



Wyoming's Forest Products Industry and Timber Harvest, 2000

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Abstract

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This report traces the flow of Wyoming's 2000 timber harvest through the primary wood-using industries; provides a description of the structure, capacity, and condition of Wyoming's primary forest products industry; and quantifies volumes and uses of wood fiber. Historical wood products industry changes are discussed, as well as changes in harvest, production, and sales.

Keywords: forest products, mill residue, sawtimber, timber harvest, Wyoming.

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Report Highlights

- A total of 55 primary wood-processing facilities operated in 14 Wyoming Counties during 2000. These facilities included 23 sawmills, 11 log furniture manufacturers, eight post and pole producers, eight log home manufacturers, and five other wood products facilities.
- Wyoming's total estimated capacity to process timber in 2000 was 260 MMBF Scribner. About 44 percent of processing capacity was utilized in 2000, processing almost 114 MMBF. From 2000 to 2002, capacity decreased 17 percent to 217 MMBF, with only 34 percent utilized.
- Sales value of Wyoming's primary forest products in 2000 was nearly \$80.4 million free on board (f.o.b.) the producing mill. Lumber and sawn products accounted for nearly \$68 million, and log home sales exceeded \$7 million.
- Wyoming's 2000 timber harvest volume was 70.5 MMBF, with 73 percent of the timber coming from private timberlands, less than 20 percent from National Forests, 7 percent from State-owned lands, and 1 percent from the Bureau of Land Management.
- Ponderosa pine (*Pinus ponderosa*) was Wyoming's most harvested species in 2000, accounting for 42.1 MMBF, or 59.8 percent of the total harvest, followed by lodgepole pine (*Pinus contorta*) with 26.7 percent or 18.8 MMBF.
- Wyoming's timber harvest and volume processed are quite different because of the substantial timber flow into and out of the State: 57 percent of the timber processed in Wyoming in 2000 came from outside the State, while 32 percent of Wyoming's harvest was processed outside the State.
- Wyoming mills relied heavily on out-of-State timber from both public and private lands in 2000. Three-quarters of public lands timber processed in Wyoming came from outside the State, while about half of the private timber received by Wyoming mills came from outside the State.
- Wyoming timber processors generated about 183,000 BDU of residue in 2000. About 99 percent of both coarse and fine residues were utilized, but over two-thirds of bark went unused.

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Introduction

This report focuses on the results of a Statewide census of Wyoming's primary forest products industry for calendar year 2000. The report includes discussion of trends since 2000, as well as longer-term historic trends drawn from other sources. The report's principal goals are to determine the utilization of Wyoming's timber harvest, identify the type and number of primary forest products firms operating in 2000 and their sources of raw material, and quantify outputs of finished products. Data on subsequent years are provided where available, based on follow-up interviews conducted in 2003 with the State's largest producers.

The University of Montana's Bureau of Business and Economic Research (BBER) and the USDA Forest Service, Rocky Mountain Research Station (Ogden, UT) cooperated in the analysis and preparation of this report. BBER, in cooperation with the Forest Inventory and Analysis (FIA) programs at the Rocky Mountain and Pacific Northwest Research Stations, has 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

This effort is the second application of FIDACS in Wyoming; the first was in 1976. The system is based on a census of primary forest product manufacturers located in a given State. Primary forest product manufacturers are firms that process timber into manufactured products such as lumber, and facilities such as wood pellet plants, that use the wood fiber residue directly from timber processors. Wyoming manufacturers were identified through telephone directories, directories of the forest products industries (Miller Freeman, Inc. 1999; Paperloop 2001; Random Lengths 2001), 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

Firms cooperating in the 2000 Wyoming census processed virtually all of the State's commercial timber harvest. Published sources and information provided by Federal, State, and industry resource managers were used to estimate volumes received by the few nonrespondent firms and to verify estimates of Wyoming's total timber and wood products production and sales. Wyoming timber processed by out-of-State firms was determined through surveys of mills in adjacent States.

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

Conditions Affecting Wyoming's Primary Forest Products Industry

In response to strong demand for lumber and wood products coupled with ready availability of Federal timber, Wyoming's industry expanded dramatically from World War II through the 1960s, with timber harvest more than doubling and lumber production more than tripling from the late 1940s to the late 1960s. Through the 1970s markets were strong with high demand—U.S. housing starts exceeded 2 million units for five of the years in the decade—and Wyoming production remained high.

The strong markets of the 1970s ended abruptly in late 1979. High interest rates caused a sharp drop in the U.S. housing and construction industries, drawing the U.S. and Wyoming's forest products industry into a 6-year period with the poorest sustained markets since the Great Depression. The period included a recession in 1980 followed by a severe recession in late 1981 and 1982. By 1983, conditions in the construction and housing industries had improved, with near-record levels of forest products consumption in the United States from 1983 to 1985. However, wood product prices remained low due to a high-valued U.S. dollar, which in turn led to decreased U.S. exports and increased Canadian imports.

It was not until the last half of the 1980s that markets for forest products began to improve, with prices of wood products increasing due to a continued strong economy and a lower U.S. dollar. Wyoming's industry responded with record production. The record production grew from the fact that mills had considerable timber under contract from the early 1980s, which they had delayed harvesting during the poor market period. Mills experienced a temporary abundance of timber from National Forests in the late 1980s when they were required to harvest some of the timber to fulfill contract obligations.

Restricted timber availability throughout the Western United States had a major impact on the forest products industry in the 1990s, with harvest from Federal timberland (mainly National Forest land) falling by more than 8 billion board feet, a decline of more than 80 percent. This precipitous drop in harvest levels resulted from numerous constraints on harvesting timber on public lands, including appeals and litigation of timber sales, threatened and endangered species protection, and cumulative impacts of past harvesting on other resources such as water quality and wildlife. The harvest from Federal lands in and surrounding Wyoming followed a

similar downward trend. Harvest from Federal lands had historically provided over 75 percent (WWPA 1964 to 2003) of the timber used.

In combination with the large decreases in Federal timber availability, changes in U.S. and global economies had a large influence on the industry. A recession in 1990 and 1991, resulting from the first Gulf War, brought about decreased lumber prices. However, by 1993 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 generally remained strong in the last half of the 1990s, with the exception of a modest decline in the U.S. economy in 1995 and sharp declines in a number of Asian economies in late 1997 and 1998. Rising imports of Canadian softwood lumber became an increasingly contentious issue, leading, in 1996, to quotas on imports from the major timber producing provinces in Canada.

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 in 2000 as a slip in housing starts in the United States and Japan served as a precursor of low softwood lumber prices plaguing the industry through the first half of 2003 (WWPA 1964 to 2003). These low prices persisted despite record U.S. lumber consumption of more than 56 billion board feet in 2002 and the replacement of the quota on Canadian softwood lumber in 2001 with a 27 percent duty. The low prices were due to excess lumber supply in the U.S. market, primarily as a result of poor economic conditions through much of the world, a high-valued U.S. dollar through most of 2002, and increased wood products manufacturing capacity worldwide. The overall impacts of this myriad of factors on Wyoming's industry were generally negative, including reduced milling capacity and decreased production.

Table 1—Number of active Wyoming primary wood products facilities by county, 2000.

County	Sawmills	Post and pole	House logs	Log furniture	Other *	Total
Albany	1	1	1	-	-	3
Carbon	2	1	-	-	-	3
Crook	2	-	-	-	-	2
Fremont	1	-	1	-	-	2
Johnson	2	3	-	-	-	5
Lincoln	2	-	1	1	-	4
Park	3	-	2	4	1	10
Platte	2	-	-	-	-	2
Sheridan	1	-	-	2	1	4
Sublette	2	-	1	1	-	4
Teton	-	-	-	2	-	2
Uinta	3	2	1	1	2	9
Washakie	-	1	1	-	1	3
Weston	2	-	-	-	-	2
All Counties (2000)	23	8	8	11	5	55
1983	34	3	4	-	-	41
1976	50	7	4	-	1	62
1962	76	-	-	-	-	76
1957	107	-	-	-	-	107

* Other facilities include firewood manufacturers and pellet mills.

Wyoming's Primary Forest Products Industry

The 2000 census identified 55 active primary forest products manufacturers in Wyoming. These plants produced an array of products including lumber and other sawn products, wood pellets, house logs, posts, poles, and log furniture (table 1). McLain (1987 and 1988) canvassed 41 firms in 1983, and 62 active firms were identified in the 1976 census (Keegan and White 1979). Most decreases in the number of firms have occurred in the sawmill sector, which had as many as 107 active sawmills in 1957 (Miller and Wilson 1959), 50 firms in 1976 (Keegan and White 1979), and only 23 active plants in 2000. In contrast, the number of primary wood products producers in other sectors has increased since 1976, including the addition of one post and pole facility, four house log manufacturers, four facilities producing firewood (as a by-product) and fuel pellets, and 11 log furniture manufacturers (not reported in 1976).

In 2000, wood product manufacturing facilities operated in 14 of Wyoming's 23 Counties (fig. 1), two fewer Counties than in 1976. Park County contained 10 active timber-processing facilities, more than any other County and seven more than in 1976. Uinta County contained the second greatest number of facilities with nine, three more than in 1976. Only one other County, Johnson, had at least five facilities in 2000.

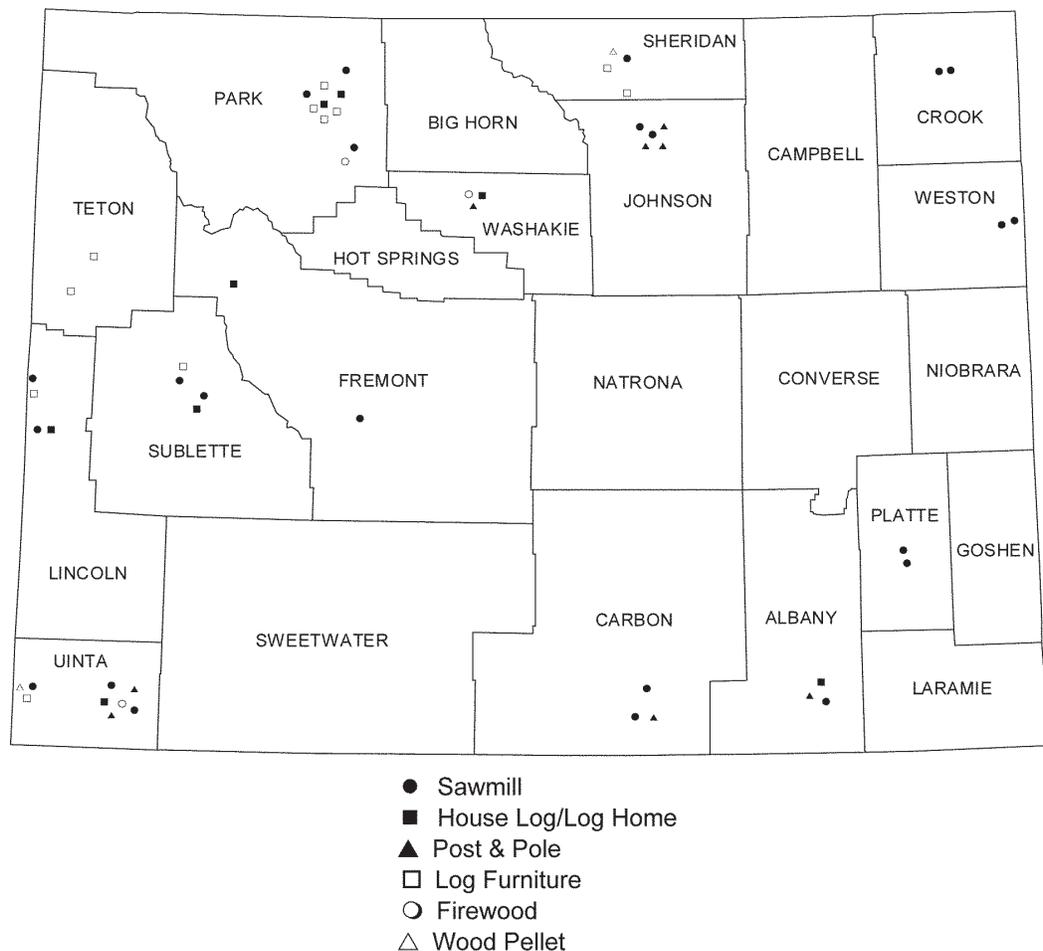
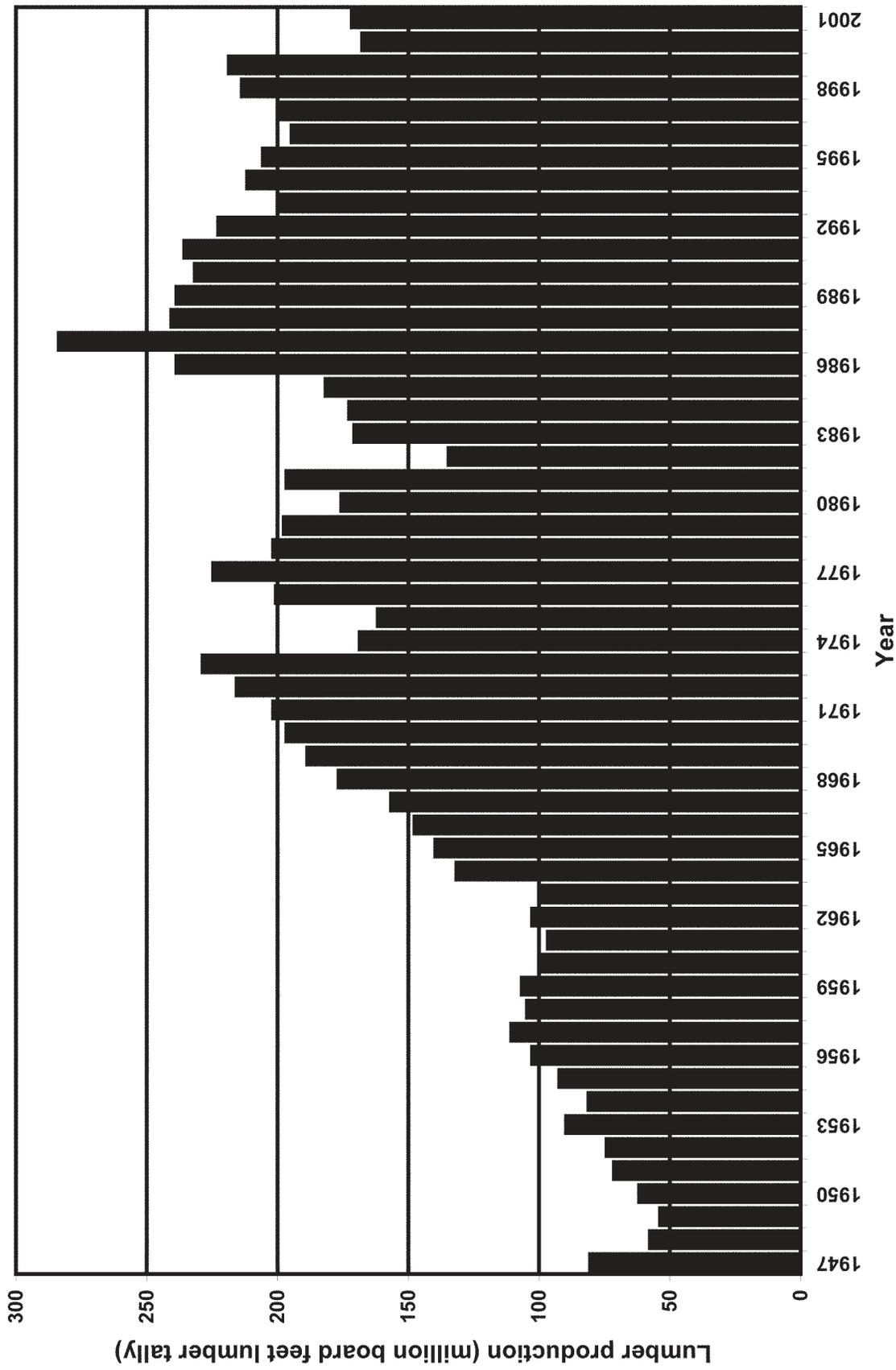


Figure 1—Location of Wyoming's active primary forest products manufacturers, 2000.



Source: Western Wood Products Association 1964-2003.

Figure 2—Wyoming lumber production, 1947-2001.

Timber-Processing Sectors

This section provides detail on Wyoming's forest products sectors that processed timber into finished products in 2000: sawmills, house log and log home manufacturers, log furniture producers, and other primary manufacturers. Two wood pellet producers, which use mill residues as a raw material, are included with the three firms selling firewood in the "other sectors" category to avoid disclosure of firm-level information.

Sawmill sector—Wyoming's 23 sawmills produced about 168 million board feet (MMBF) of lumber, timbers, and other sawn products in 2000, a 23 percent decrease from the previous year's production of 219 MMBF (fig. 2). This was the first year of decreased production since 1996, as well as the lowest production year since the severe recession of 1982, when only 135 MMBF were produced (WWPA 1964 to 2003). Of the 168 MMBF produced in 2000, approximately 158 MMBF were lumber, while 10 MMBF were structural timbers and mine props. Lumber production increased slightly in 2001 to 172 MMBF (WWPA 2001).

Although Wyoming's annual lumber production has fluctuated widely over the past 50 years and the number of sawmills has decreased, the average output per mill has generally increased (table 2). The 107 active sawmills identified by Miller and Wilson (1959) in 1957 had an average annual lumber production of 1.0 MMBF; the 50 active mills in 1976 had an average production of 4.1 MMBF (Keegan and White 1979 Keegan and others 1979); and the 23 plants active in 2000 produced an average of 7.3 MMBF of lumber each.

As in previous years, production in 2000 was concentrated in the State's largest mills. Four sawmills accounted for 77 percent of Wyoming's lumber production in 2000 (table 3). These four sawmills produced an average of 32.3 MMBF each. Eight mills producing 1 MMBF to 10 MMBF accounted for 21 percent of Wyoming's 2000 production, and averaged 4.5 MMBF of annual lumber production. Eleven mills producing less than 1 MMBF accounted for the remaining 2 percent of State-wide production.

Table 2—Number of active Wyoming sawmills and average annual lumber production.

Year	Number of mills	Average annual lumber production
1957	107	1.0
1962	76	1.4
1966	65	1.9
1969	50	3.8
1974	49	3.4
1976	50	4.1
1983	34	5.0
2000	23	7.3

Table 3—Number of active Wyoming sawmills by production size class and percentage of lumber produced, 2000.

Production size class	Number of mills	Production	Percentage of total production	Average production per mill
		<i>MBF*</i>		<i>MBF*</i>
1 MMBF or less	11	2,928	2	266
Over 1 to 10 MMBF	8	36,110	21	4,514
Over 10 MMBF	4	129,227	77	32,307
Total	23	168,265	100	7,316

* Production expressed in thousand board feet (MBF) lumber tally.

Table 4—Number of active Wyoming sawmills by capacity size class and percentage of total capacity, 2000.

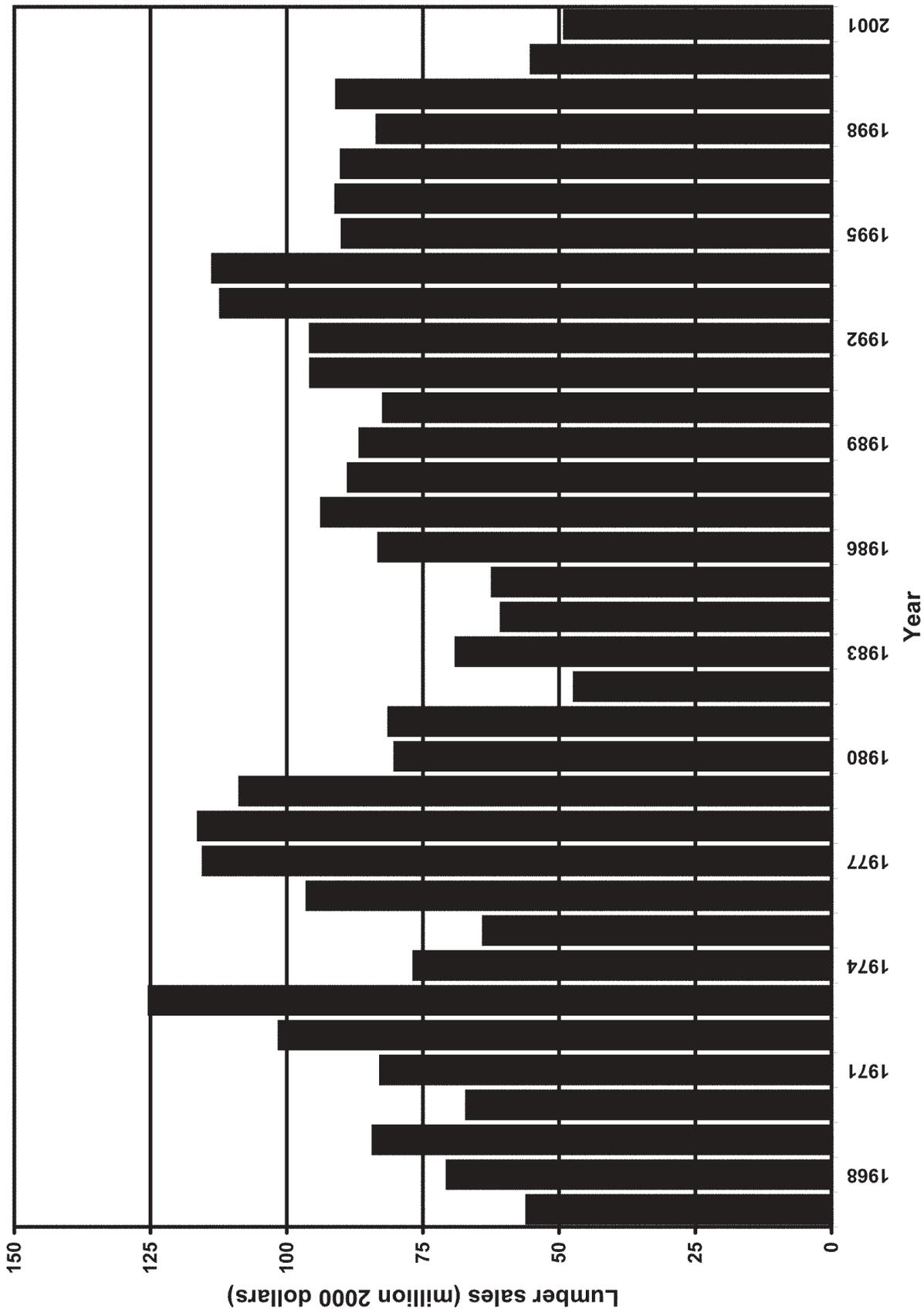
Capacity size class	Number of mills	Capacity	Percent of total capacity	Average capacity per mill
		<i>MBF*</i>		<i>MBF*</i>
1 MMBF or less	8	5,600	1	700
over 1 to 10 MMBF	9	25,210	7	2,801
over 10 MMBF	6	345,300	92	57,550
Total	23	376,110	100	16,353

* Capacity to process timber expressed in thousand board feet (MBF) Scribner.

Sawmills reported their annual output capacity in board feet lumber tally. Wyoming's 23 sawmills had about 376 MMBF of output capacity (table 4) and utilized about 45 percent of it in 2000. Six mills with an annual output capacity greater than 10 MMBF accounted for 92 percent of the total estimated capacity. Nine mills with capacity between 1 MMBF and 10 MMBF accounted for 7 percent of the total capacity, while the remaining eight mills with capacity of 1 MMBF or less accounted for just 1 percent of Wyoming's estimated total capacity.

Wyoming's inflation-adjusted lumber sales for recent years are among the lowest on record (fig. 3). The lowest sales value, expressed in 2000 dollars, occurred in 1982 when sales totaled \$47 million. Following the 1982 low point, sales increased throughout the 1980s and approached record highs in 1994, at nearly \$114 million. Sales declined to approximately \$90 million the following year and remained relatively stable until 2000, when sales dropped sharply. Despite increased production from 2000 to 2001, sales declined further to the second lowest level on record at \$49 million. Sharp declines in lumber prices in 2000 and 2001 accounted for the drop in sales.

Overrun—the volume of lumber recovered from a board foot (Scribner) of timber—was calculated for each sawmill using timber processed and lumber production volumes. Overrun ranged from 0 to 90 percent among Wyoming's sawmills. Sawmills producing primarily random length dimension lumber and studs typically had greater overrun, and mills producing mostly boards and timbers had lower overrun. On average, Wyoming sawmills produced approximately 1.55 board feet of lumber for every board foot Scribner of timber processed, for an average overrun of 55 percent in 2000. This is a dramatic improvement from 1976, when average overrun was only 18 percent.



Source: Western Wood Products Association 1964-2003.

Figure 3—Wyoming lumber sales, 1967-2001.

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 Wyoming, 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 sensing capabilities that identify optimum sawing patterns. Likewise, using thinner kerf saws as well as scanning equipment to edge and trim lumber has reduced the portion of the log that becomes sawdust.

Log home sector—Wyoming’s log home industry has experienced substantial growth since 1976 when there were just four log home plants. In 2000, there were 11 firms producing house logs or log homes. Facilities in Wyoming’s log home industry manufacture both house logs and log homes, and the industry offers two log styles: hand-hewn and sawn logs. Most firms specialize in one of the two styles. In 2000, Wyoming’s house log and log home manufacturers had sales of about \$7.1 million (table 5), selling 830 thousand lineal feet of house logs. Fifty-five percent of sales were sawn logs and 45 percent were hand-hewn. In 1976, production and sales data on the house log and log home sector were combined with data from other sectors of Wyoming’s timber processing industry to protect the privacy of firm-level data (Keegan and White 1979). Sales for those combined sectors totaled \$8 million, about two-thirds of combined sales in 2000.

Table 5—Sales value of Wyoming’s primary wood products, 2000.

Product	2000 Sales (<i>\$1000</i>)
Lumber & other sawn products	67,980
House logs & log homes	7,073
Other*	5,300
Total	80,353

* Other products include posts, poles, other roundwood products, wood pellets, and firewood.

Log furniture sector—Wyoming’s log furniture sector has grown dramatically in recent years. No firms producing log furniture were reported in 1976, while 11 firms were operating in 2000. Sales of Wyoming log furniture manufacturers in 2000 were valued at \$1.1 million. This sector predominately uses small (less than 7 inches d.b.h.) diameter lodgepole pine (*Pinus contorta* Dougl. ex. Loud.) timber to construct furniture. The logs are typically debarked and assembled into many different types of furniture including bed frames, chairs, tables and couch frames.

Other sectors—Other sectors of Wyoming’s primary forest products industry include post and pole producers, firewood producers, and pellet mills. Eight of the 13 facilities in this sector produced posts and poles, and the remaining five included firewood and fuel pellet producers that utilized mill residues. In 1976, seven post and pole facilities were in operation, while only one plant produced other material (Keegan and White 1979). Production statistics and sales figures for these individual sectors are not provided in order to protect the privacy of firm-level data. Combined sales values for these sectors were \$5.3 million in 2000.

Capacity to Process Timber

Respondent mills were asked to specify their annual product output capacity (production capacity), assuming sufficient supplies of raw materials and a firm market demand for their products. Input capacity was then calculated for each firm, using recovery and production capacity. The estimate of capacity to process timber or “processing capacity” is expressed in units of timber input (such as board feet Scribner). Wyoming’s total estimated capacity to process timber in 2000 was 260 MMBF Scribner. However, only 44 percent of this capacity was utilized, with almost 114 MMBF of timber being processed in 2000.

Wyoming’s capacity to process timber has been slowly declining for nearly two decades (table 6), with the loss of 47 MMBF or 15 percent of the State’s ability to process timber between 1986 and 2000. However, from 2000 to 2002 capacity abruptly decreased another 43 MMBF (17 percent) to 217 MMBF, with only 34 percent utilized. The recent declines in processing capacity and proportion utilized are due to the closure of a major sawmill in the State.

Product Markets

Mills summarized their 2000 shipments of finished wood products, providing information on volume, sales value, and geographic destination. Mills usually distributed their products in two ways: through their own distribution channels, or through independent wholesalers and selling agents. Because of subsequent wholesaling transactions, the geographic destination reported here may not precisely reflect final delivery points of shipments. Figure 4 identifies the regions where Wyoming’s manufactured forest products were distributed in 2000.

Table 6—Wyoming’s timber processing capacity and volume utilized, 1976 through 2002.

Year	Processing Capacity	Volume utilized	Percent utilized
	<i>MBF *</i>	<i>MBF *</i>	
1976	302,083	147,280	49
1983	272,867	153,260	56
1986	307,800	153,608	50
1996	273,483	116,906	43
2000	260,194	113,687	44
2002	217,094	74,875	34

* Timber processing capacity and volume utilized expressed in thousand board feet (MBF) Scribner.

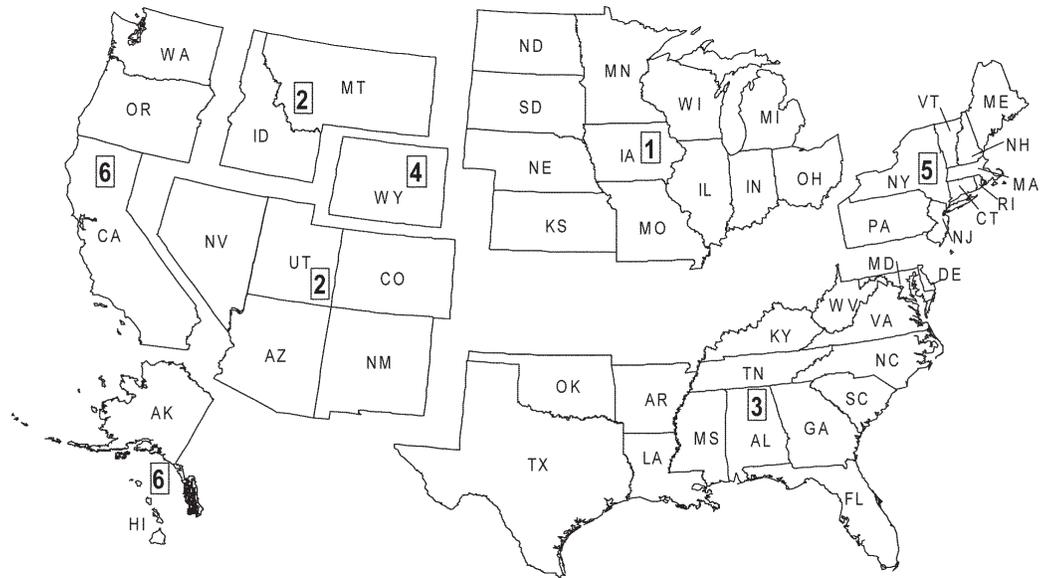


Figure 4—Market areas for Wyoming forest products. Regions are North Central (1), Rockies (2), South (3), Wyoming (4), Northeast (5), and Far West (6).

The estimated total sales value of Wyoming’s primary forest products in 2000 was nearly \$80.4 million free on board (f.o.b.) the producing mill (table 7). The North Central, South, and Rocky Mountain States (excluding Wyoming) collectively accounted for more than 86 percent of lumber sales. Wyoming lumber purchasers accounted for nearly 10 percent of lumber sales in 2000. The majority (64 percent) of house logs and log homes were sold in Wyoming and the other Rocky Mountain States. Similarly, 76 percent of other primary products sales occurred in Wyoming and the Rockies.

Table 7—Destination and value of Wyoming’s 2000 primary wood products sales.

Product	Wyoming	Rockies	Far West	North Central	North-east	South	Total
Lumber, timbers, and associated products	6,797	15,026	618	26,223	1,918	17,398	67,980
House logs and log houses	1,443	3,105	245	1,066	155	1,060	7,074
Other primary wood products*	1,300	2,763	407	658	-	172	5,300
All primary wood products	9,540	20,894	1,270	27,947	2,073	18,630	80,354

* Other products include posts, poles, other roundwood products, wood pellets, and firewood.

Wyoming's Timber Harvest, Products, and Flow

This section focuses on ownership and geographic sources of timber, types of timber products harvested and processed, species composition, and movement of timber. It examines Wyoming's timber harvest and the industry's use of timber in the direct manufacture of products in 2000 and makes comparisons with previous years. Timber harvested for fuelwood is not included.

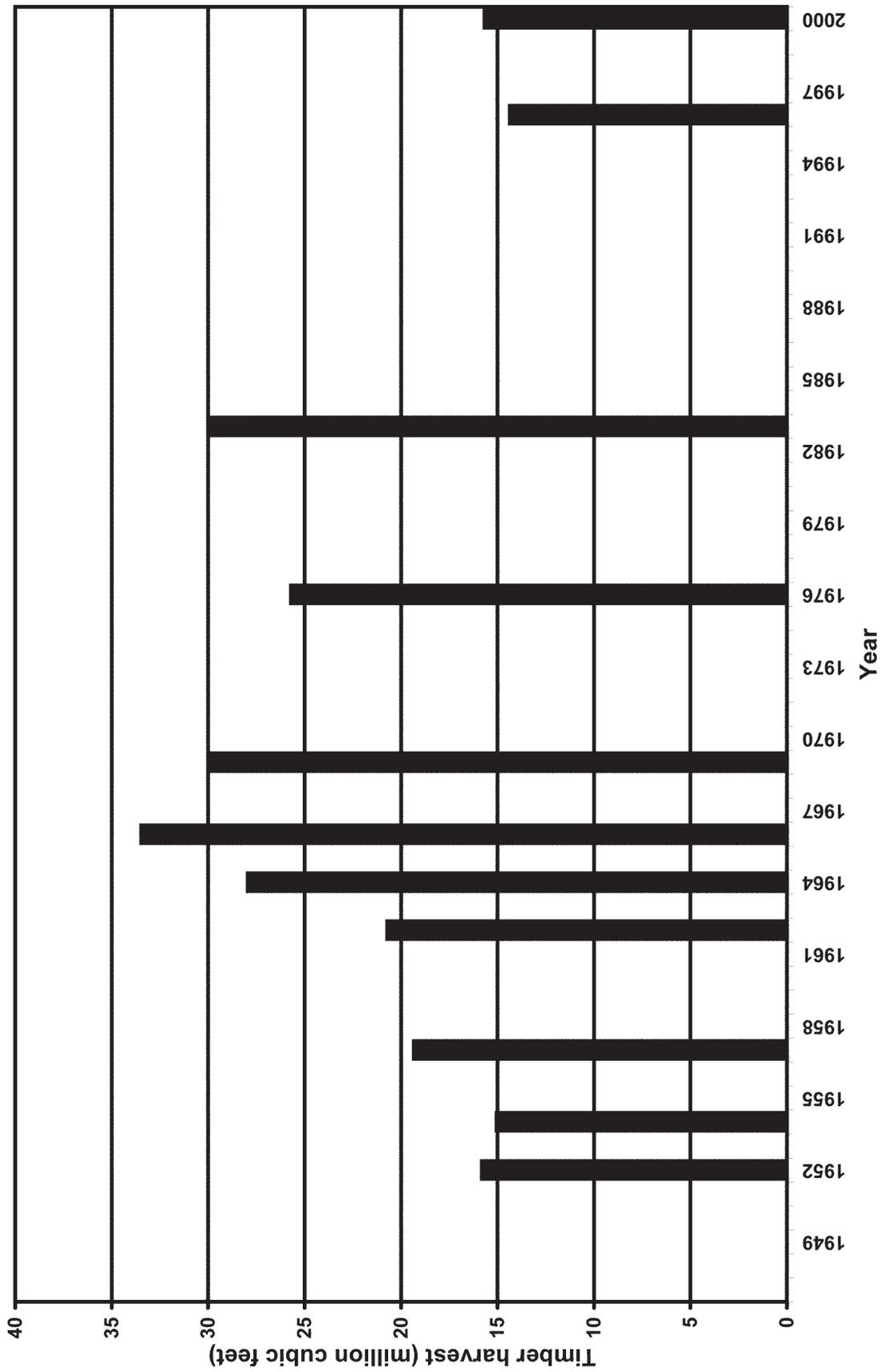
In 2000, timber harvested from Wyoming and manufactured into wood products came from four land ownership categories: nonindustrial private lands, National Forests, Bureau of Land Management (BLM), and State-owned lands. Wyoming has no large tracts of timberland owned by individuals or companies operating primary wood processing plants.

The 2000 harvest volume, at 15.7 MMCF, or 70.5 MMBF, was lower than in previous years (fig. 5), and the ownership sources for the majority and minority portions of the harvest were reversed. For example, in 1976, approximately 147 MMBF of timber were harvested from Wyoming; public lands provided 78 percent of the harvest, and private lands provided 22 percent (Keegan and White 1979). In 2000, 73 percent of the timber harvested in Wyoming came from private timberlands, while National Forests accounted for less than 20 percent, State-owned lands produced 7 percent, and 1 percent came from BLM lands (table 8).

Table 8—Wyoming's 2000 timber harvest by ownership source.

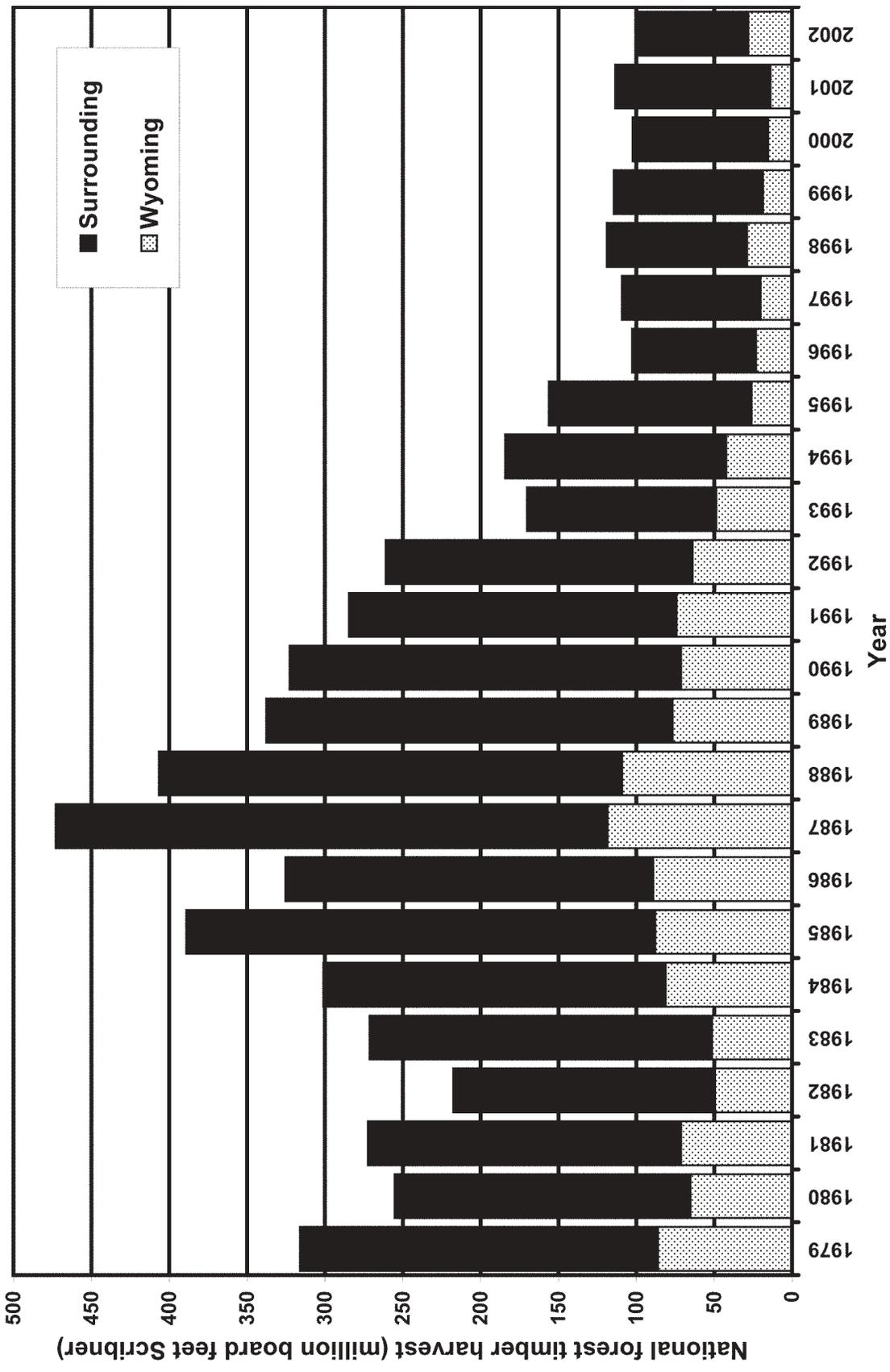
Ownership	Harvest	Percent of Total
	<i>MBF</i> *	
Industrial	-	0.0
Nonindustrial private	51,252	72.0
Tribal	-	0.0
National Forest	13,861	19.7
Bureau of Land Management	596	0.8
State	4,785	6.8
Other public	-	0.0
Total	70,494	100.0

* Harvest volume expressed in thousand board feet (MBF) Scribner.



Sources: Johnson 2001, McLain 1987, Keegan and White 1979, Setzer 1971, Setzer and Wilson 1970, Spencer and Farrenkopf 1964.

Figure 5—Wyoming timber harvest, 1947-2001.



Wyoming includes the Bighorn, Bridger/Teton, Medicine Bow, and Shoshone National Forests.
 Surrounding includes the Black Hills, Caribou/Targhee, Routt, and Wasatch-Cache National Forests.

Figure 6—National forest timber harvest in Wyoming and surrounding areas, 1979-2002.

Fifteen years of declining timber harvests from Wyoming's National Forests (fig. 6) has been the primary reason for decreases in total harvest and increases in the private lands proportion of the harvest. National forests provided 66 percent of Wyoming's timber harvest in 1986 (McLain 1987). By 2000, the National Forest share had fallen to 20 percent of the harvest, and the volume from National Forests decreased 73 percent from over 50 MMBF to less than 14 MMBF. National forest timber harvest rebounded slightly in 2002 to 28 MMBF.

Approximately 78 percent of Wyoming's 2000 timber harvest came from six Counties. Crook County was the source of 45 percent the timber harvest; while Albany and Uinta Counties each contributed 9 percent. Johnson, Sheridan, and Sublette Counties each contributed 5 percent (table 9).

Table 9—Wyoming's 2000 timber harvest by county.

County	Volume	Percentage of total
	<i>MBF</i> *	
Albany	6,052	9
Big Horn	618	1
Campbell	801	1
Carbon	3,115	4
Converse	936	1
Crook	31,975	45
Fremont	435	1
Goshen	-	0
Hot Springs	-	0
Johnson	3,864	5
Laramie	-	0
Lincoln	1,100	2
Natrona	-	0
Niobrara	-	0
Park	2,352	3
Platte	1,332	2
Sheridan	3,364	5
Sublette	3,400	5
Sweetwater	-	0
Teton	-	0
Uinta	6,416	9
Washakie	2,454	3
Weston	2,280	3
Total	70,494	100

* Harvest volume expressed in thousand board feet (MBF) Scribner.

Ponderosa pine (*Pinus ponderosa* Dougl. ex Laws.) was Wyoming's most harvested species in 2000, accounting for 42.1 MMBF, or 59.8 percent of the total harvest, followed by lodgepole pine with 26.7 percent or 18.8 MMBF (table 10). The remaining harvest was Engelmann spruce (*Picea engelmannii* Parry ex Engelm.) and Black Hills (white) spruce (*Picea glauca* (Moench) Voss) with 5.8 percent, Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco) with 5.1 percent, true firs (*Abies* spp.) with 2.4 percent, and other softwoods and hardwoods with 0.2 percent of the harvest.

Table 10—Wyoming's 2000 timber harvest by species.

Species	Volume	Percentage of total
	MBF *	
Douglas-fir	3,562	5.05
True firs	1,661	2.36
Ponderosa pine	42,121	59.75
Lodgepole pine	18,824	26.70
Spruce	4,112	5.83
Other softwoods	13	0.02
Hardwoods	201	0.29
All species	70,494	100.00

* Harvest volume expressed in thousand board feet (MBF) Scribner.

Harvest by Product Type

Wyoming's timber harvest by product type can be described by three general product categories: saw logs—timber sawn to produce lumber, mine timbers, and the like; house logs—timber used to manufacture log homes; and other products—timber used to manufacture posts, poles, log furniture, and other roundwood products.

Saw logs were the primary timber product harvested in Wyoming in 2000, accounting for 89 percent (62.9 MMBF) of the total harvest. House logs comprised less than 3 percent of the 2000 harvest, while other products accounted for about 8 percent (8.0 MMBF). The product shares differed little from previous years (McLain 1987). In 1976, saw logs comprised 91 percent of Wyoming's industrial timber harvest (Keegan and White 1979). House logs together with "other products" accounted for just over 2 percent of the total harvest in 1976. Roundwood pulpwood accounted for 7 percent of Wyoming's harvest in 1976 and less than 4 percent in 2000.

Private timberlands supplied 73 percent (46.0 MMBF) of Wyoming's 2000 saw log harvest (table 11), while National Forest timberlands made up 20 percent (12.8 MMBF), with other public timberlands supplying the remaining seven percent (4.1 MMBF). Other public timberlands (State and BLM) were the primary source of Wyoming's house log harvest, providing 54 percent (1.0 MMBF) in 2000. National Forests (43 percent; 0.8 MMBF) and private timberlands (3 percent, 0.1 MMBF) supplied the remainder of Wyoming's 2000 house log harvest. Ninety-one percent of Wyoming's 5.7 MMBF harvest for other materials came from private ownerships, while the remaining 9 percent was split nearly evenly between National Forest and other public lands.

Table 11—Wyoming's 2000 timber harvest volume by ownership source and product type.

Ownership source	Saw logs	House logs and		All Products
		Saw logs	log homes	
		MBF *		
Private timberlands:	45,962	54	5,236	51,252
Industrial	-	-	-	-
Nonindustrial	45,962	54	5,236	51,252
Tribal	-	-	-	-
Public timberlands:	16,918	1,834	490	19,242
National forests	12,821	814	226	13,861
Other	4,097	1,020	264	5,381
Total	62,880	1,888	5,726	70,494

* Harvest volume expressed in thousand board feet (MBF) Scribner.

** Other products include posts, poles, and other roundwood products.

Geographic source—The geographic source of Wyoming’s timber harvest, and the saw log harvest in particular, has been the mountainous regions of the State, where sufficient moisture allows timber to achieve a merchantable size (Green and Conner 1989). Keegan and White (1979) summarized Wyoming’s 1976 saw log harvest by three geographic regions: west, northeast, and southeast. The west region includes Fremont, Hot Springs, Lincoln, Park, Sublette, Sweetwater, Teton, and Uinta Counties, and accounted for 38 percent of the 1976 saw log harvest. In 2000, this region was responsible for 12 percent of Wyoming’s saw log harvest. The northeast region includes Big Horn, Campbell, Crook, Johnson, Sheridan, Washakie, and Weston Counties, which were responsible for 35 percent of the saw log harvest in 1976. In 2000, these Counties’ share of the saw log harvest had doubled to 70 percent. The southeast region, comprising Albany, Carbon, Converse, Goshen, Laramie, Natrona, Niobrara, and Platte Counties, yielded 27 percent of Wyoming’s 1976 saw log harvest, compared to 18 percent in 2000. Shifts in the proportions of timber harvested from the three geographic regions are closely tied to changes in National Forest and private landowner management activities.

Species composition—The species composition of Wyoming’s saw log harvest has shifted from predominantly lodgepole pine (72 percent in 1969) with substantial ponderosa pine and Engelmann spruce components to a largely ponderosa pine (66 percent in 2000) harvest with decreasing proportions of lodgepole pine and spruce (table 12). The proportion of spruce in the saw log harvest decreased from 10 percent in 1976 to 6.4 percent in 2000. Douglas-fir also decreased slightly, and true firs decreased from 4 percent to 2 percent. This species shift corresponds to the ongoing geographic shift in harvest from western Counties, where lodgepole pine, spruce, and Douglas-fir are the predominant timber species, to northeastern Counties where ponderosa pine is the predominant species.

Table 12—Species composition of Wyoming’s historical saw log harvest.

Species	1962	1969	1976	1983	2000
	<i>Thousand cubic feet</i>				
Ponderosa pine	3,735	3,383	6,000	14,138	8,870
Lodgepole pine	11,460	21,300	12,546	11,990	2,869
Douglas-fir	931	833	1,323	937	622
True firs	516	369	1,084	503	222
Engelmann/Black Hills spruce	2,970	3,399	2,563	1,902	863
Other species	5	3	75	26	3
All species	19,617	29,287	23,591	29,496	13,449
	Percent of Harvest				
Species	1962	1969	1976	1983	2000
Ponderosa pine	19.0	11.6	25.4	47.9	66.0
Lodgepole pine	58.4	72.7	53.2	40.6	21.3
Douglas-fir	4.7	2.8	5.6	3.2	4.6
True firs	2.6	1.3	4.6	1.7	1.6
Engelmann/Black Hills spruce	15.1	11.6	10.9	6.4	6.4
Other species	0.0	0.0	0.3	0.1	0.0
All species	100.0	100.0	100.0	100.0	100.0

Table 13—Wyoming’s 2000 timber harvest volume by species and product type, 2000.

Species	Saw logs	House logs and	Other products**	All products
		log homes MBF *		
Douglas-fir	2,910	8	644	3,562
True firs	1,037	132	492	1,661
Ponderosa pine	41,464	30	627	42,121
Lodgepole pine	13,416	1,621	3,787	18,824
Spruce	4,040	61	11	4,112
Other softwoods	13	-	-	13
Hardwoods	-	36	165	201
All species	62,880	1,888	5,726	70,494

* Harvest volume expressed in thousand board feet (MBF) Scribner.

** Other products include posts, poles, and other roundwood products.

In 2000, lodgepole pine accounted for 85.8 percent of volume harvested for house log production, with true firs providing 7.0 percent (table 13). Spruce, ponderosa pine, Douglas-fir, and hardwoods collectively accounted for the remaining 7.2 percent. Lodgepole pine, at 66.1 percent, was also the most common species harvested for other primary wood products in 2000. Douglas-fir was second at 11.2 percent, followed by ponderosa pine at 11.0 percent, true firs at 8.6 percent, hardwoods at 2.9 percent, and spruce made up the remaining 0.2 percent.

Timber Flow

The relatively small net flow of timber between Wyoming and adjacent States belies the complexity and magnitude of Wyoming’s total timber flow situation. Wyoming was a net importer of 42.6 MMBF of timber in 2000, importing 65.0 MMBF from other States and exporting 22.4 MMBF (table 14). Thus, more than 87 MMBF of timber crossed Wyoming State lines in 2000, a volume equivalent to 124 percent of the timber harvested and 71 percent of the volume processed in the State during the year.

South Dakota was the origin of the largest volume of timber imported by Wyoming, followed by Colorado and Montana. Together, these three States supplied 86 percent (55.9 MMBF) of the timber imported into Wyoming. The remaining 14 percent came from Idaho, Nebraska, Utah, and Canada. About 32 percent of Wyoming’s timber harvest in 2000 was exported to Idaho, Montana, and South Dakota. South Dakota received more than 80 percent of the exported timber, with Idaho and Montana receiving the remainder.

Timber harvested and processed within Wyoming generally did not move long distances. In 2000, 67 percent of the timber harvested and processed in Wyoming was processed in the County where the timber was harvested; another 25 percent was processed in adjacent Wyoming Counties. Likewise, most non-Wyoming timber processed in Wyoming mills came from adjacent, although out-of-State, Counties.

Table 14—Wyoming's 2000 timber imports and exports to other states.

Timber products	Imports	Exports <i>MBF</i> *	Net imports (net exports)
Saw logs	63,523	21,338	42,185
House logs	1,089	466	623
Other logs**	424	600	(176)
Total	65,036	22,404	42,632

* Harvest volume expressed in thousand board feet (MBF) Scribner.

** Other logs include logs for posts, poles, and other roundwood products.

Timber use by Wyoming mills—Figures for Wyoming's timber harvest and amount of timber processed are quite different because of the substantial timber flow into and out of the State. As discussed above, 65.0 MMBF Scribner of timber (57 percent of the timber processed in Wyoming in 2000) came from outside the State for processing in Wyoming, while 48.1 MMBF of timber (68 percent of Wyoming's harvest) originated and remained in Wyoming. Private timberlands contributed 54 percent (61.5 MMBF) of the 113.7 MMBF of timber processed in Wyoming mills in 2000 (table 15). Public timberlands supplied nearly 46 percent of the volume processed by Wyoming mills, while imports from Canada contributed 0.3 percent.

Wyoming mills relied heavily on out-of-State timber from both public and private lands in 2000. Almost 38.8 MMBF (75 percent) of the 51.8 MMBF of public lands timber processed in Wyoming came from outside the State, while about 26.3 MMBF (43 percent) of private timber received by Wyoming mills came from outside the State. The distribution of Wyoming's mills near the State's borders with National Forests in South Dakota, Colorado, and Montana contributed to the large proportion of out-of-State public lands timber processed by Wyoming mills.

Table 15—Ownership source of timber products delivered to Wyoming mills, 2000.

Ownership source	Volume <i>MBF</i> *	Percent of total
Private timberlands:	61,547	54.1
Industrial**	561	0.5
Nonindustrial	59,638	52.5
Tribal	1,348	1.2
Public timberlands:	51,759	45.5
National forests	46,517	40.9
Other	5,242	4.6
Canadian	381	0.3
Total	113,687	100.0

* Harvest volume expressed in thousand board feet (MBF) Scribner.

** Includes shipments of timber from other mills and industrial timberlands.

Table 16—Ownership source of timber products delivered to Wyoming’s forest industry sectors, 2000.

Ownership source	Saw logs	House logs and log homes MBF **	Other products*	All products
Private timberlands:	55,680	1,198	4,669	61,547
Industrial***	-	560	1	561
Nonindustrial	54,332	638	4,668	59,638
Tribal	1,348	-		1,348
Public timberlands:	49,386	1,510	863	51,759
National forests	45,428	490	599	46,517
Other	3,958	1,020	264	5,242
Canadian	-	363	18	381
Total	105,066	3,071	5,550	113,687

* Other products include posts, poles, and other roundwood products.

** Harvest volume expressed in thousand board feet (MBF) Scribner.

*** Includes shipments of timber from other mills and industrial timberlands.

Ownership sources of timber used by each of Wyoming’s industry sectors followed patterns similar to the total of all sectors. Private lands contributed 53 percent (55.7 MMBF) of sawtimber receipts, with public lands contributing the remaining 47 percent (table 16). Public lands were the source of 49 percent of timber used for house logs and log homes, with 39 percent originating from private lands, and 12 percent from Canada. Among mills utilizing timber for other products, private lands provided 84 percent of the timber used in 2000, public timberlands contributed slightly over 15 percent, and Canadian lands provided less than 1 percent.

Log Utilization and Mill Residue

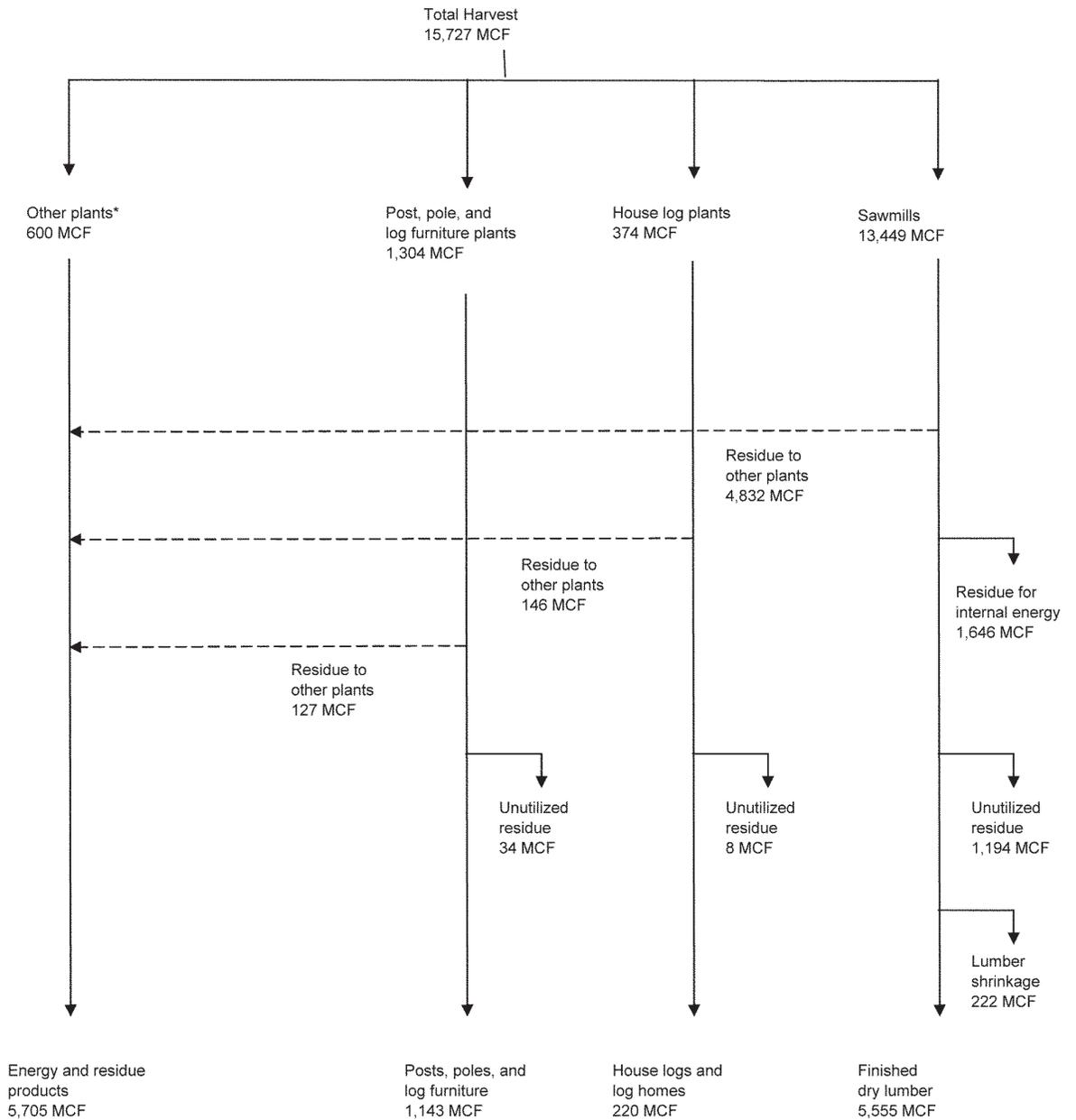
This section traces the flow of Wyoming’s timber harvest through various manufacturing sectors. Because mill residues as well as timber and finished products are displayed, volumes are presented in cubic feet. The following conversion factors, developed from the recent census, were used to convert board foot Scribner volume to cubic feet:

- 5.05 board feet per cubic foot for house logs
- 4.68 board feet per cubic foot for sawlogs
- 3.01 board feet per cubic foot for other timber products

Log Utilization

Wyoming’s timber harvest in 2000 was approximately 15.7 million cubic feet (MMCF), exclusive of bark (fig. 7). Of this volume, 85.5 percent went as logs to sawmills, 7.9 percent went to post and pole plants, 2.4 percent went to log home manufacturers, and 4.2 percent went to log furniture producers and other facilities.

Of the 13,449 thousand cubic feet (MCF) of logs received by sawmills, 5,555 MCF (41 percent) became finished lumber, and 7,672 MCF (57 percent) became mill residue. About 1,646 MCF of sawmill residue was used internally as hogfuel; 4,832 MCF went to firewood and pellet plants, out-of-State pulp mills, and other facilities; 1,194 MCF remained unused; and 222 MCF was lost to shrinkage while drying lumber.



* Other plants include wood pellet manufacturers and out-of-state pulp and reconstituted board plants.

Figure 7—Wyoming timber harvest and flow, 2000.

Post and pole yards and log furniture producers received 1,304 MCF of logs from Wyoming's timberlands in 2000. Approximately 1,143 MCF became finished goods, and 161 MCF became residue. House log and log home manufacturers received 374 MCF of timber from Wyoming's timberlands in 2000. Approximately 220 MCF became finished goods, and 154 MCF became residue. Other facilities, including fuelwood producers and out-of-State pulp and chip conversion plants received about 5,705 MCF of Wyoming wood fiber in 2000. About 600 MCF of this material was timber, while the vast majority (89 percent) was mill residue from other industry sectors receiving Wyoming timber.

Mill Residue Quantity, Type, and Use

As indicated above, a substantial portion, about 57 percent, of the wood fiber processed by primary forest products plants ends up as mill residue. Mill residue from primary wood products manufacturers can present difficult and expensive disposal problems, or they can be used to produce additional products and generate revenue.

Three types of wood residues are typically created by Wyoming's primary wood products industry: coarse or chippable residue consisting of slabs, edging, trim, and log ends; fine residue consisting primarily of planer shavings and sawdust; and bark. The 2000 census gathered information on volumes and uses of mill residue. Actual residue volumes were obtained from facilities that sold all or most of their residues. All mills reported, on a percent basis, how their residues were used.

Statewide residue volume factors (table 17), which express mill residue generated per unit of lumber produced, were derived from production and residue output volumes provided by sawmills. Sawmills accounted for 95.2 percent of all mill residues generated in Wyoming in 2000. Sawmills generated more than 174,000 bone dry units (BDU) of mill residue; 84.5 percent of this residue was utilized (table 18). One bone dry unit is the equivalent of 2,400 lb of oven-dry wood.

Table 17—Wyoming's 2000 sawmill residue factors.

Type of residue	Bone-dry units *
	<i>per thousand board feet lumber tally</i>
Coarse	0.47
Sawdust	0.19
Planer Shavings	0.15
Bark	0.22
Total	1.04

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

Table 18—Estimated volume of wood residue generated and utilized by Wyoming's sawmills.

Residue type	Wood residue		Total	Percentage of type		Percentage of total
	Used	Unused		Used	Unused	
	<i>Bone-dry units</i>					
Coarse	77,932	1,013	78,945	98.7	1.3	45
Fine *	56,989	714	57,702	98.8	1.2	33
Bark	12,360	25,382	37,742	32.7	67.3	22
Total	147,281	27,109	174,389	84.5	15.5	100

* Fine residue includes sawdust and planer shavings.

Table 19—Historical utilization of Wyoming mill residues.

Residue	Year	Used	Unused
		<i>Percent</i>	
Coarse	2000	97.7	2.3
	1983	77.4	22.6
	1976	77.8	22.2
	1969	58.2	41.8
Fine	2000	98.8	1.2
	1983	49.4	50.6
	1976	34.9	65.1
	1969	28.7	71.3
Bark	2000	32.5	67.5
	1983	31.9	68.1
	1976	11.7	88.3
	1969	0.1	99.9
All residues	2000	84.5	15.5
	1983	59.5	40.5
	1976	48.6	51.4
	1969	32.8	67.2

Facilities other than sawmills produced about 9,000 BDU of residues, meaning all Wyoming timber processors generated about 183,000 BDU of residue in 2000. The proportion of Wyoming's mill residues that are utilized has been increasing since the late 1960s. For all residues combined, utilization has increased from 33 percent in 1969 to 60 percent in 1983, to 85 percent in 2000 (table 19).

Coarse residue was the State's largest wood products residue component (47 percent of all residues) in 2000. Wyoming's primary wood products facilities produced more than 85,000 BDU of coarse residue, of which less than 2,000 BDU (2 percent) were not utilized (table 20). About 73 percent of coarse residues were chipped and sold out-of-State to pulp and paper mills and reconstituted board plants, 17 percent was burned as fuel, and about 8 percent was sold and used for other products.

Table 20—Wyoming's production and disposition of residues, 2000.

Type of residue	Total utilized	Reconstituted products	Hogfuel	Other uses	Unused	Total
Coarse *	83,411	62,606	14,305	6,500	1,978	85,389
Fine:						
Sawdust	31,403	13,928	7,249	10,226	649	32,052
Planer shavings	27,681	4,250	4,108	19,323	81	27,762
Bark	12,360	-	11,760	600	25,637	37,997
Total	154,854	80,784	37,422	36,649	28,345	183,199

* Includes residue from the manufacture of post and poles, house logs, and log furniture, as well as lumber and plywood.

About 99 percent of both coarse and fine residues were utilized in 2000, representing significant increases in utilization, especially for fine residues. Historically, more than half of Wyoming's coarse residues have been utilized, whereas less than half of fines were utilized. Fine residues made up the second largest component (33 percent) of residues in 2000, at nearly 60,000 BDU. Sawdust comprised 54 percent and planer shavings 46 percent of fine residues. All but 730 BDU (1 percent) of fine residues were utilized in some fashion. Major uses for fine residues included fuel (11,000 BDU), reconstituted products (18,000 BDU), and wood pellets and other uses (29,000 BDU).

Bark, which has typically been the least utilized residue, has undergone dramatic increases in utilization since 1969, when less than 1 percent was utilized. However, bark utilization has remained rather consistent since 1983 at about 32 percent. Bark composed the remaining 38,000 BDU (20 percent) of residues in 2000. Only one-third of bark was used, the majority of it burned for fuel.

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