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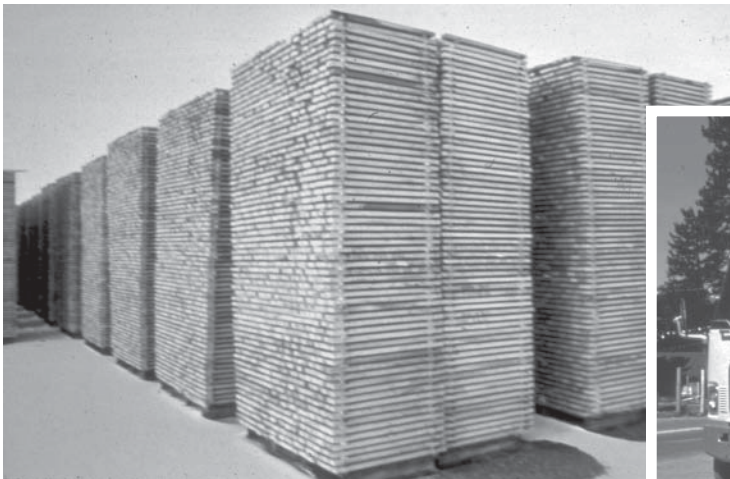
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Idaho's Forest Products Industry: A Descriptive Analysis

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Abstract

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This report provides a description of the structure, capacity, and condition of Idaho's primary forest products industry; traces the flow of Idaho's 2001 timber harvest through the primary sectors; and quantifies volumes and uses of wood fiber. The economic contribution of the forest products industry to the State and historical industry changes are discussed, as well as trends in timber harvest, production, and sales.

Keywords: Idaho, forest economics, mill residue, primary forest products, timber harvest

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Report Highlights

- A total of 109 primary forest products plants operated in Idaho in 2001. These plants included 35 sawmills, 22 post, pole, and other roundwood product manufacturers, 21 house log and log home manufacturers, 17 plants utilizing mill residues to produce various products including pulp, paper, particleboard, landscaping bark, and electricity, 10 cedar products manufacturers, and 4 plywood and veneer plants.
- Total sales value for Idaho's primary forest products was \$1.65 billion in 2001. The majority of product sales, excluding residue-related products, were to markets outside of Idaho: Far Western States (24 percent of all sales), Rocky Mountain States (23 percent), and North-Central States (20 percent). Idaho's share was the fourth largest market with 14 percent of sales.
- Three sectors account for over 95 percent of total sales: sawmills, plywood and veneer, and residue-utilizing plants.
- Idaho sawmills processed 89 percent of the timber harvested in Idaho and produced 1.76 billion board feet in 2001, with plants producing over 10 MMBF annually accounting for over 98 percent of total production.
- Idaho sawmills recovered 1.86 board feet lumber tally per board foot of Scribner input—the highest level on record and a 19 percent increase since 1990. Higher recovery is due to advanced milling technology as well as greater utilization of small diameter timber.
- Virtually 100 percent of Idaho's mill residues were utilized in 2001, the highest degree of utilization in any census year. Over 98 percent of residues are used either as raw material by the residue-related products sector or as hogfuel.
- Idaho's forest products industry's annual capacity to process sawtimber has decreased nearly 25 percent, from over 1,700 MMBF in 1990 to just under 1,300 MMBF in 2001. In 2002, capacity slipped to 1,225 MMBF, and to less than 1,150 MMBF in 2003.
- Approximately 17,900 workers, earning over \$900 million (2001 dollars), were employed in the forest products industry in Idaho in 2000. The primary sectors accounted for approximately 12,700 workers, while the secondary sectors employed the remaining 5,200.
- Idaho's 2001 timber harvest was 1,007 MMBF Scribner, a 40 percent decline from the 1990 harvest level due to an 89 percent decrease in harvest from National Forests. Harvest volumes from private and other public lands have remained relatively stable, but the proportion of harvest from private lands has increased substantially.

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Introduction

This report focuses on the results of a Statewide census of Idaho's primary forest products industry for calendar year 2001. We also discuss trends since 2001 as well as longer term historic trends drawn from other sources. Our principal goals are to determine how Idaho's timber harvest is utilized, identify the type and number of primary forest products firms operating in Idaho during 2001, describe the sources of raw material, and quantify volumes of finished products and sales values.

Primary forest products manufacturers are firms that process timber into manufactured products such as lumber, and facilities such as pulp and paper mills and particleboard plants that use the wood fiber residue directly from timber processors.

The University of Montana's Bureau of Business and Economic Research (BBER), the University of Idaho's Forest Products Department, and the USDA Forest Service, Rocky Mountain Research Station (Ogden, UT) cooperated in the analysis and preparation of this report. The BBER in cooperation with the Forest Inventory and Analysis (FIA) programs in the Rocky Mountain and Pacific Northwest (PNW) Research Stations have developed a system to collect, compile, and make available State and County information on the operations of the forest products industry—the Forest Industries Data Collection System (FIDACS).

Forest Industries Data Collection System

FIDACS is based on a census of primary forest product manufacturers located in a given State. Idaho manufacturers were identified through telephone directories, directories of the forest products industries (Miller Freeman, Inc. 1984–1999; Paperloop 2001–2003; Random Lengths 2001–2002), and with the assistance of the manufacturers themselves. Through a written questionnaire or phone interview, manufacturers provided the following detailed information for each plant for a given calendar year:

- plant production capacity and employment
- volume of raw material received, by County and ownership

- species of timber received
- finished product volumes, types, sales value, and market locations
- utilization and marketing of manufacturing residue

Previous FIDACS censuses have collected data in Idaho for 1979, 1980, 1985, 1990, and 1995. The BBER, the University of Idaho's Forest Products Department, and/or the Forest Service Research Stations have conducted similar censuses in the other Rocky Mountain and Pacific Coast States. The State of Washington, in cooperation with the PNW Station, reports on periodic censuses of Washington State's industry.

Firms that responded to the 2001 Idaho census processed virtually all of the State's commercial timber harvest. Using published sources and data from various land management agencies, estimates were made for the few nonresponding firms in an attempt to include all of Idaho's primary forest products industry activity for 2001. Volumes and characteristics of Idaho timber processed by out-of-State firms were determined through surveys of mills in adjacent States.

Information collected through FIDACS is stored at the University of Montana's BBER. Additional information is available by request. Individual firm-level data are confidential and will not be released.

The Operating Environment of Idaho's Forest Products Industry

The period since the late 1970s has been characterized by extreme changes in markets and operating conditions. Driven by a strong U.S. economy, which included annual housing starts exceeding 2 million units, the late 1970s was a period of high prices for wood products (WWPA 1964–2002), as well as a period of relatively abundant timber in Idaho. A recession began in the last quarter of 1979, and the first few years of the 1980s saw the most difficult operating conditions since the Great Depression. Official recessions occurred periodically between 1980 and 1982, with low levels of construction activity, particularly in 1982. From 1983 to 1985, there were near-record levels of forest products consumption in the United States, but low prices for lumber (Random Lengths

1976–2002; WWPA 1964–2002). The low prices were due primarily to the high value of the U.S. dollar, leading to declines in exports and increases in imports, channeling large volumes of foreign wood and paper products into U.S. markets.

Not until the last half of the 1980s did markets begin to improve, with prices of wood products increasing due to a strong economy and a lower U.S. dollar. Because of low timber harvest during the early 1980s, Idaho timber processors had substantial volume under contract that yielded a temporary “abundance of timber” in the late 1980s, and harvest and output reached record or near-record levels.

Restricted timber availability throughout the Western United States and global market conditions both have had major impacts on the forest products industry since the early 1990s. Declines in harvests from Federal timberland (mainly National Forest land) in the Western United States led to capacity losses in the West and spurred expansion in other regions. Most pertinent to U.S. markets were expansions in Eastern Canada and the Southeastern United States. The decline in harvest levels resulted from numerous constraints on harvesting timber on Federal lands, including threatened and endangered species protection, appeals and litigation of timber sales, and cumulative impacts of past harvesting on resources such as wildlife, aesthetics, and fisheries.

As was the case across the West, Idaho’s National Forest timber harvest fell sharply following 1990, with the average of the 1999 to 2001 harvest at 17 percent of the 1990 level, and the total harvest in the State falling 40 percent. Global economic conditions were also important in the 1990s. A recession occurred after the first Gulf War due to a variety of factors, leading to low lumber prices. However, in 1993 and much of 1994 the market was at the other extreme. Lumber prices rose to near record levels due to high demand, driven by the now stronger U.S. and global economies and the significant reductions in the Federal timber supply nationwide. Markets weakened modestly in 1995, with slower U.S. and international economies. Additionally, rising imports of Canadian lumber became an increasingly contentious issue as consumption slackened in 1995, and the Canadian dollar continued to weaken. In 1996, the United States and Canadian governments agreed to a 5-year quota on Canadian softwood lumber imports from the major Canadian timber-producing Provinces. This led to strong lumber prices until mid 1997, the onset of a harsh economic decline in Japan and other Asian countries.

In 1999, markets improved considerably due to the U.S. economy’s strong performance and some improvement in the global economy. However, the situation changed dramatically again in 2000 as a drop in housing starts in the United States and Japan, and a strong U.S. dollar lead to low softwood lumber prices. With a U.S. recession in 2001 (made worse by the September 11 World Trade Center terrorist attacks), the expiration of the Softwood Lumber Quota Agreement, and a continuously strengthening dollar, prices for lumber and other wood and paper products dropped to their lowest level since the 1991 recession.

Low prices persisted despite low interest rates and record U.S. lumber consumption of over 56 billion board feet in 2002 (Random Lengths 1976–2002; WWPA 1964–2002). The quota on Canadian softwood lumber expired in 2001 and was followed by the imposition of a 27 percent duty and antidumping penalty assessed by the United States on Canadian softwood lumber.

Persistent low prices for lumber, the major output of Idaho’s industry, during the 2000 through 2002 period were the result of high volumes of lumber on the U.S. market brought about by:

- poor economic conditions through much of the world
- increased wood products manufacturing capacity worldwide
- a high-valued (although weakening) U.S. dollar through most of 2002
- increased average mill size and capital intensity with higher fixed costs (and often debt) in many lumber-producing regions, making managers more reluctant to curtail production in periods of weak markets
- reported attempts by Canadian sawmills to increase production, lower per unit costs, and avoid the antidumping charge for selling lumber below their cost of manufacturing (Random Lengths various weeks 2002)

Structure of Idaho’s Forest Products Industry

Structure and Location

In 2001, timber-processing facilities operated in 28 of Idaho’s 44 Counties, while timber was harvested in 33 Counties. Idaho’s 10 northern Counties contain the greatest concentration of the primary forest products industry (fig. 1), which includes plants that manufacture:

- lumber and other sawn products
- veneer/plywood
- posts, small poles, stakes, and roundwood furniture
- house logs and log homes
- cedar products—shakes, shingles, and split rail fencing
- other products including pulp and paper, particleboard, log furniture, chips, decorative bark, and energy from biomass

The 2001 census identified 109 active primary forest products plants (table 1), 53 fewer than the 1995 census and a decrease of 133 since 1979. While all sectors of Idaho’s primary forest products industry experienced a decrease in the number of facilities since 1995, most of the loss occurred in the sawmill sector, with 27 fewer sawmills operating in the state in 2001. Since mid-2001, several larger facilities have closed; these closures are addressed in more detail in the individual sector discussions. Because the opening and closing of small primary facilities are not widely reported, the change in total number of facilities subsequent to 2001 has not been determined.



Figure 1—Location of Idaho's active primary forest products manufacturers, 2001.

Sales Value of Primary Wood Products

The periodic censuses of 1979, 1985, 1990, 1995, and 2001 provide the most complete estimates of sales values for Idaho's primary forest products industry. Various other sources were used to estimate sales values for the noncensus years between 1977 and 2002 (Random Lengths 1976–2002; WWPA 1964–2002). All sales are reported free on board (f.o.b.) the producing mill.

Sales by Idaho's primary forest products industry totaled \$1.65 billion in 2001 (table 2); estimates for 2002 indicate sales decreased by about \$70 million. Thus, 2002 sales were the lowest since 1985 (\$1.39 billion, in 2001 dollars). Average

annual sales for 1977 through 2002 were approximately \$1.72 billion. In 1978, sales totaled slightly less than \$2.2 billion, followed by 1977 at approximately \$2.1 billion, and 1993 and 1994 at about \$2.0 billion each (fig. 2).

Over 95 percent of primary wood products sales are concentrated in three sectors of the industry: sawmills, structural panels (plywood and veneer), and residue-related products. The residue-related products include pulp and paper, particleboard, wood fuel pellets, electricity generation, and chips converted from roundwood. Sales values for residue-related products also include Idaho mill residues sold to users within Idaho and outside the State.

Table 1—Number of active Idaho primary wood products facilities by County, 2001(source: Keegan and others 1997).

County	Sawmills	Veneer/ plywood	Posts, poles, and other roundwood products	House logs	Cedar	Residue- related products ^a	Total
Ada			1	1		1	3
Adams	1					1	2
Bear Lake	1						1
Benewah	4	1	1		4	1	11
Blaine				1			1
Boise			1				1
Bonner	5	1	5	4		3	18
Bonneville			1				1
Boundary	3			2	1		6
Canyon			1			1	2
Clearwater	2			1	2		5
Custer	1			1			2
Fremont	1			1			2
Gem	1	1	1			1	4
Gooding			1	1			2
Idaho	4		2	1			7
Jefferson				1			1
Kootenai	6	1	4	2		2	15
Latah	3				1		4
Lemhi			1	1			2
Lewis	1				2	1	4
Madison						1	1
Nez Perce	1					5	6
Payette				1			1
Shoshone	1						1
Teton			2	2			4
Twin Falls			1				1
Valley				1			1
2001 Total	35	4	22	21	10	17	109
1995 Total ^b	62	6	32	32	15	15	162
1990 Total	80	6	27	22	26	11	172
1985 Total	90	7	26	20	25	6	174
1979 Total	133	8	35	15	44	7	242

^aResidue-related products include a particleboard plant, roundwood/chip conversion facilities, pulp and paper facilities, decorative bark plants, and biomass/energy facilities.

^bIncludes six post and pole, four log furniture, and three decorative bark manufacturers not identified in the 1995 census.

Table 2—Sales value of Idaho's primary wood products, census years 1979 through 2001(source: Keegan and others 1997).

Product	1979	1985	1990	1995	2001
----- Million 2001 dollars -----					
Lumber, timbers, other sawn products	1,153.9	648.1	703.5	800.0	687.6
Plywood and veneer	195.6	122.6	136.2	192.7	69.9
Cedar products	30.0	12.2	18.3	15.7	30.4
House logs and log homes	17.9	5.0	13.2	23.4	25.5
Posts, poles, and other roundwood products	37.8	19.1	34.2	29.3	22.2
Residue-related products ^a	556.6	585.5	722.3	772.1	812.6
All products	1,991.7	1,392.6	1,627.8	1,833.1	1,648.1

^aResidue-related products include particleboard, chips, pulp and paper products, bioenergy products, decorative bark, and mill residues sold within and outside the State.

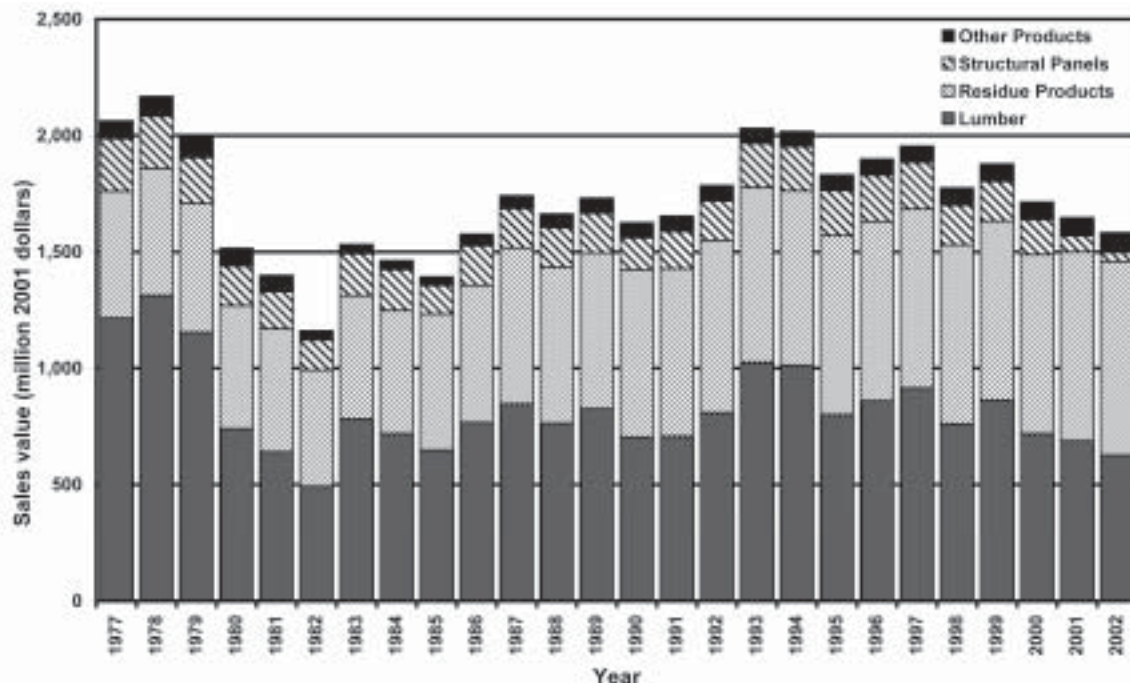


Figure 2—Sales value of Idaho's manufactured primary wood and paper products, 1977 through 2002 (source: WWPA 1977 through 2002; Keegan and others 2002).

High sales values in the late 1970s were due in large part to strong lumber markets and high (inflation-adjusted) prices. Lumber sales from Idaho sawmills exceeded \$1 billion in 1977, and peaked in 1978 at \$1.3 billion. Sales values collapsed in the early 1980s with a severe recession, low production, and weak prices. Driven by 1982 lumber sales of less than \$500 million, sales of all primary products totaled less than \$1.2 billion. In the last half of the 1980s, lumber sales moved back above \$700 million and total sales to more than \$1.5 billion.

Even though timber availability in Idaho limited production, 1993 and 1994 marked the first time since the late 1970s that total sales exceeded \$2 billion and lumber sales topped \$1 billion. As indicated earlier, 1993 and 1994 also had high wood product prices due to a strong U.S. economy and constrained timber availability throughout the Western United States. Sales value in the remainder of the 1990s fluctuated between \$1.7 and \$1.9 billion, primarily as lumber markets fluctuated. Consistently declining sales since 1999 have been due to lower per-unit prices as well as curtailments and closures. The lumber sales value of \$688 million in 2001 represents the lowest since 1985 (\$648 million).

Total sales have been buoyed and stabilized to a degree by the expansion of the residue-utilizing sector. This sector has shown substantial increases in sales over the past 20 years and has become an increasingly important sector of Idaho's forest products industry. In order to avoid disclosure of firm-level data, published information was used to estimate a sales value

for Idaho's residue-utilizing sector (Paperloop 2003; Potlatch Corporation 2002a,b). Inflation-adjusted sales were \$557 million in 1979, versus \$813 million in 2001. Sales by residue-utilizing manufacturers currently account for about 49 percent of Idaho's forest industry sales, versus 28 percent in the late 1970s (fig. 2).

Structural panel sales, on the other hand, have contributed proportionately less to total sales than lumber. The peak year for structural panel sales was 1978, at about \$225 million. More recently, high prices brought sales to over \$200 million in 1993 and 1994. Since 1997, plywood and veneer markets and timber availability have led to plant closures, and the 2001 sales fell to \$70 million, the lowest on record.

Sales by the remaining sectors of Idaho's primary wood products industry were approximately \$78 million in 2001, up \$10 million since 1995 and the highest for any census year since the \$86 million reported in 1979. Growth in recent years has been primarily in cedar products and the log home industry.

Sawmill Sector

Sawmills are the major component of Idaho's forest products industry in terms of value of production, plant numbers, and timber volume processed. In 2001, Idaho's 35 active sawmills used 89 percent of the timber processed in the State and produced 1.8 billion board feet of lumber and other sawn products, representing 5.4 percent of the total U.S. production of softwood lumber and about 3.4 percent of the nation's softwood lumber consumption.

The most commonly used species are true firs (*Abies* spp.), Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco), western hemlock (*Tsuga heterophylla* (Raf.) Sarg.), western larch (*Larix occidentalis* Nutt.), western red-cedar (*Thuja plicata* Donn ex D. Don), ponderosa pine (*Pinus ponderosa* Dougl. ex Laws.), lodgepole pine (*Pinus contorta* Dougl. ex Loud.), western white pine (*Pinus monticola* Dougl. ex D. Don), and Engelmann spruce (*Picea engelmannii* Parry ex Engelm.). High quality select and shop grades of lumber are produced, as are small volumes of structural timbers, but nearly 87 percent of production is dimension and stud lumber used in construction.

Changes in lumber production—The period from 1947 to 1960 showed steady growth in lumber production driven by strong markets and increasing timber harvest. Harvest levels in Idaho prior to World War II on both public and private lands were relatively low in relation to timber inventories (Wilson and Spencer 1967). After World War II, public policy encouraged increased harvest on Federal lands to meet the strong national demand for building products, and improved markets also increased harvest on private lands (Flowers and others 1993). From 1947 to 1960, the volume of timber harvested from Idaho timberlands increased from under 1 billion board feet to nearly 1.5 billion, and virtually all of that timber was processed by sawmills (Setzer and Wilson 1970).

During the 1960s, lumber production showed little year-to-year variation, ranging from 1.6 to 1.7 billion board feet. Market conditions during that period were relatively stable with a strong U.S. economy and no recessions between 1960

and 1970. Relatively stable lumber production occurred despite a 10-fold increase in timber use by Idaho's plywood industry, which used timber that could have been processed into lumber. Harvest increase was the major factor allowing sustained lumber production concurrent with the development and expansion of Idaho's plywood industry. The total harvest in Idaho increased from 1.6 billion board feet at the beginning of the decade to over 1.8 billion board feet in the late 1960s.

After reaching almost 2 billion board feet annually during the strong market years of the late 1970s, lumber production declined sharply through the double-dip recession of the early 1980s (fig. 3). Lumber production actually reached its highest annual level—more than 2.1 billion board feet—in 1989, even though lumber markets were not as strong as in the late 1970s. Contributing to this high lumber production in the late 1980s was a 16 percent increase in lumber recovery per unit of timber processed between 1979 and 1990.

Limited timber availability caused lumber production to fall in the early 1990s. In the strong market years of 1993 and 1994, Idaho's timber harvest fell by nearly 15 percent, and lumber production was down nearly 10 percent from just over 2 billion board feet in 1990. Prices in 1995 fell from the high levels of the previous 2 years, and production fell to 1.67 billion board feet. With higher lumber prices in 1996, production increased to 1.8 billion board feet. Prices continued to increase throughout the late 1990s, resulting in production of 1.86 billion board feet in 1999. Declining prices and further reductions in National Forest timber offerings led to decreased production in 2000 and 2001, with 2001 annual production totaling 1.8 billion board feet, the lowest since 1996 (fig. 3).

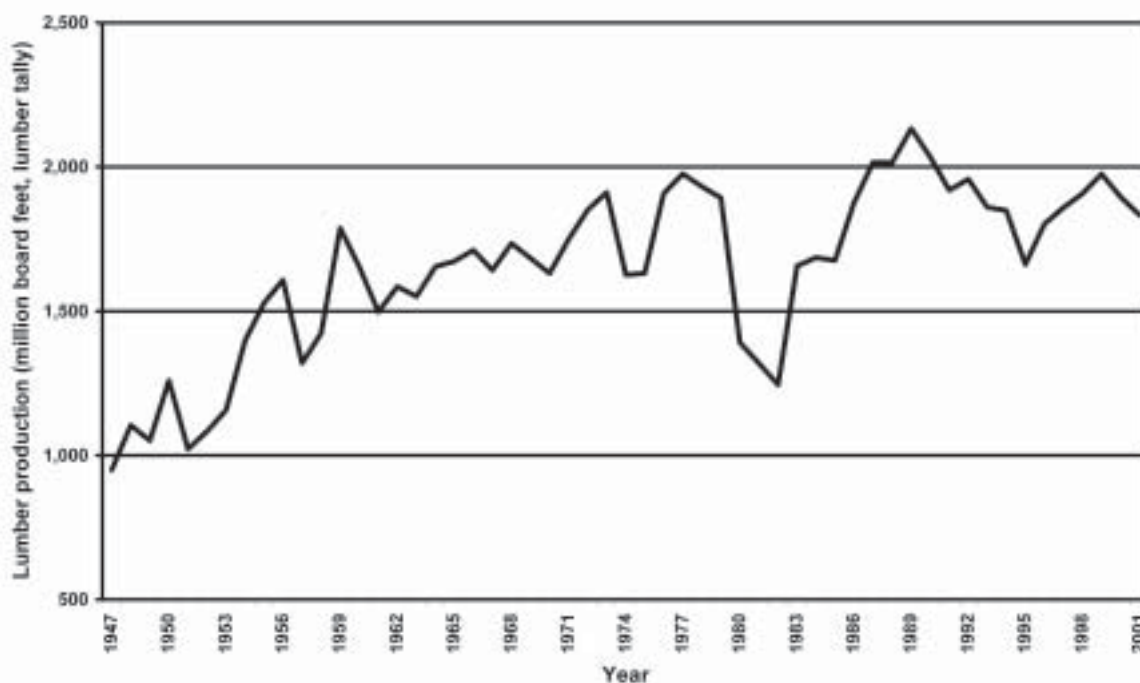


Figure 3—Idaho lumber production, 1947 through 2001 (source: WWPA 1964 through 2002).

In examining timber harvest and lumber production changes in Idaho, it is clear that timber harvest in the State between 1990 and 2001 declined more than lumber production (40 percent versus 14 percent). A number of factors have impacted lumber production from Idaho's mills including:

- fluctuating markets
- timber availability
- increased recovery of lumber per board foot of log input
- management decisions by the industry to process less timber into other products such as plywood instead of lumber
- log flows

As discussed, timber availability and markets have exerted a substantial impact on lumber production. Between 1990 and 2001, increased lumber production per unit of log input has reduced the impact of lower harvest levels on lumber output. Large scale declines in plywood manufacturing have made a greater portion of Idaho's harvest available to the sawmill sector, and—in contrast to previous years when Idaho was a net exporter of logs—in 2001 Idaho was a net importer.

Changes in overrun—Between the 1979 and the 1990 census, the volume of lumber recovered from 1 board foot Scribner of log volume (overrun) increased from 1.34 to 1.56 board feet lumber tally. Lumber recovery in Idaho has since increased to 1.86 board feet in 2001. Increases in overrun are due primarily to advances in technology and to decreased log diameter. As log diameter decreases, the Scribner Decimal C log rule, which is used in Idaho, underestimates by an increasing amount the lumber that can be recovered, thus giving a higher lumber recovery per board foot of timber. Advances in production technology increase lumber recovery through computerized log scanning capabilities that identify optimum sawing patterns. Likewise, using thinner kerf saws and scanning equipment to edge and trim lumber have reduced the portion of the log that becomes sawdust.

Lumber production by geographic area—Information on lumber production at the sub-State level is currently available only through the ongoing censuses of Idaho's

industry conducted by BBER. Lumber output by County and region is discussed for census years, with an emphasis on recent changes, particularly since 1990. Idaho lumber production in 2001 was up 5 percent from the previous census in 1995 but has declined nearly 15 percent since 1990 (table 3). The increased production since 1995 has not been a State-wide trend, as production from mills in southern Idaho decreased 55 percent, from 229 MMBF in 1995 to 102 MMBF in 2001. In contrast, Idaho's 10 northern Counties produced nearly 1.7 billion board feet of lumber in 2001, up from 1.4 billion in 1995.

Exact County-level lumber production data are withheld for individual Counties to avoid disclosure of firm-level information. Bonner County and Kootenai County continued to be the top lumber-producing Counties in Idaho in 2001, with both Counties producing over 350 MMBF of lumber. Other top-producing Counties were Benewah, Boundary, Idaho, and Nez Perce, each with over 125 MMBF.

Although timber harvest in northern Idaho decreased by 200 MMBF, lumber production has increased by nearly 300 MMBF since 1995 as the result of a number of factors. Lumber recovery from Idaho sawmills increased. The decline of Idaho's plywood industry has increased the proportion of timber available to the sawmill sector. Additionally, in 2001, Idaho was a net importer of timber from other States and Canada, in contrast to previous census years when Idaho was a net exporter of timber.

Continuing a trend that started in the last half of the 1980s, the sawmill industry in southern Idaho experienced a number of closures, resulting in sharply decreased production. Production in southern Idaho fell 55 percent from 1995 to 2001, and 71 percent since 1990. Mills in southern Idaho, which received more than 75 percent of their timber from National Forests in 1990 and over 50 percent in 1995 (Keegan and others 1992, 1997), were more vulnerable to sharp declines in National Forest timber availability. Since 2001, lumber production in southern Idaho has continued to decline. Boise Cascade permanently closed its timber processing facilities during 2001, citing declines in Federal timber availability as the primary reason for the closures (Boise 2001).

Table 3—Idaho lumber production by geographic area, census years 1979 through 2001(source: Keegan and others 1997).

County group	1979	1985	1990	1995	2001
----- MBF ^a , lumber tally -----					
Bonner, Boundary	462,481	358,064	552,426	408,988	661,509
Benewah, Kootenai, Shoshone	467,965	490,866	629,129	613,014	563,482
Latah, Lewis, Nez Perce	360,847	198,633	262,148	213,610	274,990
Clearwater, Idaho	248,917	228,792	255,336	209,176	156,298
Northern Idaho	1,540,210	1,276,355	1,699,039	1,444,788	1,656,279
Southern Idaho	391,791	389,020	355,511	228,571	102,471
Idaho Total	1,932,001	1,665,375	2,054,550	1,673,359	1,758,750

^aMBF = thousand board feet.

Number and size of mills—Over the past 45 years the number of sawmills in Idaho has declined, and production has been concentrated into fewer but larger mills. Average lumber output per mill has increased nearly 10-fold since 1956, with the 2001 average annual output per mill at just over 50 MMBF. The ongoing concentration of production in larger mills is further illustrated by the near doubling of average annual output per plant between 1995 (27 MMBF) and 2001 (50 MMBF). At the height of the post-World War II housing boom, there were more than 300, mostly small, sawmills in Idaho. Since then, the total number of mills has consistently declined—the 2001 census identified 35 active sawmills (table 1).

The decline in number of sawmills occurred primarily among the smaller facilities, with the number of mills producing less than 10 MMBF of lumber annually decreasing from 274 in 1956 to 12 in 2001 (table 4). In addition to the reduced number of small sawmills, the 2001 census identified 23 mills producing more than 10 MMBF annually—the fewest in the last 45 years.

Since the late 1950s, lumber output has become increasingly concentrated in larger mills. In 1956, 73 percent of lumber production was from mills producing more than 10 MMBF annually. By 1979, mills producing more than 10 MMBF annually accounted for 93 percent of the State's lumber output, with 14 mills producing over 50 MMBF each, for a total of 49 percent of Idaho's lumber. In 2001, 23 mills accounted for 99 percent of Idaho's lumber production, with 14 mills producing over 50 MMBF each, for a total of 85 percent of Idaho's lumber (table 5).

Residue-Related Products Sector

In addition to products such as lumber and plywood, the processing of timber generates substantial volumes of wood fiber by-products. These by-products, referred to as mill residue, are the raw material source for the residue-related products sector. The 2001 Idaho census identified a pulp and paper mill, an associated tissue plant, a particleboard plant, two wood fuel pellet producers, one roundwood chipping facility, four facilities generating electricity for sale, and seven facilities

Table 4—Number of Idaho sawmills by annual production, selected years 1956 through 2001 (source: Setzer and Wilson 1970; Godfrey and others 1980; Keegan and others 1997).

Year	Under 10 MMBF	10 to 50 MMBF	Over 50 MMBF	Unknown	Total number of mills
1956	274	37	^a	—	311
1962	151	42	^a	—	193
1966	123	45	^a	—	168
1973	67	39	6	10	122
1979	88	31	14	—	133
1985	52	24	14	—	90
1990	40	22	18	—	80
1995	29	17	16	—	62
2001	12	9	14	—	35

^aMills with lumber production in excess of 50 million board feet (MMBF) were included in the 10 to 50 MMBF category for these years.

Table 5—Number of active Idaho sawmills by production size class and average annual lumber production, 2001.

Production size class	Number of mills	Production	Percentage of total production	Average production per mill
		<i>MBF^a</i>		<i>MBF^a</i>
1 MMBF or less	7	1,992	0.1	285
Over 1 to 10 MMBF	5	18,987	1.1	3,797
Over 10 to 50 MMBF	9	244,340	13.9	27,149
Over 50 to 100 MMBF	7	499,197	28.4	71,314
Over 100 MMBF	7	994,234	56.5	142,033
Total	35	1,758,750	100.0	50,250

^aProduction volume in thousand board feet (MBF) lumber tally.

producing bark-related products such as decorative and landscape bark. The residue-utilizing sector is a significant revenue source for Idaho's lumber and plywood producers. In 2001, 94 percent of residue sales were from sawmills and veneer plants to residue-utilizing manufacturers.

As indicated earlier, this sector accounted for approximately 49 percent of Idaho's primary forest products sales in 2001, up slightly from 42 percent in 1995 but up dramatically from 28 percent in the late 1970s. Sales from the residue-utilizing sector have increased in each census year since 1979 (table 2).

Idaho has one particleboard plant and one pulp and paper mill, which produces Kraft pulp, paperboard, and tissue. Published information was used to report production at these facilities. The particleboard plant produced about 67 million square feet (MMSF, $\frac{3}{4}$ -inch basis) in 2001, versus 68 MMSF in 1995 and 60 MMSF in 1990 (Keegan and others 1992; Miller Freeman, Inc. 1984–1999; Potlatch 2002a). Production of paperboard and tissue in Idaho was 533,000 tons in 2001, up from 424,000 tons in 1995 and 411,000 tons in 1990 (Keegan and others 1992; Miller Freeman, Inc. 1984–1999; Potlatch 2002a).

Several Idaho firms operate plants producing electricity for sale through the burning of wood residue. These plants are associated with timber processing facilities and historically produced steam energy for in-house use. Many of these plants began to produce electricity for sale to outside markets in the early 1980s. There are other firms in Idaho that produce wood fuel pellets and bark products from the residues generated by timber processing facilities. Most of this activity also began in the early to mid 1980s, and some expansion has occurred since then.

Plywood, Veneer, and Oriented Strand Board

In 2001, four plants in Idaho produced plywood and/or veneer. These four plants shipped 254 MMSF ($\frac{3}{8}$ -inch basis) of plywood and veneer for total sales of \$69.9 million.

During the late 1950s and early 1960s, two plants producing plywood and veneer operated in Idaho with combined total production of less than 50 MMSF annually. The industry began to expand dramatically in the mid-1960s, with the construction of four new plants. Production reached 603 MMSF in 1967, which remained the highest level of production until the late 1980s. Slight expansion continued throughout the 1970s, and industry output remained between 500 and 600 MMSF annually. By 1979, eight plants producing structural panels or veneer were operating in Idaho.

Production of structural panels decreased 200 MMSF during the recession years of the early 1980s, and by 1985 two plywood plants and one plystran plant had closed. However, in 1984 an oriented strand board (OSB) plant was opened, raising the number of active plants in Idaho to six. The industry rebounded quickly from the recession. Production increased to prerecession levels by 1985, and peak production occurred in 1988 at 639 MMSF.

The period from 1985 to 1995 was marked by stability in both the number of plants operating and production levels. All six plants operating in 1985 were still operating in 1995, and production remained stable at approximately 600 MMSF per year. In 1995, production approached the peak levels of 1988 at 637 MMSF.

In the late 1990s, the structural panel sector began a period of significant decline. The OSB plant closed in 1997, and a plywood plant closed in 2000, reducing the number of active structural panel plants operating in Idaho to four. Another plywood plant closed in 2001. The closures since 1995 were due to reduced timber availability, as well as increased competition from OSB producers elsewhere in North America and overseas.

Other Primary Manufacturers

The 2001 census identified 53 other primary manufacturers processing timber into cedar products, log homes, utility poles, posts, and other small roundwood products. In 1990 and 1995, there were 75 and 79 facilities, respectively (table 1).

Posts, poles, and other roundwood products—In 2001, 22 plants in Idaho manufactured various types of roundwood products, such as utility poles, posts, corral poles, tree stakes, and roundwood furniture. These plants had sales of \$22.2 million from an output of more than 2.3 million pieces, a decrease from 1995, when sales were \$29.3 million from an output of approximately 3.7 million pieces (table 2). Sales of these products in 1990 were \$34.2 million, and production was 4.3 million pieces.

Cedar products—Though the number of facilities has decreased, Idaho's cedar products industry has made a resurgence in sales and volume processed. Ten cedar products manufacturers were active in 2001, processing approximately 34 MMBF Scribner of logs into cedar shakes, shingles, split rail fencing, and fence lath. In 2001, cedar products sales were \$30.4 million, the highest on record, and twice the inflation-adjusted 1995 sales value. This increase was due to slightly higher cedar product prices and increased production. Most of this growth was in split cedar posts and rails and fence lath.

Log homes—While the log home industry still accounts for only 2 percent of Idaho's primary forest industry sales, it has grown substantially since 1979. The 2001 census identified 21 log home manufacturers, producing nearly 3.1 million lineal feet of house logs. Despite decreased output and 11 fewer mills operating in 2001 than in 1995, sales value increased to \$25.5 million, the highest sales on record for Idaho. This compares to 1995 sales of \$23.4 million and production of 3.7 million lineal feet. Sales and production in 1979 were \$17.9 million and 4 million lineal feet, respectively. Sales increases from 1995 to 2001 were due to additional processing of house logs into complete building shells or homes, the use of higher value logs, and the design and production of higher value homes.

Plant Capacity

In this section we estimate the timber-processing capacity and the proportion of that capacity utilized by Idaho's primary forest product manufacturers in 2001. Our analysis focuses on plants processing sawtimber—sawmills, plywood and veneer plants, house log plants, and utility pole plants. Capacity and utilization for the nonsawtimber processing manufacturers are discussed in less detail.

Definition of Production Capacity

Mills were asked to specify production capacity—volume of finished product the facility is capable of producing both per 8-hour shift and annually—given sufficient supplies of raw materials and firm market demand for products. Most of the larger mills estimated annual capacity based on two 8- or 10-hour shifts daily for a 220- to 260-operating-day year. A few estimated annual capacity equivalent to operating 24 hours per day for 220 to 250 days per year. Smaller mills reported annual capacity at only one shift per day for not more than 250 operating days per year.

Capacity in Units of Raw Material for Sawtimber Processors

Sawtimber processors reported production capacity in a variety of units. Sawmills reported production capacity in 1,000 board feet, lumber tally, while plywood capacity was reported in 1,000 square feet on a $\frac{3}{8}$ -inch basis. Utility pole production capacity was reported in numbers of pieces of a given size, and house log capacity in lineal feet. To combine the production capacity figures from different sectors and to estimate the industry's total capacity to process sawtimber,

production capacity was converted to units of timber input (MMBF Scribner) on a mill-by-mill basis, using each facility's product recovery factor.

Sawmill capacity figures were adjusted to MMBF of timber by dividing production capacity in lumber tally by each mill's lumber recovery per board foot Scribner of timber processed. Plywood and veneer capacity figures were converted to MMBF Scribner by dividing production capacity in square feet by each mill's plywood recovery. Utility pole and house log capacities were adjusted to MMBF Scribner by multiplying capacity in the given finished product unit by an average Scribner board foot volume per piece or per lineal foot.

Industry's Capacity to Process Sawtimber, 1979 through 2001

Mill capacities and utilization estimates for 1979, 1985, 1990, 1995, and 2001 are based on complete censuses of Idaho's industry. For noncensus years, mill capacities and utilization were estimated using information from industry directories, trade associations, and industry consultants (Miller Freeman, Inc. 1984–1999; Random Lengths 2001–2002; WWP 1964–2002).

Detailed capacity information is not available prior to the 1979 census. Idaho's sawtimber processing capacity has declined by 37 percent since 1979, with most of the decline occurring in the last decade (fig. 4). Annual capacity in 1979 was 2,063 MMBF. Between 1979 and 1985, capacity declined 5 percent. Since 1985, the decline accelerated, and capacity fell to 1,717 MMBF in 1990 and 1,562 MMBF in 1995. Since 1995, Idaho's sawtimber processing capacity has declined by over 15 percent to 1,294 MMBF in 2001. Subsequent mill closures reduced annual capacity to less than 1,150 MMBF in 2003.

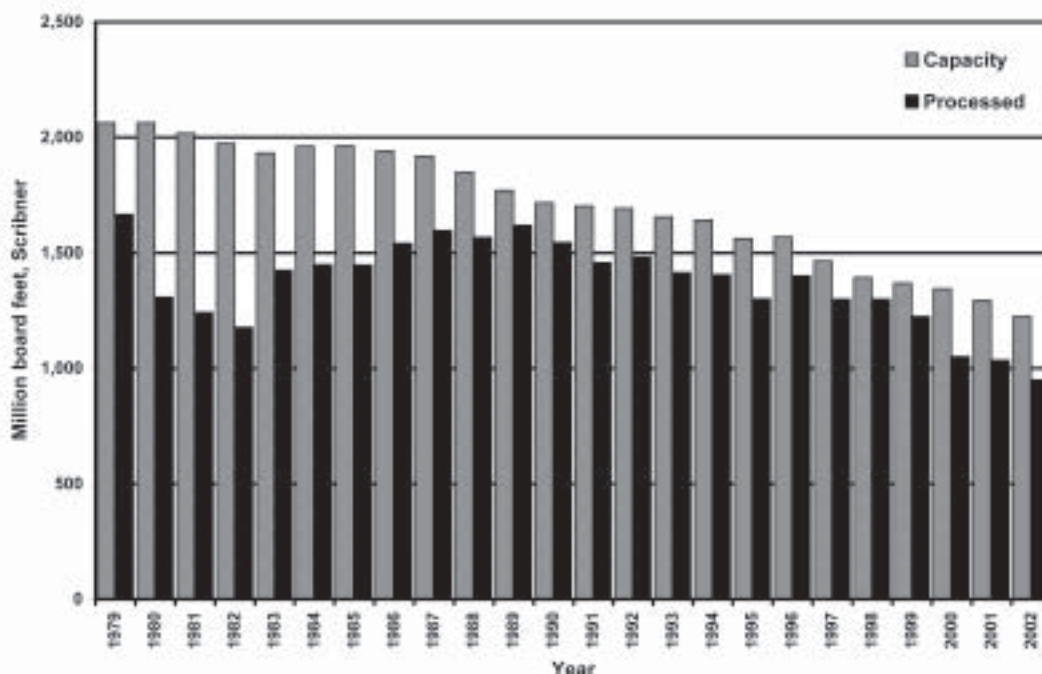


Figure 4—Idaho sawtimber processing capacity and sawtimber processed, 1979 through 2002 (source: Keegan and others 1997).

Sawtimber Capacity and Utilization by Sector

Idaho mills processed 1,036 MMBF of sawtimber in 2001, using 80 percent of sawtimber processing capacity (table 6). This is the lowest level of utilization since 1985, when mills utilized 74 percent of their capacity. Compared to previous census years, capacity utilization has declined 10 percentage points since 1990 and 3 percentage points since 1995.

Because sawmills account for roughly 88 percent of Idaho's sawtimber processing capacity, overall trends in sawtimber processing capacity and utilization follow sawmill trends. However, both sawmills and the structural panel (plywood, veneer, and OSB) sectors have shown substantial declines in capacity and in utilization. Most of the recent capacity decline has occurred in the sawmill sector, which had 1,140 MMBF of capacity in 2001. This is down by nearly 670 MMBF Scribner since 1979, while the volume processed by sawmills is down somewhat less—490 MMBF. Compared to the previous census in 1995, sawmill capacity declined by 178 MMBF (13 percent). Sawmills processed 948 MMBF of sawtimber in

2001, utilizing 83 percent of their capacity, the same proportion utilized in 1995.

Idaho's plywood and veneer plants had the capacity to process 126 MMBF in 2001 but processed 72 MMBF of sawtimber, thus utilizing only 57 percent of the sector's capacity. These figures, the lowest on record, are indicative of a significant decline in Idaho's structural panel sector. The addition of an OSB plant and the closure of a plywood plant caused capacity to increase initially from 1979 to 1985, and then fall from 1985 to 1995. Since 1995, the structural panels sector has seen the closure of the OSB plant, as well as a plywood plant, reducing the sector's capacity by 76 MMBF. Capacity utilization for these facilities was 91 percent in 1995. Plywood and OSB plants tend to run at a higher rate of capacity utilization because they are more capital-intensive than the average sawmill, and their manufacturing processes are not easily shut down. A large part of the decline in capacity utilization in 2001 was due to one plant operating for less than half of the year and then closing permanently.

The annual timber processing capacity of Idaho's utility pole and house log sectors in 2001 was 28 MMBF, which is lower

Table 6—Estimated capacity to process sawtimber and capacity utilized for sawmills, plywood/veneer plants, utility pole and house log plants, Idaho, 1979, 1985, 1990, 1995, and 2001 (source: Keegan and others 1997).

Plant type	Capacity to process sawtimber	Volume processed	Percentage of total capacity utilized
----- MMBF ^a , Scribner -----			
1979			
Sawmills	1,809	1,437	79
Plywood/veneer plants	221	210	95
Utility pole and house log plants	33	20	61
Total	2,063	1,667	81
1985			
Sawmills	1,666	1,229	74
Plywood/veneer plants	265	208	78
Utility pole and house log plants	34	15	44
Total	1,965	1,452	74
1990			
Sawmills	1,459	1,316	90
Plywood/veneer plants	227	214	94
Utility pole and house log plants	31	14	45
Total	1,717	1,544	90
1995			
Sawmills	1,318	1,097	83
Plywood/veneer plants	202	184	91
Utility pole and house log plants	41	20	49
Total	1,562	1,301	83
2001			
Sawmills	1,140	948	83
Plywood/veneer plants	126	72	57
Utility pole and house log plants	28	16	57
Total	1,294	1,036	80

^aMMBF = million board feet.

than in earlier censuses. The decrease in 2001 was mainly due to the loss of 11 log home manufacturers since 1995. In 2001, 44 percent of sector capacity was utilized, which is somewhat higher than utilization levels from previous census years.

Markets for Primary Wood Products

In this section we examine the markets for Idaho's primary forest products industry and compare 2001 survey results with 1990 and 1995. Respondent mills summarized their 2001 shipments of finished wood products, providing information on volume, sales value, and geographic destination (fig. 5). Mills usually distributed their products through their own distribution channels or through independent wholesalers and selling agents. Because of subsequent wholesaling transactions, the geographic destination reported may not precisely reflect final delivery points of shipments. Market destination for the residue sector could not be released without revealing firm-level information.

Excluding mill residues and sales by the residue-utilizing sector, sales from Idaho's primary wood products industry

totaled \$835 million in 2001, down 21 percent from the 1995 sales total (table 7). Between 1995 and 2001, inflation-adjusted sales decreased in every region except the Far West States and exports.

Sales to purchasers in the Far West increased from \$190 million in 1995 to \$201 million in 2001, while export sales to other countries increased from \$10 million to nearly \$13 million for the same period. Comparing sales values from 2001 to values from 1990 shows substantial increases in sales to other Rocky Mountain and Far West States, relatively stable sales within Idaho, and decreasing sales in the North-Central, Northeast, and South market areas as well as to other countries.

The major market areas for Idaho's primary wood products remain the Rocky Mountain and Far West States, as well as the North-Central States. Over 80 percent of Idaho's 2001 primary wood product sales occurred in four market areas: Idaho, Far West, Rocky Mountain, and North-Central (table 7). Sales to the Far West increased from 18 percent of total sales in 1995 to 24 percent in 2001. This increase was offset by a decline of sales in Idaho, from 19 percent of total sales in 1995 to 14 percent in 2001. The proportion of total sales to other Rocky Mountain States increased slightly from 1995 to 2001, but increased from 13 percent in 1990 to 23 percent in 2001.



Figure 5—Shipment destinations for Idaho's primary wood products. Regions are Far West (1), Rocky Mountain (2), North-Central (3), Idaho (4), Northeast (5), South (6).

Table 7—Destination and value of Idaho's 2001 primary wood products sales^a.

Product	Idaho	Rocky Mountain	Far West	North-Central	Northeast	South	Other countries	Unknown	Total
<i>Sales value in thousand 2001 dollars</i>									
Lumber, timbers, other sawn products	103,016	171,980	173,506	130,652	68,199	39,679	524	—	687,555
Plywood and veneer	1,128	4,734	11,477	22,156	13,773	9,086	7,500	—	69,853
Posts, poles, and other roundwood products	6,066	1,765	6,358	2,685	1,179	—	4,150	—	22,202
House logs and log homes	5,517	10,004	5,629	2,120	880	662	675	—	25,488
Cedar products	3,273	3,108	4,091	6,813	582	12,480	36	—	30,383
2001 All products total	118,999	191,591	201,061	164,425	84,613	61,907	12,885	—	835,481
1995 Total	204,895	234,493	189,500	234,831	100,874	86,231	10,221	—	1,061,046
1990 Total	120,694	117,637	173,684	218,542	144,266	96,229	14,627	19,794	905,474
1985 Total	85,014	145,216	114,243	169,362	106,842	99,260	1,942	85,174	807,053
1979 Total	153,187	291,951	129,404	363,868	147,695	150,135	14,379	184,527	1,435,146
<i>Percentage of total sales value by product</i>									

Lumber, timbers, other sawn products	15	25	25	19	10	6	0	0	100
Plywood and veneer	2	7	16	32	20	13	11	0	100
Posts, poles, rails, and other roundwood products	27	8	29	12	5	0	19	0	100
House logs and log homes	22	39	22	8	3	3	3	0	100
Cedar products	11	10	13	22	2	41	0	0	100
2001 All products total	14	23	24	20	10	7	2	0	100
1995 Total	19	22	18	22	10	8	1	0	100
1990 Total	13	13	19	24	16	11	2	2	100
1985 Total	11	18	14	21	13	12	0	11	100
1979 Total	11	20	9	25	10	10	1	13	100

^aDoes not include mill residue sales or sales by the residue-utilizing sector.

Market Areas by Finished Product Type

Lumber sales totaled just under \$688 million in 2001, with sales to the Rocky Mountain States accounting for 40 percent of all lumber sales—15 percent in Idaho and 25 percent to other Rocky Mountain States (table 7). In 1995 these States accounted for 43 percent of lumber sales, while in previous census years they accounted for less than 30 percent (Keegan and others 1997). The Far West and North-Central States accounted for 25 and 19 percent of lumber sales, respectively. Sales of Idaho lumber to the Northeast, South, and to other countries has declined since 1995.

Nearly one-third (32 percent) of Idaho’s plywood and veneer sales were to the North-Central region, up from 23 percent of plywood and veneer sales in 1995. Sales of plywood and veneer to other countries increased from 3 percent in 1995 to 11 percent in 2001. Sales of plywood and veneer to the Far West also increased, from 10 percent in 1995 to 16 percent in 2001. The sales increases to those three areas were offset by substantial decreases of sales within Idaho and other Rocky Mountain States. Sales in Idaho decreased from 16 percent in 1995 to 2 percent in 2001, and sales to other Rocky Mountain States decreased from 16 percent to 7 percent. The proportion of plywood and veneer sales to the South and Northeast remained constant compared to 1995.

The majority of Idaho’s 2001 post, pole, rail, and other roundwood product sales were in Idaho and the Far West, accounting for 27 and 29 percent of roundwood product sales, respectively. This is similar to 1995, when 31 percent of sales were within Idaho, and 27 percent went to the Far West. Sales in other Rocky Mountain States dropped from 17 percent in 1995 to 8 percent in 2001. Twelve percent of sales went to the North-Central States, compared to 15 percent in 1995.

Log home and house log manufacturers generated about \$25.5 million in sales in 2001. Idaho and the other Rocky Mountain States, as well as the Far West, were the major markets for these products, composing over 80 percent of total sales. In 2001, sales of cedar products (including cedar shakes, shingles, and split rail fencing) generated about \$30.4 million. The major markets for cedar products were the South and North-Central States, with 41 percent of cedar sales going to the South and 22 percent to the North-Central States. These

two areas were also the major markets in 1995, each accounting for 29 percent of cedar sales. Cedar exports, as well as sales to the Northeast States, have virtually ceased since 1995, when those two market areas were responsible for a combined 12 percent of total sales.

Mill Residue: Quantity, Type, and Use

Wood fiber residue from primary wood products manufacturers (mill residue) is the major source of raw material for Idaho’s pulp and paper and board industry, and an important source of fuel for all major sectors of the wood products industry. If not used, wood residue can create difficult and expensive disposal problems. Sawmills and plywood plants generate approximately 95 percent of the mill residue produced by Idaho’s forest products industry. This chapter details the volumes and uses of mill residue generated by these plants.

Three general types of wood fiber residue are generated by Idaho’s sawmills and plywood plants: coarse, fine, and bark. Coarse residue includes chippable residue from slabs, edgings, and trimmings from lumber manufacturing; log ends; pieces of veneer not suitable for manufacturing plywood; and plywood plant peeler cores not sawn into lumber. Fine residue includes planer shavings and sawdust from sawmills, and sander dust from plywood plants.

Respondents to the 2001 census provided information on volume of residue generated, sales value, and uses. Residue volumes were reported in bone-dry units; a bone-dry unit equals 2,400 lb of wood, oven-dry weight. In addition to residue quantity and disposition, Statewide residue factors, which quantify the number of bone-dry units of residue generated per MBF of lumber produced, were updated for Idaho sawmills based on the 2001 census (table 8).

Supply of Mill Residue

Idaho sawmills and plywood plants generated an estimated 1,755 thousand bone-dry units (MBDU) of manufacturing residue in 2001 (table 9), compared to 1,822 MBDU in 1995, and 2,117 MBDU in 1990. The decrease in residue generated

Table 8—Idaho sawmill residue factors (source: Keegan and others 1997).

Type of residue	1979	1985	1990	1995	2001
- - Bone-dry units per thousand board feet lumber tally ^a - -					
Coarse	0.47	0.53	0.43	0.45	0.42
Sawdust	.25	.21	.18	.18	.17
Planer shavings	.22	.20	.15	.15	.13
Bark	.30	.19	.18	.18	.20
Total	1.24	1.13	.94	.96	.92

^aBone-dry units (2,400 lb of oven-dry wood) of the various residue types generated for every 1,000 board feet of lumber manufactured.

Table 9—Volume of wood residue generated by Idaho sawmills and plywood/veneer plants, 2001.

Residue type	Wood residue			Percentage of type		Percentage of total
	Used	Unused	Total	Used	Unused	
	<i>----- Bone-dry units^a -----</i>			<i>Percent of total</i>		
Coarse	806,460	3,325	809,785	99.6	0.4	46
Fine ^b	544,556	3	544,559	100.0	.0	31
Bark	401,031	43	401,074	100.0	.0	23
Total	1,752,047	3,371	1,755,418	99.8	.2	100

^aBone-dry unit = 2,400 lb of oven-dry wood.

^bFine residue includes sawdust and planer shavings.

since 1990 has resulted from a combination of decreasing volumes of timber being processed and improving technology. With computer-guided saws, thinner kerf saws, better planers, and better plywood lathes, technological improvements have led to lower residue factors through time (table 8).

The proportion of manufacturing residue that is utilized has increased dramatically since 1969, largely because of pulp and paper industry expansion and the opening of particleboard plants in the region, but also because of the increasing use of wood residue as a fuel to dry lumber and veneer and to generate electricity. In 1969, only 63 percent of mill residues in Idaho were used, increasing to 89 percent in 1979, 94 percent in 1985, 98 percent in 1990, 99 percent in 1995, and nearly 100 percent in 2001 (table 9).

Coarse residue comprised the largest share of residues in 2001. Mills produced 810 MBDU, with nearly 100 percent (806 MBDU) utilized. Pulp and paper mills in Idaho and other States received 773 MBDU, with 33 MBDU going to other uses, primarily internal energy use. Only 4 MBDU of coarse residue were unused in 2001 (table 10).

The 545 MBDU of fine residue utilized represent virtually 100 percent of the fine residues generated in 2001. Just over half of this fine residue (273 MBDU) went to pulp and paper mills or board plants for use as raw material, 261 MBDU were consumed as fuel, and 10 MBDU went for other uses such as animal bedding, mulch, and raw material for other products. Table 10 further divides fine residues into planer shavings and sawdust. Planer shavings totaled 237 MBDU, while saw and sander dust totaled 307 MBDU.

Use of bark has increased most dramatically since 1969 when only 39 percent was utilized; nearly 100 percent was utilized in 2001. Of the 401 MBDU produced in 2001, 384 MBDU were consumed as fuel (table 10), and 17 MBDU were used for miscellaneous products including decorative bark, livestock bedding, and mulch. Less than 1 MBDU were unused.

Residues from Other Manufacturers

The manufacture of utility poles, house logs, cedar products, posts, small poles, and roundwood furniture generates several types of residue, including bark, shavings and peelings, log

ends, cull portions of logs, and slabs from log home manufacturers. In 2001, just over 97 MBDU of these residues were produced, and nearly 100 percent of this volume was used. Uses of these residues include livestock bedding, garden mulch, firewood, or other fuel.

Forest Products Industry and the Idaho Economy

In this section we discuss employment and worker earnings trends in Idaho's primary and secondary forest products industry as well as the industry's place in the economy of Idaho. The analysis focuses on the years preceding and including 2000, the last year for which comprehensive data are available. Employment estimates are provided for 2002. The primary forest products industry includes:

- logging
- processing logs into lumber and other wood products
- processing wood residues into outputs such as paper or electricity
- private-sector timber management services

The secondary industry, as defined in this report, includes the further processing of the outputs from the primary industry, though the outputs may be from Idaho or elsewhere. Secondary products include prefabricated buildings, molding, millwork, and cut stock, and doors and windows. Data from several sources were used to identify employment and labor income for Idaho's primary and secondary forest products industry, including the U.S. Department of Commerce, Regional Economic Information System (REIS), along with wage and salary data from the U.S. Department of Labor, Bureau of Labor Statistics, and information from the periodic censuses of the industry done by the Bureau of Business and Economic Research as part of the FIDACS system.

Most of the primary and secondary industry is reported in three standard industrial classifications (SIC), as defined by the U.S. Office of Management and Budget: SIC 08—forestry; SIC 24—lumber and wood products; and SIC 26—paper and allied products (Office of Management and Budget 1987). These classifications were used to estimate total employment

Table 10—Production and disposition of residues by Idaho sawmills and plywood/veneer plants, 2001
(source: Keegan and others 1997).

Type of residue	Total utilized	Reconstituted products	Hogfuel	Other uses	Unused	Total
----- Thousand bone-dry units ^a -----						
Coarse						
1979	987	957	10	20	21	1,008
1985	976	930	28	18	14	990
1990	1,001	988	—	13	5	1,006
1995	885	872	3	10	1	886
2001 ^b	806	773	30	3	3	810
Sawdust						
1979	399	197	164	38	58	457
1985	308	176	115	17	22	330
1990	365	175	167	23	13	378
1995	306	158	133	15	4	310
2001	237	80	148	9	—	237
Planer shavings						
1979	340	215	112	13	20	360
1985	288	128	155	5	17	305
1990	310	221	88	1	9	319
1995	250	130	113	7	8	258
2001	307	193	113	1	^c	307
Bark						
1979	473	—	429	44	174	647
1985	282	—	263	19	73	355
1990	395	—	344	51	19	414
1995	358	—	343	15	10	368
2001	401	—	384	17	^c	401
Total						
1979	2,199	1,369	715	115	273	2,472
1985	1,854	1,234	561	59	126	1,980
1990	2,071	1,384	599	88	46	2,117
1995	1,799	1,160	592	47	23	1,822
2001 ^b	1,751	1,046	675	30	3	1,755

^aBone dry unit = 2,400 lb of oven-dry wood.

^bNumbers do not sum to total due to rounding.

^cLess than 500 bone-dry units.

and income to workers (labor income) in Idaho's forest products industry. They provide a conservative measure of the wood and paper products industry as they capture the majority of primary and secondary activity. However, a number of activities are not included in these three classifications, including the hauling of logs by independent truckers; hauling of finished products by truck, rail, or barge; and timber management activities by government employees. Additionally, a portion of the secondary industry—the manufacturing of wood furniture—is found in (SIC) 25 and is not included here.

Based on the three classifications—08, 24, and 26—approximately 17,900 workers, earning over \$900 million (2001 dollars), were employed in the forest products industry in Idaho in 2000 (USDC Bureau of Economic Analysis 2003). The primary sectors accounted for approximately 12,700 work-

ers, while the secondary sectors employed the remaining 5,200 (table 11). With additional mill closures and curtailments, the preliminary estimate of 2002 industry employment is 16,400.

Trends in Forest Products Employment and Labor Income

Employment and timber harvest—Changes in employment levels in Idaho's forest products industry over the past three decades are due primarily to fluctuating timber harvest levels and changes in the number of workers employed per unit volume of timber harvested. Employment in Idaho's wood and paper products industry grew from about 15,400 workers in 1970 to a peak of 22,700 workers in 1979. The years 1976 through 1979 had the highest average employment for any

Table 11—Employment in Idaho's primary and secondary wood and paper products industry, 1990 and 2000.

Wood and paper products industry	1990	2000
	----- Workers -----	
Primary industries	16,832	12,750
Secondary industries	3,520	5,186
Total	20,352	17,936

4-year period from 1969 to 2000 at 21,400 workers (fig. 6). Timber harvest was also at its highest 4-year average during this period, at 1,835 MMBF per year. However, while timber harvest increased by 2.4 percent between 1969 and 1979, employment in Idaho's forest products industry increased nearly 45 percent.

With the onset of a severe recession in the early 1980s, Idaho experienced a decline in timber harvest of almost 37 percent (1979 through 1982). Employment declined significantly, reaching a trough at 16,000 workers in 1982. However, as the recession eased up, markets began to improve, and by 1989 harvest had increased to 1,845 MMBF and employment had reached 19,900. Despite a more than 35 percent decline in

timber harvest starting in the late 1980s, employment remained strong into the 1990s, reaching 21,100 workers in 1994 before starting a steady decline that continued through 2002.

Idaho's forest products industry has employed substantially more workers per million board feet of timber harvested in recent years than it did 30 years ago (fig. 7). Although the 1980s showed a decrease in the number of workers per million board feet of timber, both the 1970s and the 1990s showed increases. The number of workers employed per unit volume of timber harvested has been influenced by numerous factors, including:

- expanded utilization of timber
- market conditions
- the degree of secondary manufacturing
- structural changes in the industry
- technological changes
- mechanization and automation
- log flows
- timber harvest design changes
- changing raw material availability

While a detailed analysis of these factors is beyond the scope of this report, we discuss major influences below. During the 1970s, the forest products industry employed more workers (fig. 7) due to strong markets and expanded use of timber. The

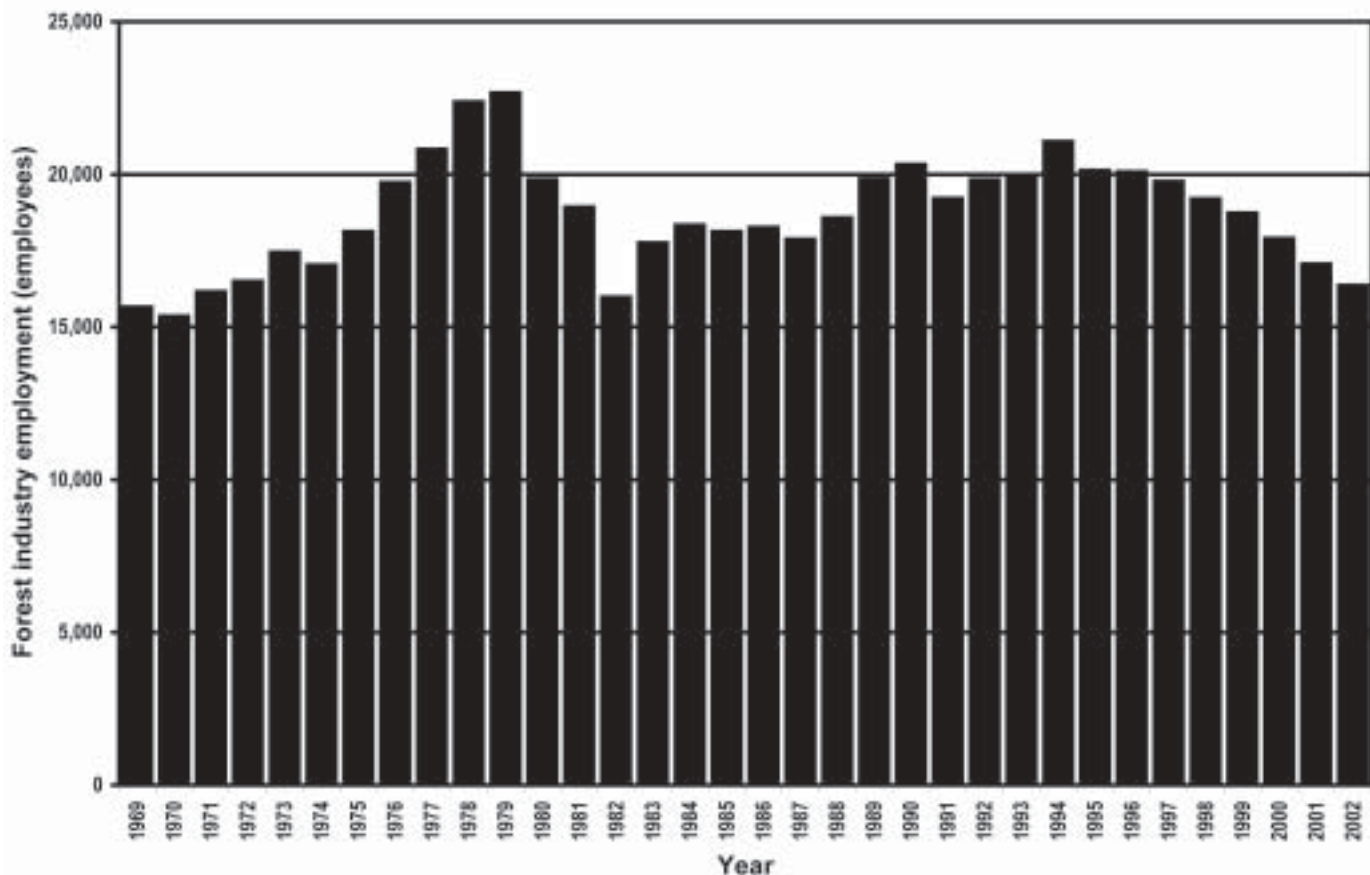


Figure 6—Idaho forest industry employment, 1969 through 2002.

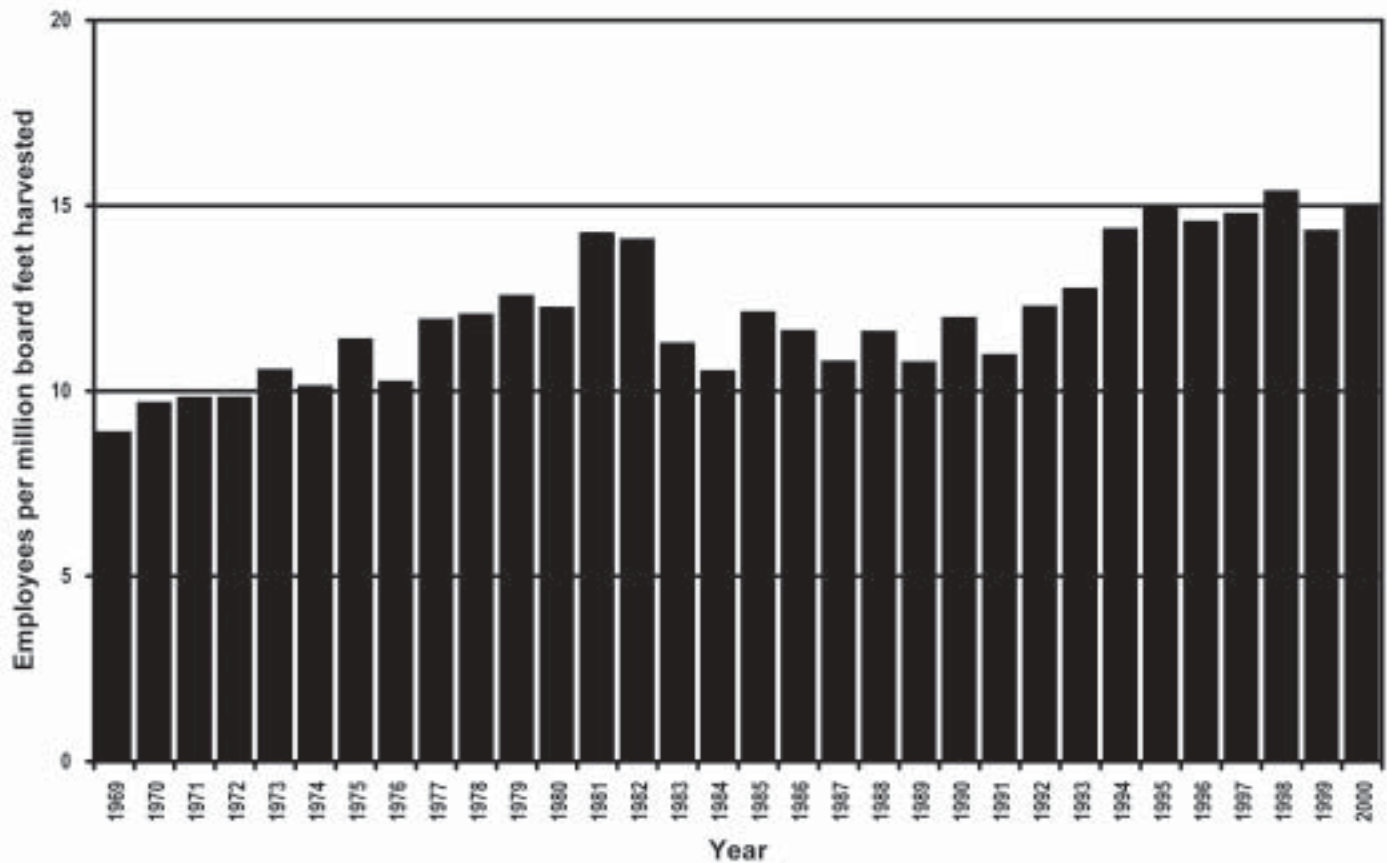


Figure 7—Idaho forest industry employment per million board feet of timber harvested, 1969 through 2000.

expanded use of timber came about specifically through the development of the particleboard industry and expansion of the paper industry, both of which use wood residue, formerly a waste product of sawmills and plywood plants. Thus, utilizing a greater proportion of the log led to employing more workers without increasing the timber harvest. Through the 1980s, development and implementation of substantial technology increased industry product output but reduced employment per unit volume of timber harvested. In the 1990s, this trend reversed and the number of workers per million board feet of timber harvested increased sharply from close to 12 in 1990 to 15 in 2000, an increase of over 25 percent that was driven mostly by increases in the secondary sectors.

Idaho's forest products industry saw a decrease in employment during the 1990s, with declines in the primary sectors overriding increases in the secondary industries (table 11). The primary and secondary sectors deal with declining timber harvests differently. Most of the secondary industries use wood products manufactured by Idaho's or the region's primary industry as their input, but it only consumes a fraction of what the regional primary industry produces. Also, the secondary industry can more easily acquire raw materials from

elsewhere. It is, therefore, not as susceptible to local declining timber availability as is the primary industry. In the primary industry, changes in timber harvest levels affect employment more directly.

Labor income—Similar to employment, labor income peaked in the late 1970s and again in the early 1990s. Labor income grew steadily through the 1970s, reaching a high of \$1.07 billion in 1978. Following major declines in the early 1980s, labor income again rose through the latter part of the decade, but 1991 saw a recession-induced trough in labor income, at \$718 million. A peak followed in 1994, at approximately \$1 billion, and labor income finished the decade at more than \$900 million.

Labor income for the forest products industry as a percentage of total labor income peaked in the late 1970s, with troughs in the early 1980s and 1990s (fig. 8). Starting out at approximately 7 percent of total labor income in 1969, the forest products industry's share rose to 8.6 percent in 1979 before hitting a trough at 5.8 percent in 1982 and another one at 5.1 percent in 1991. In 2000, the forest products industry provided 4.6 percent of the State's labor income.

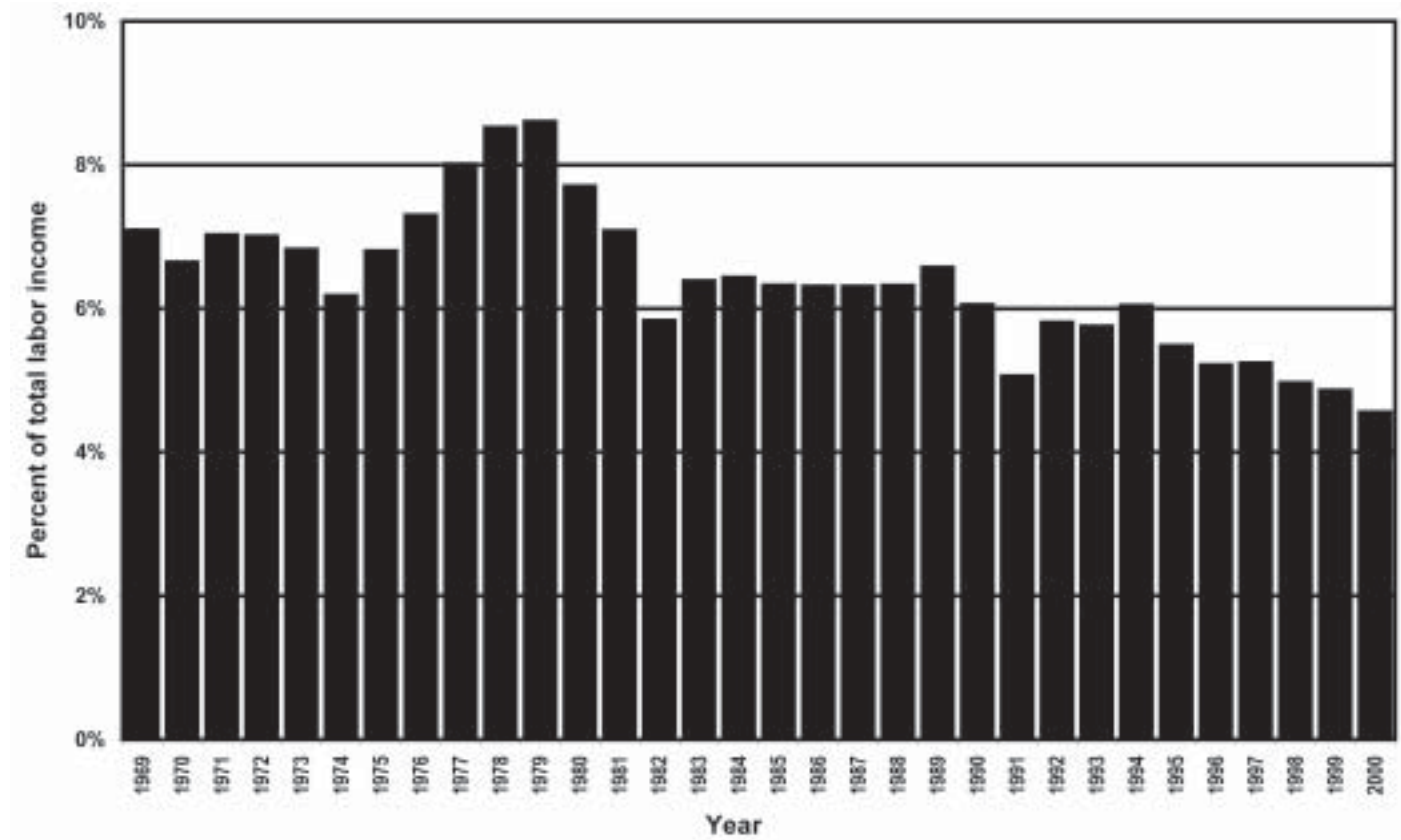


Figure 8—Forest labor income as percent of Idaho's total labor income, 1969 through 2000.

Idaho's Basic Industries and Trends in the State Economy

Basic sectors are those whose products or services are generally sold outside of the area, or otherwise result in an inflow of funds from outside of the area. Revenues from these sources inject new funds into a local economy by paying local workers, buying local investments, and making other local purchases. Thus, changes in these basic sectors lead to changes in an area's overall economic activity as measured, for example, by total labor income.

The 1970s represent a period of rapid growth in Idaho's economy, with every major nonfarm basic industry sector increasing substantially. The most rapidly growing sectors were wood and paper products and other manufacturing; each saw inflation-adjusted labor income almost doubling throughout the decade (fig. 9). From a peak in 1979, Idaho's economy declined significantly to a trough in 1982, a period coinciding with the worst postwar recession in the U.S. economy. Total labor income for the State fell by almost 10 percent during this period, driven by declines in all but one of Idaho's basic industries. Agriculture was the only basic industry to show improvements during this period, with a 30 percent increase between 1979 and 1982. Total labor income again turned

upward in 1983, with uneven growth in the late 1980s and accelerating growth in the 1990s, totaling 53 percent between 1990 and 2000.

Again, the basic industries were major contributors to the overall growth increase in the last half of the 1980s and through the 1990s, as every major basic industry in Idaho showed increases in adjusted labor income for the period. The largest growth was observed in the category of other manufacturing, where labor income more than doubled during the 1990s, from \$1.11 billion in 1990 to \$2.64 billion in 2000. By comparison, the second fastest growing sector was that of nonresident travel, where labor income increased by 47 percent, from \$347 million to \$509 million, followed by mining and transportation, with labor income growth of 43 percent, from \$793 million to \$1.14 billion. Wood and paper products labor income increased 15 percent in the 1990s, from \$845 million to \$974.

Forest Products Industry and Idaho's Economic Base

Idaho has one of the country's largest forest products industries relative to the State economy. Using percent of total labor income as a measure of relative dependency, Idaho and Oregon

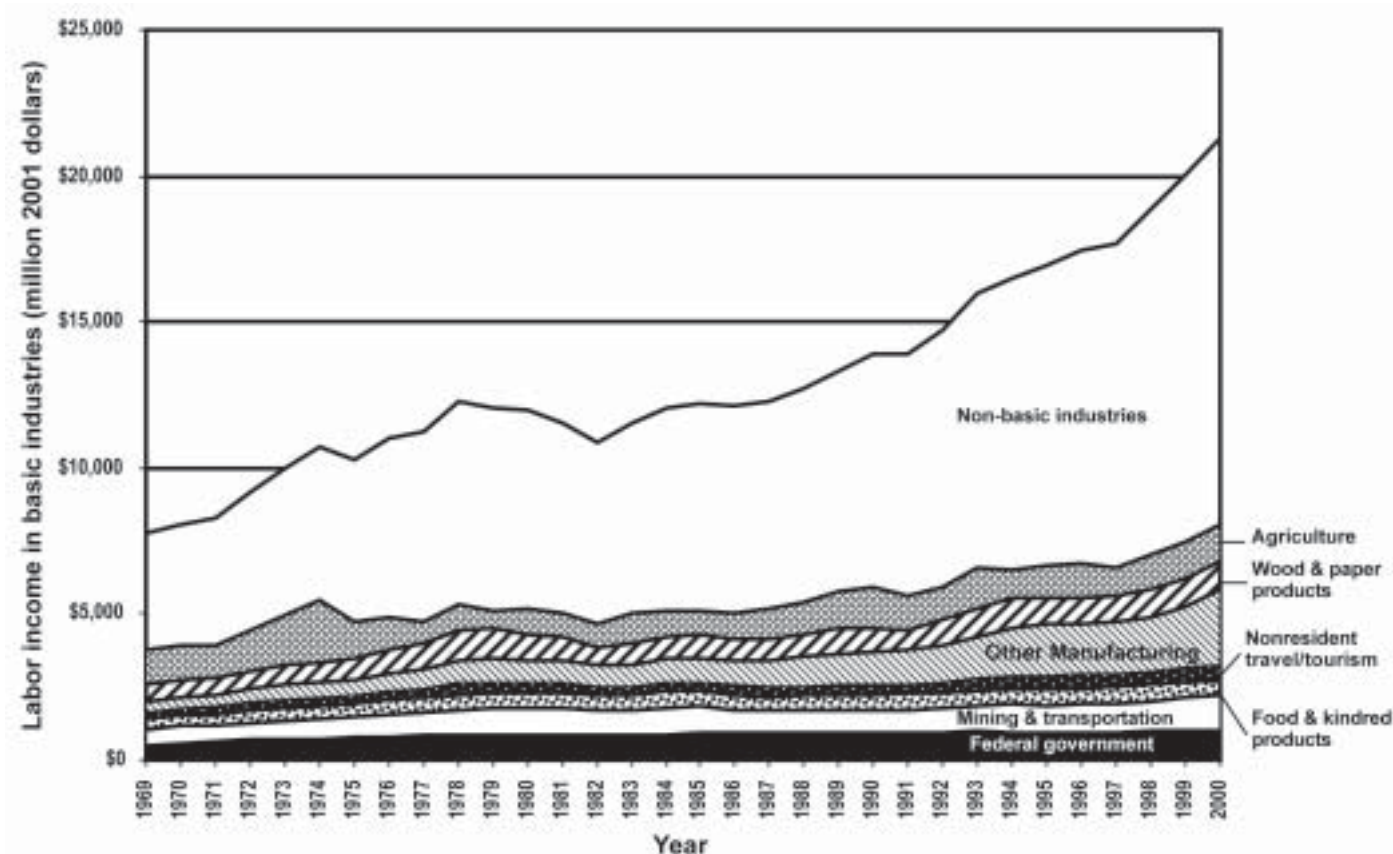


Figure 9—Labor income in Idaho's basic industries, 1969 through 2000.

ranked second among the 50 States, with 4.6 percent of total labor income coming directly from the forest products industry in 2000. Only Maine, with 5.5 percent, ranked higher. In Idaho, the wood and paper products industry accounted for 12 percent of basic labor income in 2000, a drop from its 14 percent contribution in 1990 (table 12).

Forest products is a high-wage industry. In Idaho, average labor income per forest products worker was \$44,800 in 2000, substantially higher than for other industries in the State, at

\$27,000. Consequently, the industry contributes proportionately more to the State's labor income than to State employment: 12 percent of basic industry labor income versus 8 percent of employment in 2000 (table 12).

Northern Idaho

The forest products industry is substantially more important in the 10 Idaho Counties north of the Salmon River (Benewah,

Table 12—Idaho's basic industries labor income and employment, 1990 and 2000.

Basic industry	1990	2000	1990	2000
	<i>Percentage of basic industries labor income</i>		<i>Percentage of basic industries employment</i>	
Federal government	16	13	13	10
Mining and transportation	13	14	11	12
Food and kindred products	9	7	9	8
Nonresident travel/tourism	6	6	14	15
Other manufacturing	18	32	17	21
Wood and paper products	14	12	11	8
Agriculture	24	15	25	26
Total basic	100	100	100	100

Bonner, Boundary, Clearwater, Idaho, Kootenai, Latah, Lewis, Nez Perce, and Shoshone Counties) than in the State as a whole. In addition to the State-level basic industries mentioned previously, net retirement income and earnings of commuters living in northern Idaho but working elsewhere contribute measurably to the economic base in these 10 Counties. Retirement payments represented an inflow of over \$118 million in 2000, or 8 percent of the economic base, demonstrating that northern Idaho is something of a retirement haven. In addition, northern Idaho residents working outside the area generated an inflow of \$169 million in labor income in 2000, the equivalent of 11 percent of the economic base. Net retirement and net commuter earnings are not part of the economic base at the State level.

The more conventional basic industries of northern Idaho are the same as those found in the rest of the State. The forest products industry remains a major component of the economic base, despite some recent declines. The industry provided approximately 11 percent of total area labor income and 27 percent of labor income in area basic industries in 2000. These numbers were down from 22 percent of total labor income and 39 percent of basic labor income in 1990 (table 13).

Idaho's Timber Harvest and Utilization

In this section we examine the ownership and geographic sources of Idaho timber, types of timber products harvested, end uses of timber, species composition, and movement of timber products. We begin by drawing on a number of sources to provide a broad overview of harvest trends in Idaho since World War II. Following the overview, we used recent censuses to examine specific changes in timber source and how Idaho's harvest is currently used.

According to Brown and Chojnacky (1996), there are 17.6 million acres of nonreserved timberland in Idaho available for timber production and other uses. Timberland is categorized under one of four broad ownership categories: National Forest

(73 percent of Idaho's timberland), other public (9 percent), industrial private (7 percent), and nonindustrial private land (11 percent) (Brown and Chojnacky 1996). National forests are administered by the USDA Forest Service. Other public land refers to land managed by the USDI Bureau of Land Management or Idaho Department of Lands. Industrial timberland is owned by firms that process timber into manufactured products. Nonindustrial private timberland refers to private land owned by individuals or firms without forest products manufacturing facilities; tribal timberland is classified as non-industrial private land for this report. Timber resources are distributed among the ownership categories in roughly the same proportions as timberland (Brown and Chojnacky 1996).

Harvest Trends 1947 through 2001

The USDA Forest Service has kept comprehensive annual harvest data by ownership in Idaho since 1969. Other sources of information were used to develop harvest numbers for 1947 through 1969 (fig. 10). While detailed harvest by ownership could not be developed for all years, the harvest estimates are reasonable representations of total harvest and harvest trends. Total harvest and non-National Forest harvest were estimated for 1947 through 1958; harvest data for private land, National Forests, and other public land have been produced for subsequent years.

During the 25 years immediately following World War II, Idaho's timber harvest nearly doubled, from about 950 MMBF Scribner in 1947 to about 1,800 MMBF in the late 1960s. The major factor in increased harvest during this period was the increase in National Forest harvest, from 250 MMBF in 1947 to an all time high of more than 1 billion board feet annually in 1968 and 1969. Post World War II public policy encouraged increased harvest on Federal lands to meet the strong national demand for building materials. As a result, the share of Idaho's harvest from the National Forests increased from less than 30 percent in the 1940s to 60 percent in the late 1960s.

Timber harvest levels increased further in the 1970s, and the peak harvest for Idaho occurred in 1976 at 1.9 billion board feet. National forest harvest in the late 1970s was slightly below the late 1960s; the increase in total harvest came primarily from private timberlands. In the late 1970s, National Forests provided about half of Idaho's timber harvest. Private lands provided about 40 percent of the harvest in the late 1970s versus 33 percent in the late 1960s. Most of the remaining harvest in the 1970s was from State of Idaho lands.

During the recession years of the early 1980s, harvest fell sharply, but rebounded in the last half of the 1980s to an average level of 1,635 MMBF. By the late 1980s, harvest from National Forest lands had slipped to 45 percent, and harvest from private lands increased to about 45 percent. Harvest from Idaho Department of Lands and Bureau of Land Management forest lands made up the remaining 10 percent.

Throughout the 1990s and into the 2000s, Idaho's total timber harvest declined steadily because of a dramatic decline in harvest from National Forest lands. In 2001, the National

Table 13—Northern Idaho's basic industries labor income, 1990 and 2000.

Basic industry	1990	2000
<i>Percentage of basic industries labor income</i>		
Federal government	12	11
Mining and transportation	17	16
Nonresident travel/tourism	11	10
Other manufacturing	9	13
Wood and paper products	39	27
Agriculture	4	4
Net retirement	3	8
Net residence adjustment	4	11
Total basic	100	100

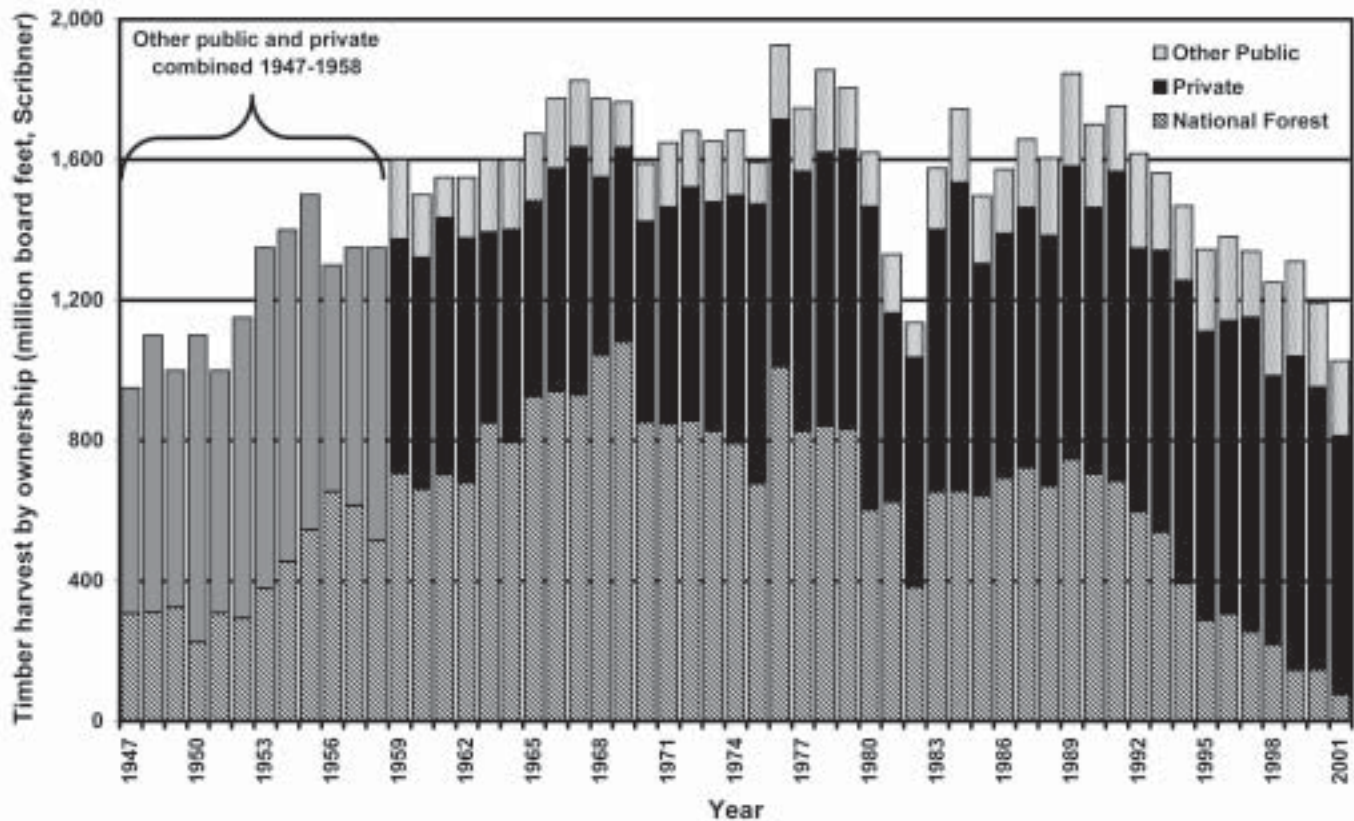


Figure 10—Idaho timber harvest by ownership, 1947 through 2001 (source: Keegan and others 1997).

Forest harvest for Idaho was the lowest on record and only 11 percent of what it was in 1990. The National Forest harvest declined by 629 MMBF from 1990 to 2001 and accounted for 94 percent of Idaho's total harvest decline (673 MMBF) over the same period. According to National Forest supervisors, the reductions in National Forest harvests from 1993 to 2000 were due to a number of factors and constraints. These include, in order of importance, protection for threatened and endangered species, timber sale appeals and litigation by conservationists, and cumulative effects of past timber harvesting (Haminishi and others 1995).

The volume of timber harvested from Idaho's private timberlands remained stable throughout the 1990s and into the new century; however, the proportion of the harvest coming from private lands increased steadily from 45 percent (732 MMBF) in 1990 to 72 percent (750 MMBF) in 2001. Harvest from Idaho's other public lands followed a similar trend, with harvest volumes remaining fairly stable, but the proportion of the total harvest increasing from 14 percent (259 MMBF) in 1990 to 21 percent (179 MMBF) in 2001. In 1998, the harvest volume from other public lands in Idaho surpassed the volume harvested from Idaho's National Forests for the first time on record. Timber harvest from State of Idaho lands accounted for 17 percent (172 MMBF) of Idaho's total harvest in 2001 and about 96 percent of harvest from "other public" lands. Harvest from Bureau of Land Management lands remained a small fraction of harvest from "other public" lands in 2001.

Geographic Source of the Harvest

Counties north of the Salmon River supplied 89 percent of the 2001 harvest, while 11 percent came from Counties south of the Salmon River (table 14). Clearwater County continued to lead the State in timber harvest with 182 MMBF in 2001—about 18 percent of Idaho's harvest. Other leading timber-producing Counties were Shoshone with 172 MMBF, Benewah with 129 MMBF, Bonner with 124 MMBF, Kootenai with 81 MMBF, and Latah with 70 MMBF. Together, these six northern Counties supplied 75 percent of Idaho's 2001 timber harvest. Valley County had the largest harvest in southern Idaho at 39 MMBF, which was 4 percent of the State's harvest. Adams, Boise, Elmore, and Valley Counties contributed to a combined 9 percent of the State's harvest.

Harvest volumes in 2001 for both northern and southern Idaho were lower than any of the previous census years. Since the 1979 census, harvest has declined 511 MMBF (36 percent) in northern Idaho and 332 MMBF (75 percent) in southern Idaho. Compared to 1995, the harvest was down 18 percent in northern Idaho and down 60 percent in southern Idaho.

All 10 northern Idaho Counties have seen declines in harvest levels since 1990, with the largest decreases occurring in Idaho and Clearwater Counties. Idaho County's harvest has declined by 63 percent since 1990, mostly due to a 93 percent decline (89 MMBF) in National Forest harvest. Harvest levels from other ownerships decreased 26 percent (21 MMBF) over the same

Table 14—Idaho's timber harvest by County, 1979, 1985, 1990, 1995, and 2001 (source: Keegan and others 1997).

County	Northern Idaho									
	1979	1985	1990	1995	2001	1979	1985	1990	1995	2001
	<i>----- Million board feet, Scribner -----</i>					<i>----- Percentage of total harvest^a -----</i>				
Clearwater	544	338	267	234	182	29	21	16	17	18
Shoshone	206	217	183	194	172	11	14	11	14	17
Idaho	190	156	174	113	65	10	10	10	8	6
Bonner	142	175	197	139	124	8	11	12	10	12
Benewah	100	94	152	117	129	5	6	9	9	13
Boundary	94	80	86	69	57	5	5	5	5	6
Kootenai	65	80	152	114	81	4	5	9	8	8
Latah	57	89	84	96	70	3	6	5	7	7
Nez Perce	8	12	17	8	4	0	1	1	1	0
Lewis	4	13	20	17	14	0	1	1	1	1
Northern Idaho	1,410	1,254	1,332	1,100	899	76	79	79	80	89
	Southern Idaho									
Valley	107	88	52	67	39	6	6	3	5	4
Boise	84	67	127	93	20	5	4	8	7	2
Adams	52	66	87	28	25	3	4	5	2	2
Washington	4	9	4	6	0	^b	1	^b	^b	0
Elmore	25	14	5	38	7	1	1	^b	3	1
Other Counties	20	3	6	11	1	1	^b	^b	1	0
Southwestern Idaho	292	247	281	242	91	16	16	17	18	9
Fremont	76	43	20	2	3	4	3	1	^b	^b
Lemhi	34	11	16	6	1	2	1	1	^b	^b
Clark	10	10	16	0	1	1	1	1	0	^b
Caribou	4	10	3	5	5	^b	1	^b	^b	^b
Other Counties	24	19	24	15	7	1	1	1	1	1
Southeastern Idaho	148	93	79	27	17	8	6	5	2	2
Southern Idaho	440	340	360	269	108	24	21	21	20	11
Idaho Total	1,850	1,594	1,692	1,370	1,007	100	100	100	100	100

^aPercentage detail may not add to 100 due to rounding.^bLess than 0.5 percent.

period. Since 1990, Clearwater County has seen a harvest decline of 90 percent (40 MMBF) from National Forest lands. Harvest levels from State lands and industrial lands also declined over the same period (34 percent and 17 percent, respectively).

Southern Idaho's most dramatic harvest decreases occurred in the southwestern Counties of Adams, Boise, and Valley, where timber harvest has decreased by 182 MMBF since 1990 (table 14). Virtually all of the decrease can be attributed to sharply declining harvest levels from National Forest lands, which declined by approximately 90 percent since 1990. The harvest from other ownerships has remained essentially unchanged over the same period.

Types of Timber Products Harvested

The primary products manufactured directly from harvested timber are reported in four general categories: saw logs, veneer logs, pulpwood, and other timber products. Saw logs are timber products sawn to produce lumber, structural timbers,

railroad ties, and similar products. Veneer logs are used to produce veneer and, in some cases, plywood. Pulpwood is timber used in round form to produce wood chips for manufacturing pulp and paper. "Other timber products" refers to utility poles, house logs, cedar product logs, posts and small poles, and timber used by roundwood furniture manufacturers. Between 1984 and 1997 timber used to produce OSB was called fiberwood and was included in other products.

The volume and proportion of harvest in each product category may indicate changes in industry structure and in market conditions as much as changes in the resource itself. This is especially true in distinguishing between saw logs and veneer logs. As in previous censuses, saw logs and veneer logs remained the primary timber products harvested, accounting for 95 percent of the harvest in 2001 (table 15). Saw logs constituted 905 MMBF, or 90 percent of the total harvest in 2001, which is a higher proportion of saw logs in the harvest than in any of the previous census years. In 1990, 1,400 MMBF of saw logs were harvested in Idaho, accounting for about 83 percent of the total harvest; and 1,028 MMBF were harvested

Table 15—Idaho's timber harvest volume by ownership source and product type, 2001.

Ownership source	Lumber, timbers, other sawn products	Veneer and plywood	Posts, poles, and other roundwood	House logs and log homes	Cedar products	Pulpwood	All products
<i>----- Thousand board feet, Scribner -----</i>							
Private timberlands	683,656	42,612	2,055	876	18,402	2,756	750,357
Industrial	389,419	39,707	754	90	11,386	1,673	443,029
Nonindustrial	282,610	2,695	1,301	786	7,016	1,063	295,471
Tribal	11,627	210	—	—	—	20	11,857
Public timberlands	221,684	12,355	5,264	5,630	11,072	698	256,704
National forests	70,703	663	1,123	5,366	—	9	77,863
Other public lands	150,982	11,692	4,141	264	11,072	689	178,841
Total	905,340	54,968	7,319	6,507	29,474	3,454	1,007,061

in 1995, accounting for about 75 percent of the total harvest (Keegan and others 1997).

Timber processed by the plywood industry and categorized as veneer logs is also suitable for lumber production. As a result of plywood industry development in the 1960s and 1970s, an increasing proportion of timber was harvested for plywood production and classified as veneer logs rather than saw logs. Since 1990, sawmill numbers, lumber production, and capacity have declined. However, reduced production and capacity in the plywood and veneer sector have been more drastic, and some timber that could be used for veneer production is being sent to sawmills for processing into lumber. At 55 MMBF, veneer logs were the second largest component of Idaho's timber harvest in 2001. Veneer logs accounted for 5 percent of the total harvest, which is a smaller proportion of the harvest than in previous census years. The veneer log harvest in 1990 was 168 MMBF, accounting for about 10 percent of the total harvest; and in 1995 it was 172 MMBF, accounting for slightly less than 13 percent of the total harvest (Keegan and others 1997).

The harvest of timber products other than saw logs and veneer logs declined from 170 MMBF in 1995 to 47 MMBF in 2001. At 29 MMBF, cedar products constituted the majority of Idaho's other products harvest in 2001. Slightly more than 7 MMBF of the harvest were post, pole, and rail material, while slightly less than 7 MMBF were for house logs. The remainder was pulpwood. Most of the decline was due to closure of an OSB plant and drastically reduced pulpwood harvest. Idaho's pulpwood harvest was 45 MMBF in 1990, 105 MMBF in 1995, and about 3 MMBF in 2001. Fluctuations in Idaho's year-to-year pulpwood harvest are due to variations in world paper markets, local (Idaho and adjacent States) and overseas chip markets, and the supply of chippable mill residue material. Therefore, no long-term significance should necessarily be attributed to annual changes in Idaho's pulpwood harvest. In 1995, paper prices were moderately strong. Consequently, demand for raw material by pulp and paper mills was also strong, and roundwood pulpwood was substituted for mill residue in 1995 due to reduced mill residue production.

Land Ownership and Type of Product Harvested

The amount of timber harvested from public and private lands varies by product type. Sawmills process about 90 percent of the timber harvested in Idaho. In 2001, private lands supplied 76 percent (684 MMBF) of Idaho's saw log harvest (table 15), an increase of 12 percent in volume compared to 1995, when private lands provided 59 percent (604 MMBF) of Idaho's saw log harvest. Prior to 1995, censuses showed private lands providing less than half of Idaho's saw log harvest (Keegan and others 1997). Substantial declines in the saw log harvest from Idaho's National Forests are the major reason for the increase in the private land proportion. In 2001, National Forests provided just 8 percent (71 MMBF) of Idaho's saw log harvest, compared to 23 percent (238 MMBF) in 1995 and 44 to 50 percent in censuses prior to 1995.

Private lands continue to be the major source of Idaho's veneer log harvest, providing 78 percent (43 MMBF) in 2001. This is not surprising since most of the manufacturing capacity in this sector is owned by mills with industrial timberlands. However, the proportion of the veneer log harvest from private lands has increased since 1995, when 62 percent (107 MMBF) of veneer logs were harvested on private lands. As with the saw log harvest, this proportionate change is due to declines in National Forest harvest. Censuses prior to 1995 showed proportions of the veneer log harvest from private lands ranging from a low of 48 percent (80 MMBF) in 1990 to 62 percent (112 MMBF) in 1985.

In 2001, private timberlands provided 52 percent of the harvest for cedar products, house logs, posts, poles, rails, and other products. This is a smaller proportion than in 1995, when private timberlands supplied 70 percent of the combined harvest for these products. The decreased proportion from private lands can be attributed to strong pulp markets in 1995 and weak markets in 2001. The pulp and paper sector typically relies on private lands for a large portion of their roundwood receipts. In 2001, private lands provided 80 percent (3 MMBF) of the pulpwood harvest in Idaho; 84 percent (88 MMBF) in 1995; and 64 percent (29 MMBF) in 1990 (Keegan and others 1997). Therefore the strength of the pulp market during census years has a direct influence on the proportion of the harvest for these products that originates from private timberlands. In addition, strong roundwood pulpwood markets often occur at infrequent and unpredictable intervals, generally when lumber production is down, paper markets are good, and private landowners can respond much more quickly to take advantage of ephemeral markets. Because three of Idaho's industrial timberland owners also own pulp and paper mills, either in Idaho or in other States, they are in a position to recognize and immediately respond to roundwood pulpwood market opportunities.

Although private lands supplied 52 percent of the combined harvest for these products, some products, particularly house logs and posts, poles, and rails, originated primarily from public timberlands in 2001. Nearly 87 percent of house logs were harvested on public lands while almost 72 percent of the harvest for posts, poles, and rails came from public lands. Public lands also supplied 38 percent of the harvest for cedar products.

Species Composition of Timber Harvest

The largest species component of Idaho's 2001 timber harvest was Douglas-fir at 26 percent of the total volume harvested (table 16). This is similar to 1995, when Douglas-fir comprised 27 percent of the harvest. True firs—grand fir (*Abies grandis* (Dougl. ex D. Don) Lindl.) and subalpine fir (*Abies lasiocarpa* (Hook.) Nutt.)—comprised the second largest component of Idaho's 2001 timber harvest, with 24 percent of the total volume. In previous census years, the true firs were the largest component of Idaho's timber harvest. The most notable recent change to the species mix of Idaho's timber

Table 16—Idaho's timber harvest by species, selected years 1969 through 2001 (source: Setzer 1971; Keegan and others 1997).

Species	1969	1979	1985	1990	1995	2001
----- Percentage of all species ^a -----						
Douglas-fir	18	20	21	22	27	26
True firs	24	22	27	23	25	24
Western hemlock	^b	1	3	3	4	12
Western redcedar	7	11	10	11	9	10
Western larch	6	6	6	6	6	10
Ponderosa pine	14	13	12	18	17	7
Lodgepole pine	4	8	10	10	6	5
Western white pine	19	8	6	5	3	4
Spruce	^b	3	5	3	2	2
Other species	8	9	1	0	2	0
All species	100	100	100	100	100	100

^aPercentage detail may not add to 100 due to rounding.

^bWestern hemlock and Engelmann spruce were included in the other species group in 1969.

harvest was ponderosa pine's decline from 17 percent of the harvest in 1995 to 7 percent in 2001, due largely to decreased harvesting in southern Idaho. Related changes since 1995 include an increased proportion of western larch, from 6 percent to 10 percent, and the increase of western hemlock from 4 percent to 12 percent of the harvest.

Over the past 30 years, a major change in species composition of the harvest has been the reduced amount of western white pine. The white pine harvest was about 343 MMBF in 1969 and accounted for 19 percent of Idaho's timber harvest. By 2001, the white pine harvest had dropped to 39 MMBF, 4 percent of the total harvest. This change is the result of several interacting factors including white pine blister rust, a bark beetle epidemic of the 1960s, high-grade logging, and fire suppression. By far the biggest blow to white pine was dealt by white pine blister rust, an exotic disease introduced to the United States from Europe in the early 1900s. Blister rust had reached epidemic levels in the 1940s and caused great damage to the white pine resource throughout the Inland Northwest (Fins and others 2001).

Species Composition of Product Types

In 2001, all of Idaho's commercial softwood tree species were used to produce lumber (table 17). True firs were the species most harvested for saw logs in 2001, comprising 26 percent of the saw log harvest, while Douglas-fir accounted for 25 percent. Thirteen percent of saw logs were western hemlock, and 9 percent were western larch. This represents a shift from previous censuses when Douglas-fir, true firs, ponderosa pine, and western redcedar (*Thuja plicata* Donn ex D. Don) were the four most harvested species for saw logs. In 1985, lodgepole pine replaced western redcedar in the top four species harvested for saw logs.

Douglas-fir made up 64 percent of Idaho's 2001 veneer log harvest, followed by western larch at 23 percent. The remainder was western white pine (9 percent), true firs (2 percent),

and other species (2 percent). The major change in veneer log species composition since 1979 has been the increase in Douglas-fir from 39 percent and decrease in true firs from 44 percent (Keegan and others 1997).

Differences between the 2001 and 1995 harvests for products other than saw logs and veneer logs can be attributed to the influence of the pulpwood market, which was strong in 1995 and weak in 2001. True fir, ponderosa pine, and Douglas-fir were the primary species harvested for pulpwood (105 MMBF) in 1995, accounting for 31, 26, and 21 percent of the pulpwood harvest, respectively. In 2001, true firs accounted for 73 percent of Idaho's pulpwood harvest, which was just 3 MMBF. Western redcedar accounted for 65 percent of the harvest of timber products other than saw logs and veneer logs in 2001, followed by lodgepole pine and western white pine at 9 percent each. In 1995, true firs, ponderosa pine, and other species (primarily cottonwood (*Populus* spp.) used for oriented strand board) were the top three species harvested for products other than saw logs and veneer logs. Spruce and Douglas-fir were the leading species harvested for house logs, while western redcedar and lodgepole pine were the most harvested species for posts, poles, and rails.

Movement of Timber

The concentration of production in fewer and larger facilities has created manufacturing centers that draw timber from large geographic areas. Thus, large volumes of timber now cross County and State lines. Because many Counties, especially in southern Idaho, now have only one or two timber processing facilities, timber movement is described by three broad geographic regions—northern Idaho, southwestern Idaho, and southeastern Idaho—to avoid disclosure of firm-level information concerning timber receipts.

Movement across State lines—In 2001, 10 percent of Idaho's harvest (103 MMBF) was shipped for processing

Table 17—Idaho's timber harvest volume by species and product type, 2001.

Ownership source	Lumber, timbers, other sawn products	Veneer and plywood	Posts, poles, and other roundwood	House logs and log homes	Cedar products	Pulpwood	All products
	<i>Thousand board feet, Scribner</i>						
Douglas-fir	223,637	35,124	52	1,782	—	374	260,968
True firs	237,677	1,283	5	21	—	2,520	241,507
Western hemlock	121,323	—	—	—	—	—	121,323
Larch	84,319	12,593	8	173	—	374	97,467
Cedar	71,000	196	4,556	38	25,612	—	101,402
Ponderosa pine	68,959	622	35	235	—	125	69,976
Lodgepole pine	48,308	238	2,664	1,500	—	60	52,769
Western white pine	30,531	4,886	—	116	3,862	—	39,395
Spruce	17,608	27	—	2,614	—	—	20,248
Other softwoods	1,979	—	—	15	—	—	1,994
Hardwoods	—	—	—	13	—	—	13
All species	905,340	54,968	7,319	6,507	29,474	3,454	1,007,061

outside of the State (table 18). Idaho's primary wood products manufacturers received 134 MMBF of timber that was harvested outside of Idaho, making the State a net importer of nearly 32 MMBF of timber in 2001. This is in contrast to previous surveys, when Idaho had net exports ranging from 7 to 39 MMBF. None of the timber harvested in Idaho during 2001 was shipped to other countries for processing. However, Idaho mills did receive nearly 28 MMBF of Canadian timber, mostly saw logs.

Southern Idaho Counties supplied 52 percent (54 MMBF) of Idaho's timber exports in 2001, with southwestern Idaho Counties accounting for the majority (49 MMBF) of that volume. Northern Idaho Counties were the source of the remaining 48 percent (49 MMBF) of timber exports to other States.

Saw and veneer logs were the major component of timber harvest flowing into and out of Idaho. In 2001, Idaho sawmills and plywood/veneer mills imported 127 MMBF of saw and veneer logs, while 102 MMBF of saw and veneer logs were exported. Nearly 6 MMBF of house logs were imported in 2001, along with just over 1 MMBF of logs for other products.

Movement within Idaho—Ninety percent (904 MMBF) of Idaho's 2001 timber harvest was processed within the State (table 19). Timber movement among Idaho's three geographic regions is extremely limited; nearly 99 percent of timber harvested in Idaho is processed in the region of harvest. However, timber movement among Counties within the same region is quite common, as 68 percent of timber harvested in Idaho during 2001 was processed in a County other than the County of harvest. The following paragraphs present a more detailed examination of timber flow for each region.

Northern Idaho: The 10 Counties north of the Salmon River are the center of both Idaho's timber harvesting and processing activities. The total harvest in these Counties was nearly 899 MMBF, or 89 percent of the State's harvest. Ninety-five percent (849 MMBF) of the timber harvested in northern Idaho was processed in Idaho. Of the 849 MMBF harvested in northern Idaho and processed in Idaho, virtually all (845 MMBF) was processed in northern Idaho. Only 4 MMBF of timber harvested in northern Idaho was processed in Idaho south of the Salmon River. Thirty-three percent of timber harvested in northern Idaho was processed in the County of harvest, 51 percent was processed in Counties adjacent to (sharing a County line with) the County of harvest, and 16 percent was processed in Counties not adjacent to the County of harvest.

Southwestern Idaho: Just over 91 MMBF of timber—9 percent of the State's total harvest—was harvested in the 10 Counties of southwestern Idaho in 2001. Nearly 54 percent (49 MMBF) was processed outside the State. Of the 46 percent (42 MMBF) that was processed in Idaho, 36 MMBF were processed in southwestern Idaho. Virtually all of the remaining 6 MMBF were processed in northern Idaho, with small volumes processed in southeastern Idaho. Within southwestern Idaho, 19 percent (8 MMBF) of the timber was processed in the

Table 18—Idaho's timber imports and exports to other States, 2001.

Timber products	Imports	Exports	Net imports
- - - Thousand board feet, Scribner - - -			
Saw and veneer logs	127,218	(102,391)	24,827
House logs	5,855	—	5,855
Other logs and chips	1,236	(295)	941
Total	134,310	(102,686)	31,623

County of harvest, while 81 percent (34 MMBF) was processed in other Counties. About 26 MMBF (63 percent) was processed in Counties adjacent to the County of harvest, and 8 MMBF (18 percent) were processed in Counties not adjacent to the County of harvest.

Southeastern Idaho: Southeastern Idaho accounted for the smallest percentage of volume harvested in Idaho in 2001, with 17 MMBF (2 percent). The majority of this volume (13 MMBF) was processed in Idaho; 4 MMBF were processed outside the State. Of the 13 MMBF processed in Idaho, 97 percent stayed in southeastern Idaho for processing. The remaining 3 percent was processed in southwestern Idaho, and trace amounts were processed in northern Idaho.

Of the timber harvested in southeastern Idaho that remained in the State for processing, just 11 percent was processed in the County of harvest, with an additional 35 percent processed in Counties adjacent to the County of harvest. The remaining 54 percent was processed in Counties not adjacent to the County of harvest.

End Uses of Idaho's Timber

In this final section we trace Idaho's timber harvest as it flows through the primary manufacturing sectors (fig. 11). Because both mill residue products and timber products are displayed, volumes are presented in cubic feet rather than board feet Scribner. The following conversion factors were used to convert board foot Scribner volume to cubic foot volume:

- 4.2 board feet per cubic foot for saw logs
- 5.0 board feet per cubic foot for veneer logs
- 3.5 board feet per cubic foot for pulpwood
- 3.0 board foot per cubic foot for all other timber products

In 2001, Idaho's timber harvest was approximately 243 million cubic feet (MMCF), exclusive of bark (fig. 11). Of this volume, 217 MMCF went to sawmills, 11 MMCF to plywood plants, 1 MMCF to pulp and board mills, and 14 MMCF to other primary manufacturers. These figures refer to Idaho's timber harvest and include timber products shipped to out-of-State mills; they do not include timber harvested in other States and processed in Idaho.

Of the 217 MMCF received by sawmills for manufacturing, 96 MMCF (44 percent) actually became finished lumber or

Table 19—Idaho's intra-State and inter-State timber flow, 2001.

Region of Harvest	Intra-State timber flow					Inter-State timber flow			
	Total processed in County of harvest	Total processed in adjacent Counties	Total processed in nonadjacent Counties	Total processed in Idaho	Total processed in southwestern Idaho	Total processed in southeastern Idaho	Total processed in Idaho	Processed out-of-State	Total harvest
----- Thousand board feet, Scribner -----									
Northern Idaho	276,870	435,315	137,216	845,093	4,308	—	849,401	49,175	898,576
Southwestern Idaho	8,014	26,196	7,569	5,523	36,126	130	41,779	49,475	91,254
Southeastern Idaho	1,491	4,645	7,061	3	350	12,844	13,197	4,036	17,233
Southern Idaho	9,505	30,841	14,630	5,526	36,476	12,974	54,976	53,511	108,487
Idaho Total	286,375	466,156	151,846	850,619	40,784	12,974	904,377	102,686	1,007,061
----- Percentage of total harvest -----									
Northern Idaho	33	51	16	99	1	0	95	5	100
Southwestern Idaho	19	63	18	13	86	0	46	54	100
Southeastern Idaho	11	35	54	0	3	97	77	23	100
Southern Idaho	17	56	27	10	66	24	51	49	100
Idaho Total	32	52	17	94	5	1	90	10	100

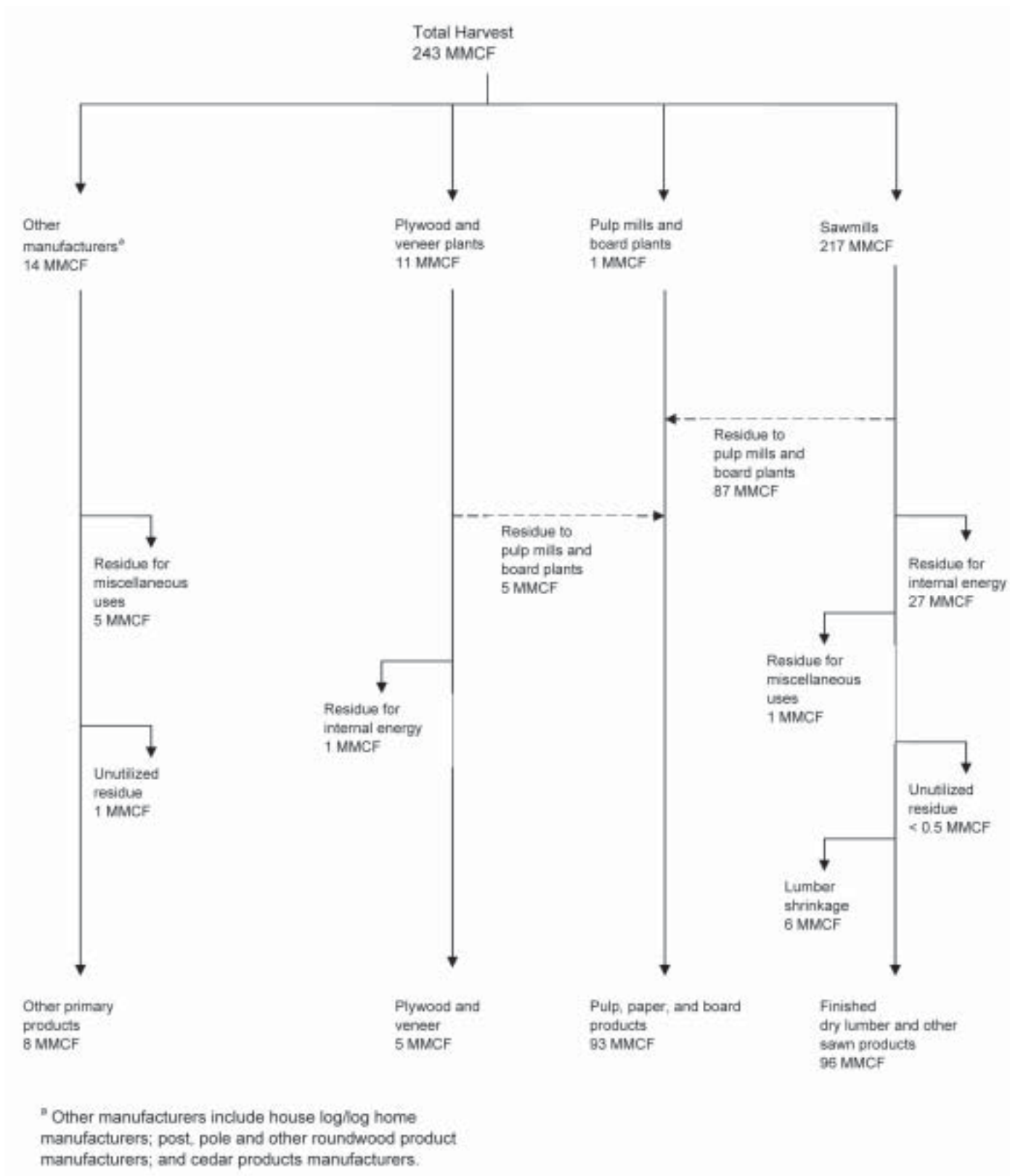


Figure 11—Idaho timber harvest and flow, 2001.

other sawn products, and 6 MMCF were lost to shrinkage. The remaining 115 MMCF of wood fiber became mill residue. About 87 MMCF of sawmill residues were used as raw material by pulp mills and board plants; 27 MMCF were used as hogfuel; 1 MMCF were used for miscellaneous purposes such as livestock bedding; and less than 0.5 MMCF remained unused.

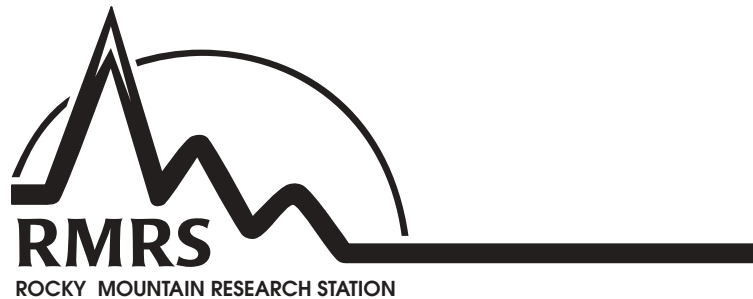
Plywood and veneer plants received 11 MMCF of timber in 2001, of which 5 MMCF (45 percent) became plywood. Of the remaining 6 MMCF, 5 MMCF were used by the pulp and board sector, and 1 MMCF were used as hogfuel.

Pulp and paper mills and particleboard plants, both in and out of Idaho, received approximately 93 MMCF of wood fiber from Idaho timberlands to be used as raw material for manufacturing products. Only 1 MMCF of that was furnished from timber delivered to pulp and paper mills in round form. Sawmills supplied 87 MMCF of mill residue, and plywood plants furnished the remaining 5 MMCF.

Other primary manufacturers received approximately 14 MMCF of timber products. The percentage of timber volume that becomes a finished product in the log home, post and pole, utility pole, and cedar product sectors varies, but several firms indicated that from 40 to more than 70 percent of the timber volume—exclusive of bark—becomes a finished product. Mills in this sector seldom supplied residue for use in other sectors. Most of the residue from these sectors was used as firewood, livestock bedding, and mulch. In 2001, an estimated 8 MMCF of the 14 MMCF delivered to these facilities became products, 5 MMCF became residue used for the various purposes mentioned, and about 1 MMCF of residue remained unused.

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