Forest-based Woody Biomass Assessment for Michigan's Upper Peninsula

Final Report

Prepared for:
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February 1, 2010

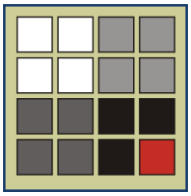

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Table of Contents

List of Tables

List of Figures

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Document History

Date	Version	Description
Jan 28, 2010	Review Draft 1	Initial version. Subject to revision
January 31, 2010	Final Report	
February 24, 2010	Final Report	Minor edit change to Table 12.

Objectives

The objectives for this study are to:

- Describe current forest conditions and woody biomass supplies in selected areas of Michigan's Upper Peninsula;
- Evaluate inventory, growth and removal trends for hardwood and softwood species groups;
- Quantify the amount of woody biomass contained in non-merchantable portions of trees;
- Assess the amount of woody biomass beyond current uses; and
- Evaluate the sustainability of wood supplies and factors contributing to sustainable supplies.

Out of Scope

The following topics were considered out of scope for this study:

- Evaluation of existing or proposed industrial facilities and their wood requirements;
- Analysis of historical or current market prices for standing timber, delivered roundwood, chipped, or bundled logging residues;
- Factors affecting availability of timber from major landowner groups or sustainability of increases in harvest levels; and
- Transportation networks, competition for woody biomass, adequacy of the logging sector to expand production, or other aspects of supply chain management.

To some extent, these topics are being investigated by researchers at Michigan State University and Michigan Technological University.

Introduction

The Michigan Economic Development Corporation (MEDC) is interested in evaluating the amount of woody biomass in Michigan's Upper Peninsula. The purpose of this study is to provide background information to evaluate the adequacy of woody biomass for economic development proposals in the region.

The Study Area

For the purposes of this analysis, timber resources were evaluated for each of twelve sample points or supply zones distributed across the Upper Peninsula of Michigan and northern Wisconsin (Figure 1). Zones were labeled as P01 to P12. Each zone has a buffer radius of 75 miles. Also, a larger centrally located zone with a buffer radius of 100 miles was evaluated and labeled P13. Many of these zones overlap. See Table 16 in the Appendix for information on the overlap of each 75-mile zone with the larger 100-mile zone.

The zones are predominantly in Michigan, but some zones extend partially into northern Wisconsin. The study area encompasses part or all of 43 counties in Michigan and Wisconsin. Table 17 and Table 18 in the Appendix detail the amount and percent of land from each county in each zone.

The study area is mostly mixed northern hardwoods with some softwoods, especially northern cedar and pine forests. Common forest types include maple, aspen, oak, red and white pine, and lowland conifers. Most of the timberland in the supply area is privately owned, however significant portions are in public ownership. In Michigan, non-federal lands include State Forests and some county lands. In Wisconsin, most non-federal lands are county-owned. Portions of four proclaimed National Forests -- the Ottawa, Hiawatha, Nicolet, and Chequamegon National Forests -- fall within one or more supply areas.

Forest inventory data based on on-the-ground plots were used for analysis. Forest inventory data are collected by the USDA-Forest Service in collaboration with the States. No areas in the Northern Lower Peninsula were included for any zone even though some buffer zones reached across Lake Michigan. Plots located on small or remote islands were excluded. Also, plot selections were adjusted in the area of the Door Peninsula where routing around the end of Green

Bay would significantly increase transportation distances. See Figure 6 to Figure 18 in the Appendix for maps of the plots included for each zone.

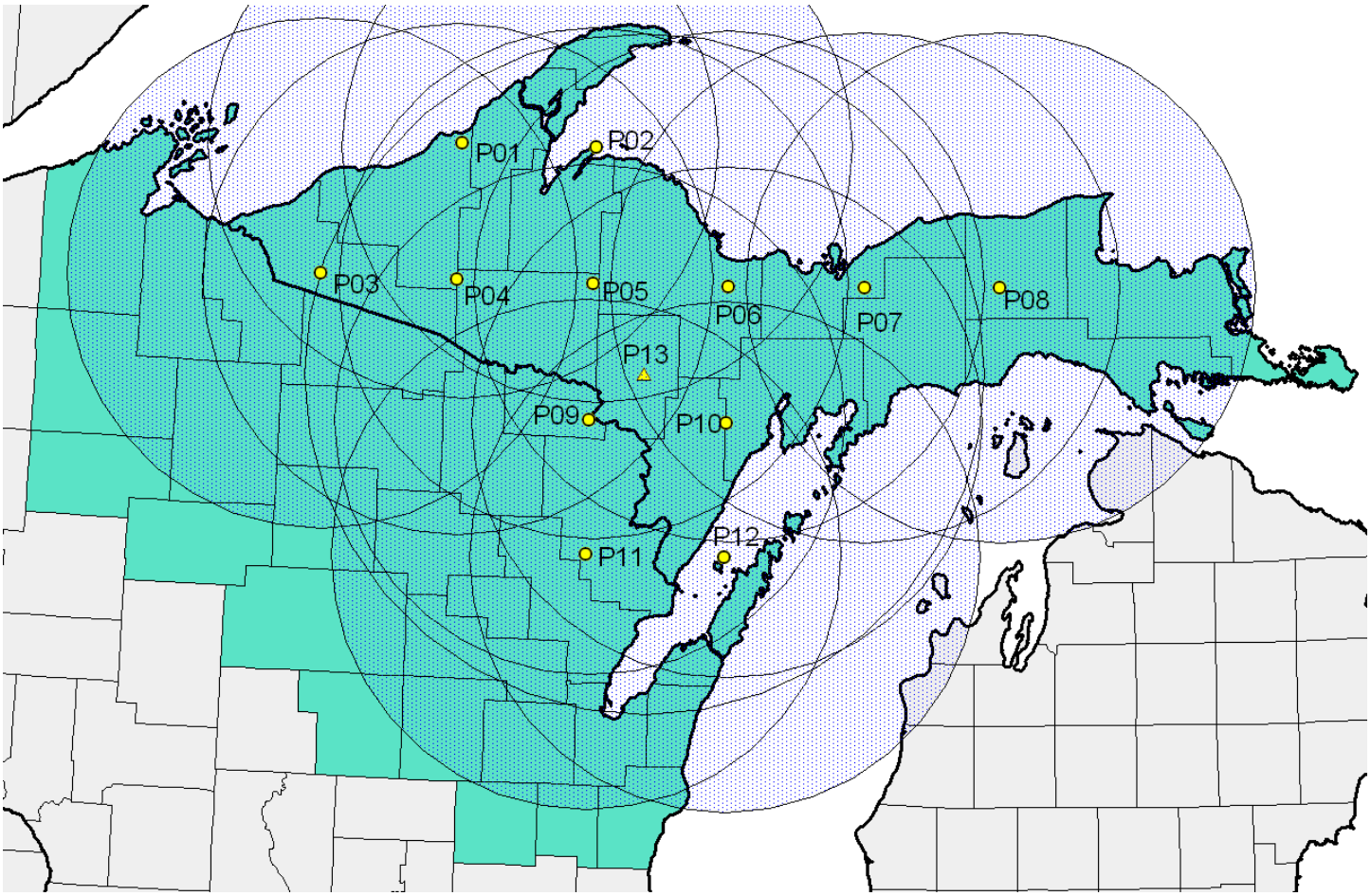

Figure 1. Location of the study area in Michigan's Upper Peninsula and portions of northern Wisconsin.

The Timber Resource in the Study Area

Information on the standing volume and growth of timber in the United States are based on annual inventories of forest resources conducted by the USDA-Forest Service (2007) in every state. Starting in 2000, this inventory has measured on-the-ground plots in every state each year. Prior to this, periodic inventories were conducted in each state every 8 to 15 years. Compilation of statistics is done for each state using plot data collected over five yearly measurements. These data are eventually published in resource reports. Plot measurements available in database form were used for custom queries for this study. Data presented in this report were derived by analysis of the 2007 snapshot database for Wisconsin, and Michigan representing plots taken from 2003 through 2007. These databases can be downloaded from http://www.fia.fs.fed.us/tools-data. Approximate locations of plots used in this analysis are shown in Figure 2. Some useful definitions of forest inventory terms are provided in the Appendix.

The timber resource in the study area was analyzed by developing 75 mile zones around each of the primary mill sites – White Pine, Escanaba, KI Sawyer, and L'Anse. Forest inventory plots that fell within any of these four zones were selected. Five basic measures were estimated for each zone: timberland area, growing stock inventory, biomass of all live trees, net annual growth on growing stock trees, annual removals, and biomass components. These data are presented below.

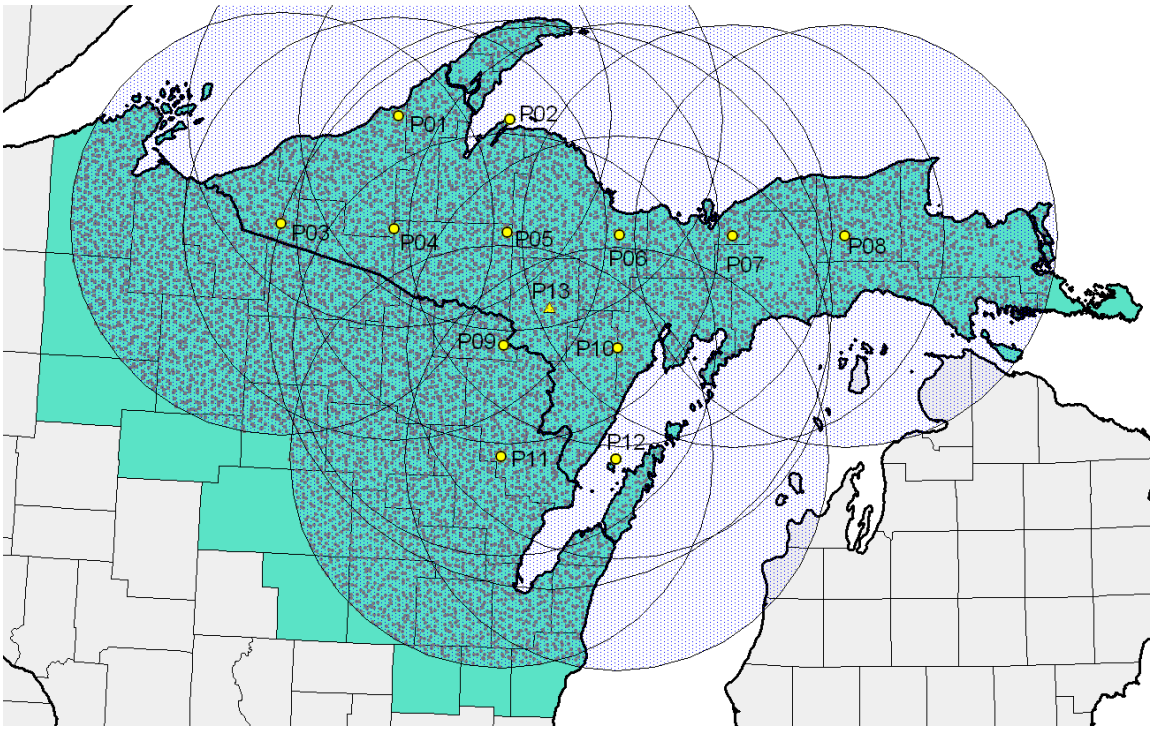

Figure 2. Distribution of FIA plots used for timber supply analysis.

Note that many of the plots indicated by dots on the map are non-forested, or are forested but do not qualify as timberland. Only timberland plots were used in this analysis. Also, many zones overlap, so some plots fall into multiple zones.

Table 1. Location of zone centers (sample points) and number of Forest Inventory plots for each zone.

Zone	Buffer	Latitude	Longitude	Plots		Zone	Buffer	Latitude	Longitude	Plots
	miles	decimal degrees		count			miles	decimal degrees		count
P01	75	46.95566	-88.98893	1,844		P08	75	46.37666	-85.64716	1,267
P02	75	46.95566	-88.15349	1,704		P09	75	45.79765	-88.15349	3,405
P03	75	46.37666	-89.82438	3,082		P10	75	45.79765	-87.31805	2,390
P04	75	46.37666	-88.98893	3,170		P11	75	45.22407	-88.15349	3,246
P05	75	46.37666	-88.15349	2,961		P12	75	45.22407	-87.31805	2,174
P06	75	46.37666	-87.31805	2,231		P13	100	45.99649	-87.82591	4,545
P07	75	46.37666	-86.48260	1,639						

Timberland Area

This region is heavily forested and most forested areas are classified as timberland. By definition, timberland excludes reserved areas, such as wilderness areas, state and federal parks, and some private areas that are unavailable for harvest. Forestland that does not qualify as timberland because it is reserved or has low productivity represents only a few percent of all zones, except P08. There are from 3 to more than 7 million acres of timberland in each of the 75-mile zones used for this study. Because all zones extend past the shoreline of the Great Lakes, the circular zones contain less than the theoretical area, 11.3 million acres, of a 75-mile circle. The central 100-mile zone (P13) has more than 10 million acres of timberland.

Table 2. Area of forestland and timberland by zone.

Zone	Forestland	Timberland	Percent Timberland
	Thousand acres		
P01	4,627	4,444	96%
P02	4,396	4,266	97%
P03	7,003	6,789	97%
P04	7,559	7,348	97%
P05	7,330	7,161	98%
P06	5,679	5,527	97%
P07	4,264	4,154	97%
P08	4,264	3,169	74%
P09	7,726	7,572	98%
P10	5,739	5,622	98%
P11	5,682	5,614	99%
P12	4,103	4,070	99%
P13	10,394	10,159	98%

For most zones, timberland makes up 96 percent or more of all forestland. Only 74% of the forestland in Zone 8 (P08) is classified as timberland. This zone has much wetland area with productivity that is too low to be classified as timberland.

Private forest owners control most of the timberland in the study area. The percent private ownership ranges from 54 to 69 percent for all zones, except P08 which is 44% private. Federal lands, mostly national forests, are 14 to 26% of the timberland area, depending on zone. State, county, and local governments control 15 to 32% of the timberland. Federal lands include national forests and lands managed by other federal agencies. Private lands include nonindustrial private, industrial, and tribal owners. State and local timberlands are lands administered by State agencies, county lands, and any timberlands owned by local cities or towns. A detailed summary of ownership is shown in Table 19 in the Appendix.

Table 3. Distribution of timberland ownership by zone.

Zone	Federal	Private	State/Local	Total	Federal	Private	State/Local
	Thousand Acres				Percent		
P01	1,017	2,777	650	4,444	23%	62%	15%
P02	780	2,806	681	4,266	18%	66%	16%
P03	1,782	3,660	1,347	6,789	26%	54%	20%
P04	1,440	4,275	1,633	7,348	20%	58%	22%
P05	1,498	4,416	1,246	7,161	21%	62%	17%
P06	764	3,479	1,284	5,527	14%	63%	23%
P07	548	2,273	1,333	4,154	13%	55%	32%
P08	798	1,408	963	3,169	25%	44%	30%
P09	1,368	4,694	1,510	7,572	18%	62%	20%
P10	917	3,427	1,278	5,622	16%	61%	23%
P11	648	3,881	1,085	5,614	12%	69%	19%
P12	587	2,600	883	4,070	14%	64%	22%
P13	1,880	6,296	1,983	10,159	19%	62%	20%

The distribution of timberland acres by broad forest type provides a useful look at the diversity of the forest. Most forests in the timber supply area are composed of natural stands with multiple species present. Hardwood forest types predominate. The maple-beech-birch forest type is the most common in all zones. The aspen type is the second most common forest type in all zones. Some zones have a very strong component of northern white cedar, but less than maple or aspen. Table 20 in the Appendix provides a detailed summary of timberland area by zone, owner, and forest type.

Volume and Green Weight of All Live Timber

There is a very large volume of live timber within the study area. Table 4 below summarizes the volume of all live trees in each zone. On average, there are 42 to 51 green tons of live volume per acre or 1,462 to 1,715 cubic feet per acre. This measure includes the volume of the main bole of all live trees from a one-foot stump to a 4 inch outside diameter top. Volumes in growing stock trees and live rough and rotten trees are included. Volumes in tops and limbs, stumps, and trees smaller than 5 inches DBH are not included. Measures of the primary components of timber volume, such as tops, stumps, and saplings are described later in this report. The distribution of biomass among owners is roughly comparable to the distribution of timberland. On average, there are roughly 34 cubic feet of wood volume per green ton, although this varies by species. Detailed information on all live volume and biomass is shown in Table 23 and Table 24 in the Appendix.

Table 4. Volume and weight of all live trees (>5 inches DBH).

Zone	Volume	Green Weight	Hardwood	Softwood	Green Weight	Volume
	Million Cubic Feet	Million Green Tons	Percent by Green Weight		Green Tons per Acre	Cubic Feet per Acre
P01	7,621.4	227.8	73%	27%	51.3	1,715
P02	7,182.2	214.0	71%	29%	50.2	1,683
P03	10,143.1	304.1	74%	26%	44.8	1,494
P04	11,512.9	343.2	72%	28%	46.7	1,567
P05	11,428.7	338.5	69%	31%	47.3	1,596
P06	8,441.2	247.2	64%	36%	44.7	1,527
P07	6,072.3	175.0	58%	42%	42.1	1,462
P08	4,685.6	134.6	56%	44%	42.5	1,479
P09	11,834.0	349.2	67%	33%	46.1	1,563
P10	8,328.7	244.0	65%	35%	43.4	1,482
P11	8,475.7	251.6	70%	30%	44.8	1,510
P12	6,121.7	179.0	64%	36%	44.0	1,504
P13	15,955.6	471.6	68%	32%	46.4	1,571

Volume and Green Weight of Growing Stock

There is a substantial inventory of growing stock timber in the supply area (Table 5). Growing stock is a measure of the volume of live trees of commercial species meeting established merchantability standards. This measure indicates the volume of the bole of growing stock trees without tops, stumps or other non-merchantable stems. Volume in dead or cull trees, tops and stumps is excluded.

Hardwoods comprise most of the growing stock volume for most zones. The hardwood component ranges from 49 to 68 percent. Only zone P08 has more softwood than hardwood. On average, there are 40 to 49 green tons of growing stock timber per acre. Cubic foot volume per acre ranges from 1,386 to 1,633 cubic feet or about 17.5 to 20.7 cords per acre.

The data shown in Table 5 includes only the merchantable portion of growing stock trees, primarily the bole from a 1 foot stump to a 4 inch outside bark top diameter. This represents 60% to 70% of the total tree volume – more for softwoods and less for hardwoods. Considerable additional wood fiber is contained in the unmerchantable top and branch portions of trees. The amount of volume in the tops and branches varies by species and tree size. Additional information on growing stock volume is contained in Table 21 to Table 22 in the Appendix.

Table 5. Volume and weight of growing stock volume by zone.

Zone	Growing Stock Volume	Green Weight	Hardwood	Softwood	Growing Stock Volume	Green Weight
	Million Cubic Feet	Million Green Tons	Percent by Green Weight		Green Tons per Acre	Cubic Feet per Acre
P01	7,257.4	216.7	67%	33%	48.8	1,633
P02	6,867.2	204.5	66%	34%	47.9	1,610
P03	9,536.4	285.4	68%	32%	42.0	1,405
P04	10,935.4	325.5	66%	34%	44.3	1,488
P05	10,877.2	321.8	63%	37%	44.9	1,519
P06	8,031.7	235.0	58%	42%	42.5	1,453
P07	5,726.6	164.7	51%	49%	39.7	1,379
P08	4,392.2	125.8	49%	51%	39.7	1,386
P09	11,284.6	332.7	62%	38%	43.9	1,490
P10	7,900.0	231.2	59%	41%	41.1	1,405
P11	8,030.5	238.2	64%	36%	42.4	1,430
P12	5,792.9	169.2	58%	42%	41.6	1,423
P13	15,178.2	448.1	62%	38%	44.1	1,494

Volume and Green Weight of Sawlog and Pulpwood Components of Growing Stock

The amount of volume in the sawlog and pulpwood components of trees is important when considering wood supplies for various markets. Sawlogs and pulpwood are the primary merchantable components of growing stock timber volume. Sawlogs are classified by size, not quality. Sawtimber-sized hardwood trees must be at least 12 inches in diameter at breast height (DBH). Softwood sawtimber is at least 9 inches DBH. Upper portions of sawtimber trees are classified as pulpwood. A significant portion of the sawlog volume is lower quality and may not be suitable for production of lumber in current markets. Table 6 shows the average growing stock volume and green weight for timber in the study area. Additional details on the volume and green weight of sawlogs and pulpwood are available in Appendix Table 25 to Table 28.

Table 6. Volume and weight of sawlog and pulpwood components of growing stock by zone.

Zone	Growing Stock Volume		Green Weight		Percent by weight		Green Tons per Acre		Growing Stock Volume		Percent by Weight
	Saw-logs	Pulp-wood	Saw-logs	Pulp-wood	Hard-wood	Soft-wood	Saw-logs	Pulp-wood	Saw-logs	Pulp-wood	Saw-logs
	Million Cubic Feet		Million Green Tons		Percent		Green Tons per Acre		Cubic Feet per acre		Percent
P01	3,497.0	3,760.4	101.6	115.1	61%	39%	22.9	25.9	787	846	47%
P02	3,279.1	3,588.0	95.2	109.3	60%	40%	22.3	25.6	769	841	47%
P03	4,286.5	5,249.9	124.6	160.8	61%	39%	18.4	23.7	631	773	44%
P04	5,038.7	5,896.7	145.9	179.6	60%	40%	19.9	24.4	686	802	45%
P05	5,079.8	5,797.4	146.8	175.1	59%	41%	20.5	24.4	709	810	46%
P06	3,702.1	4,329.5	105.9	129.1	55%	45%	19.2	23.4	670	783	45%
P07	2,655.1	3,071.5	74.7	90.0	48%	52%	18.0	21.7	639	739	45%
P08	2,097.6	2,294.6	58.8	67.0	46%	54%	18.6	21.1	662	724	47%
P09	5,231.5	6,053.1	150.6	182.1	57%	43%	19.9	24.0	691	799	45%
P10	3,535.8	4,364.3	101.2	130.0	55%	45%	18.0	23.1	629	776	44%
P11	3,588.7	4,441.8	104.4	133.7	62%	38%	18.6	23.8	639	791	44%
P12	2,602.6	3,190.2	74.5	94.7	55%	45%	18.3	23.3	640	784	44%
P13	7,112.2	8,066.0	205.0	243.1	58%	42%	20.2	23.9	700	794	46%

Eleven of the 13 areas have more hardwood growing stock volume than softwood, ranging from 55 to 62% hardwoods. Zones 7 (P07) and 8 (P08) are slightly more than half softwoods for growing stock volume.

Although there are differences between hardwoods and softwoods, about 44 to 47% of total growing stock volume is in the sawlog portion of sawtimber sized trees.

Net Annual Growth

Net annual growth is an important measure of forest productivity. Net annual growth is the average annual increase in tree volume less mortality. Many factors affect growth – species, site productivity, stand age, stocking, and more. Forests in the study area are growing at a rate of about 28 to 39 cubic feet per acre. This is approximately one-third to one-half cord per acre per year. Table 7 shows the net annual growth by zone for the study area. Growth ranges from 2.7 million green tons for zone P08 to 6.5 for zone P11. The larger central zone, P13, has growth of 10.1 million green tons per year. These growth figures include some timber that was harvested or otherwise removed from growing stock. Removals are described in the next section. Detailed information on net annual growth are provided in Appendix Table 29 and Table 30.

Table 7. Volume and weight of net annual growth for growing stock trees by zone.

	Growing Stock Growth	Green Weight	Hardwood	Softwood	Growing Stock Growth	Green Weight	Growth as percent of Growing Stock Volume
Zone	Million Cubic Feet	Million Green Tons	Percent		Cubic Feet per acre	Green Tons per Acre	Percent
P01	126.2	3.7	65%	35%	28	0.8	1.7%
P02	119.7	3.5	64%	36%	28	0.8	1.7%
P03	203.0	6.0	66%	34%	30	0.9	2.1%
P04	221.6	6.5	67%	33%	30	0.9	2.0%
P05	223.9	6.5	62%	38%	31	0.9	2.1%
P06	172.8	5.0	57%	43%	31	0.9	2.2%
P07	118.2	3.4	51%	49%	28	0.8	2.1%
P08	95.7	2.7	48%	52%	30	0.9	2.2%
P09	262.1	7.6	63%	37%	35	1.0	2.3%
P10	186.8	5.4	59%	41%	33	1.0	2.4%
P11	218.3	6.5	68%	32%	39	1.1	2.7%
P12	153.2	4.5	62%	38%	38	1.1	2.6%
P13	344.6	10.1	63%	37%	34	1.0	2.3%

Net annual growth includes in-growth (sub-merchantable trees growing into merchantable size classes) and volume growth on merchantable portion of growing stock trees. Wood in tops, branches, stumps, and saplings is excluded. .

Total Annual Removals

Annual removals is a measure of the volume of trees removed from the inventory each year. Timber inventory is diminished by harvesting and diversion of timberland to other land use classifications such as reserved, urban or non-forest. Timber removals represent harvesting, land clearing, timber cultural practices and changes in land use where trees are removed from growing stock inventory.

Table 8 provides a measure of the annual removals from all sources (harvest and diversion). Removals are determined on-the-ground by comparison of remeasured plots. On average, harvest rates are about 14 to 22 cubic feet or about 0.4 to 0.7 green tons per acre per year. This is about 1.0 to 1.5 percent of inventory or 47 to 75% of net annual growth

A useful indicator of available timber supply is indicated by the ratio of growth to removals. This is a measure of the amount of annual growth that is theoretically available for harvest without depleting the growing stock inventory under current timber conditions. Ratios greater than one indicate that growth exceeds removals. Ratios less than one indicate that harvests exceed growth. Changes in this ratio occur due to growth as trees age and changes in mortality and harvesting. The G/R ratio for the region ranges from 1.3 in zone P02 to 2.2 in zone P12. In all zones, growing stock volume is increasing significantly faster than it is being harvested or otherwise removed. More detailed data on total annual removals is available in Appendix Table 31 and Table 32.

Ratios are generally higher ratios for softwoods and reflect the faster growth of softwood forest types and lower harvesting pressure. Low harvesting pressure on National Forests indicate that this owner group continues to build greater inventories of standing timber.

Note that these statistics are derived for the period 2003 through 2007, which included most field measurements taken prior to closure of some mills in Michigan and Wisconsin. While current industrial wood users are in a down-cycle, these field-measured plot data likely missed some of the drop in removals that has occurred more recently as the wood-using sector has contracted. Hence the estimate of growth over removals presented here is likely to be conservative.

Table 8. Total annual removals of growing stock trees, by zone.

Zone	Growing Stock Removals		Hard-wood	Soft-wood	Growing Stock Removals		GS Volume	GS Growth	Growth/ Removals
	Million Cubic Feet	Million Green Tons	Percent		Cubic Feet per acre	Green Tons per Acre	Percent		Ratio
P01	83.7	2.5	76%	24%	19	0.6	1.2%	66.3%	1.5
P02	90.3	2.7	79%	21%	21	0.6	1.3%	75.4%	1.3
P03	132.2	4.0	77%	23%	19	0.6	1.4%	65.1%	1.5
P04	135.3	4.1	78%	22%	18	0.6	1.2%	61.1%	1.6
P05	142.2	4.3	76%	24%	20	0.6	1.3%	63.5%	1.6
P06	96.6	2.9	73%	27%	17	0.5	1.2%	55.9%	1.8
P07	74.1	2.2	69%	31%	18	0.5	1.3%	62.7%	1.6
P08	45.0	1.3	65%	35%	14	0.4	1.0%	47.0%	2.1
P09	159.8	4.8	74%	26%	21	0.6	1.4%	61.0%	1.6
P10	95.0	2.8	72%	28%	17	0.5	1.2%	50.8%	2.0
P11	124.1	3.8	78%	22%	22	0.7	1.5%	56.8%	1.8
P12	70.5	2.1	71%	29%	17	0.5	1.2%	46.0%	2.2
P13	214.2	6.5	75%	25%	21	0.6	1.4%	62.2%	1.6

Annual Harvest Removals

Annual removals can also be determined for harvest only as shown in Table 9. This table indicates the volume of growing stock that is being removed from inventory solely by harvesting. Harvest removals are lower than total removals because some diversion of timberland is occurring in all zones. Harvest removals are 86 to 93% of total removals, depending on zone. Growth/removal ratios are slightly higher when calculated for harvest-only removals and range from 1.5 to 2.3. More detailed data on harvest removals is available in Appendix Table 33 and Table 34.

Table 9. Total annual harvest removals of growing stock trees, by zone.

Zone	Growing Stock Removals		Hard-wood	Soft-wood	Growing Stock Removals		GS Volume	GS Growth	Growth/ Removals
	Million Cubic Feet	Million Green Tons	Percent		Cubic Feet per acre	Green Tons per Acre	Percent		Ratio
P01	74.4	2.3	80%	20%	17	0.5	1.0%	58.9%	1.7
P02	80.9	2.5	83%	17%	19	0.6	1.2%	67.6%	1.5
P03	113.3	3.4	79%	21%	17	0.5	1.2%	55.8%	1.8
P04	120.2	3.7	82%	18%	16	0.5	1.1%	54.3%	1.8
P05	129.8	4.0	79%	21%	18	0.6	1.2%	58.0%	1.7
P06	90.1	2.7	75%	25%	16	0.5	1.1%	52.1%	1.9
P07	67.7	2.0	72%	28%	16	0.5	1.2%	57.3%	1.7
P08	41.9	1.2	67%	33%	13	0.4	1.0%	43.8%	2.3
P09	145.4	4.4	78%	22%	19	0.6	1.3%	55.5%	1.8
P10	88.7	2.7	74%	26%	16	0.5	1.1%	47.5%	2.1
P11	113.9	3.5	81%	19%	20	0.6	1.4%	52.1%	1.9
P12	65.7	2.0	74%	26%	16	0.5	1.1%	42.8%	2.3
P13	196.6	6.0	79%	21%	19	0.6	1.3%	57.0%	1.8

Estimated Logging Residues

Logging residues is a measure of the volume in tops and limbs associated with harvest removals. Although this indicator is not measured by the forest inventory, estimates can be derived by determining the proportional volume of tops and limbs in growing stock trees. The estimates in Table 10 are based on the topwood volume as approximately 17% of growing stock merchantable bole volume (tops/bole) for softwoods and 29% for hardwoods. Most residuals are hardwoods – about 76 to 89%, depending on zone. Estimates of softwoods are 11 to 24% of residues. Hardwoods are typically more branched than softwoods and the biomass in tops is greater. Calculations show that there are 0.3 to 1.6 million green tons in each of the 75-mile zones. The central 100-mile zone (P13) has 1.6 million green tons of logging residues. No estimates are available of the volume of residues that are already being removed during harvest or post-harvest operations. Also, no estimates are available for the volume of these residues that are economically or technically recoverable. See Appendix Table 35 for more information.

Table 10. Estimated green weight of logging residues in tops from annual harvest removals of growing stock trees, by zone.

Zone	Residues	Hardwood	Softwood
	Million Green Tons	Percent	
P01	0.6	87%	13%
P02	0.7	89%	11%
P03	0.9	87%	13%
P04	1.0	89%	11%
P05	1.0	86%	14%
P06	0.7	83%	17%
P07	0.5	81%	19%
P08	0.3	76%	24%
P09	1.2	85%	15%
P10	0.7	83%	17%
P11	0.9	88%	12%
P12	0.5	83%	17%
P13	1.6	86%	14%

Growth in excess of total removals

Timber growth in the study area currently exceeds removals. This means that timber volume is growing faster than it is being harvested or otherwise removed for other land uses. Based on current forest inventory data, overall timber inventories are increasing each year in the study area. The data in Table 11 estimates the volume of net annual growth of growing stock trees that exceeds total removals. Harvest of this volume could be done theoretically without reducing the current inventory.

There are from 0.8 to 2.9 million green tons of growth that exceeds removals in the 75-mile zones. The central 100-mile zone (P13) has 3.6 million green tons of growth over removals. These figures translate into 7 to 20 cubic feet or 0.2 to 0.6 green tons per acre per year. The surplus volume in growing stock trees is about one-quarter to one-half of all growth. Available surplus volume is larger, if recent mortality and non-growing stock trees are also harvested, although this has not been estimated. Also, estimates of changes in total biomass from all tree components in excess of removals are not available at this time. More detailed information by owner and species group are available in the Appendix, Table 36 and Table 37.

Table 11. Net annual growth in excess of total removals on timberland for each zone.

Zone	Growing Stock Volume		Hardwood	Softwood	Growing Stock Volume		GS Volume	GS Growth
	Million Cubic Feet	Million Green Tons	Percent		Cubic Feet per acre	Green Tons per Acre	Percent	
P01	42.5	1.2	41%	59%	10	0.3	0.6%	33.7%
P02	29.4	0.8	9%	91%	7	0.2	0.4%	24.6%
P03	70.8	2.0	46%	54%	10	0.3	0.7%	34.9%
P04	86.3	2.4	49%	51%	12	0.3	0.8%	38.9%
P05	81.7	2.2	34%	66%	11	0.3	0.8%	36.5%
P06	76.2	2.1	35%	65%	14	0.4	0.9%	44.1%
P07	44.1	1.2	16%	84%	11	0.3	0.8%	37.3%
P08	50.7	1.4	32%	68%	16	0.4	1.2%	53.0%
P09	102.3	2.9	44%	56%	14	0.4	0.9%	39.0%
P10	91.8	2.6	44%	56%	16	0.5	1.2%	49.2%
P11	94.2	2.7	55%	45%	17	0.5	1.2%	43.2%
P12	82.7	2.4	54%	46%	20	0.6	1.4%	54.0%
P13	130.3	3.6	41%	59%	13	0.4	0.9%	37.8%

Biomass Components

The forest inventory database provides data and methods to estimate the biomass in four primary components of all live trees. Estimates are made in oven dry tons rather than cubic volume or green weight. For comparison purposes, an oven dry ton is approximately equal to two green tons. Table 12 provides estimates of the total live tree biomass on timberland in each zone. These estimates vary due to the amount of timberland, species mix, average stocking, timber stand condition, and other factors. There are from113 to 291 million green tons of biomass in the twelve 75-mile zones (P01 – P12). There is 394 million green tons of biomass in the central 100-mile zone (P13). It is unlikely that stumps would be removed during typical harvesting operations in this region. The volumes of biomass in tops and saplings (submerchantable trees) are 43 to 84 million green tons in the 75-mile zones. The 100-mile zone has 114 million green tons of tops and saplings. These include live growing stock and rough or rotten (cull) trees. Clearly, there is a very large inventory of potentially recoverable biomass in the study area. Additional details on biomass components can be found in Appendix Table 39to Table 46.

Table 12. Biomass of all live tree components, by zone.

Zone	Boles	Tops	Saplings	Stumps	Total
	Million Oven Dry Tons				
P01	130.9	33.9	19.7	7.6	192.1
P02	122.1	31.4	19.1	7.2	179.7
P03	171.8	45.7	30.7	9.9	258.0
P04	194.3	50.8	32.7	11.3	289.1
P05	190.9	49.0	32.5	11.2	283.6
P06	138.9	35.0	25.5	8.3	207.7
P07	97.7	24.1	19.8	5.9	147.4
P08	75.0	18.3	15.1	4.5	112.9
P09	195.6	50.0	33.9	11.3	290.8
P10	135.6	34.6	25.9	8.0	204.1
P11	139.3	36.0	25.0	7.9	208.2
P12	97.8	24.8	19.4	5.7	147.7
P13	265.4	67.9	45.7	15.4	394.4

The distribution of biomass among tree components is fairly consistent across zones as shown in Table 13. About two-thirds of all biomass (66-68%) is contained in tree boles. Tops and limbs have 16 to 18% of biomass; saplings have 10 to 13% of biomass and stumps make up 4% of on-site above ground biomass. Tops and saplings together make up 28 to 30% of all live biomass. Tops are 20 to 21% of tree biomass above the stump. The percent distribution varies by species, so differences between hardwoods and softwoods are significant.

Table 13. Percent distribution of biomass of all live tree components.

Zone	Boles	Tops	Saplings	Stumps	Tops+Saplings	Tops
	Percent of Total Biomass					Percent of Boles + Tops
P01	68%	18%	10%	4%	28%	21%
P02	68%	17%	11%	4%	28%	20%
P03	67%	18%	12%	4%	30%	21%
P04	67%	18%	11%	4%	29%	21%
P05	67%	17%	11%	4%	29%	20%
P06	67%	17%	12%	4%	29%	20%
P07	66%	16%	13%	4%	30%	20%
P08	66%	16%	13%	4%	30%	20%
P09	67%	17%	12%	4%	29%	20%
P10	66%	17%	13%	4%	30%	20%
P11	67%	17%	12%	4%	29%	21%
P12	66%	17%	13%	4%	30%	20%
P13	67%	17%	12%	4%	29%	20%

Historical Timber Production

Pulpwood Production in the Study Area

Information on pulpwood production in the study area is collected annually from consuming mills by the USDA-Forest Service in collaboration with the States. These Timber Product Output (TPO) data provide information on the production of different species of pulpwood by county. Data are collected annually by sampling mills that consume pulpwood-sized material, regardless of the end use. Estimates are based on volumes reported by individual mills (Piva, 2005-2007) Information includes pulpwood production by species and county of origin. Because these production data are based on a sample of mill receipts, they can only be distinguished by county. Therefore, this multi-county area does not correspond exactly to the area used for analysis of the timber inventory which was limited to forest inventory plots within a 75 mile radius of the proposed mill sites. Also, these data do not reveal the ownership of timberland where harvests occurred. The most recent data available are for 2006 (Piva, 2007).

Pulpwood has traditionally been used for paper manufacturing and manufactured composite panels (such as oriented strand board). More recently, roundwood (including pulpwood) has been also used as a fuel supply for power generation. Historical TPO data on pulpwood production extends back to about 1970. For the purpose of this study, data from 2001 to 2006 were analyzed. More recent data (2007 onward) are not yet available.

Pulpwood production trends for 2001 to 2006 were evaluated for the 43 counties in Michigan and Wisconsin that intersected with any of the zones (Figure 3). Similar state-wide data are collected for sawlog production, but on a much less frequent schedule. The most recent published sawlog data are about 10 years old and were considered too dated for this analysis.

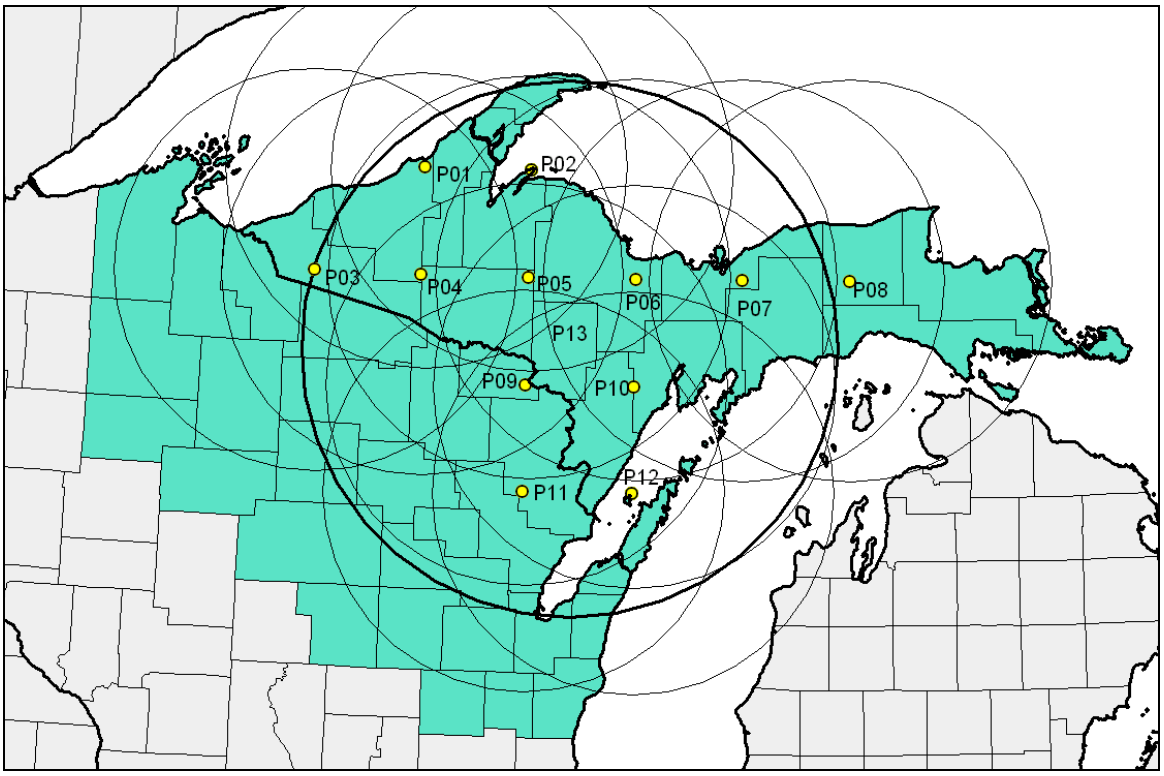

Figure 3. Location of 43 counties in the study area.

Hardwoods represented 82%, most of the production in this region. Aspen comprised 29% of total pulpwood and maple made up 32%. Oak and other mixed hardwoods together made up 21% of total production. Softwoods in the supply area comprised 19% of total production. Most softwood production was other softwoods with 11% of total pulpwood volume. About 8% of pulpwood was pine.

Average pulpwood production was 3.6 million cords annually from 2001 to 2006, the latest year data are available as shown in Table 14. Pulpwood production increased from 2001 to 2004 and 2005. There was a significant decline in average production, about 941 thousand cords or 24%, from 2005 to 2006 as the pulp and other forest products sectors contracted in the study area. Unfortunately, data are not yet published for the 2007 and 2008 reporting years, however preliminary information suggests that additional declines in pulpwood production have occurred.

Table 14. Total annual pulpwood production in the 43 county study area, 2001 to 2006.

Year	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Total
	Thousand cords						
2001	1,046.6	1,029.7	116.7	604.2	383.5	398.2	3,578.8
2002	1,125.6	1,193.4	110.3	584.8	267.3	359.9	3,641.3
2003	1,127.2	1,219.5	109.4	637.5	263.4	376.7	3,733.7
2004	1,138.5	1,315.7	114.6	825.0	236.7	409.1	4,039.7
2005	1,081.2	1,312.8	129.6	668.6	349.2	416.9	3,958.4
2006	827.1	1,042.7	46.8	562.1	180.1	358.7	3,017.6
Average	1,057.7	1,185.6	104.6	647.0	280.0	386.6	3,661.6

Estimates of pulpwood production by zone are shown in Table 15 and Figure 4. Trend in pulpwood production by zone buffer.. These estimates were developed by apportioning county-level production by the amount of each county in each zone. Implicit is the assumption that pulpwood production is uniformly distributed across each county. Production ranged from 483 thousand cords in zone P08 to 1.7 million cords in zone P09. The large central zone (P13) had production of 2.2 million cords. The production decline noted above from 2005 to 2006 is evident in most zones.

As noted above, these data are compiled from mill surveys. Hence they are not directly comparable to timber removal statistics compiled from the forest inventory plot records. However, it should be noted that the results are reasonably comparable.

Table 15. Pulpwood production for all species, by zone, 2001 to 2006.

Zone	2001	2002	2003	2004	2005	2006	Average	Rank
	Thousand cords							
P01	893.1	879.3	874.1	967.6	885.9	767.9	878.0	10
P02	884.4	869.0	891.8	950.5	895.1	827.2	886.3	9
P03	1,462.5	1,498.4	1,524.7	1,709.8	1,676.1	1,176.0	1,507.9	4
P04	1,615.3	1,570.0	1,612.8	1,757.6	1,696.0	1,294.2	1,591.0	3
P05	1,469.1	1,410.8	1,480.0	1,552.6	1,506.3	1,306.8	1,454.3	5
P06	1,133.4	1,051.2	1,135.0	1,152.8	1,114.1	1,068.6	1,109.2	8
P07	765.1	720.2	737.3	740.5	713.4	745.1	736.9	12
P08	515.8	503.9	479.3	474.4	445.0	482.1	483.4	13
P09	1,667.9	1,592.7	1,700.6	1,794.1	1,805.7	1,435.4	1,666.1	2
P10	1,160.2	1,089.2	1,167.0	1,170.4	1,182.8	1,043.1	1,135.5	7
P11	1,231.4	1,192.2	1,281.4	1,411.1	1,398.0	987.8	1,250.3	6
P12	805.6	765.8	814.0	810.9	869.9	688.3	792.4	11
P13	2,178.6	2,089.2	2,195.7	2,322.4	2,300.0	1,865.4	2,158.6	1

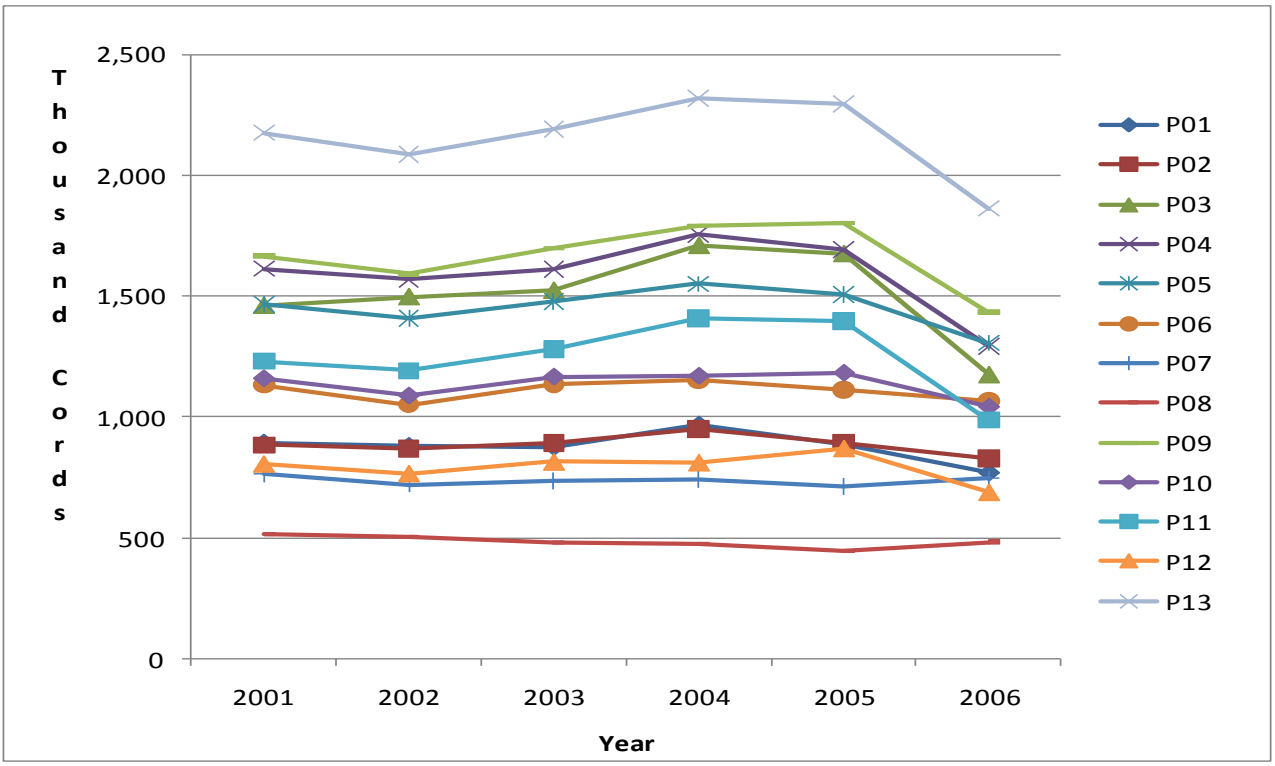

Figure 4. Trend in pulpwood production by zone buffer.

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Appendixes

Definitions of Forest Inventory Terms

Annual Removals	The net volume of growing stock trees removed from the inventory during a specified year by harvesting, cultural operations such as timber stand improvement, or land clearing.
Biomass	This measure is the volume of all live woody aboveground biomass, including stump, bole, and tops, typically specified in oven-dry tons. Below-ground biomass is excluded.
Dbh	A tree size measurement equal to the tree diameter in inches at breast height (4.5 feet).
Growing Stock	A classification of timber inventory that includes live trees of commercial species meeting specified standards of quality or vigor. Cull trees are excluded. When associated with volume, includes only trees 5.0 inches diameter at breast height and larger.
Merchantable	Refers to volume in tree species with commercial timber value meeting minimum size and quality requirements.
Net Annual Growth	The average annual net increase in the volume of trees during the period between inventories. Components include the increment in net volume of trees at the beginning of the specific year surviving to its end, plus the net volume of trees reaching the minimum size class during the year, minus the volume of trees that died during the year, and minus the net volume of trees that became cull trees during the year.
Pulpwood	Wood in the form of logs suitable for the manufacture of wood pulp, fiberboard, or other manufactured wood products. Pulpwood is usually too small, of inferior quality, or species to be used in the manufacture of lumber or plywood. Pulpwood trees are usually at least 5 inches dbh and at least 4 inches diameter at the small end of the pulp log. Much pulpwood in the Lake States is produced as 100 inch long logs.
Sawtimber	Trees or logs of large enough size, desirable species and sufficient quality to be used to manufacture lumber. Sawlogs are logs intended for lumber production and produced from sawtimber trees.
Cord	A unit of measurement of wood volume equal to 128 cubic feet of wood, bark, and air space. An average cord contains approximately 79 cubic feet of wood and bark, though this measure depends on log diameter.
Forest Inventory And Analysis (FIA)	A unit of the USDA Forest Service charged with compilation and reporting of data on the nation's forests and periodically conducts a forest inventory for each State.
Thousand Board Feet (MBF)	A unit of measurement equal to 1,000 square feet of wood having a nominal thickness of 1 inch or an equivalent amount of timber or logs. A thousand board feet, or MBF, is roughly equivalent to 150 – 175 cubic feet of wood as logs, depending on diameter. Conversion rates are determined by log rules which specify the board feet in logs of a specific size. The FIA data used in this report uses the International ¼ log rule. Other log rules, such as Scribner and Doyle, estimate different lumber yields.
Net Volume In Cubic Feet	The gross volume in cubic feet less deductions for rot, roughness, and poor form. Volume is computed for the central stem from a 1-foot stump to a minimum 4.0-inch top diameter outside bark, or to the point where the central stem breaks into limbs.
Timberland	Forest land that is producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation. Areas qualifying as timberland are capable of producing in excess of 20 cubic feet per acre per year of industrial wood in natural stands. Currently inaccessible and inoperable areas are included.

Study Area

Table 16. Intersection of 75 mile zones (P1 to P12) with 100 mile zone (P13) based on timberland area and growing stock volume.

Zone	Timberland Area			Growing Stock Volume		
	Total Area	Area In P13		Total GS Volume	GS Volume In P13	
	Thousand Acres		Percent	Million Cubic Feet		Percent
P01	4,444	3,917	88%	7,257.4	6,445.3	89%
P02	4,266	4,210	99%	6,867.2	6,776.7	99%
P03	6,789	3,668	54%	9,536.4	5,656.4	59%
P04	7,348	6,186	84%	10,935.4	9,420.0	86%
P05	7,161	7,131	100%	10,877.2	10,816.1	99%
P06	5,527	5,430	98%	8,031.7	7,888.2	98%
P07	4,154	3,116	75%	5,726.6	4,350.3	76%
P08	3,169	1,547	49%	4,392.2	2,191.0	50%
P09	7,572	7,572	100%	11,284.6	11,284.6	100%
P10	5,622	5,608	100%	7,900.0	7,868.0	100%
P11	5,614	4,894	87%	8,030.5	6,871.0	86%
P12	4,070	3,825	94%	5,792.9	5,371.7	93%

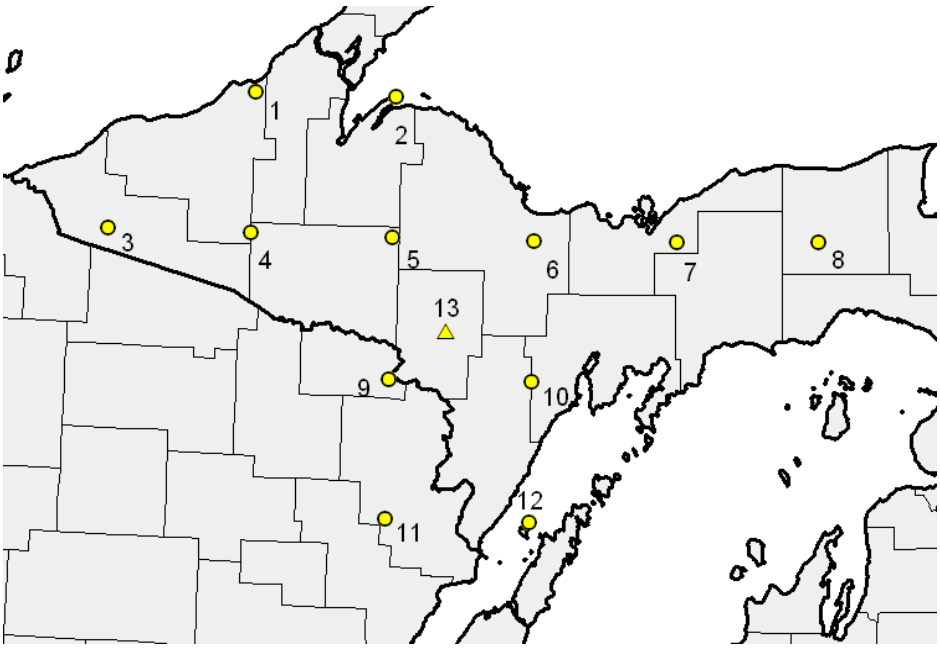

Figure 5. Location of zones.

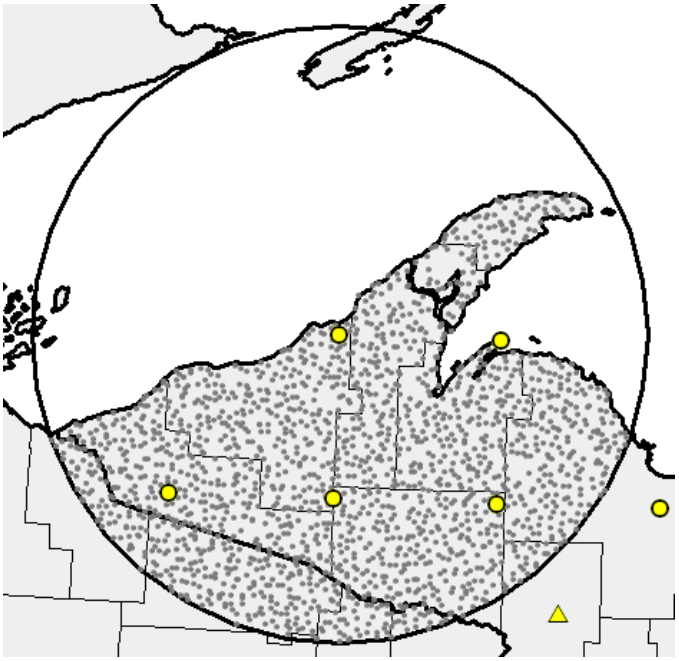

Figure 6. Forest inventory plots for zone P01 with 75 mile buffer.

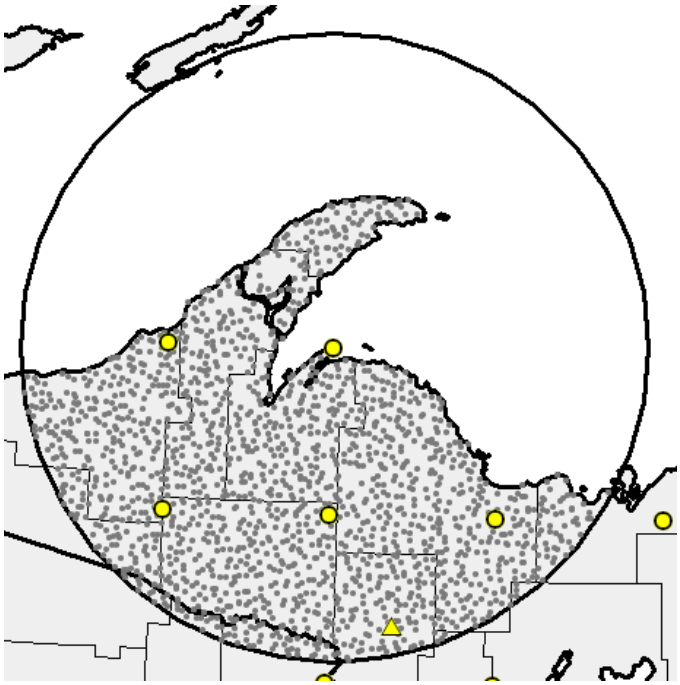

Figure 7. Forest inventory plots for zone P02 with 75 mile buffer.

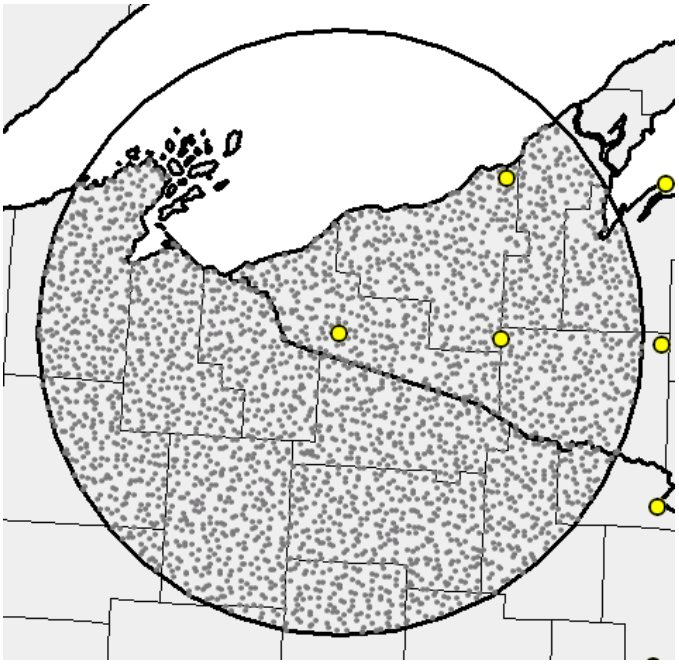

Figure 8. Forest inventory plots for zone P03 with 75 mile buffer.

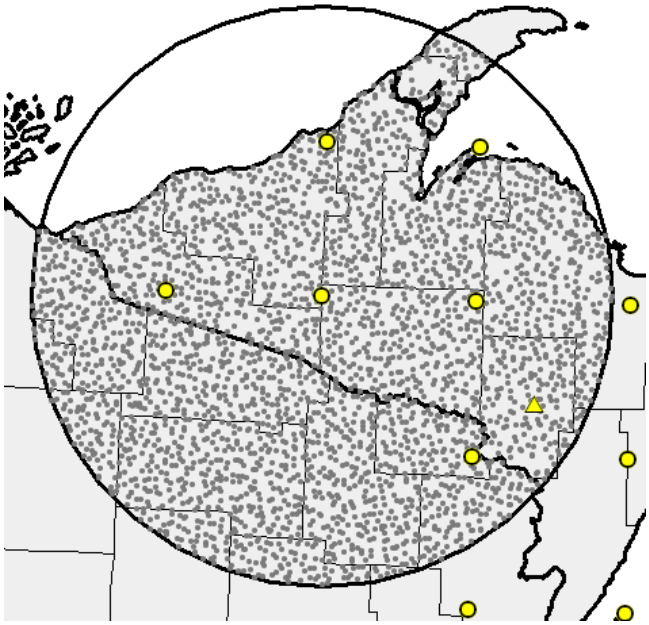

Figure 9. Forest inventory plots for zone P04 with 75 mile buffer.

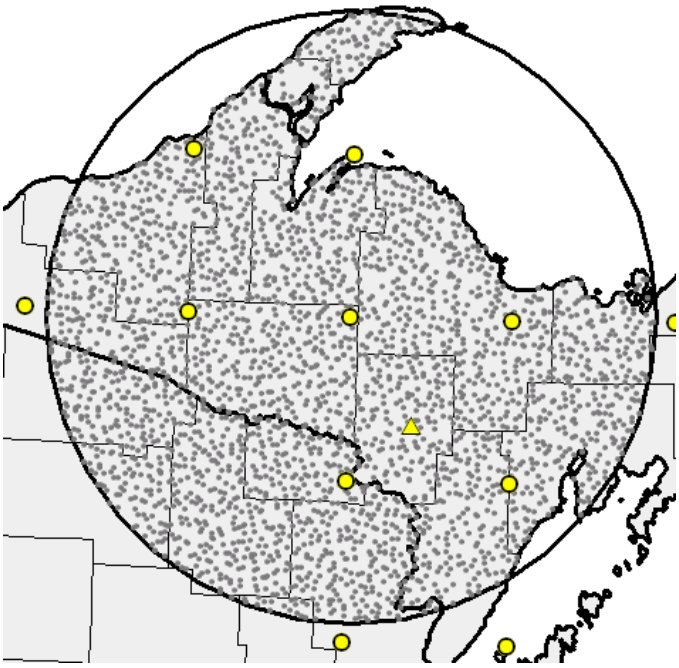

Figure 10. Forest inventory plots for zone P05 with 75 mile buffer.

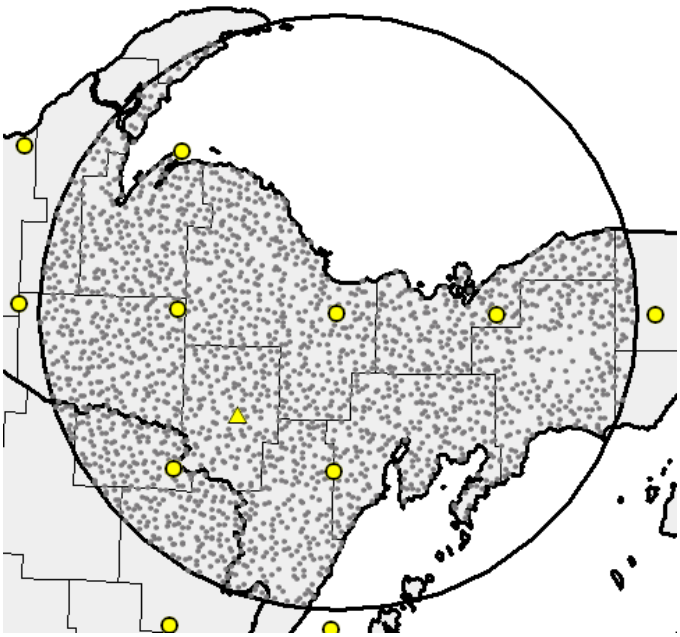

Figure 11. Forest inventory plots for zone P06 with 75 mile buffer.

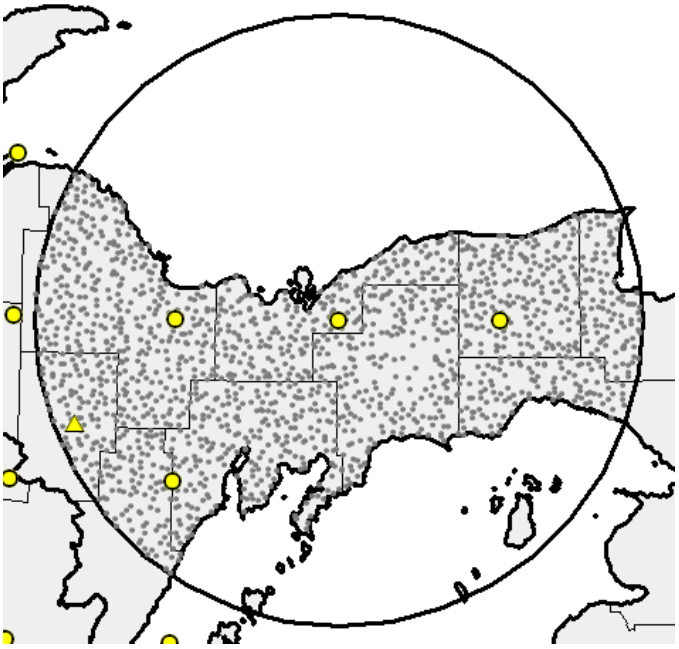

Figure 12. Forest inventory plots for zone P07 with 75 mile buffer.

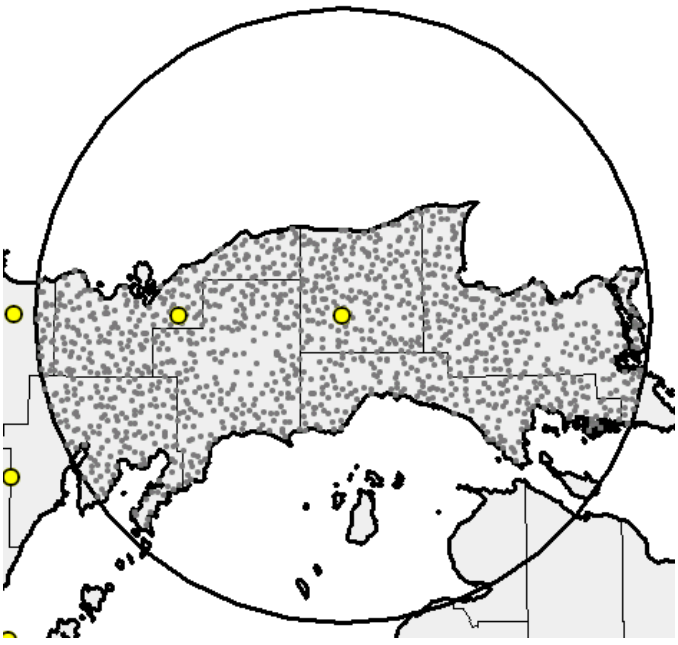

Figure 13. Forest inventory plots for zone P08 with 75 mile buffer.

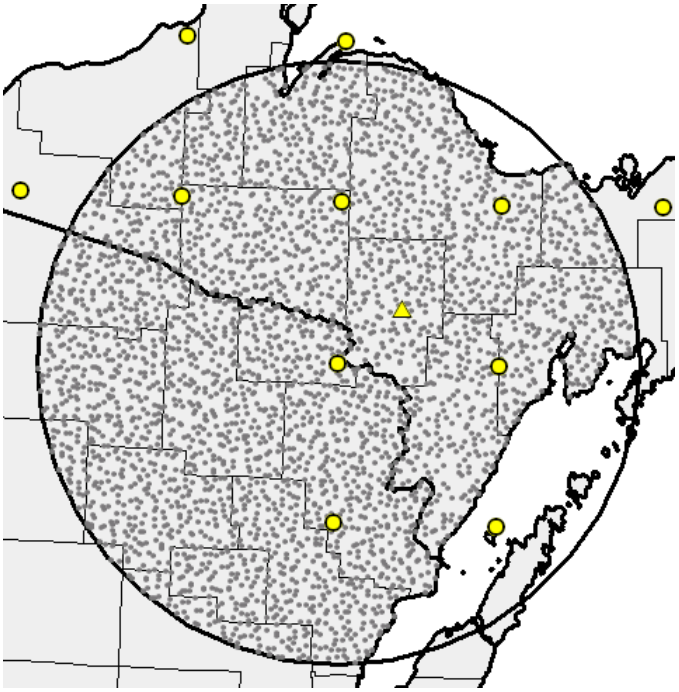

Figure 14. Forest inventory plots for zone P09 with 75 mile buffer

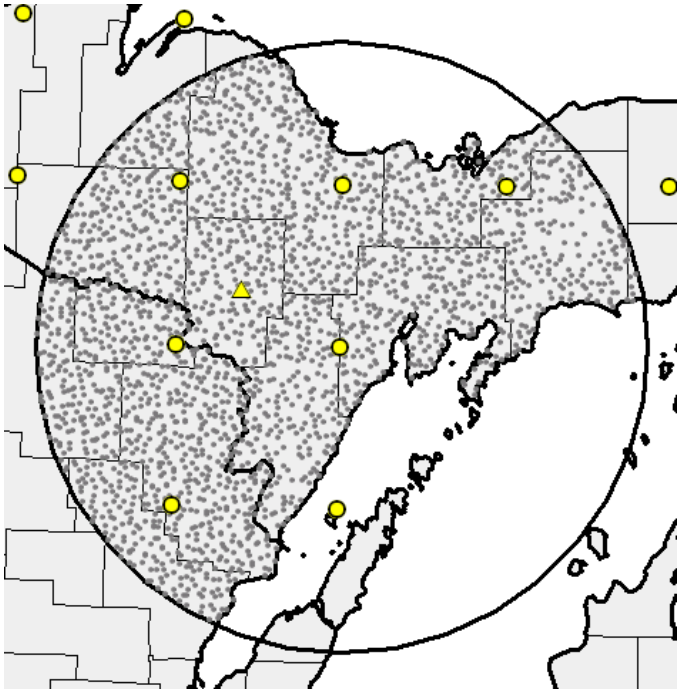

Figure 15. Forest inventory plots for zone P10 with 75 mile buffer.

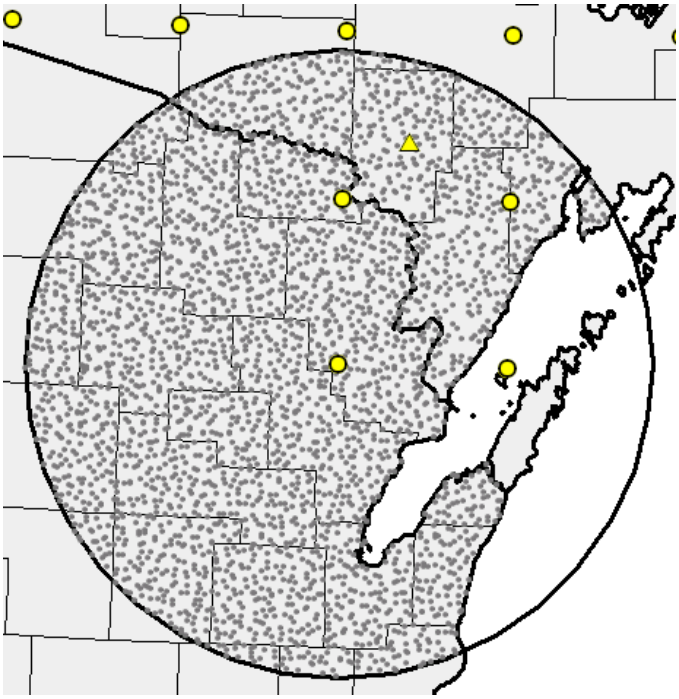

Figure 16. Forest inventory plots for zone P P11 with 75 mile buffer.

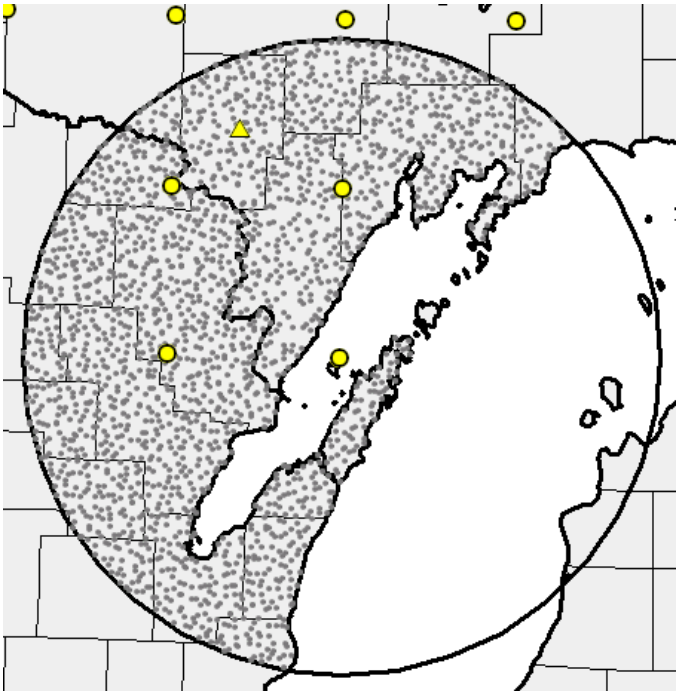

Figure 17. Forest inventory plots for zone P12 with 75 mile buffer.

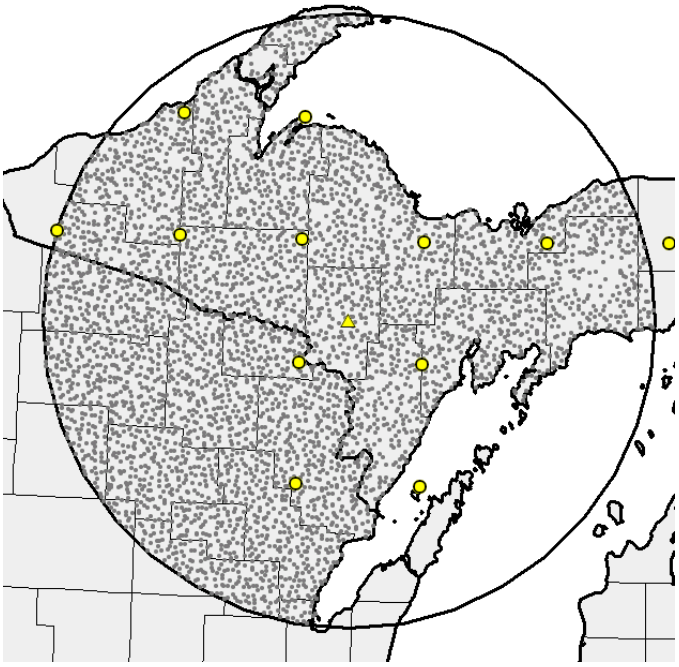

Figure 18. Forest inventory plots for zone P13 with 100 mile buffer.

Table 17. Percent of county area in each zone.

County	P01	P02	P03	P04	P05	P06
	Percent of area					
Michigan						
Alger		26.4%			59.1%	100.0%
Baraga	100.0%	100.0%	57.4%	100.0%	100.0%	100.0%
Delta		1.9%			74.0%	100.0%
Dickinson	14.2%	74.8%		99.5%	100.0%	100.0%
Gogebic	100.0%	26.5%	100.0%	100.0%	47.8%	
Houghton	100.0%	100.0%	70.8%	100.0%	100.0%	39.4%
Iron	96.4%	100.0%	76.9%	100.0%	100.0%	87.2%
Keweenaw	100.0%	100.0%		31.8%	90.0%	18.6%
Luce						15.2%
Mackinac						4.8%
Marquette	53.8%	98.5%		72.8%	100.0%	100.0%
Menominee		1.3%		4.4%	81.3%	88.5%
Ontonagon	100.0%	87.5%	100.0%	100.0%	86.8%	
Schoolcraft					0.7%	100.0%
Wisconsin						
Ashland			100.0%	13.6%		
Bayfield			73.0%			
Florence	16.0%	33.3%	39.6%	100.0%	100.0%	95.5%
Forest	16.5%	5.1%	58.4%	100.0%	98.3%	5.8%
Iron	34.2%		100.0%	99.3%		
Langlade			13.3%	37.7%	0.7%	
Lincoln			57.8%	27.1%		
Marinette				35.2%	61.3%	40.3%
Oconto				3.3%	6.8%	
Oneida	0.7%		100.0%	99.8%	31.1%	
Price			97.0%	24.0%		
Rusk			9.1%			
Sawyer			55.8%			
Taylor			5.8%			
Vilas	80.7%	4.1%	100.0%	100.0%	62.2%	

Continued below.

County	P07	P08	P09	P10	P11	P12	P13
	Percent of area						
Michigan							
Alger	100.0%	100.0%	38.1%	79.7%		17.0%	95.8%
Baraga			92.7%	33.3%			100.0%
Chippewa	31.1%	85.8%					
Delta	100.0%	64.3%	83.6%	100.0%	40.4%	99.9%	100.0%
Dickinson	61.1%		100.0%	100.0%	100.0%	94.6%	100.0%
Gogebic			29.0%		0.3%		55.4%
Houghton			33.1%				100.0%
Iron			100.0%	74.3%	60.5%	9.6%	100.0%
Keweenaw							82.6%
Luce	100.0%	100.0%					4.0%
Mackinac	53.8%	99.7%		2.9%			8.9%
Marquette	89.8%	5.1%	98.2%	95.0%	16.1%	25.0%	100.0%
Menominee	46.3%		100.0%	100.0%	100.0%	100.0%	100.0%
Ontonagon			27.3%				86.9%
Schoolcraft	100.0%	100.0%		89.8%		15.9%	100.0%
Wisconsin							
Brown					100.0%	93.3%	22.1%
Calumet					30.7%		
Door			55.1%	86.0%	100.0%	100.0%	100.0%
Florence			100.0%	100.0%	100.0%	77.6%	100.0%
Forest			100.0%	60.5%	100.0%	38.8%	100.0%
Kewaunee					100.0%	100.0%	38.9%
Langlade			99.0%	1.1%	100.0%	17.9%	100.0%
Lincoln			18.5%		39.3%		35.9%
Manitowoc					36.0%	31.1%	
Marathon			1.4%		35.3%		4.8%
Marinette			100.0%	100.0%	100.0%	100.0%	100.0%
Menominee			100.0%	0.4%	100.0%	74.2%	100.0%
Oconto			96.6%	65.9%	100.0%	100.0%	100.0%
Oneida			67.3%		50.3%		82.2%
Outagamie					100.0%	26.6%	0.2%
Portage					13.0%		
Shawano			36.8%		100.0%	42.7%	72.3%
Vilas			62.7%		17.5%		91.7%
Waupaca					82.3%	0.3%	0.2%
Winnebago					11.9%		

Table 18. Area in each county, by zone.

County	P01	P02	P03	P04	P05	P06
	Thousand Acres					
Michigan						
Alger		160.2			358.1	605.8
Baraga	589.2	589.2	338.4	589.2	589.2	589.2
Delta		14.6			556.9	752.9
Dickinson	70.5	370.4		492.6	495.2	495.2
Gogebic	729.8	193.3	729.8	729.8	348.5	
Houghton	649.5	649.5	460.1	649.5	649.5	255.7
Iron	742.9	770.9	592.8	770.9	770.9	672.4
Keweenaw	219.0	219.0		69.6	197.0	40.8
Luce						90.2
Mackinac						32.4
Marquette	644.6	1,179.6		872.3	1,198.0	1,198.0
Menominee		9.0		29.8	545.5	593.9
Ontonagon	850.5	744.0	850.5	850.5	737.8	
Schoolcraft					5.3	784.2
Wisconsin						
Ashland			623.6	84.6		
Bayfield			702.4			
Florence	51.0	106.4	126.5	319.3	319.3	305.0
Forest	110.4	34.0	391.4	669.9	658.5	38.9
Iron	177.0		516.9	513.3		
Langlade			76.0	214.9	3.9	
Lincoln			335.1	157.3		
Marinette				319.9	556.3	365.8
Oconto				21.8	44.1	
Oneida	5.8		791.4	790.1	246.4	
Price			794.8	196.9		
Rusk			54.3			
Sawyer			483.0			
Taylor			36.9			
Vilas	527.1	26.8	653.4	653.4	406.5	
All Counties	5,367.4	5,067.0	8,557.4	8,995.5	8,687.1	6,820.5

Continued below.

County	P07	P08	P09	P10	P11	P12	P13
	Thousand Acres						
Michigan							
Alger	605.8	605.8	230.7	482.7		103.2	580.5
Baraga			546.0	196.2			589.2
Chippewa	315.3	869.3					
Delta	752.9	484.1	629.7	752.9	303.9	752.1	752.9
Dickinson	302.7		495.2	495.2	495.1	468.5	495.2
Gogebic			211.9		1.8		404.6
Houghton			215.3				649.5
Iron			770.9	573.1	466.3	74.1	770.9
Keweenaw							180.8
Luce	593.7	593.7					23.9
Mackinac	365.9	677.6		19.8			60.5
Marquette	1,075.4	61.1	1,176.9	1,138.2	192.5	300.1	1,198.0
Menominee	310.7		671.2	671.2	671.2	671.2	671.2
Ontonagon			232.3				739.5
Schoolcraft	784.4	784.4		704.4		124.5	784.2
Wisconsin							
Brown					343.1	320.0	75.7
Calumet					77.9		
Door			162.7	254.3	295.5	295.5	295.5
Florence			319.3	319.3	319.3	247.7	319.3
Forest			669.9	405.5	669.9	259.7	669.9
Kewaunee					218.9	218.9	85.3
Langlade			564.7	6.1	570.2	102.1	570.2
Lincoln			107.5		227.7		208.0
Manitowoc					136.9	118.3	
Marathon			14.5		356.3		48.3
Marinette			908.1	908.1	908.1	908.1	908.1
Menominee			233.7	1.0	233.7	173.5	233.7
Oconto			630.0	429.8	651.8	651.8	651.8
Oneida			533.0		398.5		650.3
Outagamie					411.4	109.3	0.8
Portage					68.7		
Shawano			214.4		582.0	248.3	420.9
Vilas			409.9		114.4		599.5
Waupaca					403.5	1.5	0.9
Winnebago					44.3		
All Counties	5,106.7	4,075.9	9,947.9	7,357.8	9,163.3	6,148.4	13,639.3

Forest Inventory

Table 19. Forestland and timberland area for each zone, by owner group.

	Forestland				Timberland				
	Federal	Private	State/ Local	Total	Federal	Private	State/ Local	Total	Percent of Forest-land
	Thousand acres								
Zone P01									
Area	1,108	2,815	704	4,627	1,017	2,777	650	4,444	96%
Pct	24%	61%	15%	100%	23%	62%	15%	100%	
Zone P02									
Area	857	2,845	694	4,396	780	2,806	681	4,266	97%
Pct	19%	65%	16%	100%	18%	66%	16%	100%	
Zone P03									
Area	1,878	3,693	1,432	7,003	1,782	3,660	1,347	6,789	97%
Pct	27%	53%	20%	100%	26%	54%	20%	100%	
Zone P04									
Area	1,543	4,315	1,701	7,559	1,440	4,275	1,633	7,348	97%
Pct	20%	57%	23%	100%	20%	58%	22%	100%	
Zone P05									
Area	1,600	4,469	1,261	7,330	1,498	4,416	1,246	7,161	98%
Pct	22%	61%	17%	100%	21%	62%	17%	100%	
Zone P06									
Area	860	3,518	1,301	5,679	764	3,479	1,284	5,527	97%
Pct	15%	62%	23%	100%	14%	63%	23%	100%	
Zone P07									
Area	607	2,304	1,353	4,264	548	2,273	1,333	4,154	97%
Pct	14%	54%	32%	100%	13%	55%	32%	100%	
Zone P08									
Area	607	2,304	1,353	4,264	798	1,408	963	3,169	74%
Pct	14%	54%	32%	100%	25%	44%	30%	100%	
Zone P09									
Area	1,456	4,738	1,532	7,726	1,368	4,694	1,510	7,572	98%
Pct	19%	61%	20%	100%	18%	62%	20%	100%	
Zone P10									
Area	987	3,457	1,295	5,739	917	3,427	1,278	5,622	98%
Pct	17%	60%	23%	100%	16%	61%	23%	100%	
Zone P11									
Area	668	3,910	1,104	5,682	648	3,881	1,085	5,614	99%
Pct	12%	69%	19%	100%	12%	69%	19%	100%	
Zone P12									
Area	589	2,620	894	4,103	587	2,600	883	4,070	99%
Pct	14%	64%	22%	100%	14%	64%	22%	100%	
Zone P13									
Area	2,030	6,352	2,012	10,394	1,880	6,296	1,983	10,159	98%
Pct	20%	61%	19%	100%	19%	62%	20%	100%	

Table 20. Timberland area for each zone, by forest type and owner group.

Forest Type	Federal	Private	State/ Local	Total	Percent
	Thousand acres				
Zone P01					
Aspen	197	338	129	664	15%
Balsam fir	33	86	8	127	3%
Balsam poplar	2	13	2	17	0%
Black spruce	43	87	52	182	4%
Elm-Ash-Cottonwood	22	39	5	66	1%
Jack pine	15	12	30	56	1%
Maple-Beech-Birch	515	1,737	254	2,506	56%
Nonstocked	3	8		11	0%
Northern white-cedar	42	139	33	213	5%
Oak Hickory	9	45	4	58	1%
Oak Pine	25	34	20	78	2%
Other Hardwoods	5	20	5	30	1%
Other Softwoods	11	36	14	61	1%
Paper birch	16	61	15	92	2%
Red pine	31	36	34	101	2%
Tamarack	15	34	22	71	2%
White Pine	16	26	20	61	1%
White spruce	20	28	3	51	1%
Total	1,017	2,777	650	4,444	100%
Zone P02					
Aspen	154	373	122	650	15%
Balsam fir	26	77	20	123	3%
Balsam poplar	2	29	11	42	1%
Black spruce	29	104	50	184	4%
Elm-Ash-Cottonwood	12	32	7	51	1%
Jack pine	17	15	35	67	2%
Maple-Beech-Birch	398	1,678	264	2,341	55%
Nonstocked	2	5		7	0%
Northern white-cedar	23	181	81	284	7%
Oak Hickory	6	36	3	45	1%
Oak Pine	17	19	11	47	1%
Other Hardwoods	5	18	9	33	1%
Other Softwoods	8	42		49	1%
Paper birch	12	59	13	84	2%
Red pine	25	48	15	87	2%
Tamarack	12	29	22	63	1%
White Pine	13	27	13	52	1%

Forest Type	Federal	Private	State/ Local	Total	Percent
	Thousand acres				
White spruce	18	35	3	57	1%
Total	780	2,806	681	4,266	100%
Zone P03					
Aspen	360	760	333	1,453	21%
Balsam fir	55	134	37	227	3%
Balsam poplar	2	14		16	0%
Black spruce	102	140	97	339	5%
Elm-Ash-Cottonwood	56	146	37	239	4%
Jack pine	24	17	25	66	1%
Maple-Beech-Birch	773	1,799	477	3,049	45%
Nonstocked	4	21	10	35	1%
Northern white-cedar	88	106	50	244	4%
Oak Hickory	40	101	52	193	3%
Oak Pine	48	58	32	138	2%
Other Hardwoods	6	24	9	39	1%
Other Softwoods	16	29	20	65	1%
Paper birch	40	82	37	159	2%
Red pine	75	71	41	187	3%
Tamarack	44	98	52	193	3%
White Pine	26	40	28	93	1%
White spruce	24	20	11	55	1%
Total	1,782	3,660	1,347	6,789	100%
Zone P04					
Aspen	294	681	411	1,385	19%
Balsam fir	43	131	49	222	3%
Balsam poplar	2	28	7	37	1%
Black spruce	74	172	138	384	5%
Elm-Ash-Cottonwood	35	78	22	135	2%
Jack pine	16	35	50	101	1%
Maple-Beech-Birch	707	2,276	522	3,506	48%
Nonstocked	3	21	10	34	0%
Northern white-cedar	56	229	101	386	5%
Oak Hickory	11	92	37	140	2%
Oak Pine	33	77	37	147	2%
Other Hardwoods	5	24	17	46	1%
Other Softwoods	16	49	16	82	1%
Paper birch	26	99	49	173	2%
Red pine	51	85	61	196	3%
Tamarack	30	102	58	190	3%
White Pine	16	59	37	111	2%
White spruce	25	35	12	71	1%

Forest Type	Federal	Private	State/ Local	Total	Percent
	Thousand acres				
Total	1,440	4,275	1,633	7,348	100%
Zone P05					
Aspen	277	565	297	1,138	16%
Balsam fir	53	147	32	231	3%
Balsam poplar	13	92	13	118	2%
Black spruce	73	166	84	323	5%
Elm-Ash-Cottonwood	26	88	20	134	2%
Jack pine	35	39	49	124	2%
Maple-Beech-Birch	720	2,258	366	3,343	47%
Nonstocked	2	20	4	26	0%
Northern white-cedar	57	406	126	590	8%
Oak Hickory	15	104	39	158	2%
Oak Pine	36	68	43	146	2%
Other Hardwoods	5	27	18	50	1%
Other Softwoods	14	56	7	77	1%
Paper birch	26	97	29	153	2%
Red pine	63	85	53	202	3%
Tamarack	25	101	33	159	2%
White Pine	30	56	23	110	2%
White spruce	28	42	9	79	1%
Total	1,498	4,416	1,246	7,161	100%
Zone P06					
Aspen	113	386	269	767	14%
Balsam fir	20	122	36	179	3%
Balsam poplar	13	102	13	128	2%
Black spruce	48	148	93	290	5%
Elm-Ash-Cottonwood	1	77	30	107	2%
Jack pine	55	45	64	164	3%
Maple-Beech-Birch	297	1,722	355	2,375	43%
Nonstocked	1	8	4	13	0%
Northern white-cedar	62	412	176	650	12%
Oak Hickory	9	58	29	95	2%
Oak Pine	26	34	35	95	2%
Other Hardwoods		18	20	37	1%
Other Softwoods	8	56	3	67	1%
Paper birch	17	82	29	128	2%
Red pine	55	62	52	169	3%
Tamarack	10	76	34	120	2%
White Pine	22	38	36	96	2%
White spruce	8	32	7	47	1%
Total	764	3,479	1,284	5,527	100%

Forest Type	Federal	Private	State/ Local	Total	Percent
	Thousand acres				
Zone P07					
Aspen	51	221	157	429	10%
Balsam fir	15	79	36	129	3%
Balsam poplar	11	87	13	111	3%
Black spruce	55	109	117	281	7%
Elm-Ash-Cottonwood		52	28	81	2%
Jack pine	60	44	108	212	5%
Maple-Beech-Birch	174	1,044	352	1,569	38%
Nonstocked	3	8	11	22	1%
Northern white-cedar	59	342	228	629	15%
Oak Hickory	8	10	8	26	1%
Oak Pine	12	20	32	65	2%
Other Hardwoods	3	8	21	32	1%
Other Softwoods	5	34	10	49	1%
Paper birch	16	63	34	113	3%
Red pine	48	42	76	166	4%
Tamarack	2	58	42	103	2%
White Pine	20	37	46	102	2%
White spruce	7	15	13	34	1%
Total	548	2,273	1,333	4,154	100%
Zone P08					
Aspen	83	103	90	277	9%
Balsam fir	25	68	27	120	4%
Balsam poplar	14	59	8	81	3%
Black spruce	61	71	77	209	7%
Elm-Ash-Cottonwood	3	39	25	67	2%
Jack pine	76	32	83	191	6%
Maple-Beech-Birch	236	641	268	1,145	36%
Nonstocked	7	7	10	24	1%
Northern white-cedar	98	207	156	461	15%
Oak Hickory	18	6	5	29	1%
Oak Pine	18	8	27	54	2%
Other Hardwoods	5	2	12	20	1%
Other Softwoods	5	29	9	44	1%
Paper birch	28	44	30	102	3%
Red pine	80	27	60	168	5%
Tamarack	9	26	27	62	2%
White Pine	25	20	38	82	3%
White spruce	7	17	9	33	1%
Total	798	1,408	963	3,169	100%
Zone P09					

Forest Type	Federal	Private	State/ Local	Total	Percent
	Thousand acres				
Aspen	262	651	373	1,286	17%
Balsam fir	48	159	41	248	3%
Balsam poplar	13	100	13	125	2%
Black spruce	76	178	114	367	5%
Elm-Ash-Cottonwood	19	208	34	261	3%
Jack pine	35	49	48	131	2%
Maple-Beech-Birch	610	2,023	383	3,016	40%
Nonstocked	2	35	9	46	1%
Northern white-cedar	61	426	149	636	8%
Oak Hickory	20	216	64	300	4%
Oak Pine	31	92	50	173	2%
Other Hardwoods		22	22	43	1%
Other Softwoods	10	59	11	80	1%
Paper birch	32	121	42	195	3%
Red pine	70	110	71	252	3%
Tamarack	21	129	41	191	3%
White Pine	31	81	33	145	2%
White spruce	27	35	14	75	1%
Total	1,368	4,694	1,510	7,572	100%
Zone P10					
Aspen	166	441	282	890	16%
Balsam fir	27	111	38	176	3%
Balsam poplar	11	105	13	128	2%
Black spruce	57	143	86	286	5%
Elm-Ash-Cottonwood	12	172	41	225	4%
Jack pine	52	47	43	141	3%
Maple-Beech-Birch	360	1,404	335	2,099	37%
Nonstocked	1	16	2	19	0%
Northern white-cedar	63	424	169	656	12%
Oak Hickory	15	130	51	196	3%
Oak Pine	14	55	37	106	2%
Other Hardwoods		18	19	37	1%
Other Softwoods	5	29	7	41	1%
Paper birch	25	80	29	134	2%
Red pine	62	86	59	207	4%
Tamarack	12	85	31	128	2%
White Pine	24	52	28	103	2%
White spruce	12	31	9	52	1%
Total	917	3,427	1,278	5,622	100%
Zone P11					
FType	Federal	Private	State/	Total	Percent

Forest Type	Federal	Private	State/ Local	Total	Percent
	Thousand acres				
			Local		
Aspen	156	581	295	1,032	18%
Balsam fir	18	102	33	153	3%
Balsam poplar		80	9	89	2%
Black spruce	38	97	70	205	4%
Elm-Ash-Cottonwood	13	346	40	399	7%
Jack pine	11	30	9	50	1%
Maple-Beech-Birch	277	1,360	257	1,893	34%
Nonstocked	1	44	6	51	1%
Northern white-cedar	29	370	116	515	9%
Oak Hickory	13	300	58	371	7%
Oak Pine	12	90	30	132	2%
Other Hardwoods		19	17	36	1%
Other Softwoods	3	33	9	46	1%
Paper birch	16	83	30	129	2%
Red pine	34	107	43	184	3%
Tamarack	13	119	33	164	3%
White Pine	7	83	19	109	2%
White spruce	7	37	11	55	1%
Total	648	3,881	1,085	5,614	100%
Zone P12					
Aspen	127	361	224	712	17%
Balsam fir	18	65	23	106	3%
Balsam poplar	11	96	13	119	3%
Black spruce	36	64	47	148	4%
Elm-Ash-Cottonwood	10	237	35	282	7%
Jack pine	24	35	13	72	2%
Maple-Beech-Birch	190	801	193	1,183	29%
Nonstocked		22	1	24	1%
Northern white-cedar	43	364	130	536	13%
Oak Hickory	17	194	55	266	7%
Oak Pine	6	60	24	90	2%
Other Hardwoods		16	16	32	1%
Other Softwoods	3	30	5	37	1%
Paper birch	19	54	21	94	2%
Red pine	52	65	46	163	4%
Tamarack	7	68	15	90	2%
White Pine	13	51	16	81	2%
White spruce	11	18	6	36	1%
Total	587	2,600	883	4,070	100%
Zone P13					

Forest Type	Federal	Private	State/ Local	Total	Percent
	Thousand acres				
Aspen	351	870	432	1,652	16%
Balsam fir	57	191	49	297	3%
Balsam poplar	13	112	13	138	1%
Black spruce	102	220	145	466	5%
Elm-Ash-Cottonwood	33	250	50	333	3%
Jack pine	69	73	74	216	2%
Maple-Beech-Birch	820	2,916	544	4,279	42%
Nonstocked	3	40	13	56	1%
Northern white-cedar	103	523	211	837	8%
Oak Hickory	25	267	72	364	4%
Oak Pine	41	119	62	222	2%
Other Hardwoods	5	33	26	64	1%
Other Softwoods	16	79	18	114	1%
Paper birch	43	153	51	247	2%
Red pine	103	150	103	355	3%
Tamarack	27	148	50	225	2%
White Pine	37	110	54	201	2%
White spruce	31	44	17	92	1%
Total	1,880	6,296	1,983	10,159	100%

Table 21. Volume of growing stock on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Vol/acre
Zone P01	**million cubic feet**					
Hardwood	1,298.4	2,993.9	567.1	4,859.4	67%	1,093
Softwood	639.5	1,331.7	426.9	2,398.0	33%	540
Total	1,937.9	4,325.6	993.9	7,257.4		1,633
Percent	27%	60%	14%			
Zone P02						
Hardwood	1,020.8	2,930.8	563.8	4,515.4	66%	1,058
Softwood	493.5	1,399.5	458.9	2,351.8	34%	551
Total	1,514.2	4,330.3	1,022.7	6,867.2		1,610
Percent	22%	63%	15%			
Zone P03						
Hardwood	1,974.5	3,402.5	1,143.4	6,520.4	68%	960
Softwood	1,010.0	1,362.4	643.7	3,016.0	32%	444
Total	2,984.5	4,764.9	1,787.0	9,536.4		1,405
Percent	31%	50%	19%			
Zone P04						
Hardwood	1,742.5	4,231.5	1,241.4	7,215.3	66%	982
Softwood	811.5	2,002.3	906.2	3,720.1	34%	506
Total	2,554.0	6,233.8	2,147.6	10,935.4		1,488
Percent	23%	57%	20%			
Zone P05						
Hardwood	1,820.8	4,144.8	906.9	6,872.5	63%	960
Softwood	907.9	2,316.1	780.7	4,004.8	37%	559
Total	2,728.8	6,460.9	1,687.6	10,877.2		1,519
Percent	25%	59%	16%			
Zone P06						
Hardwood	747.6	3,106.8	824.7	4,679.1	58%	847
Softwood	601.6	1,918.1	832.8	3,352.6	42%	607
Total	1,349.2	5,025.0	1,657.5	8,031.7		1,453
Percent	17%	63%	21%			
Zone P07						
Hardwood	431.7	1,795.2	716.4	2,943.3	51%	709
Softwood	457.7	1,309.7	1,015.9	2,783.3	49%	670
Total	889.4	3,104.9	1,732.3	5,726.6		1,379
Percent	16%	54%	30%			
Zone P08						
Hardwood	593.0	1,053.4	524.8	2,171.2	49%	685
Softwood	689.4	822.4	709.3	2,221.0	51%	701
Total	1,282.4	1,875.8	1,234.1	4,392.2		1,386
Percent	29%	43%	28%			
Zone P09						
Hardwood	1,623.2	4,298.6	1,030.0	6,951.8	62%	918
Softwood	863.2	2,539.0	930.7	4,332.8	38%	572

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Vol/acre
Total	2,486.4	6,837.6	1,960.6	11,284.6		1,490
Percent	22%	61%	17%			
Zone P10						
Hardwood	943.6	2,834.4	846.4	4,624.4	59%	823
Softwood	593.9	1,855.0	826.7	3,275.6	41%	583
Total	1,537.6	4,689.4	1,673.1	7,900.0		1,405
Percent	19%	59%	21%			
Zone P11						
Hardwood	770.3	3,598.1	779.8	5,148.2	64%	917
Softwood	312.3	1,985.3	584.7	2,882.3	36%	513
Total	1,082.6	5,583.4	1,364.5	8,030.5		1,430
Percent	13%	70%	17%			
Zone P12						
Hardwood	560.3	2,187.4	585.6	3,333.2	58%	819
Softwood	388.0	1,522.7	548.9	2,459.6	42%	604
Total	948.3	3,710.1	1,134.5	5,792.9		1,423
Percent	16%	64%	20%			
Zone P13						
Hardwood	2,131.5	5,928.2	1,370.1	9,429.7	62%	928
Softwood	1,228.7	3,281.5	1,238.2	5,748.5	38%	566
Total	3,360.2	9,209.7	2,608.3	15,178.2		1,494
Percent	22%	61%	17%			

Table 22. Green weight of growing stock on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per acre	Percent of All Live GT
Zone P01			**million green tons**				
Hardwood	41.3	96.6	18.0	155.9	72%	35.1	94.4%
Softwood	16.5	33.6	10.7	60.8	28%	13.7	96.9%
Total	57.7	130.2	28.7	216.7		48.8	94.0%
Percent	27%	60%	13%				
Zone P02							
Hardwood	32.4	94.6	17.9	144.9	71%	34.0	95.0%
Softwood	12.7	35.3	11.5	59.6	29%	14.0	96.8%
Total	45.2	129.9	29.4	204.5		47.9	94.7%
Percent	22%	64%	14%				
Zone P03							
Hardwood	62.7	109.8	36.3	208.8	73%	30.8	93.0%
Softwood	26.0	34.4	16.1	76.6	27%	11.3	96.3%
Total	88.8	144.2	52.5	285.4		42.0	92.6%
Percent	31%	51%	18%				
Zone P04							
Hardwood	55.4	136.5	39.4	231.3	71%	31.5	94.2%
Softwood	20.9	50.5	22.7	94.2	29%	12.8	96.8%
Total	76.3	187.1	62.2	325.5		44.3	94.1%
Percent	23%	57%	19%				
Zone P05							
Hardwood	57.8	133.7	28.8	220.4	68%	30.8	94.5%
Softwood	23.4	58.5	19.6	101.5	32%	14.2	96.3%
Total	81.3	192.2	48.4	321.8		44.9	94.9%
Percent	25%	60%	15%				
Zone P06							
Hardwood	23.7	100.2	26.2	150.2	64%	27.2	94.5%
Softwood	15.5	48.4	20.9	84.8	36%	15.3	96.1%
Total	39.3	148.7	47.1	235.0		42.5	95.9%
Percent	17%	63%	20%				
Zone P07							
Hardwood	13.7	57.9	22.8	94.4	57%	22.7	93.0%
Softwood	11.8	33.1	25.5	70.3	43%	16.9	95.9%
Total	25.5	91.0	48.2	164.7		39.7	96.6%
Percent	15%	55%	29%				
Zone P08							
Hardwood	18.8	34.0	16.7	69.5	55%	21.9	91.9%
Softwood	17.8	20.8	17.8	56.3	45%	17.8	95.7%
Total	36.6	54.7	34.5	125.8		39.7	96.4%
Percent	29%	44%	27%				
Zone P09							
Hardwood	51.6	138.7	32.7	223.0	67%	29.4	94.7%
Softwood	22.3	64.1	23.3	109.7	33%	14.5	96.6%

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per acre	Percent of All Live GT
Total	73.8	202.8	56.1	332.7		43.9	95.4%
Percent	22%	61%	17%				
Zone P10							
Hardwood	30.0	91.4	26.9	148.3	64%	26.4	94.1%
Softwood	15.3	46.8	20.7	82.9	36%	14.7	96.1%
Total	45.3	138.3	47.6	231.2		41.1	95.6%
Percent	20%	60%	21%				
Zone P11							
Hardwood	24.5	116.1	24.8	165.3	69%	29.4	94.0%
Softwood	8.1	50.1	14.7	72.8	31%	13.0	96.2%
Total	32.5	166.2	39.4	238.2		42.4	94.2%
Percent	14%	70%	17%				
Zone P12							
Hardwood	17.8	70.6	18.6	107.0	63%	26.3	93.8%
Softwood	10.0	38.4	13.8	62.2	37%	15.3	95.8%
Total	27.8	109.0	32.4	169.2		41.6	95.5%
Percent	16%	64%	19%				
Zone P13							
Hardwood	67.7	191.3	43.5	302.5	68%	29.8	94.3%
Softwood	31.7	82.8	31.0	145.6	32%	14.3	96.6%
Total	99.4	274.1	74.6	448.1		44.1	95.0%
Percent	22%	61%	17%				

Table 23. Volume of all live timber on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Volume per acre
Zone P01	**million cubic feet**					**Cubic feet**
Hardwood	1,372.1	3,170.0	608.4	5,150.6	68%	1,159
Softwood	654.5	1,379.5	436.8	2,470.8	32%	556
Total	2,026.7	4,549.5	1,045.2	7,621.4		1,715
Percent	27%	60%	14%			
Zone P02						
Hardwood	1,071.4	3,085.1	595.0	4,751.5	66%	1,114
Softwood	503.9	1,452.0	474.8	2,430.7	34%	570
Total	1,575.2	4,537.1	1,069.8	7,182.2		1,683
Percent	22%	63%	15%			
Zone P03						
Hardwood	2,122.3	3,660.3	1,237.2	7,019.8	69%	1,034
Softwood	1,043.8	1,414.3	665.2	3,123.3	31%	460
Total	3,166.1	5,074.7	1,902.4	10,143.1		1,494
Percent	31%	50%	19%			
Zone P04						
Hardwood	1,850.3	4,484.2	1,333.9	7,668.3	67%	1,044
Softwood	834.7	2,072.7	937.2	3,844.6	33%	523
Total	2,685.0	6,556.9	2,271.0	11,512.9		1,567
Percent	23%	57%	20%			
Zone P05						
Hardwood	1,931.8	4,381.1	958.9	7,271.8	64%	1,016
Softwood	937.2	2,414.8	805.0	4,156.9	36%	581
Total	2,868.9	6,795.9	1,763.9	11,428.7		1,596
Percent	25%	59%	15%			
Zone P06						
Hardwood	794.5	3,278.7	876.9	4,950.2	59%	896
Softwood	620.2	2,005.9	865.0	3,491.0	41%	632
Total	1,414.7	5,284.6	1,741.9	8,441.2		1,527
Percent	17%	63%	21%			
Zone P07						
Hardwood	467.7	1,917.1	780.5	3,165.4	52%	762
Softwood	474.5	1,373.8	1,058.7	2,906.9	48%	700
Total	942.2	3,291.0	1,839.2	6,072.3		1,462
Percent	16%	54%	30%			
Zone P08						
Hardwood	650.2	1,139.5	579.0	2,368.8	51%	748
Softwood	713.5	860.6	742.8	2,316.9	49%	731
Total	1,363.7	2,000.1	1,321.8	4,685.6		1,479
Percent	29%	43%	28%			
Zone P09						
Hardwood	1,714.7	4,540.7	1,090.6	7,345.9	62%	970
Softwood	889.8	2,637.8	960.6	4,488.1	38%	593

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Volume per acre
Total	2,604.4	7,178.4	2,051.2	11,834.0		1,563
Percent	22%	61%	17%			
Zone P10						
Hardwood	1,007.1	3,010.3	900.4	4,917.8	59%	875
Softwood	614.7	1,942.8	853.4	3,410.9	41%	607
Total	1,621.9	4,953.1	1,753.7	8,328.7		1,482
Percent	19%	59%	21%			
Zone P11						
Hardwood	817.1	3,834.5	821.3	5,472.9	65%	975
Softwood	324.3	2,073.8	604.7	3,002.8	35%	535
Total	1,141.3	5,908.3	1,426.1	8,475.7		1,510
Percent	13%	70%	17%			
Zone P12						
Hardwood	596.3	2,336.4	618.9	3,551.6	58%	873
Softwood	404.2	1,596.9	569.0	2,570.1	42%	632
Total	1,000.4	3,933.3	1,188.0	6,121.7		1,504
Percent	16%	64%	19%			
Zone P13						
Hardwood	2,261.6	6,287.7	1,455.5	10,004.8	63%	985
Softwood	1,264.6	3,409.0	1,277.3	5,950.9	37%	586
Total	3,526.1	9,696.7	2,732.8	15,955.6		1,571
Percent	22%	61%	17%			

Table 24. Green weight of all live timber on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per Acre
Zone P01			**million green tons**			
Hardwood	43.6	102.3	19.3	165.2	73%	37.2
Softwood	16.9	34.8	11.0	62.7	27%	14.1
Total	60.5	137.1	30.3	227.8		51.3
Percent	27%	60%	13%			
Zone P02						
Hardwood	34.0	99.5	18.9	152.5	71%	35.7
Softwood	13.0	36.7	11.9	61.6	29%	14.4
Total	47.0	136.2	30.8	214.0		50.2
Percent	22%	64%	14%			
Zone P03						
Hardwood	67.4	118.1	39.3	224.8	74%	33.1
Softwood	26.9	35.7	16.7	79.3	26%	11.7
Total	94.3	153.8	56.0	304.1		44.8
Percent	31%	51%	18%			
Zone P04						
Hardwood	58.8	144.7	42.4	245.8	72%	33.5
Softwood	21.5	52.3	23.5	97.3	28%	13.2
Total	80.3	197.0	65.9	343.2		46.7
Percent	23%	57%	19%			
Zone P05						
Hardwood	61.4	141.3	30.5	233.2	69%	32.6
Softwood	24.2	61.0	20.2	105.3	31%	14.7
Total	85.5	202.3	50.7	338.5		47.3
Percent	25%	60%	15%			
Zone P06						
Hardwood	25.2	105.8	27.9	158.9	64%	28.7
Softwood	16.0	50.6	21.7	88.3	36%	16.0
Total	41.2	156.4	49.6	247.2		44.7
Percent	17%	63%	20%			
Zone P07						
Hardwood	14.9	61.8	24.8	101.5	58%	24.4
Softwood	12.2	34.7	26.5	73.5	42%	17.7
Total	27.1	96.5	51.3	175.0		42.1
Percent	15%	55%	29%			
Zone P08						
Hardwood	20.7	36.8	18.4	75.8	56%	23.9
Softwood	18.4	21.7	18.6	58.7	44%	18.5
Total	39.1	58.5	37.0	134.6		42.5
Percent	29%	43%	28%			
Zone P09						
Hardwood	54.5	146.5	34.7	235.6	67%	31.1
Softwood	22.9	66.6	24.1	113.6	33%	15.0
Total	77.4	213.1	58.7	349.2		46.1

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per Acre
Percent	22%	61%	17%			
Zone P10						
Hardwood	32.0	97.1	28.6	157.7	65%	28.1
Softwood	15.8	49.0	21.4	86.3	35%	15.3
Total	47.8	146.2	50.0	244.0		43.4
Percent	20%	60%	20%			
Zone P11						
Hardwood	26.0	123.7	26.1	175.8	70%	31.3
Softwood	8.4	52.4	15.2	75.9	30%	13.5
Total	34.3	176.1	41.3	251.6		44.8
Percent	14%	70%	16%			
Zone P12						
Hardwood	18.9	75.4	19.7	114.0	64%	28.0
Softwood	10.4	40.3	14.3	65.0	36%	16.0
Total	29.4	115.7	33.9	179.0		44.0
Percent	16%	65%	19%			
Zone P13						
Hardwood	71.9	202.8	46.2	320.9	68%	31.6
Softwood	32.6	86.1	32.0	150.7	32%	14.8
Total	104.5	288.9	78.3	471.6		46.4
Percent	22%	61%	17%			

Table 25. Volume of growing stock sawlogs on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Vol/acre	Percent Saw
Zone P01			million cubic feet				
Hardwood	543.1	1,151.1	227.0	1,921.2	55%	432	40%
Softwood	432.3	863.5	280.1	1,575.9	45%	355	66%
Total	975.4	2,014.6	507.0	3,497.0		787	48%
Percent	28%	58%	14%				
Zone P02							
Hardwood	436.6	1,127.5	227.5	1,791.7	55%	420	40%
Softwood	336.2	885.3	265.9	1,487.4	45%	349	63%
Total	772.9	2,012.8	493.4	3,279.1		769	48%
Percent	24%	61%	15%				
Zone P03							
Hardwood	787.1	1,200.2	395.1	2,382.4	56%	351	37%
Softwood	673.3	814.5	416.3	1,904.1	44%	280	63%
Total	1,460.4	2,014.7	811.3	4,286.5		631	45%
Percent	34%	47%	19%				
Zone P04							
Hardwood	708.9	1,575.3	434.5	2,718.7	54%	370	38%
Softwood	538.3	1,227.1	554.6	2,320.0	46%	316	62%
Total	1,247.2	2,802.4	989.1	5,038.7		686	46%
Percent	25%	56%	20%				
Zone P05							
Hardwood	767.8	1,568.4	345.8	2,682.0	53%	375	39%
Softwood	605.4	1,325.2	467.2	2,397.8	47%	335	60%
Total	1,373.2	2,893.6	813.0	5,079.8		709	47%
Percent	27%	57%	16%				
Zone P06							
Hardwood	324.3	1,170.4	306.0	1,800.8	49%	326	38%
Softwood	382.7	1,043.6	475.0	1,901.4	51%	344	57%
Total	707.0	2,214.0	781.1	3,702.1		670	46%
Percent	19%	60%	21%				
Zone P07							
Hardwood	190.9	660.5	271.0	1,122.5	42%	270	38%
Softwood	284.7	682.2	565.7	1,532.6	58%	369	55%
Total	475.7	1,342.7	836.7	2,655.1		639	46%
Percent	18%	51%	32%				
Zone P08							
Hardwood	257.0	387.8	201.5	846.4	40%	267	39%
Softwood	420.5	431.9	398.8	1,251.2	60%	395	56%
Total	677.5	819.8	600.4	2,097.6		662	48%
Percent	32%	39%	29%				
Zone P09							

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Vol/acre	Percent Saw
Hardwood	677.7	1,648.8	357.6	2,684.1	51%	354	39%
Softwood	561.2	1,428.6	557.6	2,547.4	49%	336	59%
Total	1,238.8	3,077.5	915.2	5,231.5		691	46%
Percent	24%	59%	17%				
Zone P10							
Hardwood	393.6	1,033.4	303.8	1,730.8	49%	308	37%
Softwood	367.4	958.2	479.4	1,805.0	51%	321	55%
Total	761.0	1,991.6	783.2	3,535.8		629	45%
Percent	22%	56%	22%				
Zone P11							
Hardwood	308.8	1,421.1	275.1	2,005.0	56%	357	39%
Softwood	197.3	1,056.3	330.1	1,583.7	44%	282	55%
Total	506.1	2,477.4	605.2	3,588.7		639	45%
Percent	14%	69%	17%				
Zone P12							
Hardwood	224.4	849.2	201.8	1,275.5	49%	313	38%
Softwood	233.0	784.8	309.3	1,327.1	51%	326	54%
Total	457.5	1,634.0	511.1	2,602.6		640	45%
Percent	18%	63%	20%				
Zone P13							
Hardwood	885.8	2,282.8	508.0	3,676.5	52%	362	39%
Softwood	799.9	1,888.7	747.1	3,435.7	48%	338	60%
Total	1,685.6	4,171.6	1,255.0	7,112.2		700	47%
Percent	24%	59%	18%				

Table 26. Green weight of growing stock sawlogs on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per Acre	Percent Saw
Zone P01			**million green tons**				
Hardwood	17.3	37.1	7.2	61.6	61%	13.9	40%
Softwood	11.1	21.8	7.0	40.0	39%	9.0	66%
Total	28.4	58.9	14.2	101.6		22.9	47%
Percent	28%	58%	14%				
Zone P02							
Hardwood	13.9	36.4	7.2	57.5	60%	13.5	40%
Softwood	8.7	22.3	6.7	37.7	40%	8.8	63%
Total	22.5	58.7	13.9	95.2		22.3	47%
Percent	24%	62%	15%				
Zone P03							
Hardwood	25.0	38.7	12.6	76.3	61%	11.2	37%
Softwood	17.4	20.6	10.4	48.4	39%	7.1	63%
Total	42.4	59.3	23.0	124.6		18.4	44%
Percent	0.0	0.0	0.0				
Zone P04							
Hardwood	22.5	50.8	13.8	87.1	60%	11.9	38%
Softwood	13.9	31.0	13.9	58.8	40%	8.0	62%
Total	36.4	81.8	27.7	145.9		19.9	45%
Percent	25%	56%	19%				
Zone P05							
Hardwood	24.4	50.6	11.0	86.0	59%	12.0	39%
Softwood	15.6	33.5	11.7	60.8	41%	8.5	60%
Total	40.0	84.1	22.7	146.8		20.5	46%
Percent	27%	57%	15%				
Zone P06							
Hardwood	10.3	37.8	9.7	57.8	55%	10.5	38%
Softwood	9.9	26.3	11.9	48.1	45%	8.7	57%
Total	20.2	64.1	21.6	105.9		19.2	45%
Percent	19%	61%	20%				
Zone P07							
Hardwood	6.1	21.3	8.6	36.0	48%	8.7	38%
Softwood	7.3	17.2	14.2	38.7	52%	9.3	55%
Total	13.4	38.5	22.8	74.7		18.0	45%
Percent	18%	52%	31%				
Zone P08							
Hardwood	8.2	12.5	6.4	27.1	46%	8.5	39%
Softwood	10.8	10.9	10.0	31.7	54%	10.0	56%
Total	19.0	23.4	16.4	58.8		18.6	47%
Percent	32%	40%	28%				
Zone P09							
Hardwood	21.5	53.2	11.4	86.1	57%	11.4	39%
Softwood	14.5	36.1	14.0	64.5	43%	8.5	59%
Total	36.0	89.3	25.3	150.6		19.9	45%

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per Acre	Percent Saw
Percent	24%	59%	17%				
Zone P10							
Hardwood	12.5	33.3	9.7	55.5	55%	9.9	37%
Softwood	9.5	24.2	12.0	45.7	45%	8.1	55%
Total	22.0	57.5	21.7	101.2		18.0	44%
Percent	22%	57%	21%				
Zone P11							
Hardwood	9.8	45.8	8.7	64.4	62%	11.5	39%
Softwood	5.1	26.7	8.3	40.0	38%	7.1	55%
Total	14.9	72.5	17.0	104.4		18.6	44%
Percent	14%	69%	16%				
Zone P12							
Hardwood	7.1	27.4	6.4	40.9	55%	10.1	38%
Softwood	6.0	19.8	7.8	33.6	45%	8.2	54%
Total	13.1	47.2	14.2	74.5		18.3	44%
Percent	18%	63%	19%				
Zone P13							
Hardwood	28.1	73.6	16.1	117.9	58%	11.6	39%
Softwood	20.6	47.7	18.7	87.0	42%	8.6	60%
Total	48.8	121.3	34.9	205.0		20.2	46%
Percent	24%	59%	17%				

Table 27. Volume of growing stock pulpwood on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Vol/acre	Vol/Acre	Percent Pulp
Zone P01	**million cubic feet**					**CF**	**Cords**	
Hardwood	755.3	1,842.8	340.1	2,938.2	78%	661	8.3	60%
Softwood	207.2	468.2	146.8	822.2	22%	185	2.3	34%
Total	962.5	2,311.0	486.9	3,760.4		846	10.6	52%
Percent	26%	61%	13%					
Zone P02								
Hardwood	584.1	1,803.2	336.3	2,723.7	76%	638	8.0	60%
Softwood	157.2	514.2	193.0	864.4	24%	203	2.5	37%
Total	741.4	2,317.4	529.3	3,588.0		841	10.5	52%
Percent	21%	65%	15%					
Zone P03								
Hardwood	1,187.4	2,202.2	748.3	4,138.0	79%	610	7.6	63%
Softwood	336.7	547.9	227.4	1,112.0	21%	164	2.0	37%
Total	1,524.1	2,750.2	975.7	5,249.9		773	9.7	55%
Percent	29%	52%	19%					
Zone P04								
Hardwood	1,033.6	2,656.2	806.8	4,496.6	76%	612	7.6	62%
Softwood	273.2	775.3	351.6	1,400.1	24%	191	2.4	38%
Total	1,306.8	3,431.5	1,158.5	5,896.7		802	10.0	54%
Percent	22%	58%	20%					
Zone P05								
Hardwood	1,053.0	2,576.3	561.1	4,190.4	72%	585	7.3	61%
Softwood	302.5	990.9	313.5	1,607.0	28%	224	2.8	40%
Total	1,355.6	3,567.2	874.6	5,797.4		810	10.1	53%
Percent	23%	62%	15%					
Zone P06								
Hardwood	423.3	1,936.4	518.7	2,878.3	66%	521	6.5	62%
Softwood	218.9	874.5	357.8	1,451.2	34%	263	3.3	43%
Total	642.2	2,810.9	876.5	4,329.5		783	9.8	54%
Percent	15%	65%	20%					
Zone P07								
Hardwood	240.8	1,134.7	445.4	1,820.9	59%	438	5.5	62%
Softwood	172.9	627.5	450.2	1,250.7	41%	301	3.8	45%
Total	413.7	1,762.1	895.7	3,071.5		739	9.2	54%
Percent	13%	57%	29%					
Zone P08								
Hardwood	336.0	665.6	323.3	1,324.9	58%	418	5.2	61%
Softwood	268.9	390.4	310.4	969.8	42%	306	3.8	44%
Total	604.9	1,056.0	633.7	2,294.6		724	9.1	52%
Percent	26%	46%	28%					
Zone P09								
Hardwood	945.5	2,649.8	672.4	4,267.7	71%	564	7.0	61%
Softwood	302.1	1,110.3	373.0	1,785.4	29%	236	2.9	41%

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Vol/acre	Vol/Acre	Percent Pulp
Total	1,247.5	3,760.1	1,045.4	6,053.1		799	10.0	54%
Percent	21%	62%	17%					
Zone P10								
Hardwood	550.0	1,801.0	542.6	2,893.6	66%	515	6.4	63%
Softwood	226.5	896.8	347.3	1,470.6	34%	262	3.3	45%
Total	776.6	2,697.7	890.0	4,364.3		776	9.7	55%
Percent	18%	62%	20%					
Zone P11								
Hardwood	461.6	2,177.0	504.7	3,143.2	71%	560	7.0	61%
Softwood	115.0	929.0	254.6	1,298.6	29%	231	2.9	45%
Total	576.6	3,105.9	759.3	4,441.8		791	9.9	55%
Percent	13%	70%	17%					
Zone P12								
Hardwood	335.8	1,338.2	383.8	2,057.7	65%	506	6.3	62%
Softwood	155.0	737.9	239.6	1,132.5	35%	278	3.5	46%
Total	490.8	2,076.1	623.4	3,190.2		784	9.8	55%
Percent	15%	65%	20%					
Zone P13								
Hardwood	1,245.7	3,645.4	862.1	5,753.2	71%	566	7.1	61%
Softwood	428.9	1,392.8	491.2	2,312.8	29%	228	2.8	40%
Total	1,674.6	5,038.2	1,353.3	8,066.0		794	9.9	53%
Percent	21%	62%	17%					

Table 28. Green weight of growing stock pulpwood on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per Acre	Percent Pulp
Zone P01			**million green tons**				
Hardwood	24.0	59.5	10.8	94.3	82%	21.2	60%
Softwood	5.3	11.8	3.7	20.8	18%	4.7	34%
Total	29.3	71.3	14.5	115.1		25.9	53%
Percent	25%	62%	13%				
Zone P02							
Hardwood	18.6	58.2	10.7	87.4	80%	20.5	60%
Softwood	4.1	13.0	4.8	21.9	20%	5.1	37%
Total	22.6	71.2	15.5	109.3		25.6	53%
Percent	21%	65%	14%				
Zone P03							
Hardwood	37.7	71.0	23.8	132.5	82%	19.5	63%
Softwood	8.7	13.8	5.7	28.2	18%	4.2	37%
Total	46.4	84.9	29.5	160.8		23.7	56%
Percent	29%	53%	18%				
Zone P04							
Hardwood	32.8	85.7	25.6	144.2	80%	19.6	62%
Softwood	7.0	19.6	8.8	35.4	20%	4.8	38%
Total	39.9	105.3	34.5	179.6		24.4	55%
Percent	22%	59%	19%				
Zone P05							
Hardwood	33.5	83.1	17.8	134.4	77%	18.8	61%
Softwood	7.8	25.0	7.9	40.7	23%	5.7	40%
Total	41.3	108.1	25.7	175.1		24.4	54%
Percent	24%	62%	15%				
Zone P06							
Hardwood	13.4	62.5	16.5	92.4	72%	16.7	62%
Softwood	5.6	22.1	9.0	36.7	28%	6.6	43%
Total	19.1	84.5	25.5	129.1		23.4	55%
Percent	15%	65%	20%				
Zone P07							
Hardwood	7.7	36.6	14.2	58.4	65%	14.1	62%
Softwood	4.5	15.8	11.3	31.6	35%	7.6	45%
Total	12.1	52.4	25.4	90.0		21.7	55%
Percent	13%	58%	28%				
Zone P08							
Hardwood	10.7	21.5	10.3	42.4	63%	13.4	61%
Softwood	6.9	9.9	7.8	24.6	37%	7.8	44%
Total	17.6	31.3	18.1	67.0		21.1	53%
Percent	26%	47%	27%				
Zone P09							
Hardwood	30.0	85.5	21.4	136.9	75%	18.1	61%
Softwood	7.8	28.0	9.4	45.2	25%	6.0	41%
Total	37.8	113.5	30.7	182.1		24.0	55%

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per Acre	Percent Pulp
Percent	21%	62%	17%				
Zone P10							
Hardwood	17.5	58.1	17.2	92.8	71%	16.5	63%
Softwood	5.8	22.6	8.7	37.2	29%	6.6	45%
Total	23.3	80.7	25.9	130.0		23.1	56%
Percent	18%	62%	20%				
Zone P11							
Hardwood	14.7	70.2	16.0	100.9	75%	18.0	61%
Softwood	3.0	23.5	6.4	32.8	25%	5.8	45%
Total	17.6	93.7	22.4	133.7		23.8	56%
Percent	13%	70%	17%				
Zone P12							
Hardwood	10.7	43.2	12.2	66.0	70%	16.2	62%
Softwood	4.0	18.6	6.0	28.6	30%	7.0	46%
Total	14.7	61.8	18.2	94.7		23.3	56%
Percent	15%	65%	19%				
Zone P13							
Hardwood	39.6	117.6	27.4	184.6	76%	18.2	61%
Softwood	11.1	35.2	12.3	58.5	24%	5.8	40%
Total	50.6	152.8	39.7	243.1		23.9	54%
Percent	21%	63%	16%				

Table 29. Net annual growth of growing stock trees on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Vol/acre	Vol/Acre	Percent Growth
Zone P01	**million cubic feet**					**CF**	**Cords**	
Hardwood	17.4	49.3	8.1	74.8	59%	17	0.21	1.5%
Softwood	11.1	31.1	9.2	51.3	41%	12	0.14	2.1%
Total	28.5	80.4	17.3	126.2		28	0.35	1.7%
Percent	23%	64%	14%					
Zone P02								
Hardwood	10.6	48.2	10.5	69.3	58%	16	0.20	1.5%
Softwood	7.1	34.1	9.2	50.4	42%	12	0.15	2.1%
Total	17.7	82.3	19.7	119.7		28	0.35	1.7%
Percent	15%	69%	16%					
Zone P03								
Hardwood	29.8	69.5	24.2	123.5	61%	18	0.23	1.9%
Softwood	21.1	38.7	19.7	79.5	39%	12	0.15	2.6%
Total	50.9	108.2	43.8	203.0		30	0.37	2.1%
Percent	25%	53%	22%					
Zone P04								
Hardwood	28.1	82.6	26.3	137.0	62%	19	0.23	1.9%
Softwood	15.1	48.0	21.6	84.6	38%	12	0.14	2.3%
Total	43.2	130.6	47.8	221.6		30	0.38	2.0%
Percent	19%	59%	22%					
Zone P05								
Hardwood	24.6	77.9	23.1	125.6	56%	18	0.22	1.8%
Softwood	17.1	63.1	18.1	98.3	44%	14	0.17	2.5%
Total	41.8	141.0	41.2	223.9		31	0.39	2.1%
Percent	19%	63%	18%					
Zone P06								
Hardwood	10.5	58.0	20.5	89.0	52%	16	0.20	1.9%
Softwood	15.8	50.2	17.9	83.8	48%	15	0.19	2.5%
Total	26.3	108.2	38.3	172.8		31	0.39	2.2%
Percent	15%	63%	22%					
Zone P07								
Hardwood	5.9	35.9	11.5	53.3	45%	13	0.16	1.8%
Softwood	12.1	31.3	21.5	64.9	55%	16	0.20	2.3%
Total	18.0	67.2	33.0	118.2		28	0.36	2.1%
Percent	15%	57%	28%					
Zone P08								
Hardwood	10.8	24.4	5.2	40.4	42%	13	0.16	1.9%
Softwood	17.8	23.0	14.5	55.3	58%	17	0.22	2.5%
Total	28.6	47.4	19.7	95.7		30	0.38	2.2%
Percent	30%	50%	21%					
Zone P09								
Hardwood	25.1	95.6	29.2	150.0	57%	20	0.25	2.2%
Softwood	17.5	72.0	22.7	112.2	43%	15	0.19	2.6%

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Vol/acre	Vol/Acre	Percent Growth
Total	42.6	167.6	51.9	262.1		35	0.43	2.3%
Percent	16%	64%	20%					
Zone P10								
Hardwood	16.3	58.1	24.3	98.7	53%	18	0.22	2.1%
Softwood	15.3	54.1	18.7	88.1	47%	16	0.20	2.7%
Total	31.6	112.3	42.9	186.8		33	0.42	2.4%
Percent	17%	60%	23%					
Zone P11								
Hardwood	14.8	95.9	25.9	136.6	63%	24	0.30	2.7%
Softwood	7.2	59.4	15.2	81.8	37%	15	0.18	2.8%
Total	22.0	155.2	41.1	218.3		39	0.49	2.7%
Percent	10%	71%	19%					
Zone P12								
Hardwood	12.2	56.1	17.9	86.2	56%	21	0.26	2.6%
Softwood	11.5	42.5	13.1	67.1	44%	16	0.21	2.7%
Total	23.6	98.6	31.0	153.2		38	0.47	2.6%
Percent	15%	64%	20%					
Zone P13								
Hardwood	34.5	125.4	37.4	197.4	57%	19	0.24	2.1%
Softwood	27.2	90.0	30.0	147.2	43%	14	0.18	2.6%
Total	61.7	215.4	67.4	344.6		34	0.42	2.3%
Percent	18%	63%	20%					

Table 30. Green weight of net annual growth of growing stock trees on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per Acre	Percent Growth
Zone P01	**million green tons**						
Hardwood	0.6	1.6	0.3	2.4	65%	0.5	1.5%
Softwood	0.3	0.8	0.2	1.3	35%	0.3	2.1%
Total	0.8	2.4	0.5	3.7		0.8	1.7%
Percent	23%	64%	13%				
Zone P02							
Hardwood	0.3	1.6	0.3	2.2	64%	0.5	1.5%
Softwood	0.2	0.9	0.2	1.3	36%	0.3	2.1%
Total	0.5	2.4	0.6	3.5		0.8	1.7%
Percent	15%	69%	16%				
Zone P03							
Hardwood	0.9	2.2	0.8	4.0	66%	0.6	1.9%
Softwood	0.5	1.0	0.5	2.0	34%	0.3	2.6%
Total	1.5	3.2	1.3	6.0		0.9	2.1%
Percent	25%	54%	21%				
Zone P04							
Hardwood	0.9	2.7	0.8	4.4	67%	0.6	1.9%
Softwood	0.4	1.2	0.5	2.1	33%	0.3	2.3%
Total	1.3	3.9	1.4	6.5		0.9	2.0%
Percent	20%	59%	21%				
Zone P05							
Hardwood	0.8	2.5	0.7	4.0	62%	0.6	1.8%
Softwood	0.4	1.6	0.5	2.5	38%	0.3	2.5%
Total	1.2	4.1	1.2	6.5		0.9	2.0%
Percent	19%	63%	18%				
Zone P06							
Hardwood	0.3	1.9	0.7	2.9	57%	0.5	1.9%
Softwood	0.4	1.3	0.4	2.1	43%	0.4	2.5%
Total	0.7	3.1	1.1	5.0		0.9	2.1%
Percent	15%	63%	22%				
Zone P07							
Hardwood	0.2	1.2	0.4	1.7	51%	0.4	1.8%
Softwood	0.3	0.8	0.5	1.6	49%	0.4	2.3%
Total	0.5	1.9	0.9	3.4		0.8	2.0%
Percent	15%	58%	27%				
Zone P08							
Hardwood	0.3	0.8	0.2	1.3	48%	0.4	1.9%
Softwood	0.5	0.6	0.4	1.4	52%	0.4	2.5%
Total	0.8	1.4	0.5	2.7		0.9	2.1%
Percent	30%	51%	20%				
Zone P09							
Hardwood	0.8	3.1	0.9	4.8	63%	0.6	2.2%
Softwood	0.5	1.8	0.6	2.8	37%	0.4	2.6%

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per Acre	Percent Growth
Total	1.2	4.9	1.5	7.6		1.0	2.3%
Percent	16%	64%	20%				
Zone P10							
Hardwood	0.5	1.9	0.8	3.2	59%	0.6	2.1%
Softwood	0.4	1.4	0.5	2.2	41%	0.4	2.7%
Total	0.9	3.2	1.2	5.4		1.0	2.3%
Percent	17%	60%	23%				
Zone P11							
Hardwood	0.5	3.1	0.8	4.4	68%	0.8	2.7%
Softwood	0.2	1.5	0.4	2.1	32%	0.4	2.8%
Total	0.7	4.6	1.2	6.5		1.1	2.7%
Percent	10%	71%	19%				
Zone P12							
Hardwood	0.4	1.8	0.6	2.8	62%	0.7	2.6%
Softwood	0.3	1.1	0.3	1.7	38%	0.4	2.7%
Total	0.7	2.9	0.9	4.5		1.1	2.6%
Percent	15%	65%	20%				
Zone P13							
Hardwood	1.1	4.0	1.2	6.3	63%	0.6	2.1%
Softwood	0.7	2.3	0.8	3.7	37%	0.4	2.6%
Total	1.8	6.3	1.9	10.1		1.0	2.2%
Percent	18%	63%	19%				

Table 31. Annual removals of growing stock trees on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Vol/acre	Vol/Acre	Percent GSVol	Percent Growth	G/R ratio
Zone P01	**million cubic feet**					**CF**	**Cords**			
Hardwood	7.1	43.9	8.6	59.6	71%	13	0.17	1.2%	79.6%	1.3
Softwood	3.0	15.2	5.9	24.1	29%	5	0.07	1.0%	47.0%	2.1
Total	10.1	59.2	14.5	83.7		19	0.24	1.2%	66.3%	1.5
Percent	12%	71%	17%							
Zone P02										
Hardwood	2.4	52.0	12.7	67.2	74%	16	0.20	1.5%	96.9%	1.0
Softwood	2.1	19.0	1.9	23.1	26%	5	0.07	1.0%	45.9%	2.2
Total	4.6	71.0	14.7	90.3		21	0.26	1.3%	75.4%	1.3
Percent	5%	79%	16%							
Zone P03										
Hardwood	10.8	60.0	24.4	95.2	72%	14	0.18	1.5%	77.1%	1.3
Softwood	4.7	20.9	11.5	37.0	28%	5	0.07	1.2%	46.6%	2.1
Total	15.5	80.9	35.9	132.2		19	0.24	1.4%	65.1%	1.5
Percent	12%	61%	27%							
Zone P04										
Hardwood	8.2	69.3	22.0	99.5	74%	14	0.17	1.4%	72.6%	1.4
Softwood	3.1	20.1	12.6	35.8	26%	5	0.06	1.0%	42.4%	2.4
Total	11.3	89.4	34.6	135.3		18	0.23	1.2%	61.1%	1.6
Percent	8%	66%	26%							
Zone P05										
Hardwood	7.8	74.8	19.2	101.8	72%	14	0.18	1.5%	81.0%	1.2
Softwood	5.1	27.7	7.7	40.4	28%	6	0.07	1.0%	41.1%	2.4
Total	12.9	102.5	26.8	142.2		20	0.25	1.3%	63.5%	1.6
Percent	9%	72%	19%							
Zone P06										
Hardwood	1.5	48.1	16.4	66.0	68%	12	0.15	1.4%	74.2%	1.3
Softwood	2.4	24.0	4.1	30.5	32%	6	0.07	0.9%	36.4%	2.7
Total	3.9	72.1	20.6	96.6		17	0.22	1.2%	55.9%	1.8
Percent	4%	75%	21%							
Zone P07										
Hardwood	0.1	38.0	9.4	47.5	64%	11	0.14	1.6%	89.1%	1.1
Softwood	3.1	18.4	5.1	26.6	36%	6	0.08	1.0%	41.0%	2.4
Total	3.2	56.4	14.5	74.1		18	0.22	1.3%	62.7%	1.6
Percent	4%	76%	20%							
Zone P08										
Hardwood	0.1	22.9	3.8	26.7	59%	8	0.11	1.2%	66.2%	1.5
Softwood	3.1	11.5	3.6	18.3	41%	6	0.07	0.8%	33.0%	3.0
Total	3.2	34.3	7.4	45.0		14	0.18	1.0%	47.0%	2.1
Percent	7%	76%	17%							
Zone P09										
Hardwood	7.8	79.0	23.7	110.4	69%	15	0.18	1.6%	73.6%	1.4
Softwood	5.1	34.1	10.2	49.4	31%	7	0.08	1.1%	44.0%	2.3

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Vol/acre	Vol/Acre	Percent GSVol	Percent Growth	G/R ratio
Total	12.9	113.0	33.9	159.8		21	0.26	1.4%	61.0%	1.6
Percent	8%	71%	21%							
Zone P10										
Hardwood	1.9	46.9	14.7	63.5	67%	11	0.14	1.4%	64.3%	1.6
Softwood	2.1	24.6	4.8	31.5	33%	6	0.07	1.0%	35.7%	2.8
Total	4.0	71.5	19.5	95.0		17	0.21	1.2%	50.8%	2.0
Percent	4%	75%	21%							
Zone P11										
Hardwood	4.4	72.1	14.3	90.8	73%	16	0.20	1.8%	66.5%	1.5
Softwood	1.0	26.5	5.9	33.3	27%	6	0.07	1.2%	40.8%	2.5
Total	5.4	98.6	20.1	124.1		22	0.28	1.5%	56.8%	1.8
Percent	4%	79%	16%							
Zone P12										
Hardwood	0.7	39.4	6.1	46.2	66%	11	0.14	1.4%	53.7%	1.9
Softwood	2.0	19.9	2.3	24.3	34%	6	0.07	1.0%	36.2%	2.8
Total	2.8	59.3	8.5	70.5		17	0.22	1.2%	46.0%	2.2
Percent	4%	84%	12%							
Zone P13										
Hardwood	7.8	114.5	28.8	151.1	71%	15	0.19	1.6%	76.6%	1.3
Softwood	5.1	44.2	13.8	63.1	29%	6	0.08	1.1%	42.9%	2.3
Total	12.9	158.8	42.6	214.2		21	0.26	1.4%	62.2%	1.6
Percent	6%	74%	20%							

Note: Includes harvest removals and diversions to other non-timberland conditions.

Table 32. Green weight of annual removals of growing stock trees on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per Acre	Percent GS Vol	Percent Growth	G/R ratio
Zone P01	**million green tons**								
Hardwood	0.2	1.4	0.3	1.9	76%	0.4	1.2%	79.7%	1.3
Softwood	0.1	0.4	0.1	0.6	24%	0.1	1.0%	46.9%	2.1
Total	0.3	1.8	0.4	2.5		0.6	1.2%	68.2%	1.5
Percent	12%	71%	17%						
Zone P02									
Hardwood	0.1	1.7	0.4	2.2	79%	0.5	1.5%	97.0%	1.0
Softwood	0.1	0.5	0.0	0.6	21%	0.1	1.0%	45.9%	2.2
Total	0.1	2.2	0.5	2.7		0.6	1.3%	78.4%	1.3
Percent	5%	79%	17%						
Zone P03									
Hardwood	0.3	1.9	0.8	3.1	77%	0.4	1.5%	77.2%	1.3
Softwood	0.1	0.5	0.3	0.9	23%	0.1	1.2%	46.4%	2.2
Total	0.5	2.5	1.1	4.0		0.6	1.4%	66.8%	1.5
Percent	12%	62%	27%						
Zone P04									
Hardwood	0.3	2.2	0.7	3.2	78%	0.4	1.4%	72.7%	1.4
Softwood	0.1	0.5	0.3	0.9	22%	0.1	1.0%	42.3%	2.4
Total	0.3	2.7	1.0	4.1		0.6	1.3%	62.7%	1.6
Percent	8%	67%	25%						
Zone P05									
Hardwood	0.2	2.4	0.6	3.3	76%	0.5	1.5%	81.2%	1.2
Softwood	0.1	0.7	0.2	1.0	24%	0.1	1.0%	41.1%	2.4
Total	0.4	3.1	0.8	4.3		0.6	1.3%	65.9%	1.5
Percent	9%	73%	19%						
Zone P06									
Hardwood	0.0	1.6	0.5	2.1	73%	0.4	1.4%	74.3%	1.3
Softwood	0.1	0.6	0.1	0.8	27%	0.1	0.9%	36.4%	2.7
Total	0.1	2.2	0.6	2.9		0.5	1.2%	58.1%	1.7
Percent	4%	75%	22%						
Zone P07									
Hardwood	0.0	1.2	0.3	1.5	69%	0.4	1.6%	89.2%	1.1
Softwood	0.1	0.5	0.1	0.7	31%	0.2	1.0%	41.0%	2.4
Total	0.1	1.7	0.4	2.2		0.5	1.3%	65.6%	1.5
Percent	4%	77%	19%						
Zone P08									
Hardwood	0.0	0.7	0.1	0.9	65%	0.3	1.2%	66.4%	1.5
Softwood	0.1	0.3	0.1	0.5	35%	0.1	0.8%	32.9%	3.0
Total	0.1	1.0	0.2	1.3		0.4	1.1%	49.0%	2.0
Percent	6%	78%	16%						
Zone P09									
Hardwood	0.2	2.5	0.8	3.5	74%	0.5	1.6%	73.7%	1.4

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per Acre	Percent GS Vol	Percent Growth	G/R ratio
Softwood	0.1	0.9	0.3	1.2	26%	0.2	1.1%	44.0%	2.3
Total	0.4	3.4	1.0	4.8		0.6	1.4%	62.7%	1.6
Percent	8%	71%	21%						
Zone P10									
Hardwood	0.1	1.5	0.5	2.0	72%	0.4	1.4%	64.5%	1.6
Softwood	0.1	0.6	0.1	0.8	28%	0.1	1.0%	35.7%	2.8
Total	0.1	2.1	0.6	2.8		0.5	1.2%	52.6%	1.9
Percent	4%	75%	21%						
Zone P11									
Hardwood	0.1	2.3	0.5	2.9	78%	0.5	1.8%	66.5%	1.5
Softwood	0.0	0.7	0.1	0.8	22%	0.1	1.2%	40.7%	2.5
Total	0.2	3.0	0.6	3.8		0.7	1.6%	58.3%	1.7
Percent	4%	80%	16%						
Zone P12									
Hardwood	0.0	1.3	0.2	1.5	71%	0.4	1.4%	53.8%	1.9
Softwood	0.1	0.5	0.1	0.6	29%	0.2	1.0%	36.2%	2.8
Total	0.1	1.8	0.3	2.1		0.5	1.2%	47.1%	2.1
Percent	4%	84%	12%						
Zone P13									
Hardwood	0.2	3.7	0.9	4.9	75%	0.5	1.6%	76.7%	1.3
Softwood	0.1	1.1	0.3	1.6	25%	0.2	1.1%	42.8%	2.3
Total	0.4	4.8	1.3	6.5		0.6	1.4%	64.1%	1.6
Percent	6%	75%	20%						

Note: Includes harvest removals and diversions to other non-timberland conditions.

Table 33. Annual removals of growing stock trees on timberland by harvesting for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Vol/acre	Vol/Acre	Percent GSVol	Percent Growth	G/R ratio
Zone P01	**million cubic feet**					**CF**	**Cords**			
Hardwood	6.9	41.8	7.7	56.3	76%	13	0.16	1.2%	75.3%	1.3
Softwood	2.6	11.6	3.8	18.0	24%	4	0.05	0.8%	35.1%	2.8
Total	9.5	53.4	11.4	74.4		17	0.21	1.0%	58.9%	1.7
Percent	13%	72%	15%							
Zone P02										
Hardwood	2.3	48.9	12.5	63.8	79%	15	0.19	1.4%	92.0%	1.1
Softwood	1.9	13.4	1.9	17.2	21%	4	0.05	0.7%	34.1%	2.9
Total	4.2	62.3	14.5	80.9		19	0.24	1.2%	67.6%	1.5
Percent	5%	77%	18%							
Zone P03										
Hardwood	8.4	56.8	20.1	85.3	75%	13	0.16	1.3%	69.1%	1.4
Softwood	4.3	17.0	6.7	28.0	25%	4	0.05	0.9%	35.2%	2.8
Total	12.7	73.8	26.8	113.3		17	0.21	1.2%	55.8%	1.8
Percent	11%	65%	24%							
Zone P04										
Hardwood	8.0	65.6	20.7	94.3	78%	13	0.16	1.3%	68.8%	1.5
Softwood	2.8	15.8	7.3	26.0	22%	4	0.04	0.7%	30.7%	3.3
Total	10.8	81.4	28.1	120.2		16	0.20	1.1%	54.3%	1.8
Percent	9%	68%	23%							
Zone P05										
Hardwood	7.7	70.9	18.9	97.5	75%	14	0.17	1.4%	77.6%	1.3
Softwood	4.8	21.6	6.0	32.3	25%	5	0.06	0.8%	32.9%	3.0
Total	12.4	92.5	24.9	129.8		18	0.23	1.2%	58.0%	1.7
Percent	10%	71%	19%							
Zone P06										
Hardwood	1.4	45.9	16.2	63.5	71%	11	0.14	1.4%	71.4%	1.4
Softwood	2.4	20.1	4.1	26.5	29%	5	0.06	0.8%	31.7%	3.2
Total	3.8	65.9	20.3	90.1		16	0.20	1.1%	52.1%	1.9
Percent	4%	73%	23%							
Zone P07										
Hardwood	0.1	36.4	9.2	45.6	67%	11	0.14	1.5%	85.5%	1.2
Softwood	3.1	13.9	5.1	22.1	33%	5	0.07	0.8%	34.1%	2.9
Total	3.2	50.2	14.3	67.7		16	0.20	1.2%	57.3%	1.7
Percent	5%	74%	21%							
Zone P08										
Hardwood	0.1	21.9	3.7	25.7	61%	8	0.10	1.2%	63.6%	1.6
Softwood	3.1	9.5	3.6	16.3	39%	5	0.06	0.7%	29.4%	3.4
Total	3.2	31.4	7.4	41.9		13	0.17	1.0%	43.8%	2.3
Percent	8%	75%	18%							
Zone P09										
Hardwood	7.7	75.4	23.3	106.4	73%	14	0.18	1.5%	70.9%	1.4

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Vol/acre	Vol/Acre	Percent GSVol	Percent Growth	G/R ratio
Softwood	4.8	27.1	7.1	39.0	27%	5	0.06	0.9%	34.8%	2.9
Total	12.4	102.5	30.4	145.4		19	0.24	1.3%	55.5%	1.8
Percent	9%	71%	21%							
Zone P10										
Hardwood	1.8	45.3	14.4	61.5	69%	11	0.14	1.3%	62.3%	1.6
Softwood	2.1	20.3	4.8	27.2	31%	5	0.06	0.8%	30.9%	3.2
Total	4.0	65.5	19.2	88.7		16	0.20	1.1%	47.5%	2.1
Percent	4%	74%	22%							
Zone P11										
Hardwood	4.3	69.4	14.1	87.8	77%	16	0.20	1.7%	64.3%	1.6
Softwood	0.9	22.3	2.8	26.0	23%	5	0.06	0.9%	31.8%	3.1
Total	5.2	91.7	16.9	113.9		20	0.25	1.4%	52.1%	1.9
Percent	5%	81%	15%							
Zone P12										
Hardwood	0.7	38.6	6.1	45.4	69%	11	0.14	1.4%	52.7%	1.9
Softwood	2.0	15.9	2.3	20.2	31%	5	0.06	0.8%	30.2%	3.3
Total	2.8	54.5	8.4	65.7		16	0.20	1.1%	42.8%	2.3
Percent	4%	83%	13%							
Zone P13										
Hardwood	7.7	110.0	28.4	146.1	74%	14	0.18	1.5%	74.0%	1.4
Softwood	4.8	35.0	10.7	50.5	26%	5	0.06	0.9%	34.3%	2.9
Total	12.4	145.0	39.1	196.6		19	0.24	1.3%	57.0%	1.8
Percent	6%	74%	20%							

Note: Includes harvest removals only.

Table 34. Green weight of annual removals of growing stock trees on timberland by harvesting for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per Acre	Percent GS Vol	Percent Growth	G/R ratio
Zone P01	**million green tons**								
Hardwood	0.2	1.3	0.2	1.8	80%	0.4	1.2%	75.4%	1.3
Softwood	0.1	0.3	0.1	0.5	20%	0.1	0.7%	35.0%	2.9
Total	0.3	1.6	0.3	2.3		0.5	1.0%	61.2%	1.6
Percent	13%	72%	15%						
Zone P02									
Hardwood	0.1	1.6	0.4	2.0	83%	0.5	1.4%	92.1%	1.1
Softwood	0.0	0.3	0.0	0.4	17%	0.1	0.7%	34.1%	2.9
Total	0.1	1.9	0.4	2.5		0.6	1.2%	71.0%	1.4
Percent	5%	77%	18%						
Zone P03									
Hardwood	0.3	1.8	0.6	2.7	79%	0.4	1.3%	69.2%	1.4
Softwood	0.1	0.4	0.2	0.7	21%	0.1	0.9%	35.1%	2.8
Total	0.4	2.3	0.8	3.4		0.5	1.2%	57.7%	1.7
Percent	11%	66%	23%						
Zone P04									
Hardwood	0.3	2.1	0.7	3.0	82%	0.4	1.3%	68.9%	1.5
Softwood	0.1	0.4	0.2	0.7	18%	0.1	0.7%	30.6%	3.3
Total	0.3	2.5	0.8	3.7		0.5	1.1%	56.4%	1.8
Percent	9%	68%	23%						
Zone P05									
Hardwood	0.2	2.3	0.6	3.1	79%	0.4	1.4%	77.8%	1.3
Softwood	0.1	0.5	0.2	0.8	21%	0.1	0.8%	32.9%	3.0
Total	0.4	2.8	0.8	4.0		0.6	1.2%	60.6%	1.6
Percent	9%	72%	19%						
Zone P06									
Hardwood	0.0	1.5	0.5	2.0	75%	0.4	1.4%	71.5%	1.4
Softwood	0.1	0.5	0.1	0.7	25%	0.1	0.8%	31.6%	3.2
Total	0.1	2.0	0.6	2.7		0.5	1.2%	54.5%	1.8
Percent	4%	73%	23%						
Zone P07									
Hardwood	0.0	1.2	0.3	1.5	72%	0.4	1.6%	85.7%	1.2
Softwood	0.1	0.4	0.1	0.6	28%	0.1	0.8%	34.1%	2.9
Total	0.1	1.5	0.4	2.0		0.5	1.2%	60.4%	1.7
Percent	4%	75%	21%						
Zone P08									
Hardwood	0.0	0.7	0.1	0.8	67%	0.3	1.2%	63.8%	1.6
Softwood	0.1	0.2	0.1	0.4	33%	0.1	0.7%	29.3%	3.4
Total	0.1	0.9	0.2	1.2		0.4	1.0%	45.9%	2.2
Percent	7%	76%	17%						
Zone P09									
Hardwood	0.2	2.4	0.7	3.4	78%	0.5	1.5%	71.0%	1.4

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per Acre	Percent GS Vol	Percent Growth	G/R ratio
Softwood	0.1	0.7	0.2	1.0	22%	0.1	0.9%	34.8%	2.9
Total	0.4	3.1	0.9	4.4		0.6	1.3%	57.6%	1.7
Percent	8%	71%	21%						
Zone P10									
Hardwood	0.1	1.5	0.5	2.0	74%	0.4	1.3%	62.5%	1.6
Softwood	0.1	0.5	0.1	0.7	26%	0.1	0.8%	30.8%	3.2
Total	0.1	2.0	0.6	2.7		0.5	1.2%	49.4%	2.0
Percent	4%	74%	22%						
Zone P11									
Hardwood	0.1	2.2	0.4	2.8	81%	0.5	1.7%	64.4%	1.6
Softwood	0.0	0.6	0.1	0.7	19%	0.1	0.9%	31.8%	3.1
Total	0.2	2.8	0.5	3.5		0.6	1.5%	54.0%	1.9
Percent	5%	81%	15%						
Zone P12									
Hardwood	0.0	1.2	0.2	1.5	74%	0.4	1.4%	52.9%	1.9
Softwood	0.1	0.4	0.1	0.5	26%	0.1	0.8%	30.1%	3.3
Total	0.1	1.6	0.3	2.0		0.5	1.2%	44.2%	2.3
Percent	4%	83%	13%						
Zone P13									
Hardwood	0.2	3.5	0.9	4.7	79%	0.5	1.6%	74.2%	1.3
Softwood	0.1	0.9	0.3	1.3	21%	0.1	0.9%	34.2%	2.9
Total	0.4	4.4	1.2	6.0		0.6	1.3%	59.4%	1.7
Percent	6%	74%	20%						

Note: Includes harvest removals only.

Table 35. Estimate of green tons of tops as logging residues associated with current harvest removals.

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW
Zone P01			**Million Green Tons**		
Hardwood	0.1	0.4	0.1	0.5	86.9%
Softwood	0.0	0.1	0.0	0.1	13.1%
Total	0.1	0.4	0.1	0.6	100.0%
Percent	12%	73%	14%	100%	
Zone P02					
Hardwood	0.0	0.5	0.1	0.6	88.6%
Softwood	0.0	0.1	0.0	0.1	11.4%
Total	0.0	0.5	0.1	0.7	100.0%
Percent	4%	77%	18%	100%	
Zone P03					
Hardwood	0.1	0.5	0.2	0.8	87.1%
Softwood	0.0	0.1	0.0	0.1	12.9%
Total	0.1	0.6	0.2	0.9	100.0%
Percent	11%	66%	23%	100%	
Zone P04					
Hardwood	0.1	0.6	0.2	0.9	88.7%
Softwood	0.0	0.1	0.0	0.1	11.3%
Total	0.1	0.7	0.2	1.0	100.0%
Percent	9%	69%	22%	100%	
Zone P05					
Hardwood	0.1	0.7	0.2	0.9	86.4%
Softwood	0.0	0.1	0.0	0.1	13.6%
Total	0.1	0.8	0.2	1.0	100.0%
Percent	9%	72%	19%	100%	
Zone P06					
Hardwood	0.0	0.4	0.1	0.6	83.3%
Softwood	0.0	0.1	0.0	0.1	16.7%
Total	0.0	0.5	0.2	0.7	100.0%
Percent	3%	73%	24%	100%	
Zone P07					
Hardwood	0.0	0.3	0.1	0.4	81.0%
Softwood	0.0	0.1	0.0	0.1	19.0%
Total	0.0	0.4	0.1	0.5	100.0%
Percent	3%	77%	20%	100%	
Zone P08					
Hardwood	0.0	0.2	0.0	0.2	76.4%
Softwood	0.0	0.0	0.0	0.1	23.6%
Total	0.0	0.2	0.1	0.3	100.0%
Percent	5%	79%	16%	100%	
Zone P09					
Hardwood	0.1	0.7	0.2	1.0	85.3%

Softwood	0.0	0.1	0.0	0.2	14.7%
Total	0.1	0.8	0.2	1.2	100.0%
Percent	8%	71%	21%	100%	
Zone P10					
Hardwood	0.0	0.4	0.1	0.6	82.7%
Softwood	0.0	0.1	0.0	0.1	17.3%
Total	0.0	0.5	0.2	0.7	100.0%
Percent	4%	74%	22%	100%	
Zone P11					
Hardwood	0.0	0.7	0.1	0.8	87.9%
Softwood	0.0	0.1	0.0	0.1	12.1%
Total	0.0	0.8	0.1	0.9	100.0%
Percent	5%	80%	15%	100%	
Zone P12					
Hardwood	0.0	0.4	0.1	0.4	82.7%
Softwood	0.0	0.1	0.0	0.1	17.3%
Total	0.0	0.4	0.1	0.5	100.0%
Percent	3%	84%	13%	100%	
Zone P13					
Hardwood	0.1	1.0	0.3	1.4	86.0%
Softwood	0.0	0.2	0.0	0.2	14.0%
Total	0.1	1.2	0.3	1.6	100.0%
Percent	6%	75%	19%	100%	

Note: Based on tops as approximately 17% of growing stock merchantable bole volume (tops/bole) for softwoods and 29% for hardwoods.

Table 36. Net annual growth in excess of total removals on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Vol/acre	Volume/ Acre	Percent GS Volume	Percent Growth
Zone P01	**million cubic feet**					**CF**	**Cords**		
Hardwood	10.3	5.4	-0.4	15.2	36%	3	0.04	0.3%	20.4%
Softwood	8.1	15.8	3.2	27.2	64%	6	0.08	1.1%	53.0%
Total	18.4	21.2	2.8	42.5	100%	10	0.12	0.6%	33.7%
Percent	43%	50%	7%	100%					
Zone P02									
Hardwood	8.2	-3.8	-2.3	2.1	7%	1	0.01	0.0%	3.1%
Softwood	4.9	15.1	7.3	27.3	93%	6	0.08	1.2%	54.1%
Total	13.1	11.3	5.0	29.4	100%	7	0.09	0.4%	24.6%
Percent	45%	38%	17%	100%					
Zone P03									
Hardwood	19.0	9.5	-0.2	28.3	40%	4	0.05	0.4%	22.9%
Softwood	16.4	17.9	8.2	42.5	60%	6	0.08	1.4%	53.4%
Total	35.4	27.3	8.0	70.8	100%	10	0.13	0.7%	34.9%
Percent	50%	39%	11%	100%					
Zone P04									
Hardwood	19.9	13.3	4.3	37.5	43%	5	0.06	0.5%	27.4%
Softwood	12.0	27.8	9.0	48.8	57%	7	0.08	1.3%	57.6%
Total	31.9	41.1	13.3	86.3	100%	12	0.15	0.8%	38.9%
Percent	37%	48%	15%	100%					
Zone P05									
Hardwood	16.9	3.1	3.9	23.8	29%	3	0.04	0.3%	19.0%
Softwood	12.0	35.4	10.4	57.9	71%	8	0.10	1.4%	58.9%
Total	28.9	38.5	14.3	81.7	100%	11	0.14	0.8%	36.5%
Percent	35%	47%	18%	100%					
Zone P06									
Hardwood	9.0	9.9	4.0	22.9	30%	4	0.05	0.5%	25.8%
Softwood	13.4	26.2	13.7	53.3	70%	10	0.12	1.6%	63.6%
Total	22.4	36.1	17.8	76.2	100%	14	0.17	0.9%	44.1%
Percent	29%	47%	23%	100%					
Zone P07									
Hardwood	5.9	-2.1	2.1	5.8	13%	1	0.02	0.2%	10.9%
Softwood	9.0	12.9	16.4	38.3	87%	9	0.12	1.4%	59.0%
Total	14.8	10.8	18.5	44.1	100%	11	0.13	0.8%	37.3%
Percent	34%	24%	42%	100%					
Zone P08									
Hardwood	10.7	1.5	1.4	13.7	27%	4	0.05	0.6%	33.8%
Softwood	14.7	11.5	10.9	37.1	73%	12	0.15	1.7%	67.0%
Total	25.4	13.1	12.3	50.7	100%	16	0.20	1.2%	53.0%
Percent	50%	26%	24%	100%					
Zone P09									

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	Vol/acre	Volume/ Acre	Percent GS Volume	Percent Growth
Hardwood	17.4	16.7	5.5	39.5	39%	5	0.07	0.6%	26.4%
Softwood	12.4	37.9	12.4	62.8	61%	8	0.10	1.4%	56.0%
Total	29.8	54.6	18.0	102.3	100%	14	0.17	0.9%	39.0%
Percent	29%	53%	18%	100%					
Zone P10									
Hardwood	14.4	11.2	9.6	35.2	38%	6	0.08	0.8%	35.7%
Softwood	13.2	29.6	13.8	56.6	62%	10	0.13	1.7%	64.3%
Total	27.6	40.8	23.5	91.8	100%	16	0.20	1.2%	49.2%
Percent	30%	44%	26%	100%					
Zone P11									
Hardwood	10.4	23.8	11.7	45.8	49%	8	0.10	0.9%	33.5%
Softwood	6.2	32.9	9.3	48.4	51%	9	0.11	1.7%	59.2%
Total	16.6	56.6	21.0	94.2	100%	17	0.21	1.2%	43.2%
Percent	18%	60%	22%	100%					
Zone P12									
Hardwood	11.4	16.7	11.8	39.9	48%	10	0.12	1.2%	46.3%
Softwood	9.4	22.6	10.8	42.8	52%	11	0.13	1.7%	63.8%
Total	20.9	39.3	22.6	82.7	100%	20	0.25	1.4%	54.0%
Percent	25%	47%	27%	100%					
Zone P13									
Hardwood	26.8	10.9	8.6	46.2	35%	5	0.06	0.5%	23.4%
Softwood	22.1	45.8	16.2	84.1	65%	8	0.10	1.5%	57.1%
Total	48.9	56.7	24.8	130.3	100%	13	0.16	0.9%	37.8%
Percent	37%	43%	19%	100%					

Table 37. Green weight of net annual growth in excess of total removals on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per Acre	Percent GS Volume	Percent Growth
Zone P01			million green tons					
Hardwood	0.3	0.2	0.0	0.5	41%	0.1	0.3%	20.4%
Softwood	0.2	0.4	0.1	0.7	59%	0.2	1.1%	53.0%
Total	0.5	0.6	0.1	1.2	100%	0.3	0.5%	33.7%
Percent	46%	49%	6%	100%				
Zone P02								
Hardwood	0.3	-0.1	-0.1	0.1	9%	0.0	0.0%	3.1%
Softwood	0.1	0.4	0.2	0.7	91%	0.2	1.2%	54.1%
Total	0.4	0.3	0.1	0.8	100%	0.2	0.4%	24.6%
Percent	51%	34%	15%	100%				
Zone P03								
Hardwood	0.6	0.3	0.0	0.9	46%	0.1	0.4%	22.9%
Softwood	0.4	0.5	0.2	1.1	54%	0.2	1.4%	53.4%
Total	1.0	0.8	0.2	2.0	100%	0.3	0.7%	34.9%
Percent	52%	38%	10%	100%				
Zone P04								
Hardwood	0.6	0.4	0.1	1.2	49%	0.2	0.5%	27.4%
Softwood	0.3	0.7	0.2	1.2	51%	0.2	1.3%	57.6%
Total	0.9	1.1	0.4	2.4	100%	0.3	0.7%	38.9%
Percent	39%	46%	15%	100%				
Zone P05								
Hardwood	0.5	0.1	0.1	0.8	34%	0.1	0.3%	19.0%
Softwood	0.3	0.9	0.3	1.5	66%	0.2	1.4%	58.9%
Total	0.8	1.0	0.4	2.2	100%	0.3	0.7%	36.5%
Percent	38%	45%	17%	100%				
Zone P06								
Hardwood	0.3	0.3	0.1	0.7	35%	0.1	0.5%	25.8%
Softwood	0.3	0.7	0.3	1.3	65%	0.2	1.6%	63.6%
Total	0.6	1.0	0.5	2.1	100%	0.4	0.9%	44.1%
Percent	30%	47%	23%	100%				
Zone P07								
Hardwood	0.2	-0.1	0.1	0.2	16%	0.0	0.2%	10.9%
Softwood	0.2	0.3	0.4	1.0	84%	0.2	1.4%	59.0%
Total	0.4	0.3	0.5	1.2	100%	0.3	0.7%	37.3%
Percent	36%	22%	42%	100%				
Zone P08								
Hardwood	0.3	0.0	0.0	0.4	32%	0.1	0.6%	33.8%
Softwood	0.4	0.3	0.3	0.9	68%	0.3	1.7%	67.0%
Total	0.7	0.3	0.3	1.4	100%	0.4	1.1%	53.0%
Percent	52%	25%	23%	100%				
Zone P09								
Hardwood	0.6	0.5	0.2	1.3	44%	0.2	0.6%	26.4%

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners	Percent HW/SW	Green Tons per Acre	Percent GS Volume	Percent Growth
Softwood	0.3	1.0	0.3	1.6	56%	0.2	1.4%	56.0%
Total	0.9	1.5	0.5	2.9	100%	0.4	0.9%	39.0%
Percent	31%	52%	17%	100%				
Zone P10								
Hardwood	0.5	0.4	0.3	1.1	44%	0.2	0.8%	35.7%
Softwood	0.3	0.7	0.3	1.4	56%	0.3	1.7%	64.3%
Total	0.8	1.1	0.7	2.6	100%	0.5	1.1%	49.2%
Percent	31%	43%	26%	100%				
Zone P11								
Hardwood	0.3	0.8	0.4	1.5	55%	0.3	0.9%	33.5%
Softwood	0.2	0.8	0.2	1.2	45%	0.2	1.7%	59.2%
Total	0.5	1.6	0.6	2.7	100%	0.5	1.1%	43.2%
Percent	18%	59%	22%	100%				
Zone P12								
Hardwood	0.4	0.5	0.4	1.3	54%	0.3	1.2%	46.3%
Softwood	0.2	0.6	0.3	1.1	46%	0.3	1.7%	63.8%
Total	0.6	1.1	0.6	2.4	100%	0.6	1.4%	54.0%
Percent	26%	47%	27%	100%				
Zone P13								
Hardwood	0.9	0.4	0.3	1.5	41%	0.1	0.5%	23.4%
Softwood	0.6	1.2	0.4	2.1	59%	0.2	1.5%	57.1%
Total	1.4	1.5	0.7	3.6	100%	0.4	0.8%	37.8%
Percent	39%	42%	19%	100%				

Table 38. Ratio of growing stock growth to total removals on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners
Zone P01	**million cubic feet**			
Hardwood	2.5	1.1	1.0	1.3
Softwood	3.8	2.0	1.5	2.1
All Species	2.8	1.4	1.2	1.5
Zone P02				
Hardwood	4.3	0.9	0.8	1.0
Softwood	3.3	1.8	4.7	2.2
All Species	3.9	1.2	1.3	1.3
Zone P03				
Hardwood	2.8	1.2	1.0	1.3
Softwood	4.5	1.9	1.7	2.1
All Species	3.3	1.3	1.2	1.5
Zone P04				
Hardwood	3.4	1.2	1.2	1.4
Softwood	4.9	2.4	1.7	2.4
All Species	3.8	1.5	1.4	1.6
Zone P05				
Hardwood	3.2	1.0	1.2	1.2
Softwood	3.4	2.3	2.4	2.4
All Species	3.2	1.4	1.5	1.6
Zone P06				
Hardwood	7.0	1.2	1.2	1.3
Softwood	6.6	2.1	4.3	2.7
All Species	6.7	1.5	1.9	1.8
Zone P07				
Hardwood	84.3	0.9	1.2	1.1
Softwood	3.9	1.7	4.2	2.4
All Species	5.6	1.2	2.3	1.6
Zone P08				
Hardwood	153.4	1.1	1.4	1.5
Softwood	5.7	2.0	4.0	3.0
All Species	8.9	1.4	2.7	2.1
Zone P09				
Hardwood	3.2	1.2	1.2	1.4
Softwood	3.4	2.1	2.2	2.3
All Species	3.3	1.5	1.5	1.6
Zone P10				
Hardwood	8.5	1.2	1.7	1.6
Softwood	7.2	2.2	3.9	2.8
All Species	7.8	1.6	2.2	2.0
Zone P11				
Hardwood	3.4	1.3	1.8	1.5

Hardwood/ Softwood	Federal	Private	State/ Local	All Owners
Softwood	7.5	2.2	2.6	2.5
All Species	4.1	1.6	2.0	1.8
Zone P12				
Hardwood	16.6	1.4	2.9	1.9
Softwood	5.6	2.1	5.6	2.8
All Species	8.5	1.7	3.7	2.2
Zone P13				
Hardwood	4.4	1.1	1.3	1.3
Softwood	5.4	2.0	2.2	2.3
All Species	4.8	1.4	1.6	1.6

Table 39. Total biomass for all live trees on timberland by tree component for all live trees by zone and species group.

Zone	Bole	Tops	Saplings	Stumps	Total	Bole	Tops	Saplings	Stumps
	Million oven dry tons					Percent			
Zone P01									
Hardwood	98.1	28.2	14.8	5.8	146.9	67%	19%	10%	4%
Softwood	32.9	5.7	4.8	1.8	45.2	73%	13%	11%	4%
Total	130.9	33.9	19.7	7.6	192.1	68%	18%	10%	4%
Zone P02									
Hardwood	90.0	25.8	14.0	5.4	135.2	67%	19%	10%	4%
Softwood	32.1	5.6	5.1	1.8	44.6	72%	13%	11%	4%
Total	122.1	31.4	19.1	7.2	179.7	68%	17%	11%	4%
Zone P03									
Hardwood	130.1	38.6	23.1	7.3	199.1	65%	19%	12%	4%
Softwood	41.7	7.1	7.6	2.5	58.9	71%	12%	13%	4%
Total	171.8	45.7	30.7	9.9	258.0	67%	18%	12%	4%
Zone P04									
Hardwood	143.2	42.0	23.8	8.2	217.3	66%	19%	11%	4%
Softwood	51.0	8.8	8.9	3.0	71.8	71%	12%	12%	4%
Total	194.3	50.8	32.7	11.3	289.1	67%	18%	11%	4%
Zone P05									
Hardwood	136.5	39.5	22.6	8.0	206.5	66%	19%	11%	4%
Softwood	54.4	9.5	10.0	3.2	77.1	71%	12%	13%	4%
Total	190.9	49.0	32.5	11.2	283.6	67%	17%	11%	4%
Zone P06									
Hardwood	93.2	27.0	16.3	5.5	142.0	66%	19%	11%	4%
Softwood	45.7	8.1	9.3	2.7	65.7	70%	12%	14%	4%
Total	138.9	35.0	25.5	8.3	207.7	67%	17%	12%	4%
Zone P07									
Hardwood	59.7	17.3	11.2	3.6	91.7	65%	19%	12%	4%
Softwood	38.0	6.8	8.6	2.3	55.7	68%	12%	15%	4%
Total	97.7	24.1	19.8	5.9	147.4	66%	16%	13%	4%
Zone P08									
Hardwood	44.6	12.8	8.3	2.7	68.4	65%	19%	12%	4%
Softwood	30.4	5.4	6.8	1.8	44.4	68%	12%	15%	4%
Total	75.0	18.3	15.1	4.5	112.9	66%	16%	13%	4%
Zone P09									
Hardwood	136.9	39.8	23.0	7.7	207.4	66%	19%	11%	4%
Softwood	58.8	10.2	10.9	3.5	83.5	70%	12%	13%	4%
Total	195.6	50.0	33.9	11.3	290.8	67%	17%	12%	4%
Zone P10									
Hardwood	91.3	26.8	16.6	5.3	140.0	65%	19%	12%	4%
Softwood	44.3	7.8	9.4	2.7	64.2	69%	12%	15%	4%
Total	135.6	34.6	25.9	8.0	204.1	66%	17%	13%	4%
Zone P11									

Zone	Bole	Tops	Saplings	Stumps	Total	Bole	Tops	Saplings	Stumps
	Million oven dry tons					Percent			
Hardwood	100.3	29.3	17.0	5.4	152.0	66%	19%	11%	4%
Softwood	39.1	6.8	8.0	2.5	56.3	69%	12%	14%	4%
Total	139.3	36.0	25.0	7.9	208.2	67%	17%	12%	4%
Zone P12									
Hardwood	64.8	19.0	12.5	3.6	99.9	65%	19%	13%	4%
Softwood	33.1	5.8	6.9	2.1	47.8	69%	12%	14%	4%
Total	97.8	24.8	19.4	5.7	147.7	66%	17%	13%	4%
Zone P13									
Hardwood	187.3	54.3	31.3	10.7	283.6	66%	19%	11%	4%
Softwood	78.1	13.6	14.4	4.6	110.8	71%	12%	13%	4%
Total	265.4	67.9	45.7	15.4	394.4	67%	17%	12%	4%

Table 40. Average biomass per acre on timberland by tree component for all live trees by zone and species group.

Zone	Bole	Tops	Saplings	Stumps	Total
Zone P01	**Oven dry tons per acre**				
Hardwood	22.1	6.3	3.3	1.3	33.1
Softwood	7.4	1.3	1.1	0.4	10.2
Total	29.5	7.6	4.4	1.7	43.2
Zone P02					
Hardwood	21.1	6.0	3.3	1.3	31.7
Softwood	7.5	1.3	1.2	0.4	10.4
Total	28.6	7.4	4.5	1.7	42.1
Zone P03					
Hardwood	19.2	5.7	3.4	1.1	29.3
Softwood	6.1	1.0	1.1	0.4	8.7
Total	25.3	6.7	4.5	1.5	38.0
Zone P04					
Hardwood	19.5	5.7	3.2	1.1	29.6
Softwood	6.9	1.2	1.2	0.4	9.8
Total	26.4	6.9	4.5	1.5	39.3
Zone P05					
Hardwood	19.1	5.5	3.2	1.1	28.8
Softwood	7.6	1.3	1.4	0.4	10.8
Total	26.7	6.8	4.5	1.6	39.6
Zone P06					
Hardwood	16.9	4.9	2.9	1.0	25.7
Softwood	8.3	1.5	1.7	0.5	11.9
Total	25.1	6.3	4.6	1.5	37.6
Zone P07					
Hardwood	14.4	4.2	2.7	0.9	22.1
Softwood	9.2	1.6	2.1	0.5	13.4
Total	23.5	5.8	4.8	1.4	35.5
Zone P08					
Hardwood	14.1	4.1	2.6	0.8	21.6
Softwood	9.6	1.7	2.2	0.6	14.0
Total	23.7	5.8	4.8	1.4	35.6
Zone P09					
Hardwood	18.1	5.3	3.0	1.0	27.4
Softwood	7.8	1.3	1.4	0.5	11.0
Total	25.8	6.6	4.5	1.5	38.4
Zone P10					
Hardwood	16.2	4.8	3.0	0.9	24.9
Softwood	7.9	1.4	1.7	0.5	11.4
Total	24.1	6.1	4.6	1.4	36.3
Zone P11					
Hardwood	17.9	5.2	3.0	1.0	27.1

Zone	Bole	Tops	Saplings	Stumps	Total
Zone P01	**Oven dry tons per acre**				
Softwood	7.0	1.2	1.4	0.4	10.0
Total	24.8	6.4	4.4	1.4	37.1
Zone P12					
Hardwood	15.9	4.7	3.1	0.9	24.6
Softwood	8.1	1.4	1.7	0.5	11.7
Total	24.0	6.1	4.8	1.4	36.3
Zone P13					
Hardwood	18.4	5.3	3.1	1.1	27.9
Softwood	7.7	1.3	1.4	0.5	10.9
Total	26.1	6.7	4.5	1.5	38.8

Table 41. Biomass of all live trees on timberland for each zone, by species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	odt/acre
Zone P01	**Million Oven Dry Tons**					
Hardwood	37.3	92.5	17.1	146.9	76%	33.1
Softwood	11.9	25.3	8.1	45.2	24%	10.2
Total	49.2	117.8	25.2	192.1		43.2
Percent	26%	61%	13%			
Zone P02						
Hardwood	29.0	89.6	16.7	135.2	75%	31.7
Softwood	9.1	26.7	8.7	44.6	25%	10.4
Total	38.1	116.3	25.4	179.7		42.1
Percent	21%	65%	14%			
Zone P03						
Hardwood	58.2	105.3	35.5	199.1	77%	29.3
Softwood	19.1	27.2	12.6	58.9	23%	8.7
Total	77.3	132.5	48.2	258.0		38.0
Percent	30%	51%	19%			
Zone P04						
Hardwood	50.1	129.2	38.0	217.3	75%	29.6
Softwood	15.4	38.7	17.7	71.8	25%	9.8
Total	65.5	167.9	55.7	289.1		39.3
Percent	23%	58%	19%			
Zone P05						
Hardwood	52.4	126.7	27.4	206.5	73%	28.8
Softwood	17.2	45.0	14.9	77.1	27%	10.8
Total	69.6	171.7	42.3	283.6		39.6
Percent	25%	61%	15%			
Zone P06						
Hardwood	21.6	95.1	25.3	142.0	68%	25.7
Softwood	11.7	37.8	16.2	65.7	32%	11.9
Total	33.3	132.9	41.5	207.7		37.6
Percent	16%	64%	20%			
Zone P07						
Hardwood	12.8	56.1	22.8	91.7	62%	22.1
Softwood	9.1	26.2	20.4	55.7	38%	13.4
Total	21.9	82.4	43.1	147.4		35.5
Percent	15%	56%	29%			
Zone P08						
Hardwood	18.0	33.4	17.1	68.4	61%	21.6
Softwood	13.5	16.5	14.4	44.4	39%	14.0
Total	31.5	49.9	31.5	112.9		35.6
Percent	28%	44%	28%			
Zone P09						
Hardwood	46.2	129.6	31.6	207.4	71%	27.4
Softwood	16.3	49.3	17.8	83.5	29%	11.0
Total	62.5	179.0	49.4	290.8		38.4

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	odt/acre
Percent	21%	62%	17%			
Zone P10						
Hardwood	27.2	86.5	26.2	140.0	69%	24.9
Softwood	11.6	36.7	15.9	64.2	31%	11.4
Total	38.8	123.2	42.1	204.1		36.3
Percent	19%	60%	21%			
Zone P11						
Hardwood	21.8	106.9	23.3	152.0	73%	27.1
Softwood	5.9	39.0	11.3	56.3	27%	10.0
Total	27.8	145.9	34.6	208.2		37.1
Percent	13%	70%	17%			
Zone P12						
Hardwood	15.9	66.0	18.0	99.9	68%	24.6
Softwood	7.5	29.8	10.5	47.8	32%	11.7
Total	23.4	95.8	28.5	147.7		36.3
Percent	16%	65%	19%			
Zone P13						
Hardwood	61.2	180.7	41.7	283.6	72%	27.9
Softwood	23.4	63.5	23.9	110.8	28%	10.9
Total	84.6	244.2	65.6	394.4		38.8
Percent	21%	62%	17%			

Note: includes bole, top, and stump of trees >5 inches DBH, plus saplings,

Table 42. Biomass of bole and top for all live trees greater than 5 inches DBH on timberland by zone, species, and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	odt/acre
Zone P01	**Million Oven Dry Tons**					
Hardwood	32.6	78.9	14.7	126.3	77%	28.4
Softwood	10.2	21.4	6.9	38.5	23%	8.7
Total	42.9	100.3	21.6	164.8		37.1
Percent	26%	61%	13%			
Zone P02						
Hardwood	25.4	76.3	14.1	115.8	75%	27.1
Softwood	7.9	22.5	7.3	37.7	25%	8.8
Total	33.3	98.7	21.4	153.4		36.0
Percent	22%	64%	14%			
Zone P03						
Hardwood	50.5	88.5	29.7	168.7	78%	24.8
Softwood	16.2	22.1	10.4	48.8	22%	7.2
Total	66.7	110.6	40.1	217.5		32.0
Percent	31%	51%	18%			
Zone P04						
Hardwood	43.7	110.0	31.6	185.2	76%	25.2
Softwood	13.1	32.1	14.6	59.8	24%	8.1
Total	56.8	142.0	46.2	245.0		33.3
Percent	23%	58%	19%			
Zone P05						
Hardwood	45.8	107.6	22.5	176.0	73%	24.6
Softwood	14.8	36.8	12.3	63.9	27%	8.9
Total	60.6	144.4	34.8	239.9		33.5
Percent	25%	60%	15%			
Zone P06						
Hardwood	18.9	80.7	20.6	120.2	69%	21.7
Softwood	9.9	30.5	13.3	53.7	31%	9.7
Total	28.8	111.2	33.9	173.9		31.5
Percent	17%	64%	20%			
Zone P07						
Hardwood	11.2	47.2	18.6	77.0	63%	18.5
Softwood	7.6	20.7	16.5	44.8	37%	10.8
Total	18.8	67.9	35.1	121.8		29.3
Percent	15%	56%	29%			
Zone P08						
Hardwood	15.5	28.0	14.0	57.5	62%	18.1
Softwood	11.2	13.0	11.6	35.8	38%	11.3
Total	26.7	41.0	25.6	93.3		29.4
Percent	29%	44%	27%			
Zone P09						
Hardwood	40.5	110.5	25.7	176.7	72%	23.3

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	odt/acre
Softwood	14.0	40.3	14.7	69.0	28%	9.1
Total	54.5	150.8	40.4	245.7		32.4
Percent	22%	61%	16%			
Zone P10						
Hardwood	23.7	73.2	21.2	118.1	69%	21.0
Softwood	9.7	29.2	13.1	52.1	31%	9.3
Total	33.4	102.4	34.3	170.1		30.3
Percent	20%	60%	20%			
Zone P11						
Hardwood	19.1	91.6	18.9	129.5	74%	23.1
Softwood	5.0	31.5	9.3	45.8	26%	8.2
Total	24.1	123.1	28.2	175.4		31.2
Percent	14%	70%	16%			
Zone P12						
Hardwood	13.6	55.7	14.4	83.8	68%	20.6
Softwood	6.4	23.9	8.6	38.8	32%	9.5
Total	20.0	79.6	23.0	122.6		30.1
Percent	16%	65%	19%			
Zone P13						
Hardwood	53.4	153.7	34.4	241.6	72%	23.8
Softwood	19.9	52.1	19.7	91.7	28%	9.0
Total	73.3	205.9	54.2	333.3		32.8
Percent	22%	62%	16%			

Note: includes bole and tops only of live trees >5 inches DBH.

Table 43. Biomass of bole portion for all live trees greater than 5 inches DBH on timberland by zone, species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	odt/acre
Zone P01	**Million Oven Dry Tons**					
Hardwood	25.5	61.2	11.4	98.1	75%	22.1
Softwood	8.7	18.2	5.9	32.9	25%	7.4
Total	34.2	79.4	17.3	130.9		29.5
Percent	26%	61%	13%			
Zone P02						
Hardwood	19.9	59.2	11.0	90.0	74%	21.1
Softwood	6.8	19.1	6.2	32.1	26%	7.5
Total	26.6	78.3	17.1	122.1		28.6
Percent	22%	64%	14%			
Zone P03						
Hardwood	39.2	68.1	22.8	130.1	76%	19.2
Softwood	13.9	18.9	8.9	41.7	24%	6.1
Total	53.0	87.0	31.7	171.8		25.3
Percent	31%	51%	18%			
Zone P04						
Hardwood	34.0	85.0	24.3	143.2	74%	19.5
Softwood	11.2	27.4	12.5	51.0	26%	6.9
Total	45.2	112.3	36.7	194.3		26.4
Percent	23%	58%	19%			
Zone P05						
Hardwood	35.7	83.3	17.4	136.5	71%	19.1
Softwood	12.6	31.3	10.5	54.4	29%	7.6
Total	48.4	114.6	27.9	190.9		26.7
Percent	25%	60%	15%			
Zone P06						
Hardwood	14.8	62.5	15.9	93.2	67%	16.9
Softwood	8.4	25.9	11.3	45.7	33%	8.3
Total	23.2	88.4	27.2	138.9		25.1
Percent	17%	64%	20%			
Zone P07						
Hardwood	8.8	36.5	14.4	59.7	61%	14.4
Softwood	6.4	17.6	14.0	38.0	39%	9.2
Total	15.2	54.1	28.4	97.7		23.5
Percent	16%	55%	29%			
Zone P08						
Hardwood	12.1	21.7	10.8	44.6	59%	14.1
Softwood	9.5	11.0	9.9	30.4	41%	9.6
Total	21.6	32.7	20.7	75.0		23.7
Percent	29%	44%	28%			

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	odt/acre
Zone P09						
Hardwood	31.6	85.6	19.7	136.9	70%	18.1
Softwood	11.9	34.3	12.5	58.8	30%	7.8
Total	43.5	119.9	32.3	195.6		25.8
Percent	22%	61%	17%			
Zone P10						
Hardwood	18.4	56.5	16.4	91.3	67%	16.2
Softwood	8.3	24.8	11.1	44.3	33%	7.9
Total	26.7	81.4	27.5	135.6		24.1
Percent	20%	60%	20%			
Zone P11						
Hardwood	14.8	70.9	14.5	100.3	72%	17.9
Softwood	4.3	26.9	7.9	39.1	28%	7.0
Total	19.1	97.8	22.4	139.3		24.8
Percent	14%	70%	16%			
Zone P12						
Hardwood	10.6	43.2	11.0	64.8	66%	15.9
Softwood	5.4	20.3	7.3	33.1	34%	8.1
Total	16.0	63.5	18.4	97.8		24.0
Percent	16%	65%	19%			
Zone P13						
Hardwood	41.6	119.1	26.6	187.3	71%	18.4
Softwood	17.0	44.4	16.8	78.1	29%	7.7
Total	58.6	163.5	43.4	265.4		26.1
Percent	22%	62%	16%			

Table 44. Biomass of tops only for all live trees greater than 5 inches DBH on timberland by zone, species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	odt/acre
Zone P01	**Million Oven Dry Tons**					
Hardwood	7.2	17.7	3.3	28.2	83%	6.3
Softwood	1.5	3.2	1.0	5.7	17%	1.3
Total	8.7	20.9	4.3	33.9		7.6
Percent	26%	62%	13%			
Zone P02						
Hardwood	5.6	17.1	3.1	25.8	82%	6.0
Softwood	1.2	3.3	1.1	5.6	18%	1.3
Total	6.7	20.5	4.2	31.4		7.4
Percent	21%	65%	13%			
Zone P03						
Hardwood	11.3	20.4	6.9	38.6	84%	5.7
Softwood	2.4	3.2	1.5	7.1	16%	1.0
Total	13.6	23.6	8.4	45.7		6.7
Percent	30%	52%	18%			
Zone P04						
Hardwood	9.7	25.0	7.3	42.0	83%	5.7
Softwood	1.9	4.7	2.1	8.8	17%	1.2
Total	11.6	29.7	9.4	50.8		6.9
Percent	23%	59%	19%			
Zone P05						
Hardwood	10.1	24.3	5.1	39.5	81%	5.5
Softwood	2.2	5.5	1.8	9.5	19%	1.3
Total	12.2	29.8	6.9	49.0		6.8
Percent	25%	61%	14%			
Zone P06						
Hardwood	4.1	18.2	4.7	27.0	77%	4.9
Softwood	1.5	4.6	2.0	8.1	23%	1.5
Total	5.6	22.8	6.7	35.0		6.3
Percent	16%	65%	19%			
Zone P07						
Hardwood	2.4	10.7	4.2	17.3	72%	4.2
Softwood	1.1	3.2	2.5	6.8	28%	1.6
Total	3.5	13.9	6.7	24.1		5.8
Percent	15%	58%	28%			
Zone P08						
Hardwood	3.4	6.4	3.1	12.8	70%	4.1
Softwood	1.7	2.0	1.8	5.4	30%	1.7
Total	5.1	8.3	4.9	18.3		5.8

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	odt/acre
Percent	28%	46%	27%			
Zone P09						
Hardwood	8.9	24.9	5.9	39.8	80%	5.3
Softwood	2.1	6.0	2.2	10.2	20%	1.3
Total	11.0	30.9	8.1	50.0		6.6
Percent	22%	62%	16%			
Zone P10						
Hardwood	5.2	16.7	4.9	26.8	77%	4.8
Softwood	1.4	4.4	2.0	7.8	23%	1.4
Total	6.7	21.1	6.8	34.6		6.1
Percent	19%	61%	20%			
Zone P11						
Hardwood	4.3	20.6	4.4	29.3	81%	5.2
Softwood	0.7	4.7	1.4	6.8	19%	1.2
Total	5.0	25.3	5.8	36.0		6.4
Percent	14%	70%	16%			
Zone P12						
Hardwood	3.1	12.6	3.3	19.0	77%	4.7
Softwood	1.0	3.5	1.3	5.8	23%	1.4
Total	4.0	16.1	4.6	24.8		6.1
Percent	16%	65%	19%			
Zone P13						
Hardwood	11.8	34.7	7.8	54.3	80%	5.3
Softwood	2.9	7.7	2.9	13.6	20%	1.3
Total	14.7	42.4	10.8	67.9		6.7
Percent	22%	62%	16%			

Note: includes tops only of live trees >5 inches DBH

Table 45. Biomass of all live saplings, 1 to 5 inches DBH on timberland by zone, species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	ODT/acre
Zone P01	**Million Oven Dry Tons**					
Hardwood	3.2	9.9	1.7	14.8	75%	3.3
Softwood	1.1	2.8	0.9	4.8	25%	1.1
Total	4.4	12.7	2.6	19.7		4.4
Percent	22%	65%	13%			
Zone P02						
Hardwood	2.4	9.7	1.9	14.0	73%	3.3
Softwood	0.8	3.2	1.1	5.1	27%	1.2
Total	3.2	12.9	3.0	19.1		4.5
Percent	17%	67%	16%			
Zone P03						
Hardwood	5.6	12.9	4.6	23.1	75%	3.4
Softwood	2.1	3.9	1.7	7.6	25%	1.1
Total	7.6	16.8	6.3	30.7		4.5
Percent	25%	55%	20%			
Zone P04						
Hardwood	4.5	14.2	5.1	23.8	73%	3.2
Softwood	1.6	5.0	2.3	8.9	27%	1.2
Total	6.1	19.3	7.3	32.7		4.5
Percent	19%	59%	22%			
Zone P05						
Hardwood	4.6	14.2	3.8	22.6	69%	3.2
Softwood	1.7	6.3	2.0	10.0	31%	1.4
Total	6.2	20.5	5.8	32.5		4.5
Percent	19%	63%	18%			
Zone P06						
Hardwood	1.9	10.6	3.7	16.3	64%	2.9
Softwood	1.3	5.8	2.2	9.3	36%	1.7
Total	3.2	16.4	5.9	25.5		4.6
Percent	12%	64%	23%			
Zone P07						
Hardwood	1.1	6.7	3.4	11.2	56%	2.7
Softwood	1.2	4.4	3.0	8.6	44%	2.1
Total	2.3	11.1	6.4	19.8		4.8
Percent	11%	56%	32%			
Zone P08						
Hardwood	1.7	4.1	2.4	8.3	55%	2.6
Softwood	1.8	2.8	2.2	6.8	45%	2.2

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	ODT/acre
Total	3.5	6.9	4.7	15.1		4.8
Percent	23%	46%	31%			
Zone P09						
Hardwood	3.9	14.3	4.8	23.0	68%	3.0
Softwood	1.6	7.0	2.3	10.9	32%	1.4
Total	5.6	21.2	7.1	33.9		4.5
Percent	16%	63%	21%			
Zone P10						
Hardwood	2.6	10.0	4.1	16.6	64%	3.0
Softwood	1.4	5.9	2.1	9.4	36%	1.7
Total	4.0	15.8	6.2	25.9		4.6
Percent	15%	61%	24%			
Zone P11						
Hardwood	2.0	11.5	3.5	17.0	68%	3.0
Softwood	0.6	5.8	1.5	8.0	32%	1.4
Total	2.6	17.2	5.1	25.0		4.4
Percent	11%	69%	20%			
Zone P12						
Hardwood	1.7	7.9	3.0	12.5	65%	3.1
Softwood	0.9	4.6	1.4	6.9	35%	1.7
Total	2.5	12.4	4.5	19.4		4.8
Percent	13%	64%	23%			
Zone P13						
Hardwood	5.5	20.1	5.7	31.3	68%	3.1
Softwood	2.5	8.7	3.2	14.4	32%	1.4
Total	7.9	28.8	8.9	45.7		4.5
Percent	17%	63%	20%			

includes saplings only, 1-5 inches DBH

Table 46. Biomass of stumps for all live trees, greater than 5 inches DBH on timberland by zone, species and owner groups.

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	ODT per Acre
Zone P01	**Million Oven Dry Tons**					
Hardwood	1.4	3.7	0.7	5.8	76%	1.3
Softwood	0.5	1.0	0.3	1.8	24%	0.4
Total	1.9	4.7	1.0	7.6		1.7
Percent	25%	62%	13%			
Zone P02						
Hardwood	1.1	3.6	0.6	5.4	75%	1.3
Softwood	0.4	1.1	0.4	1.8	25%	0.4
Total	1.5	4.7	1.0	7.2		1.7
Percent	21%	65%	14%			
Zone P03						
Hardwood	2.2	3.9	1.3	7.3	74%	1.1
Softwood	0.8	1.2	0.5	2.5	26%	0.4
Total	3.0	5.1	1.8	9.9		1.5
Percent	30%	51%	18%			
Zone P04						
Hardwood	1.9	5.0	1.4	8.2	73%	1.1
Softwood	0.7	1.6	0.8	3.0	27%	0.4
Total	2.6	6.6	2.1	11.3		1.5
Percent	23%	58%	19%			
Zone P05						
Hardwood	2.0	4.9	1.0	8.0	71%	1.1
Softwood	0.7	1.9	0.6	3.2	29%	0.4
Total	2.7	6.8	1.6	11.2		1.6
Percent	24%	61%	15%			
Zone P06						
Hardwood	0.8	3.8	0.9	5.5	67%	1.0
Softwood	0.5	1.6	0.7	2.7	33%	0.5
Total	1.3	5.3	1.6	8.3		1.5
Percent	16%	64%	20%			
Zone P07						
Hardwood	0.5	2.2	0.9	3.6	62%	0.9
Softwood	0.4	1.1	0.8	2.3	38%	0.5
Total	0.9	3.3	1.7	5.9		1.4
Percent	15%	56%	29%			
Zone P08						
Hardwood	0.7	1.3	0.7	2.7	60%	0.8
Softwood	0.5	0.7	0.6	1.8	40%	0.6
Total	1.2	2.0	1.2	4.5		1.4
Percent	28%	44%	28%			

Hardwood/ Softwood	Federal	Private	State/ Local	Total	Percent	ODT per Acre
Zone P09						
Hardwood	1.7	4.9	1.1	7.7	69%	1.0
Softwood	0.7	2.1	0.8	3.5	31%	0.5
Total	2.4	7.0	1.9	11.3		1.5
Percent	22%	62%	17%			
Zone P10						
Hardwood	1.0	3.3	1.0	5.3	66%	0.9
Softwood	0.5	1.6	0.7	2.7	34%	0.5
Total	1.5	4.9	1.6	8.0		1.4
Percent	19%	61%	20%			
Zone P11						
Hardwood	0.8	3.8	0.8	5.4	68%	1.0
Softwood	0.3	1.7	0.5	2.5	32%	0.4
Total	1.0	5.6	1.3	7.9		1.4
Percent	13%	70%	17%			
Zone P12						
Hardwood	0.6	2.4	0.6	3.6	64%	0.9
Softwood	0.3	1.3	0.4	2.1	36%	0.5
Total	0.9	3.7	1.1	5.7		1.4
Percent	16%	65%	19%			
Zone P13						
Hardwood	2.3	6.9	1.5	10.7	70%	1.1
Softwood	1.0	2.7	1.0	4.6	30%	0.5
Total	3.3	9.5	2.5	15.4		1.5
Percent	22%	62%	16%			

Note: includes stumps only, >5 inches DBH.

Pulpwood Production

Table 47. Average annual pulpwood production from 2001 to 2006 in the 43 county study area by county and species group.

County	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Average
	Thousand cords						
Michigan							
Alger	15.8	31.9	0.6	13.5	8.8	15.8	103.6
Baraga	21.3	44.9	0.8	21.4	2.8	15.0	127.5
Chippewa	23.5	22.7	0.5	10.5	8.2	9.1	89.4
Delta	21.0	32.4	0.6	14.1	8.7	13.8	108.6
Dickinson	41.9	27.5	0.7	20.4	5.5	15.1	133.4
Gogebic	19.8	57.2	2.0	22.3	0.9	7.4	131.6
Houghton	26.5	32.9	1.4	16.9	6.1	8.8	111.1
Iron	35.6	32.9	0.8	23.3	8.5	24.8	151.2
Keweenaw	4.2	27.5	1.0	10.0	0.5	2.1	54.3
Luce	13.0	33.8	1.7	13.2	12.1	8.6	98.9
Mackinac	26.1	26.2	0.5	11.6	9.7	7.5	98.0
Marquette	64.0	63.6	0.9	34.5	21.9	39.1	268.8
Menominee	27.5	23.4	0.5	14.2	5.6	18.9	108.2
Monroe	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ontonagon	41.5	56.2	3.3	26.3	1.9	8.7	165.7
Schoolcraft	15.9	41.8	2.4	16.9	13.0	9.8	119.7
Wisconsin							
Ashland	54.2	61.2	4.6	23.3	4.7	12.7	192.9
Bayfield	52.6	32.2	6.1	23.1	18.2	9.8	170.4
Brown	0.3	0.1	0.0	0.2	0.6	0.0	1.5
Calumet	0.0	0.1	0.0	0.0	0.0	0.0	0.2
Door	1.3	0.9	0.3	0.7	0.2	1.0	5.4
Florence	18.1	32.3	1.6	15.1	5.8	8.9	98.2
Forest	26.2	49.5	3.2	29.7	6.2	14.3	155.0
Iron	34.6	30.9	2.5	16.9	1.1	6.4	110.8
Kewaunee	0.2	0.4	0.0	0.2	1.1	0.2	2.5
Langlade	37.1	68.6	5.7	38.2	3.0	12.3	197.9
Lincoln	56.5	43.5	2.8	24.1	4.2	9.3	168.4
Manitowoc	1.2	1.8	0.5	0.9	0.2	1.1	6.8
Marathon	31.5	23.2	4.4	10.2	6.0	5.3	96.8
Marinette	39.3	32.7	2.8	24.6	24.1	11.6	162.3
Menominee	10.1	15.4	2.6	7.6	2.8	11.2	59.7
Oconto	20.4	17.4	1.2	9.7	9.6	2.0	72.4
Oneida	51.7	31.5	3.8	22.2	17.5	18.8	174.5
Outagamie	0.5	1.8	0.2	0.8	1.3	0.1	5.7
Portage	10.4	6.7	3.6	2.9	19.9	6.6	60.1
Price	45.9	33.3	3.4	24.7	2.3	18.4	153.5
Rusk	31.1	22.9	6.8	15.8	1.6	3.9	98.6
Sawyer	64.8	64.7	18.3	35.6	5.9	11.1	240.5
Shawano	10.6	18.6	4.9	7.5	5.7	2.6	59.9
Taylor	26.3	20.1	2.0	14.0	0.8	4.6	81.4

County	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Average
	Thousand cords						
Vilas	26.5	14.3	2.9	12.3	13.1	7.0	91.2
Waupaca	8.2	6.0	1.9	17.3	9.4	2.2	54.1
Winnebago	0.2	0.5	0.5	0.3	0.3	0.6	2.9
Study Area	1,057.7	1,185.6	104.6	647.0	280.0	386.6	3,661.6

Table 48. Pulpwood production in 2001 in the 43 county study area by county and species group.

County	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Total
	Thousand cords						
Michigan							
Alger	10.7	32.1	0.7	12.5	11.7	24.5	92.1
Baraga	23.6	27.8	1.0	13.5	3.5	16.0	85.5
Chippewa	19.9	21.9	0.5	11.2	9.7	9.4	72.6
Delta	27.3	27.0	0.6	11.0	20.8	13.8	100.5
Dickinson	53.1	26.5	1.3	15.4	8.5	16.4	121.1
Gogebic	18.7	52.5	5.9	25.9	2.1	14.6	119.7
Houghton	34.5	34.2	1.7	17.7	5.7	9.1	103.0
Iron	41.2	39.9	2.2	20.2	12.8	23.6	139.9
Keweenaw	3.0	25.0	1.1	10.6	0.2	1.9	41.7
Luce	11.9	26.1	0.8	10.7	16.1	5.4	71.1
Mackinac	29.1	29.8	0.7	12.2	13.8	10.8	96.4
Marquette	64.1	60.8	0.8	26.0	19.8	40.6	212.1
Menominee	33.2	22.4	0.8	12.0	6.8	19.1	94.2
Monroe	0.0	0.0		0.0			0.1
Ontonagon	53.9	41.1	2.6	26.0	3.6	8.7	135.9
Schoolcraft	21.4	34.3	1.0	13.9	36.0	12.2	118.8
Wisconsin							
Ashland	25.6	30.4	7.1	12.5	3.9	6.6	86.0
Bayfield	46.0	35.9	13.2	24.2	36.6	12.3	168.3
Brown	0.2	0.0	0.0	0.0	0.1	0.0	0.3
Calumet						0.0	0.0
Door	0.0	0.3	0.0	0.1	0.1		0.6
Florence	19.2	32.0	2.5	15.2	3.9	7.2	80.0
Forest	28.5	47.1	3.9	32.0	8.0	12.0	131.5
Iron	58.3	25.3	4.5	18.3	2.5	7.0	115.9
Kewaunee					0.0	0.0	0.0
Langlade	34.2	58.4	4.5	42.7	3.9	12.5	156.0
Lincoln	51.9	26.3	4.4	22.6	4.8	10.5	120.5
Manitowoc	6.7	8.8	2.2	4.4	0.3	0.7	23.1
Marathon	25.8	16.3	4.1	13.5	4.5	5.3	69.5
Marinette	40.1	26.9	1.6	16.0	28.6	11.2	124.4
Menominee	16.4	16.1	1.8	8.5	6.0	11.7	60.5
Oconto	18.5	20.5	2.4	11.2	8.1	1.7	62.3
Oneida	49.0	36.3	5.6	25.6	16.1	19.1	151.7
Outagamie	0.2	1.2	0.2	0.8	0.6	0.0	3.0
Portage	7.4	5.3	3.1	3.3	25.3	6.6	51.0

County	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Total
	Thousand cords						
Price	44.0	30.3	5.3	26.9	3.7	16.4	126.5
Rusk	28.6	20.6	6.6	17.1	3.8	3.1	79.8
Sawyer	43.4	46.8	13.6	33.2	7.3	11.5	155.8
Shawano	4.3	11.5	2.2	7.9	4.1	2.3	32.3
Taylor	20.1	15.5	1.4	15.7	1.0	4.6	58.2
Vilas	29.3	11.6	2.7	10.0	20.8	7.2	81.5
Waupaca	3.5	4.7	1.7	3.4	18.2	2.5	34.2
Winnebago	0.0	0.2	0.3	0.1	0.5	0.3	1.3
Study Area	1,046.6	1,029.7	116.7	604.2	383.5	398.2	3,578.8

Table 49. Pulpwood production in 2002 in the 43 county study area by county and species group.

County	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Total
Michigan							
Alger	11.1	33.7	0.7	15.2	17.4	17.6	95.7
Baraga	20.4	33.7	0.8	16.6	2.9	15.3	89.7
Chippewa	39.3	23.6	0.5	10.8	7.4	8.0	89.6
Delta	19.3	23.9	0.5	10.8	7.6	12.9	75.1
Dickinson	48.6	26.5	0.8	14.5	5.7	11.1	107.2
Gogebic	19.1	47.8	1.4	20.6	1.2	11.9	102.1
Houghton	26.7	30.2	1.7	14.2	2.0	7.1	81.8
Iron	38.2	30.2	0.6	17.1	7.3	25.5	118.9
Keweenaw	6.0	26.9	1.2	10.2	0.5	2.0	46.9
Luce	7.3	34.3	2.3	12.9	9.4	8.9	75.0
Mackinac	41.8	30.6	0.7	15.1	8.7	10.7	107.5
Marquette	67.9	56.3	1.0	30.2	22.8	32.0	210.2
Menominee	32.7	22.4	0.5	12.6	6.4	21.0	95.7
Ontonagon	41.7	88.5	5.6	29.9	0.9	9.8	176.3
Schoolcraft	8.6	44.0	3.2	17.0	8.4	8.9	90.2
Wisconsin							
Ashland	52.9	47.8	3.4	18.6	3.0	13.4	139.2
Bayfield	49.2	20.8	4.2	19.2	24.4	8.8	126.6
Brown	0.1	0.0	0.0	0.0	0.1	0.0	0.2
Calumet					0.0		0.0
Door	0.8	0.4	0.0	0.2	0.3	0.7	2.4
Florence	18.2	33.1	1.6	13.6	3.1	8.6	78.1
Forest	26.0	51.2	2.9	28.6	4.6	8.9	122.3
Iron	70.6	40.4	2.1	17.2	0.5	4.7	135.6
Kewaunee					0.2	0.1	0.3
Langlade	32.0	76.6	6.1	36.0	4.0	10.4	165.1
Lincoln	56.3	44.2	2.5	23.0	5.5	8.6	140.2
Manitowoc	0.1	0.3	0.2	0.1	0.3	0.9	1.8
Marathon	24.3	16.9	5.4	8.3	6.4	5.4	66.7
Marinette	42.3	32.2	4.0	18.2	29.0	12.4	138.0
Menominee	8.8	14.4	5.1	7.5	1.2	10.2	47.2

County	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Total
Oconto	18.1	22.2	1.4	11.6	4.2	1.1	58.6
Oneida	39.4	26.1	1.7	20.7	10.2	12.9	111.0
Outagamie	0.1	2.2	0.1	0.4	0.0	0.1	2.8
Portage	12.7	6.7	4.8	2.9	25.6	6.6	59.3
Price	53.1	39.8	2.6	25.4	3.4	12.4	136.7
Rusk	46.9	31.9	8.9	19.2	1.2	4.6	112.7
Sawyer	65.7	75.3	17.5	32.2	6.0	9.0	205.7
Shawano	22.8	17.8	5.9	5.8	5.4	1.8	59.4
Taylor	24.7	18.6	2.1	11.5	0.8	5.0	62.8
Vilas	26.0	13.9	2.4	13.8	10.6	7.3	74.0
Waupaca	5.2	6.3	3.0	2.1	8.1	2.0	26.7
Winnebago	0.4	1.7	0.7	1.0	0.5	1.3	5.7
Study Area	1,125.6	1,193.4	110.3	584.8	267.3	359.9	3,641.3

Table 50. Pulpwood production in 2003 in the 43 county study area by county and species group.

County	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Total
	Thousand cords						
Michigan							
Alger	13.0	28.3	0.6	13.2	7.0	15.2	77.2
Baraga	22.6	49.4	0.8	23.8	1.9	18.4	116.8
Chippewa	20.9	28.3	0.5	13.1	12.5	9.3	84.7
Delta	26.0	26.7	0.5	14.8	4.6	15.5	87.9
Dickinson	57.4	25.5	0.6	18.0	6.3	17.0	124.8
Gogebic	19.1	52.2	1.5	20.0	1.0	8.7	102.5
Houghton	25.0	27.5	0.9	12.2	8.7	7.6	81.9
Iron	35.6	37.8	0.7	19.3	5.0	18.5	116.9
Keweenaw	7.4	29.0	1.3	10.5	0.6	3.3	52.1
Luce	12.7	31.1	2.4	12.6	6.0	4.5	69.3
Mackinac	21.1	28.3	0.5	14.7	9.6	7.6	81.8
Marquette	76.1	66.1	1.1	35.1	11.6	36.7	226.7
Menominee	32.2	21.9	0.5	13.2	5.0	18.3	91.1
Ontonagon	42.6	51.2	3.9	23.5	0.9	9.2	131.3
Schoolcraft	23.6	46.3	3.4	19.9	7.4	9.8	110.5
Wisconsin							
Ashland	57.9	72.8	3.5	18.7	2.3	15.8	171.1
Bayfield	71.6	19.9	4.3	27.2	19.9	10.2	153.0
Brown	0.9	0.1	0.0	0.2	0.7	0.0	1.9
Calumet	0.0	0.1	0.0	0.0	0.0	0.0	0.2
Door	1.9	1.3	0.1	1.0	0.3	0.7	5.2
Florence	21.8	35.5	1.6	16.2	9.3	9.0	93.5
Forest	38.0	53.6	4.5	31.5	9.3	11.3	148.2
Iron	21.6	36.8	2.3	17.4	0.8	10.9	89.8
Kewaunee	0.4	0.3	0.0	0.1	0.5	0.1	1.4
Langlade	39.8	73.4	6.8	39.5	3.6	10.7	173.7
Lincoln	71.1	44.0	2.8	26.4	5.6	11.0	160.9
Manitowoc	0.0	0.4	0.2	0.1	0.1	1.7	2.5
Marathon	31.9	19.1	4.8	11.1	7.0	4.6	78.6
Marinette	37.6	32.8	2.5	20.2	29.2	12.0	134.3
Menominee	11.2	14.1	1.5	5.9	3.1	13.1	48.9
Oconto	19.5	17.5	1.0	9.2	4.8	0.7	52.8
Oneida	43.9	30.7	3.5	24.6	14.2	13.5	130.3
Outagamie	0.4	2.4	0.1	0.7	0.4	0.2	4.2
Portage	11.4	7.2	3.8	3.0	22.0	6.0	53.5
Price	41.3	34.8	2.5	23.7	1.9	18.2	122.3
Rusk	33.3	33.2	8.6	22.3	0.6	2.7	100.7
Sawyer	63.7	73.8	20.7	38.5	7.4	10.3	214.2
Shawano	11.9	22.1	6.7	8.3	4.9	1.3	55.1
Taylor	26.4	21.8	2.2	13.2	1.3	3.3	68.2
Vilas	25.1	16.5	3.1	12.4	17.4	7.2	81.6
Waupaca	9.0	5.5	2.6	2.1	8.7	1.9	29.7
Winnebago	0.2	0.3	0.3	0.1	0.2	0.8	2.0

County	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Total
	Thousand cords						
Study Area	1,127.2	1,219.5	109.4	637.5	263.4	376.7	3,733.7

Table 51. Pulpwood production in 2004 in the 43 county study area by county and species group.

County	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Total
	Thousand cords						
Michigan							
Alger	9.6	29.4	0.6	13.1	6.3	17.1	76.1
Baraga	21.8	57.2	0.9	25.2	2.7	15.4	123.2
Chippewa	19.4	21.4	0.5	10.4	6.3	9.2	67.2
Delta	20.6	25.6	0.4	12.0	6.3	15.9	80.8
Dickinson	38.0	26.3	0.6	19.9	4.1	18.9	107.7
Gogebic	31.5	71.3	1.3	26.9	0.4	3.4	134.8
Houghton	32.0	34.6	1.5	18.3	7.7	7.8	101.9
Iron	41.8	33.1	0.7	21.6	8.5	31.9	137.6
Keweenaw	4.0	24.0	0.9	9.0	0.6	2.2	40.5
Luce	18.0	37.0	2.3	16.9	12.6	10.1	96.9
Mackinac	23.1	22.3	0.5	10.3	9.4	7.3	72.9
Marquette	74.0	63.1	0.8	32.2	16.9	47.4	234.4
Menominee	27.3	24.1	0.4	14.2	5.3	21.8	93.1
Monroe	0.0	0.0		0.0			0.1
Ontonagon	47.4	64.4	3.8	28.0	2.1	8.6	154.4
Schoolcraft	15.9	47.0	3.4	20.0	9.0	11.8	107.2
Wisconsin							
Ashland	67.0	71.5	4.5	32.8	4.7	11.6	192.1
Bayfield	46.3	36.6	4.6	27.8	10.4	9.9	135.7
Brown	0.1	0.2	0.0	0.1	0.7	0.0	1.1
Calumet	0.0	0.1		0.0		0.1	0.2
Door	2.4	1.0	0.1	0.9	0.1	0.6	5.1
Florence	22.6	37.1	1.9	18.1	7.1	7.4	94.2
Forest	26.5	53.8	3.7	36.5	7.3	10.9	138.7
Iron	17.8	35.2	3.0	21.2	0.7	5.2	83.0
Kewaunee	0.2	0.3	0.0	0.2	0.6	0.1	1.3
Langlade	41.9	72.6	7.0	47.2	1.8	13.7	184.2
Lincoln	66.6	60.9	2.0	33.5	4.4	9.6	176.9
Manitowoc	0.0	0.4	0.2	0.1	0.1	1.6	2.4
Marathon	35.9	26.4	4.6	11.4	7.9	5.9	92.1
Marinette	40.8	38.8	3.3	27.1	19.4	11.8	141.2
Menominee	9.3	18.7	3.9	10.2	2.5	13.3	57.9
Oconto	24.6	16.9	1.1	9.2	3.8	1.5	57.1
Oneida	67.3	41.1	2.9	30.7	15.2	18.4	175.5
Outagamie	0.7	1.6	0.2	0.7	0.3	0.1	3.7
Portage	9.4	7.6	4.2	3.8	19.8	5.4	50.1
Price	53.5	39.5	3.4	35.6	1.9	20.3	154.1
Rusk	20.0	20.9	6.8	14.0	2.5	4.7	69.0
Sawyer	64.8	76.9	22.8	47.2	4.3	12.3	228.4
Shawano	11.8	21.9	6.5	7.7	3.7	1.3	52.9
Taylor	35.0	28.7	2.9	22.1	0.7	4.9	94.3
Vilas	31.2	19.3	3.1	16.4	11.0	7.1	88.1
Waupaca	18.1	6.7	1.5	92.1	7.4	2.0	127.9

County	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Total
	Thousand cords						
Winnebago	0.2	0.4	1.8	0.2	0.2	0.7	3.5
Study Area	1,138.5	1,315.7	114.6	825.0	236.7	409.1	4,039.7

Table 52. Pulpwood production in 2005 in the 43 county study area by county and species group.

County	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Total
	Thousand cords						
Michigan							
Alger	8.1	27.8	0.3	10.1	5.7	11.0	63.0
Baraga	19.5	48.8	0.6	20.3	2.5	12.8	104.5
Chippewa	35.3	21.4	0.3	10.2	8.3	7.7	83.4
Delta	19.0	45.1	0.7	15.3	6.3	12.4	98.8
Dickinson	43.0	31.3	0.5	17.9	4.1	14.9	111.8
Gogebic	20.0	64.4	1.0	24.1	0.6	2.9	113.0
Houghton	26.0	37.6	1.1	15.7	8.5	14.4	103.3
Iron	41.7	28.9	0.3	17.2	9.1	27.7	124.9
Keweenaw	2.3	30.1	0.7	8.8	0.5	1.5	44.0
Luce	14.5	18.1	1.6	8.7	17.7	9.1	69.6
Mackinac	22.6	24.2	0.4	9.6	10.2	3.5	70.5
Marquette	63.0	64.5	0.5	24.3	44.9	43.5	240.7
Menominee	27.1	25.1	0.4	11.2	4.7	15.5	84.0
Ontonagon	43.3	47.8	2.2	19.5	2.4	7.9	123.2
Schoolcraft	12.1	43.6	2.9	15.8	10.3	10.1	94.8
Wisconsin							
Ashland	70.3	77.4	6.4	42.5	9.7	13.6	219.9
Bayfield	46.1	42.9	5.8	30.0	12.5	9.8	147.1
Brown	0.2	0.2	0.1	0.1	1.6	0.1	2.2
Calumet	0.0	0.1		0.0		0.1	0.2
Door	2.5	2.1	0.1	1.3	0.4	3.5	9.9
Florence	16.7	38.9	1.3	14.9	9.0	8.7	89.4
Forest	31.4	60.5	3.6	36.3	2.8	10.3	144.8
Iron	16.9	33.2	2.9	22.1	0.8	5.9	81.9
Kewaunee	0.5	0.8	0.0	0.3	5.0	0.3	7.0
Langlade	38.5	75.9	9.0	45.8	2.8	14.5	186.5
Lincoln	50.8	55.4	4.8	28.8	3.2	9.0	152.1
Manitowoc	0.0	0.5	0.2	0.1	0.1	1.4	2.5
Marathon	30.4	40.3	6.9	13.4	7.4	6.4	104.8
Marinette	52.2	36.5	2.6	23.5	23.5	12.0	150.4
Menominee	8.4	14.0	3.0	8.1	3.3	15.3	52.0
Oconto	28.1	15.7	0.8	6.6	29.2	4.9	85.3
Oneida	60.7	35.5	7.6	23.3	33.6	34.7	195.4
Outagamie	0.9	1.9	0.7	0.8	6.3	0.3	10.9
Portage	8.2	8.9	3.9	4.0	16.7	4.6	46.2
Price	41.9	38.8	6.2	30.4	1.7	27.5	146.6
Rusk	28.1	20.2	7.9	14.1	1.4	4.5	76.3
Sawyer	78.7	78.8	25.2	48.4	4.8	13.1	249.1

County	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Total
	Thousand cords						
Shawano	6.1	23.4	7.1	8.1	13.7	5.9	64.4
Taylor	32.0	27.2	3.1	19.6	0.6	5.2	87.6
Vilas	27.1	16.5	4.5	14.2	11.0	6.7	80.0
Waupaca	6.6	7.7	2.1	3.3	12.0	3.3	35.0
Winnebago	0.1	0.3	0.2	0.1	0.2	0.6	1.6
Study Area	1,081.2	1,312.8	129.6	668.6	349.2	416.9	3,958.4

Table 53. Pulpwood production in 2006 in the 43 county study area by county and species group.

County	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Total
	Thousand cords						
Michigan							
Alger	42.1	39.8	0.6	17.1	4.6	9.7	114.0
Baraga	19.8	52.4	0.9	28.9	3.4	12.2	117.6
Chippewa	6.1	19.8	0.3	7.1	5.1	11.0	49.5
Delta	13.8	46.0	0.7	20.5	6.7	12.1	99.8
Dickinson	11.2	29.0	0.6	36.9	4.5	12.2	94.3
Gogebic	10.5	54.8	1.1	16.3	0.4	3.1	86.2
Houghton	14.8	33.3	1.6	23.1	4.1	6.5	83.4
Iron	15.1	27.7	0.4	44.7	8.1	21.8	117.8
Keweenaw	2.4	30.0	0.9	10.8	0.5	1.5	46.1
Luce	13.3	56.3	0.7	17.3	11.0	13.8	112.4
Mackinac	19.1	22.1	0.4	8.0	6.4	5.1	61.1
Marquette	39.1	70.8	1.0	59.3	15.4	34.4	220.0
Menominee	12.5	24.6	0.4	22.0	5.5	17.9	83.0
Ontonagon	20.2	44.3	2.1	31.2	1.7	7.8	107.3
Schoolcraft	13.7	35.3	0.6	15.0	6.5	6.0	77.0
Wisconsin							
Ashland	51.4	67.4	2.6	14.7	4.7	15.5	156.3
Bayfield	56.5	36.8	4.4	10.3	5.2	8.0	121.1
Brown	0.4	0.4	0.0	0.5	0.5	0.1	1.8
Calumet	0.0	0.4	0.0	0.1	0.0	0.0	0.6
Door	0.3	0.5	1.5	0.9	0.2	0.6	4.0
Florence	10.1	17.6	0.5	12.5	2.3	12.8	55.8
Forest	7.1	31.0	0.7	13.5	5.2	32.1	89.5
Iron	22.4	14.4	0.1	5.0	1.3	4.8	47.9
Kewaunee	0.2	1.1	0.1	0.7	0.1	0.4	2.6
Langlade	36.5	54.7	1.0	18.0	2.2	11.8	124.0
Lincoln	42.0	30.1	0.4	10.2	1.6	6.9	91.2
Manitowoc	0.1	0.7	0.0	0.6	0.0	0.6	2.0
Marathon	40.9	20.3	0.4	3.3	3.0	4.2	72.1
Marinette	23.1	29.4	2.8	42.7	15.0	10.3	123.3
Menominee	6.7	15.4	0.5	5.0	1.0	3.6	32.1
Oconto	13.8	11.6	0.6	10.2	7.7	2.0	45.8
Oneida	49.9	19.3	1.4	8.1	15.8	14.3	108.8
Outagamie	0.9	1.2	0.0	1.1	0.3	0.2	3.7
Portage	13.5	4.4	1.6	0.7	10.2	10.2	40.6
Price	41.4	16.8	0.4	6.3	1.0	15.3	81.3
Rusk	29.6	10.7	1.9	7.9	0.3	3.9	54.4
Sawyer	72.8	36.3	10.2	14.3	5.7	10.2	149.6
Shawano	6.8	14.9	1.2	7.2	2.5	2.9	35.5
Taylor	19.8	8.6	0.1	2.2	0.4	4.7	35.8
Vilas	20.1	7.7	1.3	7.1	8.1	6.7	51.0
Waupaca	6.9	5.1	0.7	0.9	1.7	1.7	17.0

County	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Total
	Thousand cords						
Winnebago	0.2	0.0		0.0	0.1	0.0	0.3
Study Area	827.1	1,042.7	46.8	562.1	180.1	358.7	3,017.6

Table 54. Pulpwood production by species group and zone buffer, 2001 to 2006.

Year	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Total
Zone P01							
2001	267.2	286.7	19.9	151.7	59.0	108.5	893.1
2002	246.8	329.2	15.4	150.3	37.7	99.9	879.3
2003	237.9	325.7	14.1	153.9	42.5	100.1	874.1
2004	261.9	363.8	14.0	178.0	42.9	107.1	967.6
2005	227.2	336.9	11.7	148.2	59.3	102.5	885.9
2006	131.9	302.9	8.9	202.3	35.2	86.7	767.9
Zone P02							
2001	270.0	279.3	13.0	139.6	58.0	124.5	884.4
2002	248.3	310.2	12.1	141.2	47.0	110.2	869.0
2003	265.5	310.1	10.2	151.0	39.7	115.4	891.8
2004	264.1	330.4	9.9	164.8	46.2	135.1	950.5
2005	238.0	316.5	6.6	133.3	75.4	125.1	895.1
2006	135.6	307.5	7.8	235.5	39.0	101.8	827.2
Zone P03							
2001	467.5	415.7	61.4	262.4	109.1	146.3	1,462.5
2002	498.8	507.1	39.7	252.8	67.4	132.6	1,498.4
2003	478.0	511.5	43.2	266.2	81.0	144.6	1,524.7
2004	523.8	588.1	45.9	337.9	69.5	144.5	1,709.8
2005	482.2	561.1	57.9	312.2	93.7	168.9	1,676.1
2006	371.1	397.5	21.0	193.3	56.3	136.8	1,176.0
Zone P04							
2001	513.3	477.8	40.6	278.8	116.7	188.0	1,615.3
2002	489.7	540.6	28.3	267.6	80.5	163.3	1,570.0
2003	477.3	544.6	30.0	285.8	97.5	177.5	1,612.8
2004	504.8	604.8	30.0	339.2	89.4	189.5	1,757.6
2005	461.0	577.5	34.3	292.7	130.3	200.3	1,696.0
2006	281.4	446.0	13.7	303.0	74.1	176.1	1,294.2
Zone P05							
2001	435.1	444.9	25.6	234.5	130.5	198.6	1,469.1
2002	399.6	478.8	21.8	233.8	99.2	177.7	1,410.8
2003	435.7	486.2	21.3	253.1	98.8	185.0	1,480.0
2004	426.5	522.1	20.7	282.1	93.2	207.9	1,552.6
2005	400.9	524.6	18.8	240.0	129.3	192.8	1,506.3
2006	230.6	460.5	13.1	340.3	76.9	185.4	1,306.8
Zone P06							
2001	318.9	330.8	12.3	154.6	138.6	178.3	1,133.4
2002	288.9	335.4	12.5	162.5	94.5	157.3	1,051.2
2003	330.5	367.2	11.9	187.9	73.6	163.7	1,135.0
2004	297.3	377.7	12.1	196.2	78.0	191.4	1,152.8
2005	277.9	388.2	9.5	164.0	110.7	163.8	1,114.1
2006	192.6	377.9	7.7	280.1	65.3	145.0	1,068.6
Zone P07							
2001	198.4	223.5	5.5	96.5	121.2	119.9	765.1
2002	186.8	236.9	8.8	109.3	76.7	101.7	720.2

Year	Aspen	Maple	Oak	Mixed HW	Pine	Mixed SW	Total
2003	211.5	241.5	9.0	121.0	50.6	103.7	737.3
2004	185.0	241.5	8.3	118.4	61.4	125.8	740.5
2005	172.3	243.0	6.8	96.1	93.0	102.2	713.4
2006	142.9	288.1	4.4	162.3	53.0	94.4	745.1
Zone P08							
2001	110.9	161.5	4.0	67.3	100.2	71.8	515.8
2002	118.2	180.9	7.7	78.0	56.3	62.8	503.9
2003	108.9	178.7	7.8	82.9	44.2	56.8	479.3
2004	100.3	173.7	7.5	78.5	47.7	66.8	474.4
2005	103.1	164.3	6.0	63.9	57.4	50.4	445.0
2006	104.2	203.6	3.1	79.7	38.0	53.5	482.1
Zone P09							
2001	489.6	487.9	33.5	275.8	160.6	220.6	1,667.9
2002	458.3	516.2	33.2	267.0	121.4	196.6	1,592.7
2003	504.1	541.2	31.3	295.4	121.9	206.6	1,700.6
2004	501.4	577.4	33.4	335.7	109.2	237.1	1,794.1
2005	482.4	581.6	36.0	291.4	180.4	233.8	1,805.7
2006	290.4	480.1	14.7	349.4	95.8	204.9	1,435.4
Zone P10							
2001	330.6	331.8	15.0	164.0	150.4	168.5	1,160.2
2002	307.3	339.4	15.3	170.1	107.3	149.7	1,089.2
2003	351.4	360.7	14.8	193.1	91.2	155.8	1,167.0
2004	315.4	367.2	14.8	204.7	85.9	182.4	1,170.4
2005	313.6	387.6	12.2	175.8	133.3	160.3	1,182.8
2006	186.3	343.2	9.7	276.9	73.9	153.0	1,043.1
Zone P11							
2001	359.6	352.0	32.0	215.8	131.5	140.6	1,231.4
2002	353.4	381.3	36.6	195.7	96.9	128.2	1,192.2
2003	391.8	392.8	34.6	218.4	108.8	134.9	1,281.4
2004	386.0	417.9	36.0	327.2	89.9	154.1	1,411.1
2005	371.3	437.0	41.1	229.1	156.4	163.2	1,398.0
2006	217.7	313.2	12.6	227.6	70.8	145.9	987.8
Zone P12							
2001	242.8	225.6	14.6	120.8	99.6	102.2	805.6
2002	229.4	234.1	18.0	118.0	72.0	94.2	765.8
2003	253.3	239.1	14.5	131.7	72.6	102.7	814.0
2004	226.0	249.5	16.8	146.2	59.8	112.6	810.9
2005	234.5	273.9	15.4	130.8	107.8	107.5	869.9
2006	120.6	227.3	8.9	182.2	52.4	96.9	688.3
Zone P13							
2001	618.3	653.1	43.8	359.4	227.2	276.8	2,178.6
2002	569.2	723.0	46.8	353.6	153.6	243.0	2,089.2
2003	631.8	730.9	44.4	382.0	153.4	253.1	2,195.7
2004	631.6	787.4	46.0	432.4	139.9	285.1	2,322.4
2005	589.4	783.6	48.5	371.7	222.7	284.0	2,300.0
2006	387.2	661.1	21.1	438.5	118.4	239.1	1,865.4

Conversion Factors

Conversion of cubic foot volumes of growing stock timber to cord and thousand board feet (MBF) measures depend on tree size. A common standard rate for pulpwood is 79 cubic feet of solid wood per cord. Conversion of sawlog-sized material to MBF is very dependent on log diameter. In general, small logs yield less usable wood volume than larger logs, due to higher percent bark content and lower lumber recovery values. Estimates based on analysis of FIA records of sawtimber tree measurements in the study area show average of 160 cubic feet per MBF for hardwood sawlogs and 170 cubic feet per MBF for softwood, using the International ¼ log rule. Other log rules, such as Scribner or Doyle, or weight scaling, may be used in specific market situations with higher or lower recovery factors, depending on species, diameter, and other factors.

Usable wood volume contained in standing or delivered logs contain components of both solid wood and bark, however, there is considerable variation in wood and bark density among species. For example, bark percent varies from a low of about 7 percent for thin-barked species such as beech to as much as 25 percent for very thick-barked species such as hemlock. The most common range is between 12 and 20 percent. Specific gravity, the relative weight of a substance compared with that of an equal volume of water varies considerably. The relative weight of dry wood per cubic foot ranges from 0.31 to 0.66 times the weight of a cubic foot of water (62.4 pounds). Some species are twice as dense as others and the wood specific gravity found in common species ranges from 0.31 to 0.66 or about 19 to 41 pounds per cubic foot of dry solid wood. This variation is significant for processes that depend on the mass of wood such as production of wood fuels or chemical conversion. Additional information on sawlog conversion rates, wood-bark components, and specific gravity measures for different species groups and diameters is available.

Table 55. Specific gravity and conversion factors for wood and bark components for common tree species.

	Specific gravity			Pct	Dry weight – lbs/cuft			Cubic feet/dry ton		
Common Name	**Wood**	**Bark**	**Log**	**Bark**	**Wood**	**Bark**	**Logs**	**Wood**	**Bark**	**Logs**
Hardwoods										
Balsam Poplar	0.31	0.50	0.35	20%	19.3	31.2	21.7	103.6	64.1	92.1
Cottonwood	0.37	0.43	0.38	20%	23.1	26.8	23.8	86.6	74.6	83.9
Bigtooth Aspen	0.36	0.50	0.39	20%	22.5	31.2	24.2	88.9	64.1	82.6
Quaking Aspen	0.35	0.50	0.38	20%	21.8	31.2	23.7	91.7	64.1	84.4
Black Willow	0.36	0.50	0.39	20%	22.5	31.2	24.2	88.9	64.1	82.6
Red Maple	0.49	0.52	0.49	14%	30.6	32.4	30.8	65.4	61.7	64.9
Silver Maple	0.44	0.52	0.45	14%	27.5	32.4	28.2	72.7	61.7	71.0
Sugar Maple	0.56	0.54	0.56	19%	34.9	33.7	34.7	57.3	59.4	57.6
Yellow Birch	0.55	0.56	0.55	14%	34.3	34.9	34.4	58.3	57.3	58.1
Paper Birch	0.48	0.56	0.49	14%	30.0	34.9	30.7	66.7	57.3	65.3
Am. Beech	0.56	0.56	0.56	7%	34.9	34.9	34.9	57.3	57.3	57.2
White Ash	0.55	0.34	0.51	18%	34.3	21.2	32.0	58.3	94.3	62.6
Green Ash	0.53	0.34	0.50	18%	33.1	21.2	30.9	60.4	94.3	64.7
Black Walnut	0.51	0.38	0.49	18%	31.8	23.7	30.4	62.9	84.4	65.9
Black Cherry	0.47	0.48	0.47	18%	29.3	30.0	29.4	68.3	66.7	67.9
Black Locust	0.66	0.29	0.59	18%	41.2	17.8	37.0	48.5	112.4	54.1
Am. Basswood	0.32	0.45	0.34	18%	20.0	28.1	21.4	100.0	71.2	93.3
Am. Elm	0.46	0.28	0.43	18%	28.7	17.5	26.7	69.7	114.3	75.0
Hickory spp.	0.62	0.54	0.60	19%	38.7	33.4	37.7	51.7	59.9	53.1
No. Red Oak	0.56	0.65	0.58	19%	34.9	40.6	36.0	57.3	49.3	55.5
Black Oak	0.56	0.57	0.56	19%	34.9	35.4	35.0	57.3	56.5	57.1
White Oak	0.60	0.53	0.59	19%	37.4	33.1	36.6	53.5	60.4	54.6
Scarlet Oak	0.60	0.64	0.61	19%	37.4	39.7	37.9	53.5	50.4	52.8
No. Pin Oak	0.58	0.60	0.58	19%	36.2	37.4	36.4	55.3	53.5	54.9
Softwoods										
Balsam Fir	0.33	0.38	0.34	15%	20.6	23.7	21.1	97.1	84.4	95.0
Tamarack	0.49	0.30	0.46	15%	30.6	18.7	28.8	65.4	107.0	69.5
White Spruce	0.37	0.47	0.38	12%	23.1	29.3	23.8	86.6	68.3	83.9
Black Spruce	0.38	0.38	0.38	12%	23.7	23.7	23.7	84.4	84.4	84.4
Jack Pine	0.40	0.34	0.39	18%	25.0	21.2	24.3	80.0	94.3	82.4
Red Pine	0.41	0.24	0.38	18%	25.6	15.0	23.7	78.1	133.3	84.5
E. White Pine	0.34	0.49	0.37	18%	21.2	30.6	22.9	94.3	65.4	87.3
E. Hemlock	0.38	0.40	0.39	25%	23.7	25.0	24.0	84.4	80.0	83.3

Source: Calculating biomass by component ratio method (CRM) for FIA measured trees. Data provided by M.Hansen, USDA Forest Service, St. Paul, MN. (Spreadsheet: National biomass estimation v8-gr.xls)

Table 56. Conversion factors commonly used In the North Central region.

Species	Cords/ GrTon	Lbs/ Cord	GrTons/ Cord	Lbs/ CF	CF/ GrTon
Ash	0.4330	4,619	2.31	58.5	34.2
Aspen	0.4291	4,661	2.33	59.0	33.9
Balsam fir	0.4688	4,266	2.13	54.0	37.0
Balsam poplar	0.4083	4,898	2.45	62.0	32.3
Basswood	0.5167	3,871	1.94	49.0	40.8
Beech	0.3956	5,056	2.53	64.0	31.3
Black cherry	0.4688	4,266	2.13	54.0	37.0
Black oak	0.3444	5,807	2.90	73.5	27.2
Blackgum	0.3779	5,292	2.65	67.0	29.9
Cottonwood	0.4291	4,661	2.33	59.0	33.9
Elm	0.4018	4,978	2.49	63.0	31.7
Hard hardwoods	0.3708	5,394	2.70	68.3	29.3
Hard maple	0.3617	5,529	2.76	70.0	28.6
Hardwoods	0.3939	5,077	2.54	64.3	31.1
Hemlock	0.4150	4,819	2.41	61.0	32.8
Hickory	0.3701	5,404	2.70	68.4	29.2
Jack pine	0.4688	4,266	2.13	54.0	37.0
Northern white-cedar	0.6329	3,160	1.58	40.0	50.0
Other hardwoods	0.4777	4,187	2.09	53.0	37.7
Red oak	0.3444	5,807	2.90	73.5	27.2
Red pine	0.4688	4,266	2.13	54.0	37.0
River birch	0.3871	5,167	2.58	65.4	30.6
Shortleaf pine	0.3956	5,056	2.53	64.0	31.3
Soft hardwoods	0.4171	4,795	2.40	60.7	33.0
Soft maple	0.4083	4,898	2.45	62.0	32.3
Softwoods	0.4688	4,266	2.13	54.0	37.0
Spruce	0.5014	3,989	1.99	50.5	39.6
Sweetgum	0.3669	5,451	2.73	69.0	29.0
Sycamore	0.4083	4,898	2.45	62.0	32.3
Tamarack	0.4291	4,661	2.33	59.0	33.9
White birch	0.4018	4,978	2.49	63.0	31.7
White oak	0.3723	5,372	2.69	68.0	29.4
White pine	0.4777	4,187	2.09	53.0	37.7
Yellow birch	0.3723	5,372	2.69	68.0	29.4
Yellow-poplar	0.4219	4,740	2.37	60.0	33.3

Table 57. Conversion factors used for determining green and dry biomass weights, by owner.

Conversion Factor	Federal	Private	State/ Local	All Owners
Hardwoods				
Oven dry pounds per cubic foot	30.5	31.2	30.3	30.9
Green pounds per cubic foot	63.5	64.5	63.5	64.2
Cubic feet per oven dry ton	65.6	64.0	66.0	64.7
Cubic feet per green ton	31.5	31.0	31.5	31.2
Oven dry tons per standard cord	1.2	1.2	1.2	1.2
Green tons per standard cord	2.5	2.5	2.5	2.5
Softwoods				
Oven dry pounds per cubic foot	22.8	22.5	22.7	22.6
Green pounds per cubic foot	51.6	50.5	50.1	50.6
Cubic feet per oven dry ton	87.5	88.9	88.2	88.4
Cubic feet per green ton	38.8	39.6	39.9	39.5
Oven dry tons per standard cord	0.9	0.9	0.9	0.9
Green tons per standard cord	2.0	2.0	2.0	2.0
All Species				
Oven dry pounds per cubic foot	27.7	28.1	26.7	27.8
Green pounds per cubic foot	59.2	59.5	57.2	59.0
Cubic feet per oven dry ton	72.2	71.1	75.0	72.0
Cubic feet per green ton	33.8	33.6	35.0	33.9
Oven dry tons per standard cord	1.1	1.1	1.1	1.1
Green tons per standard cord	2.3	2.4	2.3	2.3

Note: Based on the species distribution for growing stock volume in cubic feet, by owner group for zone P13.

Table 58. Distribution of total growing stock volume, dry and green weight for Zone 13, by species.

Rank	Species	Dry Weight	Green Weight	Growing Stock Volume	Oven Dry Weight	Green Weight
Hardwoods		**Pounds per CF**		**Percent**		
1	sugar maple	34.7	70.0	21.2%	26.5%	25.2%
2	red maple	30.8	62.0	12.1%	13.5%	12.7%
3	quaking aspen	23.7	59.0	6.7%	5.7%	6.7%
4	American basswood	21.4	49.0	4.2%	3.2%	3.5%
5	yellow birch	34.4	68.0	3.0%	3.7%	3.5%
6	paper birch	30.7	63.0	2.9%	3.2%	3.1%
7	northern red oak	36.0	73.5	2.8%	3.7%	3.5%
8	bigtooth aspen	24.2	59.0	2.0%	1.8%	2.0%
9	black ash	32.0	58.5	1.4%	1.7%	1.4%
10	black cherry	29.4	54.0	1.1%	1.2%	1.0%
11	white ash	32.0	58.5	1.1%	1.2%	1.0%
12	balsam poplar	21.7	62.0	0.7%	0.6%	0.8%
	Other Hardwoods			2.7%	3.2%	3.0%
	All Hardwood species			62.1%	69.2%	67.5%
Softwoods						
1	northern white-cedar	20.0	40.0	9.9%	7.1%	6.7%
2	eastern white pine	22.9	53.0	5.6%	4.6%	5.0%
3	red pine	23.7	54.0	5.6%	4.8%	5.1%
4	eastern hemlock	24.0	61.0	5.1%	4.4%	5.2%
5	Balsam fir	21.1	54.0	3.9%	2.9%	3.5%
6	white spruce	23.8	50.5	2.7%	2.3%	2.3%
7	black spruce	23.7	50.5	2.5%	2.1%	2.1%
8	tamarack (native)	28.8	54.0	1.5%	1.6%	1.4%
9	jack pine	24.3	54.0	1.1%	1.0%	1.0%
	Other Softwoods			0.1%	0.1%	0.1%
	All Softwood species			37.9%	30.8%	32.5%