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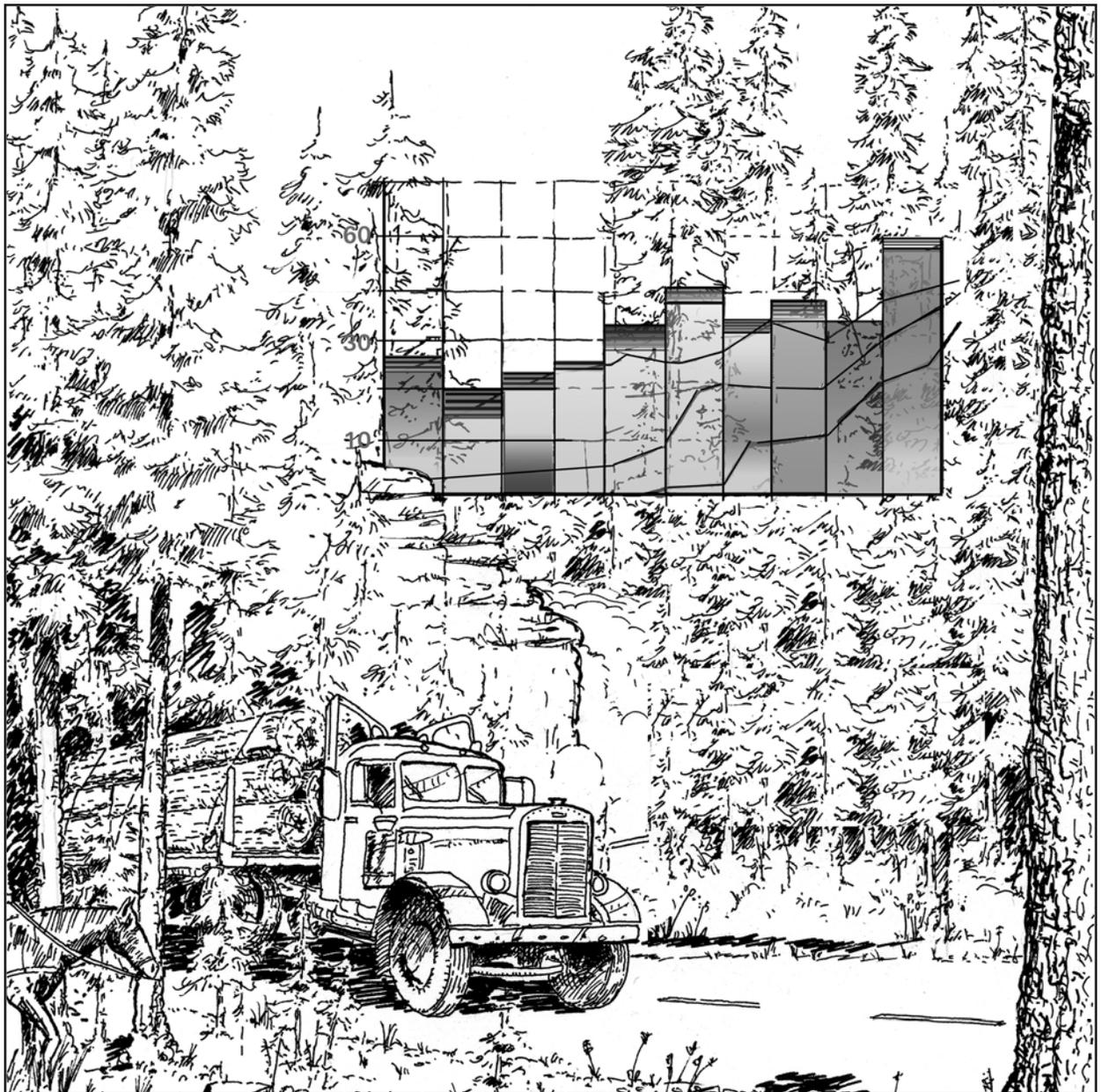
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# Utilization of Oregon's Timber Harvest and Associated Direct Economic Effects, 1998

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## Abstract

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With more than 16 million acres of commercial timberland, Oregon's forest products industry is an important part of Oregon's economy and a major player in the Nation's wood products market. Despite declining production over the last decade, in 1998 Oregon was still the leading producer of softwood lumber and plywood in the United States, and the timber harvested in Oregon is the major supplier of the raw material used by Oregon's wood-processing mills. This report traces the flow of Oregon's 1998 timber harvest through the various primary wood-using industries and investigates the relations between the harvest and key economic variables such as the value of production, employment, and workers' earnings. Also included is a section on Oregon's secondary wood products industry.

Keywords: Wood products industry, timber harvest, economic effects, employment, labor income, sales value, Oregon.

## 1998 Report Highlights

- In 1998, Oregon's primary and secondary wood-using industries generated \$10 billion in sales and employed nearly 75,000 workers earning about \$2.8 billion in labor income.
- Oregon's primary wood products industry employed more than 51,000 workers and paid out \$2 billion in labor income, including logging and forestry, with most (86 percent) of this associated with Oregon's timber harvest.
- Oregon's secondary wood products industry (also referred to as the value-added industry) generated around \$2.9 billion in sales, 23,000 jobs, and \$752 million in labor income. Firms manufacturing doors, windows, moulding, and cutstock generated the most sales revenue at \$701 million.
- The 1998 Oregon timber harvest was an estimated 3,752 million board feet Scribner. This equals 749 million cubic feet (MMCF) of timber of which 64 percent flowed to sawmills, 22 percent to plywood and veneer plants, 10 percent to chipping mills, and another 3 percent directly to pulp, paper, and board plants. The remainder of the harvested timber went to log export companies; shake and shingle mills; and post, pole, and piling facilities.
- The processing of Oregon's timber harvest generated an estimated 350 MMCF of mill residue. Sawmills produced 76 percent of this residue, and plywood and veneer plants produced 24 percent. Other wood products manufacturers produced less than 0.5 percent of the mill residue.
- Of the 350 MMCF of wood fiber residue derived from Oregon's timber harvest, 286 MMCF (82 percent) went to the pulp, paper, and board industry, and 61 MMCF (17 percent) was used as hog fuel or for miscellaneous uses such as firewood, wood fuel pellets, or livestock bedding. The remaining 1 percent of wood fiber residue was in the form of peeler cores shipped to sawmills for processing into lumber (2.5 MMCF) or went unused (1.6 MMCF).

- Altogether, 382 MMCF of wood fiber from Oregon's timber harvest went to the pulp, paper, and board industry, with most of this (75 percent) coming from mill residue. The remaining 96 MMCF was in roundwood form, with 24 MMCF flowing directly to pulp, paper, and board mills and 72 MMCF going to separate chipping mills.
- The stumpage value of Oregon's timber harvest was about \$1.1 billion, or on average, \$300 per thousand board feet (MBF) Scribner of timber harvested, and the mill-delivered log value was about \$1.8 billion.
- The total sales value of products made from Oregon's 1998 timber harvest was \$4.2 billion, of which lumber products accounted for \$1.8 billion; plywood and veneer—\$1.2 billion; pulp, paper, and board products—\$1.2 billion; log exports—\$44 million; and other primary wood products—\$17 million.
- Primary processing of Oregon's timber harvest generated an estimated 44,000 jobs and \$1.7 billion in labor income, including the residue and fiber-processing sector, with harvesting and timber management activities accounting for 46 percent of this employment.
- In addition to the 749 MMCF of timber harvested in Oregon, Oregon's primary wood-using mills processed 148 MMCF of timber from outside of Oregon in 1998, 69 percent of which came from the state of Washington.

## Introduction

With more than 16 million acres of commercial timberland, Oregon's forest products industry is an important part of Oregon's economy and a major player in the Nation's wood products market. Despite a decline in lumber production of 36 percent and in plywood production of 56 percent since 1988, Oregon was still the leading producer of softwood lumber and plywood in the United States in 1998. Oregon mills produced about 5.5 billion board feet, lumber tally, of lumber or nearly 16 percent of U.S. lumber output (Warren 2000). At 3.5 billion square feet of plywood (3/8-inch basis), Oregon was also the Nation's leading producer of softwood plywood, accounting for 12 percent of the Nation's softwood structural panel production (Warren 2000).

The sales value of Oregon's manufactured primary wood and paper products in 1998 was about \$7 billion, with secondary manufacturing adding an additional \$3 billion in value. These sales translated into thousands of jobs and billions of dollars in income for Oregon's residents. In 1998, Oregon's primary and secondary wood and paper products industry employed nearly 75,000 workers earning about \$2.8 billion in labor income.

The primary forest products industry consists of manufacturers that process timber into manufactured wood products and facilities that use the wood fiber residue directly from the timber processors and includes lumber, veneer and plywood, pulp and board, shake and shingle, log export, and post, pole, and piling manufacturers. The secondary industry (also referred to as the value-added industry) comprises facilities such as wood cabinet or furniture manufacturers that further process the outputs from primary forest products industries.

Oregon's timber harvest is the major supplier of raw material for Oregon's wood-processing mills, supplying over 83 percent of the timber used in 1998. This report traces the flow of Oregon's 1998 timber harvest through the various primary wood-using industries and investigates the relations between harvest and key economic variables such as the value of production, employment, and worker's earnings. These relations are examined in sections describing (1) the utilization of Oregon's 1998 timber harvest, (2) the value of the products derived from that harvest, (3) the direct employment and earnings associated with the harvest, and (4) the direct effects of all timber processed in Oregon. We also include a section on the secondary wood products industry to give a more complete view of the wood-using industries in Oregon.

## Oregon's Forest Products Industry—The Last 10 Years

Wood product markets in Oregon, as with the rest of the Nation, were sluggish in 1998 owing to the expanding Asian financial crisis. After near record high prices in the first half of 1997, lumber prices dropped sharply throughout the rest of the year and remained low throughout 1998. Lumber production in Oregon fell slightly in 1998, from 5,589 million board feet (MMBF), lumber tally, in 1997 to 5,486 MMBF, and softwood structural panel production increased from 3,471 million square feet (MMSF), 3/8-inch basis, in 1997 to 3,492 MMSF in 1998 (Warren 2000). The effect of the Asian crisis on the wood products industry in Oregon was most clearly seen in the nearly 17-percent decrease in log exports from the Seattle and Columbia-Snake Custom Districts from 1997 to 1998 (Warren 2000).

Compared to a decade earlier, lumber production, softwood plywood production, and log exports were all significantly lower in 1998. Lumber production in Oregon decreased 36 percent from 1988 to 1998, softwood plywood production by 56 percent, and log exports by 76 percent (from the Seattle and Columbia-Snake Customs Districts combined). In addition, timber flowing into Oregon mills from outside the state increased from 7 percent of total timber processed in 1988 to nearly 17 percent in 1998 (Ward et al. 2000).

Declining harvest levels contributed to the fall in log consumption, and resultant production, by Oregon's primary forest products industries. From 1988 to 1998, Oregon's timber harvest fell almost 60 percent, from 8,615 MMBF in 1988 to 3,542 MMBF in 1998 (Warren 2000). Though harvest fell on all timberlands during this time, regardless of major ownership category, the largest effect came from the decline in harvest on federal lands, which fell more than 89 percent over the 10-year period. Harvest on state lands fell nearly 48 percent, and private timber harvest fell 13 percent (Warren 2000). The fall in timber harvest was due primarily to legislative and administrative requirements emphasizing nontimber resources and habitat conservation strategies over timber production, particularly on federal lands.

As a result, the number of primary mills, and thereby log consumption, decreased dramatically. In 1988, 360 separate mills used about 8.8 billion board feet of logs. By 1998, the number of mills had fallen to 200, and log consumption had dropped to 4.5 billion board feet (Howard and Ward 1991, Ward et al. 2000). Changes in Oregon's forest products industry during this time also reflect the continuing substitution among forest products. In particular, expansion of reconstituted structural panel production such as oriented strand board has taken markets away from plywood, which is more expensive to produce. Moreover, expanded production of these reconstituted structural panels has been seen in regions other than the Western United States (Haynes 2001).

During this same time, employment in Oregon's wood-using industries (not counting furniture) fell from 89,693 workers in 1988 to 71,360 workers in 1998, a decrease of more than 20 percent. The decrease in employment, however, was proportionally much smaller than either the decrease in timber harvested or the decrease in log consumption. In fact, employment per MMBF harvested doubled from 1988 to 1998, from 10 workers per MMBF harvested to 20 workers per MMBF. This increase in labor intensity was due to several factors including:

- Expansion of the secondary wood products industry.
- Increased use of timber from other states and Canada.
- Reduced volume of log exports.
- The use of lower quality timber, which requires more labor to harvest and process.
- More labor-intensive harvesting practices owing to environmental and aesthetic considerations.
- Increased use of recycled fiber by pulp, paper, and board mills.

## Data Sources and Methodology

We describe available timber harvest and use data and outline possible reasons for discrepancies between the sources, but we do not imply that one source is more accurate than the other. It is difficult, if not impossible, to report exactly how much timber is harvested in a region during a particular period. Lump sum sales, differences in conversion factors, and problems with determining dates of harvest versus log flow together make determining the volume of timber harvested particularly complex. It is not cost effective, therefore, to estimate the volume of timber harvest with extreme accuracy.

## Timber Harvest and Use Data

Two sources of timber harvest data were available for use in this report. The Timber Harvest Report, published by the Oregon Department of Forestry (2000b), gives data on volume harvested by major ownership type estimated at 3,452 MMBF Scribner for 1998. The other source of harvest data is a report on Oregon's forest products industry by Ward et al. (2000), which states that 3,752 MMBF of logs flowed to mills in Oregon from Oregon's 1998 timber harvest. The analysis in the remaining sections of this report is based on the timber harvest and wood fiber flow reported in Ward et al. (2000) as it is the only source that (1) identifies product use and (2) identifies log flows and residue use.

Possible reasons for the differences between the volumes reported by the two sources are outlined below. If adjustments were made to the reported values as discussed, reasons 1, 2, and 3 would tend to make the two values even further apart; reason 4 would bring the values closer together, and it is unclear what effect reasons 5 and 6 would have on the difference between the two values.

1. Ward et al. (2000) report the volume of logs flowing to Oregon's primary wood product mills in 1998 from Oregon and other regions. Timber flowing out of Oregon to mills in other states is not reported. Therefore, the log flow volumes reported in the Ward et al. (2000) understate Oregon's timber harvest.
2. Although the response rate for the survey in Ward et al. (2000) was 92 percent, several of the 17 nonrespondent mills were relatively large (using more than 25 MMBF each), leading to an understatement of timber use.
3. Timber harvest reporting for tax purposes may sometimes result in harvests being reported in later periods, such as when payment was received. Given that 1997 wood product prices were higher than 1998 prices, the volume of private timber sold was likely higher. If much of the 1997 harvest was reported in 1998, it would lead to an overstatement of ODF harvest for that year.
4. Comparing Tables 3 and 7 of Ward et al. (2000) reveals that most of the logs of unknown origin (100,800 MBF of the 126,043 MBF of unknown origin) were attributed to the state of Oregon in the log flow table. If these logs were from out of state, then the harvest from Oregon reported by Ward et al. (2000) is overstated.
5. The two reports likely use different conversion factors to convert pulpwood and small saw logs sold on a green ton basis to board feet.

6. Ward et al. (2000) report consumption of timber and the ODF reports harvest. This could lead to differences in several ways:
- Changes in beginning and end-of-year log inventories at the mills will lead to a difference between what was harvested and delivered to a mill and what was processed by that mill.
  - The volume delivered to a mill, which is often scaled as it is received, generally forms the basis for the estimate of harvest volume for various ownerships. The volume processed for that same batch of logs may be tallied in a different fashion, for example, via automated scanning or using an estimate of drain from log deck inventory. Also, different agencies or entities may require specific and differing scaling standards. The mills might purchase logs by using these standards but keep records based on their own standards.
  - Lump sum timber sales can cause problems with reported harvest levels. Dates of harvest versus dates of consumption or log acquisition may not be exactly the same. Some lump sum timber sales are reported as cut when sold by the agencies, but mills may not report them until they are harvested and received. In fact, 1998 was a low harvest year, so if Ward et al. (2000) included any data from 1997 harvests (but reported as acquired or consumed by the mill in 1998) it would inflate the volume in Ward et al. (2000). Additionally, the timber volume for a lump sum sale is estimated and is most likely not the actual volume that is delivered to, and reported by, the mills.

### **Estimating Employment, Labor Income, and Sales Value**

To estimate employment and labor income in the primary and secondary forest products industries, we use four standard industrial classifications (SIC) that closely correspond to the industry. These classifications, as defined by the U.S. Office of Management and Budget, are SIC 08—Forestry, SIC 24—Lumber and Wood Products, SIC 25—Furniture and Fixtures, and SIC 26—Paper and Allied Products. Total employment and labor income for the forest products industry came from the U.S. Department of Commerce, Regional Economic Information System (U.S. Department of Commerce, Bureau of Economic Analysis 2000).

Although these industrial classifications give a good representation of forest industry employment and labor income, the correspondence is not exact. A number of activities involving several thousand workers associated with forest products are not included in these categories including log hauling by independent truckers; truck, rail, or barge transport of logs, wood fiber, or finished products; and forest management activities by government employees. Also, some workers in the secondary industry are included in these categories, but their work is not entirely related to Oregon's timber resources, or wood products in general. For example, the activity of mobile home manufacturers included in SIC 24 is more closely related to the region's construction activity than to the wood products industry.

The proportion of employment and income for the individual sectors was estimated by using data from Oregon Covered Employment and Payroll for 1998 (Oregon Employment Department 2000), as well as the 1997 Census of Manufacturers (U.S. Department of Commerce, Bureau of the Census 2000b) and 1998 County Business Patterns (U.S. Department of Commerce, Bureau of the Census 2000a). Because SIC 25, Furniture and Fixtures, includes metal furniture as well as wood furniture, Covered Employment and County Business Pattern data were used to estimate the amount of employment attributable to wood furniture only. Employment and labor income was distributed among the various products within a sector, such as lumber versus mill residue, according to sales value.

Published employment and wage data for Oregon's forest products industry pertain to the entirety of Oregon's forest products industry, not just that portion attributable to Oregon's timber harvest. Therefore, to estimate the portion of employment and wages attributable to Oregon's timber harvest, we first calculated employment and wage-consumption ratios using our sector-specific employment and wage estimates and all data on the flow of logs to the various mill types from Ward et al. (2000). Then, to determine the amount of employment and wages attributable to Oregon's timber harvest, these calculated ratios were combined with information on the flow of logs coming specifically from Oregon's timber harvest to the various mill types (Ward et al. 2000). Additionally, we assumed that the relation between log consumption and employment and labor income that occurred in Oregon was also true for other states and, therefore, the same employment and wage-consumption ratios were used for Oregon timber processed in other states. For the pulp, paper, and board industry, the employment, labor income, and sales value derived from Oregon's timber harvest were calculated by (1) estimating the percentage of Oregon's pulp and paper mills' wood fiber consumption that is attributable to Oregon's timber harvest and (2) multiplying total employment, labor income, or sales value in Oregon's primary pulp, paper, and board industry by this percentage.

Sales values for the other primary industries were estimated by converting the output of each sector into the appropriate market units (e.g., thousands of board feet, lumber tally, for lumber and thousands of square feet, 3/8-inch basis, for plywood) and multiplying by an average market price per unit. Average market prices for the various products were estimated by using information from Random Lengths (Random Lengths Publications 1998), the 1997 Economic Census of Manufacturers (U.S. Department of Commerce, Bureau of the Census 2000b), the Directory of Wood Products Industry (Miller Freeman Publications 1998), the Statistical Yearbook of the Western Lumber Industry (Western Wood Products Association 1999), and conversations with various mills. Delivered log values were estimated by using information from published log price reports from the Oregon Department of Forestry (2000a), as well as conversations with various mills.

## Utilization of Oregon's Timber Harvest, 1998

Although declining timber harvests in Oregon have resulted in an increase in consumption of logs from other states and Canada, 83 percent of the timber used by Oregon's primary forest products industry in 1998 came from within the state. Oregon's primary forest products industries include lumber; veneer and plywood; pulp and board; shake and shingle; log export; and post, pole, and pilings. The pulp, paper, and board sector consists of many pulp and paper mills as well as mills producing hardboard, particle-board, insulation board, and composition panel.

Figures referring to Oregon's timber harvest include timber products shipped to other states, primarily Washington. They do not include timber that was harvested in other states and shipped to Oregon for processing. Tables and figures dealing with the utilization of Oregon's timber harvest and the associated sales value, employment, and labor income reflect the direct effects of Oregon's timber harvest on Oregon and surrounding states.

Both mill residue products and timber products are displayed in the diagrams and tables describing timber flow; therefore, volumes are presented in cubic feet, rather than board feet, Scribner. The following conversion factors were used to convert Scribner volume to cubic-foot volume:

- 5 board feet, Scribner, per cubic foot for saw logs.
- 5.5 board feet, Scribner, per cubic foot for veneer logs and log exports.
- 4.2 board feet, Scribner, per cubic foot for pulpwood.
- 4.5 board feet, Scribner, per cubic foot for posts, poles, pilings, and cedar product logs.

## Timber Flow

In 1998, Oregon's timber harvest was about 749 million cubic feet (MMCF), exclusive of bark (fig. 1). The largest volume, 476 MMCF, flowed to sawmills, and plywood and veneer plants received 162 MMCF of timber. About 96 MMCF of pulpwood in round form went to chipping facilities with 24 MMCF going directly to pulp and paper mills and the remaining 72 MMCF going to separate chipping mills. An additional 4 MMCF went to other manufacturers, which included post, pole, and piling facilities as well as shake and shingle mills. Finally, 11 MMCF of timber flowed to log export companies in 1998.

Sawmills received 64 percent of the volume harvested in Oregon in 1998. In addition to 476 MMCF of harvested timber, they received 3 MMCF of peeler cores from plywood and veneer plants. Of the total 479 MMCF, 45 percent became lumber or other sawn products. The remaining 55 percent of the volume, 265 MMCF, became wood residue. Most of this residue, 220 MMCF, went to pulp, paper, and board plants in Oregon and other states. The remaining 45 MMCF of residue was used as hog fuel (36 MMCF) and for various uses such as firewood, wood fuel pellets, and livestock bedding (9 MMCF) with less than 0.007 MMCF going unused.

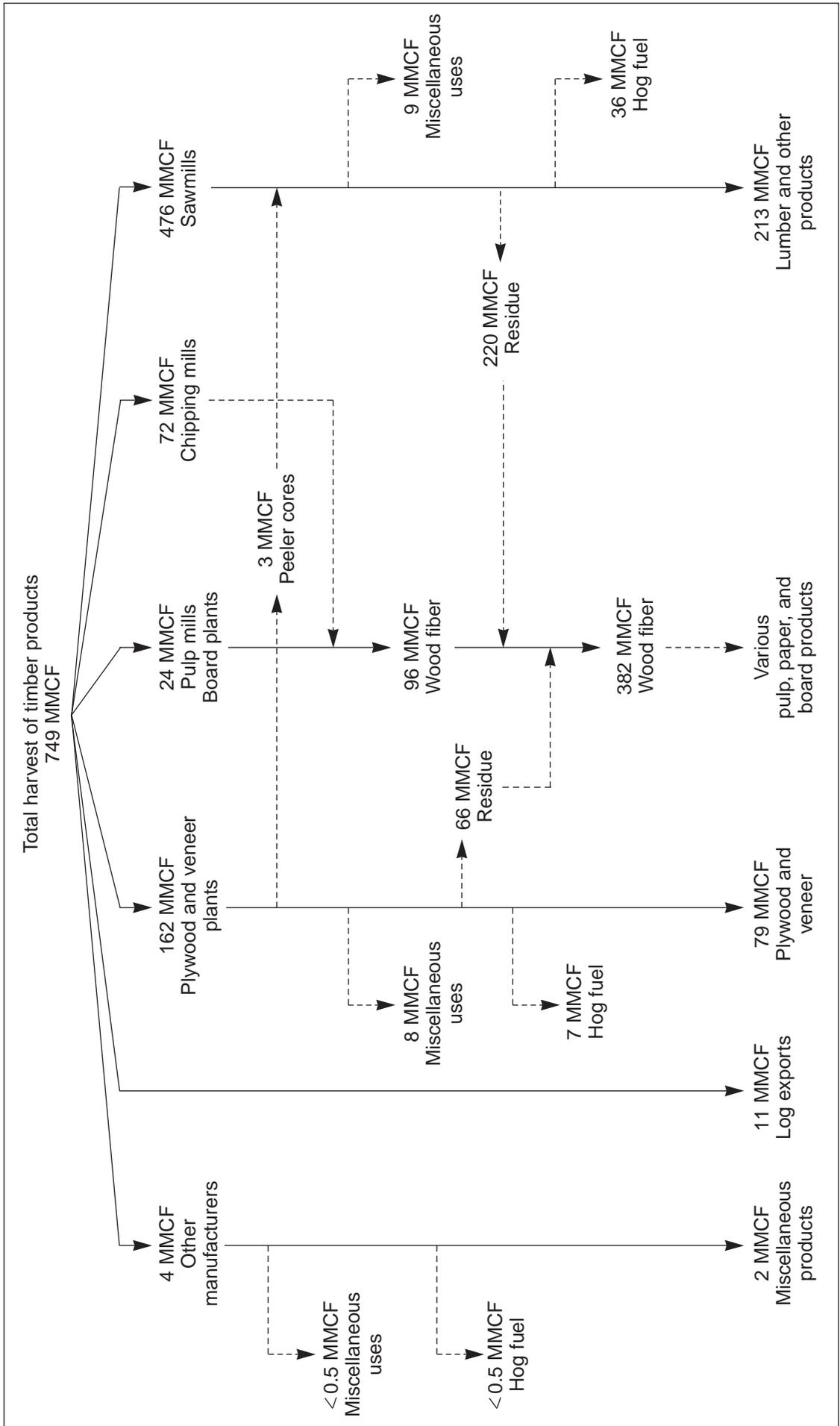


Figure 1—Utilization of Oregon's timber harvest, 1998.

## Value of Shipments

Nearly 22 percent, 162 MMCF, of Oregon's timber harvest went to plywood and veneer plants with about half becoming plywood or veneer and the other half becoming mill residue. Of the 84 MMCF of residue generated by plywood and veneer plants, 79 percent (66 MMCF) flowed to pulp, paper, and board plants, 9 MMCF became hog fuel, 8 MMCF was used for other miscellaneous purposes, and 3 MMCF of peeler cores was shipped to sawmills for processing into lumber. Only 0.4 MMCF of residue generated by plywood and veneer plants was reported as going unused.

About 24 MMCF of Oregon's timber was pulpwood delivered directly to pulp and paper mills. Additionally, 72 MMCF of pulpwood was received by Oregon's chipping mills and then sold to pulp and paper mills as chips. Another 286 MMCF of mill residue from Oregon's sawmills and plywood and veneer plants was used by pulp, paper, and board mills, so that altogether 382 MMCF of wood fiber from Oregon's timber harvest flowed to pulp, paper, and board mills, both in and out of Oregon.

Other primary manufacturers (shake and shingle mills; post, pole, and piling facilities) received 4 MMCF of Oregon's timber harvest. The amount of residue generated by these facilities varies widely. Based on previous work and conversations with producers, we have assumed that two-thirds of the timber becomes finished product and one third becomes residue. Given this assumption, less than 0.5 MMCF of residue was used for hog fuel or other miscellaneous uses, whereas less than 1,000 CF of the residue produced by shake and shingle mills went unused. For the 1.2 MMCF of residue estimated to have come from post, pole, and piling facilities, no breakdown was available concerning its use.

The value of Oregon's timber harvest includes value from stump to finished product f.o.b. the processing mill. Stumpage values for all timber products were calculated by subtracting logging costs from delivered log prices. According to the Oregon Department of Forestry (2000b), logging costs (including haul costs) run from \$125 to \$225 per MBF. We used an average logging cost of \$175 per MBF for all timber except pulpwood. For pulpwood, we used the low of \$125 per MBF, which because of its low value is generally harvested from sites on flat ground near the mill or in conjunction with the harvesting of higher valued logs, leading to lower marginal logging costs.

The stumpage value of Oregon's 1998 timber harvest was estimated to be around \$1.1 billion, or on average, \$300/MBF harvested for all timber products (fig. 2). By the time the logs were delivered to the mill, the value of the harvest had increased to \$1.8 billion. Timber delivered to sawmills accounted for 60 percent of the delivered log value, at \$1.1 billion, and timber flowing to plywood and veneer plants accounted for nearly a third of the value, at \$580 million. Timber received by chipping mills and pulp, paper, and board plants accounted for another 4 percent of the delivered log value, and timber delivered to other manufacturers accounted for less than 1 percent. The remaining \$44 million (2 percent) of delivered log value is attributable to the log export sector.

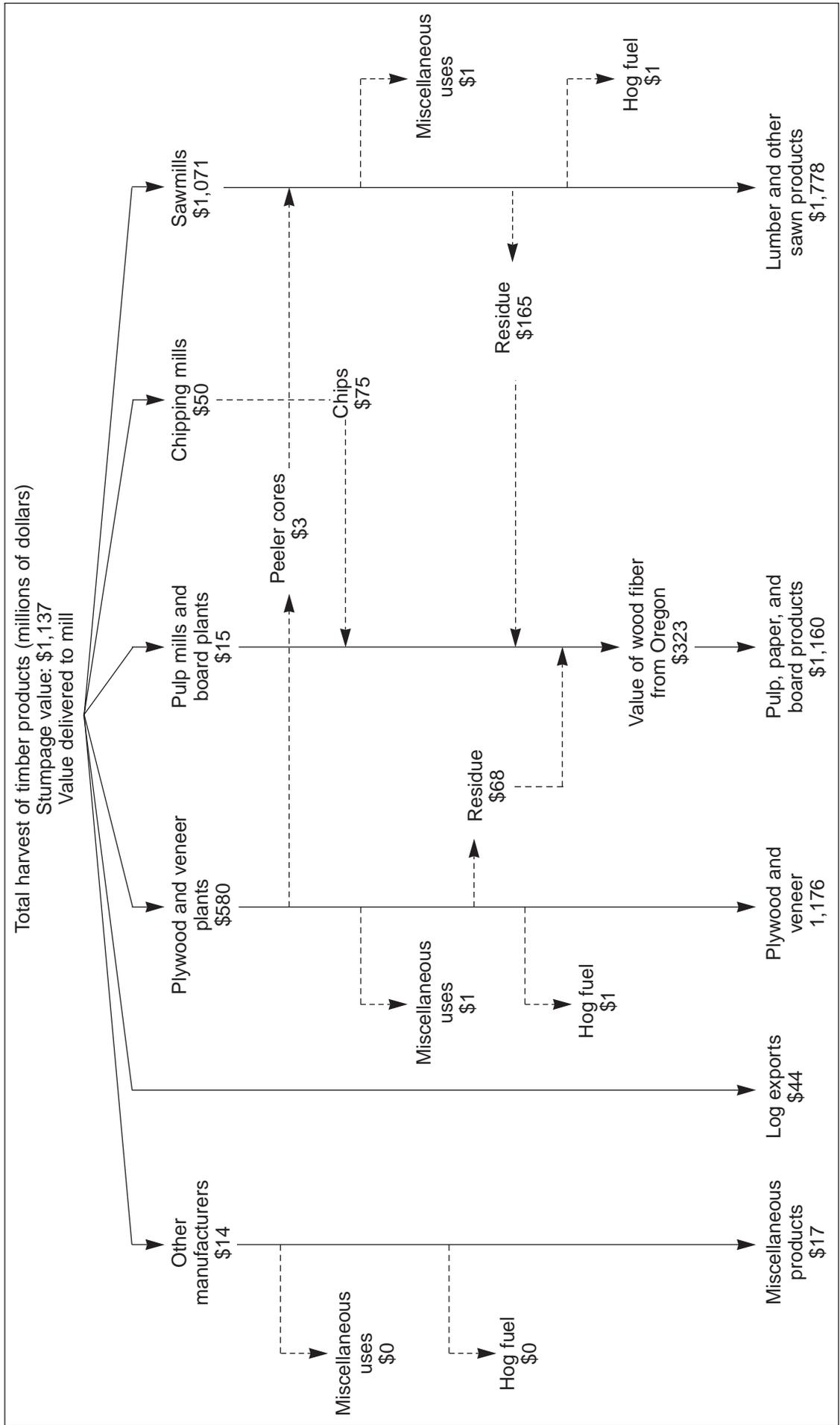


Figure 2—Sales value of primary wood products produced from Oregon's timber harvest, 1998.

The value added during the actual production of primary wood products was substantial. For the lumber sector, sales value in 1998 (not counting residue) was estimated to be \$1.8 billion, an increase of more than \$700 million (65 percent) from the delivered log value. Additionally, we estimate that the sale of residue from the milling process created another \$171 million in revenue for the lumber industry. For plywood and veneer, the value added in the production process was about \$596 million, an increase of more than 102 percent over the delivered log value. The sale of mill residue generated another \$73 million in revenue for the plywood and veneer industry.

In 1998, \$15 million of pulpwood flowed directly to the pulp, paper, and board industry. Another \$75 million worth of pulpwood was delivered to pulp, paper, and board mills via Oregon's chipping mills, and \$233 million worth of mill residue from sawmills and plywood plants flowed to pulp, paper, and board mills both in and out of Oregon. Altogether, \$323 million of wood fiber attributable to Oregon's timber harvest was consumed by the pulp, paper, and board industry. With this residue, the pulp, paper, and board industry generated an estimated \$1.2 billion in pulp, paper, and board products. The value added by production was, therefore, about \$837 million. Finally, other primary wood manufacturers added another \$3 million in value to the \$14 million worth of timber delivered to them from Oregon's timber harvest.

## **Employment and Labor Income**

The 749 MMCF of timber harvested in Oregon in 1998 generated an estimated 44,000 jobs in the primary forest products industry and \$1.7 billion in labor income, including the residue and fiber processing sector (fig. 3). Timber management and the actual harvesting of the timber accounted for about 46 percent of the employment and 41 percent of the labor income with 20,220 workers and \$707 million in labor income. Sawmills accounted for the next largest share of employment and income with 9,606 jobs and \$371 million in labor income. Distributing this employment and labor income according to the sales value of each of the products shows that the bulk of the employment and labor income was due to the production of lumber and other sawn products (8,761 workers and \$338 million in labor income). The mill residue from the lumber production generated another 845 jobs and \$33 million in labor income, with 96 percent of the employment and income associated with the sale of mill residue to pulp, paper, and board plants.

The plywood and veneer industry employed about 19 percent of the workers and paid out 19 percent of the labor income generated from the 1998 harvest, or about 8,539 workers and \$327 million in labor income. Most of the employment and income (8,042 workers and \$308 million) in this sector came from the production of plywood and veneer, whereas the rest can be attributed to the production of mill residue. Of the remaining 497 jobs and \$19 million in labor income associated with mill residue, all but 32 jobs and \$1.2 million were due to the mill residue sold to pulp, paper, and board plants in Oregon and elsewhere.

Pulp, paper, and board plants, both in and out of Oregon, received about 382 MMCF of wood fiber from Oregon's timber harvest: 286 MMCF of wood fiber residue from sawmills and plywood and veneer plants and 96 MMCF from timber delivered directly to pulp and paper mills or chipping plants. The processing of this wood fiber generated an estimated 4,178 jobs and \$234 million in labor income. Other primary wood manufacturers accounted for less than 1 percent of the total employment and labor income generated by the Oregon timber harvest. In addition, log export is estimated to have accounted for 248 jobs and \$9.6 million in labor income.

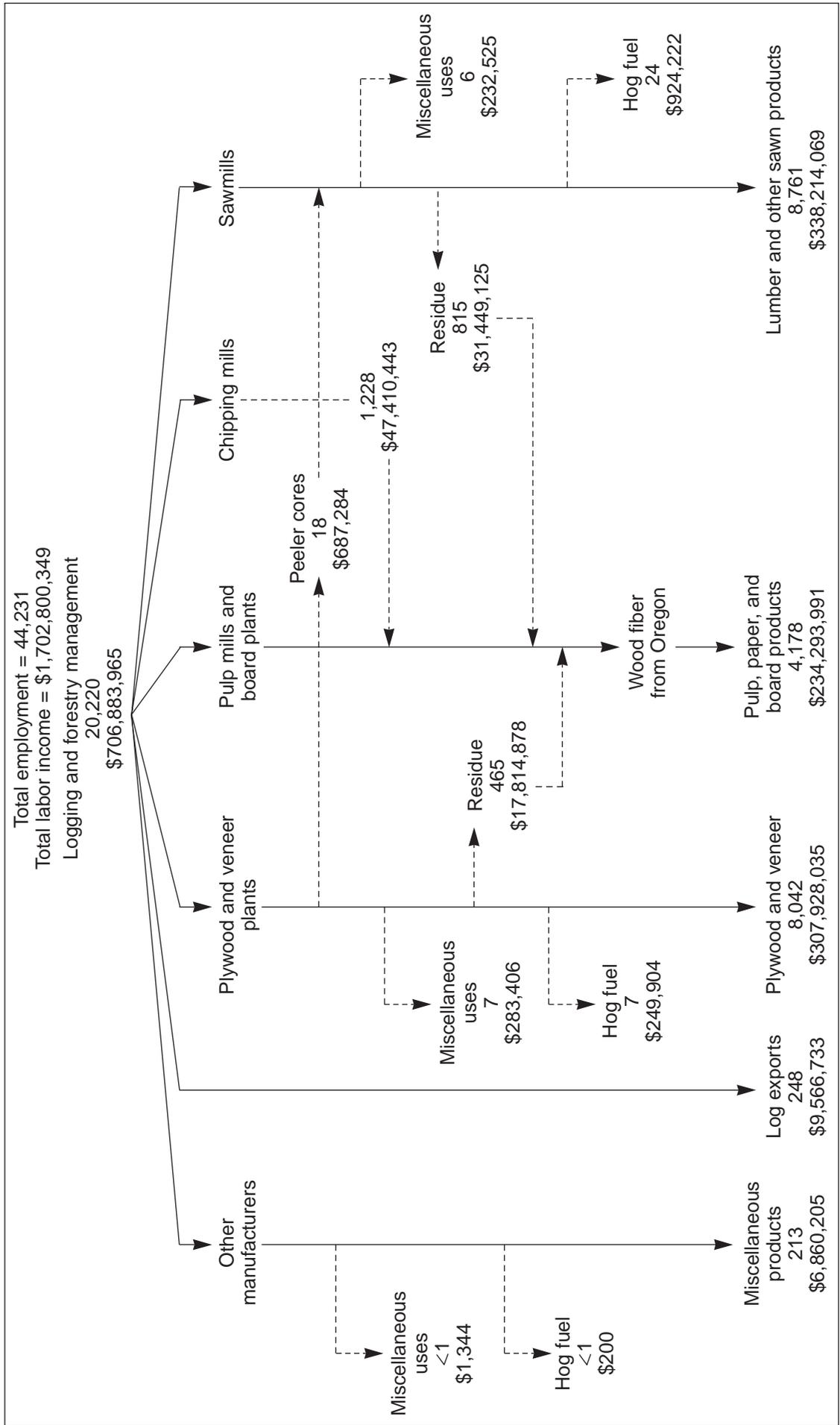


Figure 3—Primary forest industry employment and labor income attributable to Oregon's timber harvest, 1998.

**Table 1—Log flow to Oregon mills by industry and state of origin, 1998**

Industry	Oregon	Washington	California	Idaho	Other	Total
----- Millions of cubic feet -----						
Sawmills	476	78	10	3	8	575
Chipping	72	6	1	0	0	79
Pulp, paper, and board	24	0	3	0	6	33
Plywood and veneer	162	18	15	1	0	196
Log export	11	0	0	0	0	11
Other	4	< 0.5	< 0.5	0	0	4
<b>Total</b>	<b>749</b>	<b>102</b>	<b>29</b>	<b>4</b>	<b>14</b>	<b>898</b>

**Table 2—Wood fiber consumption by Oregon pulp and paper mills**

Type	From Oregon	From other	Total
----- Millions of cubic feet -----			
Timber in round form	24	9	33
From chipping mills	53	20	73
Chips from mill residue	108	42	150
Sawdust	47	16	63
Shavings	32	11	43
Bark	22	8	30
Total residue	286	106	392
Recycled fiber			124
Market pulp			2
<b>Total wood fiber consumption</b>	<b>286</b>	<b>106</b>	<b>518</b>

**Direct Effects of Oregon's Wood Products Industry**

The previous three sections have described the flow of Oregon's 1998 timber harvest through the primary forest products industry and the associated effects on sales value, employment, and labor income. In the next two sections, we look at the direct effects of the entire wood-products industry in Oregon by including timber or residue purchased from other states but processed by Oregon's primary mills. We also include a section on Oregon's secondary wood products industry.

**Primary Wood Products Industry**

Table 1 shows log consumption by Oregon's mills in 1998 by area of origin. In addition to the 749 MMCF of timber coming from the 1998 Oregon harvest, Oregon's mills processed 149 MMCF of timber from outside the state. More than 68 percent of out-of-state timber (102 MMCF) came from the state of Washington, with the largest amount (78 MMCF) flowing to Oregon's sawmills. The remaining 47 MMCF came from California (29 MMCF), Idaho (4 MMCF), and other states and Canada (14 MMCF).

In 1998, Oregon's pulp, paper, and board industry consumed about 518 MMCF of wood fiber (table 2). More than 55 percent of this fiber is estimated to have come from Oregon's timber harvest, about 21 percent from other states, and 24 percent from recycled fiber and market pulp of unknown origin. The largest percentage of the wood fiber consumed by Oregon's pulp, paper, and board mills (29 percent) was chips from

**Table 3—Direct economic effects of Oregon’s primary wood products industry on Oregon’s economy, by sector, 1998**

Industry	Out-of-state timber and wood fiber		Oregon’s timber harvest		Total	
	Employment	Labor income	Employment	Labor income	Employment	Labor income
		<i>Dollars</i>		<i>Dollars</i>		<i>Dollars</i>
Forestry	0	0	7,033	281,980,000	7,033	281,980,000
Logging	0	0	13,187	424,903,965	13,187	424,903,965
Sawmills	2,000	77,216,445	9,605	370,819,941	11,605	448,036,387
Chipping	106	4,093,799	1,228	47,410,443	1,334	51,504,242
Pulp, paper, and board	3,399	190,634,784	4,178	234,293,991	7,578	424,928,774
Plywood and veneer	1,794	68,687,503	8,539	326,963,507	10,333	395,651,011
Log export	0	0	248	9,566,733	248	9,566,733
Other	27	835,037	213	6,861,769	240	7,696,806
<b>Total</b>	<b>7,326</b>	<b>341,467,568</b>	<b>44,231</b>	<b>1,702,800,349</b>	<b>51,558</b>	<b>2,044,267,918</b>

sawmills and plywood and veneer plants, most of which came from the state of Oregon. The second largest type of wood fiber consumed by Oregon’s pulp, paper, and board mills was recycled fiber, which made up around 24 percent of the fiber consumed in 1998. To arrive at these estimates, we assumed that the percentage of chips from mill residue purchased from within the state of Oregon was about the same as (1) the percentage of chips purchased from chipping mills in Oregon, and (2) the percentage of sawdust and shavings purchased from sawmills and plywood and veneer plants in Oregon. From Ward et al. (2000), both of these percentages were calculated to be around 72 percent.

The processing of the timber and wood fiber brought in from outside the state contributed additional employment and labor income for Oregon residents (table 3). In total, Oregon’s primary wood products industry employed an estimated 51,558 workers and paid out \$2 billion in labor income, including logging and forestry. Most of this, 86 percent, was associated with wood fiber derived from Oregon’s 1998 timber harvest. Wood fiber flowing to Oregon’s mills from outside the state accounted for 7,327 jobs and \$341 million in labor income. Most of these jobs (3,399) were generated from out-of-state wood fiber (including recycled and market pulp of unknown origin) flowing to Oregon’s pulp and paper mills. Out-of-state timber provided another 2,000 jobs in the sawmill industry and 1,794 jobs in the plywood and veneer industry. The remaining 133 jobs generated by out-of-state timber were in chipping mills; shake and shingle mills; and post, pole, and piling facilities.

### **Secondary Wood Products Industry**

For a more complete picture of Oregon’s wood products industry, we consider the sales value generated by Oregon’s secondary wood products industry along with the associated employment and labor income. The secondary wood products industry consists of facilities that further process the outputs from primary wood-using industries, producing such goods as doors and windows, prefabricated buildings, cabinets, furniture, and so forth.

**Table 4—Profile of Oregon’s secondary wood products manufacturers by sector, 1998**

Industry	Employment	Labor income	Sales
		----- Dollars -----	
Trusses, structural building components	2,003	72,224,500	606,305,745
Doors, windows, moulding, cutstock	8,120	252,428,766	700,925,377
Wood preservation	458	16,231,479	104,514,387
Wood kitchen cabinets	1,526	42,722,299	123,991,820
Wood containers	434	9,222,206	51,869,477
Wood buildings and mobile homes	3,697	121,222,033	427,877,104
Wood furniture	3,207	86,058,057	228,413,823
Pulp and paper products	2,866	126,887,851	561,578,000
Other	947	24,824,868	75,578,105
Total	23,258	751,822,059	2,881,053,838

Table 4 breaks down Oregon’s major secondary wood products manufacturers by product type. Not included are manufacturers that use wood products but that are classified under other industries (i.e., archery equipment, which is classified under sporting goods).

During the 1990s, employment in the secondary wood products industry increased about 7 percent, generating 23,259 jobs, \$752 million in labor income, and \$2.9 billion in sales value in 1998 (U.S. Department of Commerce, Bureau of Economic Analysis 2000). Secondary manufacturers use various wood types, many of which are purchased within the state of Oregon, but substantial volumes come from outside the state. The following discussion describes the entire secondary wood products industry and does not attempt to determine how much of the production is attributable to Oregon’s timber harvest.

Of the eight types of manufacturers listed, firms manufacturing doors, windows, moulding, and cutstock generated the most sales revenue at \$701 million, nearly a quarter of the total sales value. They also employed the most people, 8,120 employees, and paid out the most in labor income, at \$252 million.

The next largest sector in terms of sales value was trusses and structural building components, which generated \$606 million in sales revenue. This sector ranked fifth, however, in terms of both labor income and employment. The second largest sector in terms of employment was wood buildings and mobile homes, accounting for 3,697 employees. Secondary pulp and paper products came in second with regard to labor income, at \$127 million. Together, the top four sectors in terms of labor income and employment accounted for 67 percent of sales value, 77 percent of employment, and 78 percent of labor income. The smallest sector consisted of manufacturers producing wood containers, with \$52 million in sales value, 434 employees, and \$9 million in labor income.

**Table 5—Direct economic effects of Oregon’s wood products industry on Oregon’s economy, 1998**

Industry	Employment	Labor income	Sales value
		----- Dollars -----	
Forestry	7,033	281,980,000	
Logging	13,187	424,903,965	
Primary forest products	31,338	1,337,383,953	7,461,600,801
Secondary wood products	23,259	751,822,059	2,881,053,839
Total	74,817	2,796,089,977	10,342,654,640

**Oregon’s Forest  
Products Industry:  
Putting It All  
Together**

Table 5 gives a complete picture of Oregon’s wood-using industry, showing the estimated sales value, employment, and labor income attributable to Oregon’s primary and secondary forest products industry in 1998. The sales value of manufactured primary and secondary wood and paper products in 1998 was about \$10.3 billion, with primary wood products accounting for \$7.5 billion or 73 percent of the value, and secondary manufacturing adding an additional \$2.8 billion in value. These sales translated into the employment of nearly 75,000 workers earning roughly \$2.8 billion.

This report describes the state of Oregon’s wood using industry in 1998—a year of weak markets largely attributable to poor global economic conditions stemming primarily from the Asian financial crisis. Since 1998 there have been dramatic swings in market conditions but only modest changes through 2001 in the size and output of Oregon’s wood and paper products industry. A stronger U.S. and global economy in 1999 led to improved prices, higher output, and slightly higher employment. Oregon’s forest products industry again experienced weakened demand during calendar year 2000, worsening in 2001 with an official U.S. recession, the September 11 terrorist attacks, and poor global conditions including a recession in Japan.

In terms of output and sales value the performance of Oregon’s industry in 2000 was very similar to the 1998 levels discussed in detail in this report with employment at about 75,000, Oregon again leading the Nation in lumber production, and sales value of wood and paper products at about \$10 billion. Modest declines appear to have occurred in 2001, but the wood and paper products industry remains important in the Oregon economy, and the state remains one of the Nation’s leading wood products producers (Western Wood Products Association 2001, U.S. Department of Commerce, Bureau of Economic Analysis 2002).

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