	246	210	251	279
Central	184	151	149	175	152	35	45	27	25	17	113	134	93	94	126
Southwest	12	14	11	29	18	1	1	1	1	1	1	4	1	3	5
Southeast	2	2	3	6	10	(2/)	(2/)	(2/)	(2/)	(2/)	4	3	4	3	4
Total	1,208	1,096	1,090	1,216	1,129	333	331	272	307	261	615	659	590	657	730
Total Lake States	3,921	3,870	3,882	4,235	4,455	636	582	474	514	500	1,543	1,584	1,629	1,722	1,817

2/Less than 500 cords.

Table 9.--Pulpwood production from roundwood by county and species group, Michigan, 1993

(In standard cords, unpeeled)

Unit and county 1/	All species	Species group										
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
E. UPPER PENINSULA												
Alger	104,039	631	8,410	2,585	10,428	4,357	1,550	2,432	524	685	16,595	2,147
Chippewa	106,049	605	8,501	1,895	28,961	4,075	1,476	3,779	483	162	36,136	3,325
Delta	174,773	815	10,961	3,365	19,637	5,940	2,002	3,622	744	668	58,357	3,934
Luce	75,241	368	5,589	3,192	15,298	2,622	903	4,063	331	504	7,531	880
Mackinac	96,397	405	5,495	1,241	8,260	2,235	730	3,425	243	322	38,174	2,909
Menominee	95,902	285	4,403	1,250	5,469	2,690	750	3,293	244	654	32,699	1,498
Schoolcraft	125,634	837	11,240	3,815	22,514	7,433	2,057	5,935	907	596	21,624	2,278
Total	778,034	3,946	54,599	17,343	110,567	29,351	9,469	26,550	3,476	3,590	211,117	16,971
W. UPPER PENINSULA												
Baraga	62,997	124	2,915	4,056	3,214	1,147	305	2,349	223	922	32,317	1,867
Dickinson	138,240	634	9,321	2,641	17,690	5,163	1,557	5,949	526	396	57,103	2,589
Gogebic	98,284	--	1,906	689	4,069	1,106	35	2,500	--	2,603	35,392	1,360
Houghton	140,643	159	4,260	1,097	5,148	2,581	656	3,401	133	2,214	45,070	4,000
Iron	187,856	272	7,105	1,149	6,691	2,775	694	9,805	225	2,459	64,109	3,143
Keweenaw	5,288	--	42	6	--	638	--	516	--	44	1,211	7
Marquette	301,233	1,196	16,762	9,431	42,659	8,830	2,975	12,072	1,033	1,463	77,683	5,835
Ontonagon	116,087	--	1,318	877	5,915	653	97	2,274	--	2,197	60,514	2,611
Total	1,050,628	2,384	43,630	19,946	85,386	22,893	6,318	38,865	2,139	12,298	373,398	21,413
N. LOWER PENINSULA												
Alcona	51,246	--	13	--	316	9,453	--	6	--	669	27,245	1,045
Alpena	21,185	9	165	--	689	3	6	161	--	489	13,491	493
Antrim	21,260	--	--	--	4,508	140	46	--	--	173	8,080	22
Arenac	13,288	--	--	--	335	31	--	--	--	10	9,320	45
Bay	1,571	--	--	--	--	--	--	--	--	--	1,331	--
Benzie	8,824	--	--	--	--	--	--	--	--	221	2,815	--
Charlevoix	7,713	--	--	--	150	132	--	--	--	153	2,742	--
Cheboygan	66,320	94	990	--	13,195	185	132	425	--	607	36,472	328
Clare	44,576	--	--	--	1,121	--	--	--	--	--	32,759	--
Crawford	36,113	--	--	--	18,504	179	150	--	--	31	10,587	--
Emmet	19,923	27	218	--	1,419	109	4	52	--	109	10,681	14
Gladwin	28,187	--	--	--	260	--	--	--	--	--	22,229	20
Grand Traverse	13,298	--	--	--	2,545	57	24	--	--	94	5,201	35
Iosco	15,176	--	--	--	96	30	--	--	--	176	11,270	98
Isabella	24,661	--	--	--	--	183	--	--	--	--	18,125	--
Kalkaska	16,670	--	--	--	4,140	446	8	--	--	--	9,160	--
Lake	49,865	--	--	--	286	16	--	--	--	292	15,885	--
Leelanau	4,896	--	--	--	--	--	--	--	--	124	1,937	--
Manistee	60,929	--	--	--	64	215	--	--	--	763	28,011	--
Mason	29,930	--	--	--	24	--	--	--	--	190	17,700	--
Mecosta	37,341	--	--	--	21	41	--	--	--	248	27,742	--
Midland	13,275	--	--	--	--	--	--	--	--	--	7,836	16
Missaukee	42,274	--	--	--	1,223	136	--	--	--	275	25,033	--
Montmorency	54,246	4	80	--	3,207	180	32	26	--	452	32,779	350
Newaygo	35,947	--	--	--	--	--	--	--	--	124	18,367	--
Oceana	22,110	--	--	--	--	--	--	--	--	248	12,439	--
Ogemaw	29,945	--	--	--	2,921	89	13	--	--	401	16,100	188
Osceola	37,351	--	--	--	9	21	--	--	--	--	26,756	--
Oscoda	44,537	--	--	--	15,463	106	155	--	--	212	20,398	194
Otsego	34,977	3	100	--	13,529	283	139	64	--	149	10,333	--
Presque Isle	42,281	19	1,130	--	420	142	2	970	--	854	25,522	890
Roscommon	50,803	--	--	--	14,857	924	109	--	--	189	22,100	57
Wexford	34,828	--	--	--	1,090	1,657	--	--	--	304	14,332	--
Total	1,015,544	156	2,696	--	100,391	14,759	820	1,705	--	7,558	544,777	3,793
S. LOWER PENINSULA												
Allegan	9,885	--	--	--	--	--	--	--	--	--	1,953	--
Barry	13,136	--	--	--	--	--	--	--	--	210	225	--
Calhoun	251	--	--	--	--	--	--	--	--	--	--	--
Cass	1,418	--	--	--	--	--	--	--	--	--	--	--
Clinton	1,387	--	--	--	--	--	--	--	--	124	--	--
Eaton	5,560	--	--	--	--	--	--	--	--	--	377	--
Gratiot	150	--	--	--	--	--	--	--	--	--	83	--
Hillsdale	14	--	--	--	--	14	--	--	--	--	--	--
Kalamazoo	4,719	--	--	--	--	--	--	--	--	124	2,515	--
Kent	8,134	--	--	--	--	--	--	--	--	--	4,001	--
Montcalm	3,023	--	--	--	--	17	--	--	--	--	856	--
Muskegon	9,362	--	--	--	--	--	--	--	--	--	1,534	--
Ottawa	2,162	--	--	--	--	--	--	--	--	--	201	--
Saginaw	123	--	--	--	--	--	--	--	--	--	--	--
Shiawassee	540	--	--	--	--	--	--	--	--	--	253	--
St. Joseph	3,855	--	--	--	--	--	--	--	--	--	172	--
Tuscola	381	--	--	--	--	--	--	--	--	--	381	--
Van Buren	399	--	--	--	--	--	--	--	--	--	--	--
Total	64,499	--	--	--	--	31	--	--	--	458	12,550	--
State total	2,908,704	6,486	100,925	37,288	296,344	67,033	16,607	67,120	5,615	23,904	1,141,842	42,177

1/ Includes only those counties that supplied pulpwood in 1993.

(Table 9 continued on next page)

(Table 9 continued)

MICHIGAN

Unit and county 1/	Species group											
	Bass-wood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwood
E. UPPER PENINSULA												
Alger	1,064	3,013	6,425	2,590	--	169	--	23,628	14,318	806	--	1,682
Chippewa	331	971	3,971	667	--	10	--	4,737	5,570	66	--	329
Delta	1,509	3,564	14,602	2,078	--	190	--	24,479	15,628	733	32	1,914
Luce	700	1,355	4,374	427	--	140	--	14,517	10,970	640	1	836
Mackinac	639	1,587	5,923	880	--	51	--	10,302	12,474	325	22	753
Menominee	1,073	1,479	14,542	767	--	173	--	14,545	8,396	748	34	909
Schoolcraft	968	2,832	4,632	1,654	--	143	--	20,937	12,975	685	21	1,551
Total	6,284	14,801	54,467	9,063	--	875	--	113,145	80,333	4,003	110	7,974
W. UPPER PENINSULA												
Baraga	1,708	408	1,414	736	--	67	--	5,907	2,687	399	16	217
Dickinson	1,191	1,559	10,329	962	--	229	--	11,677	7,402	424	28	870
Gogebic	4,161	1,172	3,691	1,012	--	241	--	23,008	11,182	2,865	170	1,122
Houghton	3,524	3,100	9,447	2,413	--	260	--	32,093	17,460	1,722	99	1,807
Iron	3,931	3,023	14,325	1,520	--	601	--	40,157	20,981	2,672	141	2,077
Keweenaw	62	87	700	80	--	12	--	1,159	607	58	--	58
Marquette	3,088	5,711	28,136	3,372	--	416	--	47,175	28,311	1,775	70	3,242
Ontonagon	3,647	979	1,673	878	--	249	--	20,592	9,386	1,442	91	695
Total	21,311	16,039	69,714	10,973	--	2,075	--	181,768	98,016	11,358	614	10,089
N. LOWER PENINSULA												
Alcona	102	116	3,559	--	--	--	--	308	4,083	3,886	442	4
Alpena	59	129	2,119	--	--	--	--	209	2,449	641	73	--
Antrim	331	319	1,783	--	--	--	--	984	4,874	--	--	--
Arenac	5	2	877	--	--	--	--	5	1,519	398	740	--
Bay	--	--	90	--	--	--	--	--	151	--	--	--
Benzie	580	291	448	--	--	--	--	997	2,773	370	81	249
Charlevoix	309	252	364	1	--	--	--	1,400	2,195	15	--	--
Cheboygan	347	383	3,044	--	--	--	--	2,324	6,352	1,435	6	--
Clare	--	214	1,782	--	--	--	--	646	5,505	1,086	983	479
Crawford	33	34	190	--	--	--	--	239	2,530	3,502	134	--
Emmet	216	118	1,551	--	--	--	--	773	4,632	--	--	--
Gladwin	--	--	885	--	496	--	--	--	3,034	836	427	--
Grand Traverse	156	156	687	--	--	--	--	1,132	1,769	753	345	345
Iosco	27	25	1,537	--	--	--	--	68	1,450	352	44	3
Isabella	124	223	276	--	248	122	--	118	1,191	2,769	1,281	--
Kalkaska	--	--	477	--	--	--	--	--	1,915	257	247	21
Lake	720	898	747	--	--	122	--	3,806	4,796	12,265	9,251	779
Leelanau	500	472	368	119	--	122	--	288	444	348	173	--
Manistee	1,836	1,634	3,382	--	--	122	--	4,453	8,061	5,066	4,563	2,761
Mason	257	501	2,082	--	--	--	--	785	2,289	3,303	2,469	331
Mecosta	124	334	810	--	--	122	119	1,184	1,750	2,630	2,140	73
Midland	--	--	739	--	--	--	--	--	3,516	1,057	111	--
Missaukee	550	--	1,896	--	--	--	--	301	7,715	2,875	1,995	275
Montmorency	317	228	3,431	--	--	122	--	844	6,195	4,654	1,345	--
Newaygo	124	334	563	--	--	--	--	592	2,533	8,570	4,739	--
Oceana	249	223	852	--	248	--	--	1,374	1,227	3,835	1,375	40
Ogemaw	314	175	1,399	--	--	--	--	778	2,142	4,790	490	147
Osceola	206	--	2,104	--	--	--	--	1,957	2,605	2,808	664	220
Oscoda	96	63	1,926	--	--	--	--	705	1,686	3,474	59	--
Otsego	267	272	1,471	--	--	--	--	4,576	3,228	563	--	--
Presque Isle	138	137	5,822	--	--	--	--	1,670	3,714	766	85	--
Roscommon	52	42	1,592	--	--	--	--	5,372	1,612	3,493	318	88
Wexford	1,826	1,064	1,785	--	--	--	--	1,384	4,195	4,324	1,500	1,368
Total	9,867	8,638	50,638	120	993	734	119	39,270	104,129	81,120	36,079	7,181
S. LOWER PENINSULA												
Allegan	--	--	--	--	--	--	--	33	--	3,796	4,103	--
Barry	282	535	2,213	149	--	61	--	5,719	3,053	406	--	282
Calhoun	--	--	--	--	--	--	--	--	--	121	130	--
Cass	--	--	--	--	--	--	--	--	343	517	558	--
Clinton	124	111	121	--	--	--	--	118	119	669	--	--
Eaton	124	111	--	--	124	--	--	1,184	1,191	1,236	1,212	--
Gratiot	--	--	--	--	--	--	--	--	67	--	--	--
Hillsdale	--	--	--	--	--	--	--	--	--	--	--	--
Kalamazoo	124	111	--	--	--	--	--	237	476	989	142	--
Kent	--	--	--	--	--	--	--	--	269	1,976	1,887	--
Montcalm	--	--	--	--	--	--	--	--	--	1,033	1,117	--
Muskegon	--	--	--	--	--	--	--	--	--	3,846	3,982	--
Ottawa	--	--	--	--	--	--	--	--	--	1,030	931	--
Saginaw	--	--	--	--	--	--	--	123	--	--	--	--
Shiawassee	--	--	--	--	--	--	--	--	--	--	287	--
St. Joseph	--	--	--	--	--	--	--	--	817	1,378	1,489	--
Tuscola	--	--	--	--	--	--	--	--	--	--	--	--
Van Buren	--	--	--	--	--	--	--	--	41	172	186	--
Total	655	870	2,334	149	124	61	--	7,415	6,376	17,168	16,025	282
State total	38,117	40,348	177,154	20,305	1,117	3,746	119	341,598	288,854	113,649	52,828	25,527

1/ Includes only those counties that supplied pulpwood in 1993.

Table 10.--Pulpwood production from roundwood by county and species group, Minnesota, 1993

(In standard cords, unpeeled)

Unit and county 1/	All species	Species group									
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
ASPEN-BIRCH												
Carlton	45,591	--	9,223	--	1,400	392	--	2,122	29	--	26,350	919
Cook	75,708	--	6,440	--	11,049	253	--	13,293	42	--	42,086	--
Koochiching	447,623	--	26,370	--	7,643	438	--	49,230	1,165	--	323,181	39,250
Lake	96,616	--	8,491	--	2,672	299	--	16,913	210	671	52,676	538
St. Louis	664,866	--	63,184	--	28,102	3,297	--	43,053	259	--	480,773	30,042
Total	1,330,403	--	113,707	--	50,866	4,679	--	124,611	1,705	671	925,066	70,749
NORTHERN PINE												
Aitkin	106,198	--	5,426	--	1,172	827	--	833	--	238	90,907	2,246
Becker	96,620	--	735	--	1,533	188	--	17	--	--	93,983	163
Beltrami	179,600	--	10,523	--	8,190	481	27	6,141	541	--	148,820	2,175
Cass	164,789	--	6,199	--	5,250	1,756	--	1,405	--	--	146,644	2,164
Clearwater	68,790	--	1,970	--	375	--	--	460	50	--	65,486	449
Crow Wing	85,921	--	385	--	7,647	3,126	--	--	--	--	73,933	490
Hubbard	117,023	--	441	--	5,367	691	--	217	--	--	106,985	2,899
Itasca	409,215	--	55,649	--	6,326	1,426	--	20,053	--	--	309,582	7,324
Lake of the Woods	46,597	--	2,117	--	18,233	47	--	2,191	251	--	23,012	745
Mahnomen	25,745	--	--	--	--	--	--	--	--	--	25,541	204
Roseau	23,965	--	96	--	15,000	31	--	1,302	--	--	6,972	564
Wadena	16,257	--	--	--	2,286	609	--	--	--	--	13,280	82
Total	1,340,720	--	83,542	--	71,380	9,182	27	32,619	842	238	1,105,144	19,505
CENTRAL HARDWOOD												
Benton	43	--	--	--	43	--	--	--	--	--	--	--
Chisago	356	--	--	--	--	97	--	--	--	--	260	--
Goodhue	54	--	--	--	--	22	--	--	--	--	33	--
Isanti	1,535	--	--	--	71	1,371	--	--	--	--	94	--
Kanabec	9,685	--	--	--	107	107	--	--	--	--	9,270	--
Mille Lacs	38,128	--	44	--	2,485	2,600	2,389	--	--	--	30,611	--
Morrison	17,094	--	--	--	1,165	516	--	42	--	--	15,371	--
Olmsted	26	--	--	--	--	26	--	--	--	--	--	--
Otter Tail	6,755	--	--	--	280	69	--	--	--	--	6,283	122
Pine	87,126	--	1,703	--	1,471	6,745	--	609	--	240	67,711	1,322
Sherburne	365	--	--	--	--	352	--	13	--	--	--	--
Todd	1,922	--	--	--	141	23	--	--	--	--	1,757	--
Total	163,089	--	1,747	--	5,763	11,929	2,389	664	--	240	131,388	1,445
PRAIRIE												
Clay	15	--	--	--	--	--	--	--	--	--	15	--
Kittson	179	--	--	--	--	--	--	--	--	--	179	--
Marshall	3,348	--	--	--	--	--	--	--	--	--	3,308	41
Norman	6,485	--	--	--	--	--	--	--	--	--	6,485	--
Pennington	4,664	--	--	--	--	--	--	--	--	--	4,664	--
Polk	5,818	--	--	--	--	--	--	--	--	--	5,818	--
Red Lake	2,579	--	--	--	--	--	--	--	--	--	2,579	--
Sibley	13	--	--	--	--	13	--	--	--	--	--	--
Total	23,101	--	--	--	--	13	--	--	--	--	23,048	41
State total	2,857,313	--	198,997	--	128,008	25,803	2,416	157,894	2,547	1,150	2,184,646	91,740

1/ Includes only those counties that supplied pulpwood in 1993.

(Table 10 continued on next page)

(Table 10 continued)

MINNESOTA

Unit and county 1/	Species group											
	Bass-wood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwood
ASPEN-BIRCH												
Carlton	--	--	3,350	--	--	--	--	--	1,806	--	--	--
Cook	--	--	2,546	--	--	--	--	--	--	--	--	--
Koochiching	--	--	347	--	--	--	--	--	--	--	--	--
Lake	336	--	11,767	--	--	--	--	497	1,545	--	--	--
St. Louis	--	--	9,354	--	--	--	--	253	6,547	--	--	--
Total	336	--	27,364	--	--	--	--	751	9,898	--	--	--
NORTHERN PINE												
Aitkin	52	--	1,352	--	--	--	--	259	2,886	--	--	--
Becker	--	--	--	--	--	--	--	--	--	--	--	--
Beltrami	--	--	2,701	--	--	--	--	--	--	--	--	--
Cass	--	--	1,370	--	--	--	--	--	--	--	--	--
Clearwater	--	--	--	--	--	--	--	--	--	--	--	--
Crow Wing	--	--	295	--	--	--	--	--	46	--	--	--
Hubbard	--	--	424	--	--	--	--	--	--	--	--	--
Itasca	--	--	5,182	--	--	--	--	197	3,476	--	--	--
Lake of the Woods	--	--	2	--	--	--	--	--	--	--	--	--
Mahnomen	--	--	--	--	--	--	--	--	--	--	--	--
Roseau	--	--	--	--	--	--	--	--	--	--	--	--
Wadena	--	--	--	--	--	--	--	--	--	--	--	--
Total	52	--	11,326	--	--	--	--	456	6,408	--	--	--
CENTRAL HARDWOOD												
Benton	--	--	--	--	--	--	--	--	--	--	--	--
Chisago	--	--	--	--	--	--	--	--	--	--	--	--
Goodhue	--	--	--	--	--	--	--	--	--	--	--	--
Isanti	--	--	--	--	--	--	--	--	--	--	--	--
Kanabec	--	--	121	--	--	--	--	14	65	--	--	--
Mille Lacs	--	--	--	--	--	--	--	--	--	--	--	--
Morrison	--	--	--	--	--	--	--	--	--	--	--	--
Olmsted	--	--	--	--	--	--	--	--	--	--	--	--
Otter Tail	--	--	--	--	--	--	--	--	--	--	--	--
Pine	510	--	3,293	--	--	44	--	261	3,215	--	--	2
Sherburne	--	--	--	--	--	--	--	--	--	--	--	--
Todd	--	--	--	--	--	--	--	--	--	--	--	--
Total	510	--	3,414	--	--	44	--	275	3,280	--	--	2
PRAIRIE												
Clay	--	--	--	--	--	--	--	--	--	--	--	--
Kittson	--	--	--	--	--	--	--	--	--	--	--	--
Marshall	--	--	--	--	--	--	--	--	--	--	--	--
Norman	--	--	--	--	--	--	--	--	--	--	--	--
Pennington	--	--	--	--	--	--	--	--	--	--	--	--
Polk	--	--	--	--	--	--	--	--	--	--	--	--
Red Lake	--	--	--	--	--	--	--	--	--	--	--	--
Sibley	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--	--	--	--	--	--
State total	897	--	42,104	--	--	44	--	1,481	19,586	--	--	2

1/ Includes only those counties that supplied pulpwood in 1993.

Table 11.--Pulpwood production from roundwood by county and species group, Wisconsin, 1993

(In standard cords, unpeeled)

Unit and county 1/	All species	Species group: Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
NORTHEASTERN												
Florence	83,521	3	2,557	2,185	1,783	1,866	66	1,389	137	828	41,935	301
Forest	107,817	--	4,668	1,992	432	5,141	353	2,975	136	3,370	31,730	340
Langlade	123,778	--	5,213	946	4,301	4,582	293	1,225	224	2,860	51,296	252
Lincoln	107,272	--	2,826	700	4,186	5,242	634	884	151	3,494	43,583	326
Marinette	159,370	11	3,435	461	25,130	21,622	761	914	233	984	59,453	353
Menominee	69,527	58	916	9,114	2,148	1,559	2,999	198	96	2,158	24,799	225
Oconto	67,653	--	714	156	3,901	9,061	478	177	--	682	31,199	300
Oneida	155,198	--	5,743	449	9,861	10,654	2,145	2,616	811	4,214	46,385	601
Shawano	24,420	--	95	1,193	207	1,374	86	43	--	650	13,133	22
Vilas	154,944	--	3,339	219	13,289	5,028	2,222	3,032	232	2,238	61,268	392
Total	1,053,500	71	29,506	17,414	65,238	66,128	10,037	13,454	2,019	21,478	404,780	3,111
NORTHWESTERN												
Ashland	70,231	--	2,842	276	2,189	2,434	826	4,645	623	1,572	28,804	14
Barron	19,539	--	--	--	986	1,103	--	75	9	438	11,258	6
Bayfield	198,719	--	1,807	30	48,120	7,507	420	1,660	371	2,321	90,590	35
Burnett	71,159	--	11	--	23,195	7,659	80	150	--	1,236	30,715	--
Douglas	149,559	--	8,454	--	61,648	13,408	116	1,547	44	471	43,782	--
Iron	138,342	75	5,161	1,184	3,528	1,393	448	3,463	355	3,632	66,889	162
Polk	24,179	--	--	--	3,537	1,583	24	--	--	186	16,373	--
Price	132,931	--	6,267	1,006	1,597	2,925	423	3,367	836	4,350	59,144	340
Rusk	83,524	--	338	146	441	1,517	93	342	1,082	2,595	40,948	66
Sawyer	146,607	--	3,133	260	2,225	4,396	626	2,310	1,135	4,021	60,513	112
Taylor	70,108	--	2,181	1,180	57	852	34	947	411	2,093	34,734	90
Washburn	116,408	--	1,118	127	21,429	7,622	131	727	96	927	60,664	6
Total	1,221,306	75	31,312	4,210	168,954	52,399	3,220	19,233	4,963	23,841	544,414	831
CENTRAL												
Adams	76,660	--	--	--	38,226	20,754	1,803	--	88	295	2,280	--
Chippewa	50,034	--	38	56	570	2,725	205	55	150	1,019	32,509	--
Clark	76,384	--	68	--	1,202	2,932	311	66	23	1,445	38,635	12
Eau Claire	34,508	--	--	--	12,404	5,987	453	83	--	413	6,214	2
Jackson	92,915	--	--	--	45,239	8,676	1,155	33	10	947	17,865	--
Juneau	34,855	--	--	--	19,806	5,441	650	--	--	206	994	--
Marathon	58,460	--	235	1,167	1,747	4,687	758	141	40	2,039	26,843	40
Marquette	12,576	--	--	11	639	10,011	720	11	--	49	48	--
Monroe	27,006	--	--	--	13,500	6,540	420	6	--	112	1,220	--
Portage	30,085	--	159	191	7,770	10,275	1,352	33	51	380	5,075	8
Waupaca	14,865	--	16	53	583	6,797	921	77	9	255	3,825	2
Waushara	30,737	--	--	--	1,512	23,383	3,096	154	--	100	743	--
Wood	36,248	--	--	14	6,856	5,865	1,118	173	19	426	15,962	2
Total	575,333	--	516	1,492	150,053	114,073	12,963	833	389	7,685	152,213	66
SOUTHWESTERN												
Buffalo	5,920	--	--	--	234	1,021	221	40	--	23	3,948	--
Crawford	281	--	--	--	--	42	200	--	--	7	10	--
Dunn	20,273	--	24	--	2,213	8,324	301	38	--	162	6,786	--
Grant	352	--	--	11	53	179	--	--	--	6	--	--
Iowa	547	--	--	--	79	372	84	--	--	1	--	--
La Crosse	3,432	--	--	--	747	1,903	425	42	--	11	44	--
Lafayette	17	--	13	--	--	--	--	--	--	--	--	--
Pepin	2,083	--	--	--	158	1,390	293	--	--	3	209	--
Pierce	983	--	15	--	39	643	46	--	--	1	226	--
Richland	1,153	--	--	--	26	963	164	--	--	--	--	--
Sauk	8,177	--	11	--	3,074	3,009	1,101	14	--	38	52	--
St. Croix	8,294	--	--	11	141	1,325	317	111	--	10	5,896	--
Trempealeau	6,035	--	--	--	588	3,851	382	332	--	18	491	--
Vernon	145	--	--	--	97	--	--	--	--	--	--	--
Total	57,692	--	63	23	7,448	23,021	3,533	576	--	279	17,662	--
SOUTHEASTERN												
Brown	10,358	--	13	--	46	169	--	--	--	69	8,448	451
Calumet	22	--	--	--	--	19	--	--	--	1	--	--
Columbia	5,459	--	--	--	325	3,739	469	23	--	2	13	--
Dane	1,352	--	--	--	551	709	92	--	--	--	--	--
Dodge	36	--	--	--	--	--	22	14	--	--	--	--
Door	309	--	--	11	15	--	10	--	--	3	204	--
Fond Du Lac	54	--	--	--	--	--	--	--	--	(2/)	--	--
Green	487	--	--	--	--	249	168	--	--	5	--	--
Green Lake	2,410	--	--	--	80	1,050	213	7	--	61	93	1
Jefferson	83	--	--	--	30	--	--	--	--	(2/)	52	--
Kenosha	63	--	--	--	--	63	--	--	--	--	--	--
Kewaunee	48	--	--	34	--	--	--	--	--	2	--	--
Manitowoc	272	--	--	--	--	83	84	27	--	7	--	--
Milwaukee	23	--	--	--	--	23	--	--	--	--	--	--
Outagamie	1,914	--	--	--	11	159	34	11	--	82	840	--
Ozaukee	189	--	--	--	--	68	121	--	--	--	--	--
Racine	(2/)	--	--	--	--	--	--	--	--	--	--	--
Rock	1,626	--	--	--	22	1,374	208	22	--	--	--	--
Sheboygan	1,003	--	--	--	--	957	--	36	--	1	--	--
Walworth	1,314	--	--	--	26	1,222	55	--	--	--	--	--
Washington	869	--	11	--	--	237	582	--	--	5	--	--
Waukesha	1,270	--	--	--	--	1,120	108	41	--	--	--	--
Winnebago	382	--	--	--	--	227	--	13	--	1	--	--
Total	29,540	--	24	45	1,105	11,467	2,165	193	--	239	9,650	452
State total	2,937,371	146	61,420	23,185	392,799	267,089	31,919	34,289	7,371	53,523	1,128,718	4,461

1/ Includes only those counties that supplied pulpwood in 1993.

2/ Less than 1 standard cord, unpeeled.

(Table 11 continued on next page)

(Table 11 continued)

WISCONSIN

Unit and county 1/	Species group											
	Bass-wood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwood
NORTHEASTERN												
Florence	1,193	688	7,782	294	--	220	--	11,820	6,760	898	249	567
Forest	1,809	538	8,951	1,092	--	3,461	--	21,114	14,954	2,614	1,345	804
Langlade	2,735	259	12,059	1,889	--	5,294	--	15,524	10,533	2,464	1,009	818
Lincoln	5,111	167	10,577	686	--	2,959	--	11,763	7,856	4,574	599	955
Marinette	1,193	881	18,439	538	--	173	--	14,207	8,101	1,546	147	790
Menominee	389	368	3,213	1,191	--	3,163	--	8,387	7,195	989	30	332
Oconto	766	375	6,646	356	20	455	--	6,969	4,272	633	160	331
Oneida	8,780	180	22,176	589	--	685	--	18,201	11,560	6,734	1,342	1,473
Shawano	114	26	1,046	266	1	759	--	2,613	2,237	321	172	63
Vilas	2,529	471	30,398	579	--	359	--	15,256	9,602	2,881	775	834
Total	24,618	3,954	121,288	7,481	21	17,529	--	125,854	83,072	23,652	5,828	6,968
NORTHWESTERN												
Ashland	684	--	5,758	314	--	238	--	9,090	6,543	1,934	1,003	442
Barron	494	5	1,406	49	--	181	--	1,274	1,155	831	124	145
Bayfield	1,153	--	24,588	256	--	211	--	7,825	7,070	3,048	1,160	547
Burnett	355	--	1,348	34	--	577	--	1,194	2,393	1,304	819	88
Douglas	239	--	12,241	41	--	198	--	1,308	5,409	353	223	78
Iron	3,377	438	8,892	449	--	527	--	18,595	11,374	5,898	1,030	1,473
Polk	173	--	900	2	--	72	--	352	654	226	65	32
Price	8,241	35	11,109	796	--	2,962	--	13,056	8,096	6,433	541	1,408
Rusk	3,255	16	6,850	603	--	1,840	--	10,476	7,731	3,637	825	724
Sawyer	3,750	12	19,944	2,309	--	1,213	--	17,683	15,045	4,680	1,795	1,444
Taylor	2,154	72	5,043	626	--	2,819	--	7,351	6,981	1,648	481	354
Washburn	556	--	10,350	106	--	79	--	3,993	5,417	1,955	811	292
Total	24,430	578	108,429	5,584	--	10,917	--	92,196	77,868	31,947	8,877	7,027
CENTRAL												
Adams	126	--	516	5	2	59	--	604	379	7,869	3,475	179
Chippewa	1,004	--	3,265	69	26	128	--	3,276	2,709	1,660	225	347
Clark	1,209	11	4,525	412	--	1,703	--	8,022	5,513	5,706	4,271	319
Eau Claire	220	--	908	56	--	129	--	1,832	1,384	2,614	1,691	120
Jackson	426	1	2,141	74	2	712	--	2,470	3,252	8,337	739	836
Juneau	99	--	367	8	3	136	--	545	400	3,925	2,209	65
Marathon	970	95	1,874	677	--	3,292	--	6,238	5,029	1,695	629	264
Marquette	16	--	85	2	--	1	--	121	66	498	276	20
Monroe	54	--	148	5	--	174	--	345	211	2,435	1,817	18
Portage	306	11	414	100	8	354	--	1,175	933	955	459	77
Waupaca	65	12	140	98	2	357	--	780	712	127	7	26
Waushara	31	--	133	5	--	21	--	206	155	757	401	41
Wood	474	--	601	94	2	573	--	1,447	956	980	618	70
Total	5,000	130	15,118	1,606	45	7,638	--	27,061	21,698	37,556	16,817	2,381
SOUTHWESTERN												
Buffalo	7	--	58	5	22	3	--	140	95	59	36	7
Crawford	--	--	--	--	--	--	--	10	7	2	--	3
Dunn	253	--	386	6	2	81	--	449	473	533	175	67
Grant	1	--	16	1	--	2	--	41	28	6	5	2
Iowa	1	--	2	--	--	--	--	2	1	3	--	2
La Crosse	10	--	23	2	--	18	--	53	117	9	6	21
Lafayette	--	--	--	--	--	--	--	--	--	4	--	(2/)
Pepin	4	--	3	--	--	4	--	10	7	1	--	(2/)
Pierce	3	--	(2/)	1	--	3	--	3	3	(2/)	--	(2/)
Richland	--	--	--	--	--	--	--	--	--	--	--	(2/)
Sauk	13	--	78	3	--	2	--	136	84	335	211	15
St. Croix	35	--	117	--	--	--	--	69	237	19	--	7
Trempealeau	43	--	44	2	3	22	--	70	108	24	16	41
Vernon	--	--	--	--	--	--	--	--	--	28	20	--
Total	371	--	728	21	27	135	--	983	1,159	1,025	470	167
SOUTHEASTERN												
Brown	234	3	118	29	--	76	--	312	260	75	41	15
Calumet	--	--	--	--	--	--	--	1	1	--	--	(2/)
Columbia	4	--	2	--	1	1	--	3	3	488	382	4
Dane	--	--	--	--	--	--	--	--	--	--	--	--
Dodge	--	--	--	--	--	--	--	--	--	--	--	--
Door	--	--	4	4	--	--	--	29	29	--	--	(2/)
Fond Du Lac	--	--	1	--	--	--	--	1	1	30	22	(2/)
Green	2	--	11	1	--	--	--	23	15	9	2	2
Green Lake	46	--	114	2	1	2	--	155	85	319	154	25
Jefferson	--	--	--	--	--	--	--	(2/)	(2/)	(2/)	--	(2/)
Kenosha	--	--	--	--	--	--	--	--	--	--	--	--
Kewaunee	1	--	3	--	--	--	--	3	1	3	--	(2/)
Manitowoc	--	--	3	2	--	--	--	21	21	24	--	(2/)
Milwaukee	--	--	--	--	--	--	--	--	--	--	--	(2/)
Outagamie	16	--	68	32	--	1	--	318	293	36	6	7
Ozaukee	--	--	--	--	--	--	--	--	--	--	--	(2/)
Racine	--	--	--	--	--	--	--	--	--	--	--	(2/)
Rock	--	--	--	--	--	--	--	--	--	--	--	--
Sheboygan	--	--	1	--	--	--	--	4	4	--	--	(2/)
Walworth	--	--	2	--	--	--	--	4	3	1	1	--
Washington	2	--	8	--	--	--	--	8	4	10	--	2
Waukesha	--	--	--	--	--	--	--	--	--	--	--	(2/)
Winnebago	1	--	2	--	--	--	--	3	1	78	54	1
Total	307	3	337	70	2	80	--	885	719	1,074	663	59
State total	54,726	4,664	245,900	14,761	95	36,300	--	246,979	184,516	95,255	32,655	16,602

1/ Includes only those counties that supplied pulpwood in 1993.

2/ Less than 1 standard cord, unpeeled.

Table 12.--Central States pulpwood production by State and destination, 1987-1993

(In thousand standard cords, unpeeled)

Year	Illinois			Indiana			Iowa			Missouri		
		Destination			Destination			Destination			Destination	
	Total	Central States	Other States	Total	Central States	Other States	Total	Central States	Other States	Total	Central States	Other States
1987	91	35	56	178	76	102	23	23	--	111	29	82
1988	92	38	55	179	73	106	26	26	--	101	24	77
1989	92	32	60	170	68	102	25	25	--	109	18	91
1990	76	33	43	189	75	114	14	14	--	95	19	76
1991	81	37	44	157	56	101	14	14	--	87	17	70
1992	77	33	44	150	49	101	12	12	--	116	22	94
1993	55	25	30	143	47	97	13	13	--	78	13	65

Table 13.--Trends in receipts of roundwood and residue as pulpwood, Central States, 1989-1993

(In thousand standard cords, unpeeled)

Type of material and area	1989	1990	1991	1992	1993
Roundwood					
Indiana, Iowa, Missouri	53	44	44	33	28
Residue					
Indiana, Iowa, Missouri	91	97	85	83	71
All material	144	141	129	116	99

Piva, Ronald J.
1994. **Pulpwood production in the North-Central Region, 1993**. Resour. Bull. NC-160. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 39 p.

Lake States pulpwood production increased to 9.4 million cords in 1993. Central States pulpwood production decreased 19 percent—from 356 thousand cords in 1992 to 288 thousand cords in 1993. Plains States pulpwood production was 114 thousand cords. Pulpwood production is shown by county and species group for Michigan, Minnesota, and Wisconsin.

KEY WORDS: Roundwood, whole-tree chips, residue, pulpwood, particleboard, Minnesota, Michigan, Wisconsin, Illinois, Iowa, Indiana, Missouri, Plains States.

Our job at the North Central Forest Experiment Station is discovering and creating new knowledge and technology in the field of natural resources and conveying this information to the people who can use it. As a new generation of forests emerges in our region, managers are confronted with two unique challenges: (1) Dealing with the great diversity in composition, quality, and ownership of the forests, and (2) Reconciling the conflicting demands of the people who use them. Helping the forest manager meet these challenges while protecting the environment is what research at North Central is all about.