



Montana's Forest Products Industry and Timber Harvest, 2004

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Abstract

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This report traces the flow of Montana's 2004 timber harvest through the primary wood-using industries; provides a description of the structure, capacity, and condition of Montana'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, employment, and sales.

Keywords: forest economics, mill residue, timber processors, wood utilization

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Report Highlights

- Montana's 2004 timber harvest was 785 million board feet (MMBF) Scribner. Private lands supplied 77 percent of the harvest. Douglas-fir was the leading species harvested, accounting for 38 percent of the harvest. Sawlogs (76 percent) and veneer logs (16 percent) were the main products harvested.
- Montana's timber harvest is heavily concentrated in the western part of the state. Flathead (20 percent), Lincoln (15 percent), and Missoula (14 percent) were the top three counties for harvest. About 21 percent of the harvest came from counties east of the Continental Divide.
- Ninety percent of Montana's timber harvest was processed in the state during 2004, but for the first time since 1988 Montana shipped more timber out of the state than it imported. Almost 75 MMBF Scribner of timber were shipped out of the state, while 37 MMBF of timber were brought into Montana from other states and Canada.
- A total of 215 facilities manufactured primary forest products in Montana during 2004, receiving over 747 MMBF Scribner of timber for processing. Most facilities are found in the western areas of the state; consequently, most of the timber harvested in Montana flows toward that region.
- Sawmills are the largest sector of Montana's forest products industry in terms of sales, employment, and timber use. Montana's lumber production in 2004 was 1,040 MMBF lumber tally, accounting for 3 percent of U.S. softwood lumber production and 2 percent of U.S. lumber consumption.
- Industry capacity to process sawtimber was 934 MMBF in 2004, and 70 percent of capacity was utilized. Sawmills account for about 80 percent of sawtimber-processing capacity.
- Montana's forest products industry employed 10,695 workers during 2004, with labor income of \$410 million.
- Sales from Montana's forest products industry were \$1.2 billion in 2004. Lumber and plywood accounted for 53 percent of total sales, followed by residue-related products with 39 percent. Sales from log home manufacturers were \$82 million, accounting for 7 percent of total industry sales. The North Central states, with 28 percent of total sales, was the largest market area for Montana's forest products.

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Introduction

This report presents the detailed results of a statewide census of Montana's primary forest products industry for calendar year 2004. The report includes discussion of trends since the last industry census in 1998, as well as longer-term historic trends drawn from other reports. The report's principal goals are to determine the utilization of Montana's timber harvest, identify the type and number of primary forest products firms operating during 2004, their sources of raw material, and quantify outputs and sales values of finished products and residue.

The University of Montana's Bureau of Business and Economic Research (BBER) and the USDA, Forest Service, Forest Inventory and Analysis (FIA) Program (Ogden, Utah) cooperated in the analysis and preparation of this report. BBER, in cooperation with FIA programs at the Rocky Mountain and Pacific Northwest Research Stations, has developed a system to collect, compile, and make available state and county-level information on timber harvest and the operations of the forest products industry—the Forest Industries Data Collection System (FIDACS).

Forest Industries Data Collection System

This report represents the sixth application of FIDACS in Montana; the first was in 1976, with subsequent studies conducted for 1981, 1988, 1993, and 1998 (Keegan 1980; Keegan and others 1983, 1990, 1995, 2001). 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 or plywood, and facilities like pulp mills and wood pellet plants that use the wood fiber residue directly from timber processors. Montana's manufacturers were identified through participation in previous studies, telephone directories, directories of the forest products industries (Paperloop 2005; Random Lengths 2002-2005), agency bidder lists, and with the assistance of the manufacturers themselves.

Through a written questionnaire or phone interview, manufacturers provided the following detailed information for each timber-processing facility for a given calendar year:

- facility type, location, contact information, and opening date
- installed equipment and employment

- number of operating days, shifts per day, and shift length
- shift and annual production capacity in units of output
- preferred and accepted log sizes
- volume of raw material received by timber product, county, and ownership
- species and live/dead proportions of timber received
- beginning- and end-of-year raw material inventory
- volume and destination of log transfers
- finished product types, volumes, sales value, and market locations
- beginning- and end-of-year finished product inventory
- production, utilization, and sales of manufacturing residue

Firms cooperating in the 2004 Montana forest industry census processed virtually all of the state's commercial timber harvest. Volume and characteristics of Montana timber processed by out-of-state firms was determined through surveys of mills in other states. Published sources and information provided by federal, state, and industry managers were used to estimate volumes received by the few non-respondent firms and to verify estimates of the state's total timber harvest, lumber production, and sales value of primary wood products.

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 is confidential and will not be released.

Historical Overview of Factors Impacting Montana's Forest Products Industry

Forest products activity in Montana can be traced back to the 1840s, when the state's first sawmill was established near Stevensville. Until the late 1800s Montana's forest products industry consisted of small sawmills mostly producing lumber for local use. The advent of copper mining in Butte and Anaconda resulted in a great demand for mine timbers and fuel for smelters. Expansion of railroads to the Northwest created a demand for railroad ties, as well as material for pilings and bridges, and camps used during construction. Once completed, the railroads gave Western lumber producers access to national markets. The industry continued to expand until the Great Depression, which brought about sharp reductions in the size and scale of the industry (Flanagan 2003).

After World War II strong wood products markets and increasing levels of timber harvest led to continued expansion and modernization of Montana's industry. Sawmills continued to dominate the industry, with production quadrupling from 1945 to 1969. The 1950s and 1960s also saw major diversification within the industry, as shown by the development of the plywood industry and a pulp and paper mill to use wood residue from sawmills and plywood plants.

Markets remained strong through much of the 1970s and diversification of Montana's industry continued with growth of the plywood sector, the expansion of mill residue use to include a particleboard and medium density fiberboard plant, and a growing log home industry leading to record sales and employment. The strong markets ended abruptly in late 1979 with high inflation and interest rates.

The 1980s began with three years of poor economic performance including official recessions in 1980 and 1982. Conditions began to improve in the construction industry in 1983, and by 1984 wood products consumption in the United States hit record levels. However, low prices persisted through 1985, due in large part to increased imports of Canadian softwood lumber made more competitive by the high value of the U.S. Dollar. During this period, the import of Canadian softwood lumber developed as a major issue between the U.S. and Canada. Over the subsequent two decades disagreements over

Canadian imports led to a series of disputes and agreements involving quotas, tariffs, countervailing duties, and charges on Canadian lumber imported to the U.S. The industry rebounded in the late 1980s, due in part to stronger markets, a weaker U.S. Dollar, and a temporary “abundance” of timber in Montana because mills had purchased, but not harvested timber in the early 1980s. Montana’s industry responded with record production and product sales.

The 1990s brought new challenges to Montana’s forest products industry. The condition of the U.S. and global economy exerted positive and negative influences on Montana’s forest products industry, but by far the most significant impact on the industry was a dramatic downturn in timber availability and harvest from National Forests. Issues related to appeals and litigation, threatened and endangered species, the effects of past harvesting, and federal budgets constrained timber harvesting on National Forests. Throughout the West and in Montana harvest from these lands fell by more than 70 percent during the 1990s.

The decade began with a relatively mild national recession followed by a recovery in 1992 and 1993. Increased U.S. construction activity, coupled with reduced federal timber availability throughout the western U.S. led to dramatically higher timber and wood products prices. With the exception of a near recession in the U.S. in 1995, and the Asian financial crisis in 1998, lumber prices remained at or near record levels in the remainder of the 1990s. A five-year quota limiting Canadian softwood lumber entering the U.S. was instituted in 1996 and influenced U.S. lumber prices upward. High prices in the 1990s did not offset the loss of much of the federal timber program, and the size of Montana’s timber processing industry decreased substantially through the decade. As a result of these combined factors, 15 sawmills each processing more than 10 MMBF Scribner closed between 1990 and 2000.

After low prices, wildfires, very low levels of federal timber offerings, and a spike in electric rates in 2000, operating conditions actually worsened for Montana’s forest products industry in 2001. The U.S. and global recession in 2001 was exacerbated by the September 11 terrorist attacks. A high-valued U.S. Dollar and the expiration of the Canadian softwood lumber agreement led to increased imports as lumber consumption in the U.S. remained stagnant. Wood products prices began to rise in the second half of 2003 in response to increased domestic and global demand for wood products, a weakening U.S. Dollar, and a countervailing duty on Canadian softwood lumber. Court decisions related to federal lands and another severe wildfire season resulted in restrictions on harvesting activity, causing shortages of logs at many mills and rendering them incapable of taking advantage of the improved market conditions (Keegan and others 2004). Both 2004 and 2005 saw strong markets for wood products. Demand for wood products was strong and prices reached their highest levels since the late 1990s. The U.S. housing market continued to be strong, as was global demand for wood products. In addition, damaging hurricane seasons in the Southeastern U.S. caused additional demand for wood products. However, timber availability continued to constrain Montana’s industry (Keegan and others 2005, 2006a). During 2006, a decline in the U.S. housing market led to sharp decreases in prices for most wood products (Keegan and others 2007). High fuel prices during the summer months also led to increased logging and transportation costs. Market conditions caused a number of mills to curtail production in 2006.

Influenced by both wood products markets and timber availability, several large Montana mills closed between 2000 and 2006, and there was a net loss of capacity in the state. The lack of response from private lands, illustrated by lower timber harvest levels even in good market years, has raised concerns that timber availability is becoming an issue on private as well as federal lands.

Montana's Timber Harvest and Flow

Montana has approximately 19.8 million acres of “nonreserved timberland” that are available for timber harvest (table 1). “Nonreserved timberland” includes land that is “not permanently reserved from wood products utilization through statute or administrative designation” (Bechtold and Patterson 2005), such as National Forest Wilderness areas and National Parks and Monuments. About 60 percent (12.0 million acres) of the nonreserved timberland are part of the USDA Forest Service’s National Forest System. Non-industrial private forest (NIPF) land, including tribal lands, is the second largest class of ownership with 23 percent, or more than 45 million acres. The forest products industry owns close to 9 percent (1.7 million acres) of nonreserved timberland. The State of Montana and Bureau of Land Management (BLM) account for about 8 percent of nonreserved timberland, while other public owners account for 0.1 percent.

Standing volume on Montana’s nonreserved timberland is approximately 130.7 billion board feet Scribner. About 32 percent of standing volume is Douglas-fir, followed by lodgepole pine (18 percent), Engelmann spruce (15 percent), and ponderosa pine (11 percent). Annual net growth on nonreserved timberland is approximately 2.7 billion board feet per year. Lodgepole pine accounts for nearly 25 percent of net growth, followed by Douglas-fir (22 percent), Engelmann spruce (15 percent) and ponderosa pine (11 percent).

Table 1—Montana nonreserved timberland by ownership class
(source: Interior West Forest Inventory and Analysis, 2003-2005).

Ownership class	Thousand acres	Percentage of nonreserved timberland
National Forest	11,962	60.4
Non-industrial private	4,547	23.0
Industrial	1,699	8.6
Bureau of Land Management	886	4.5
State	683	3.4
Other public	13	0.1
All owners ^a	19,790	100

^aPercentage detail may not sum to 100% due to rounding.

Timber Harvest

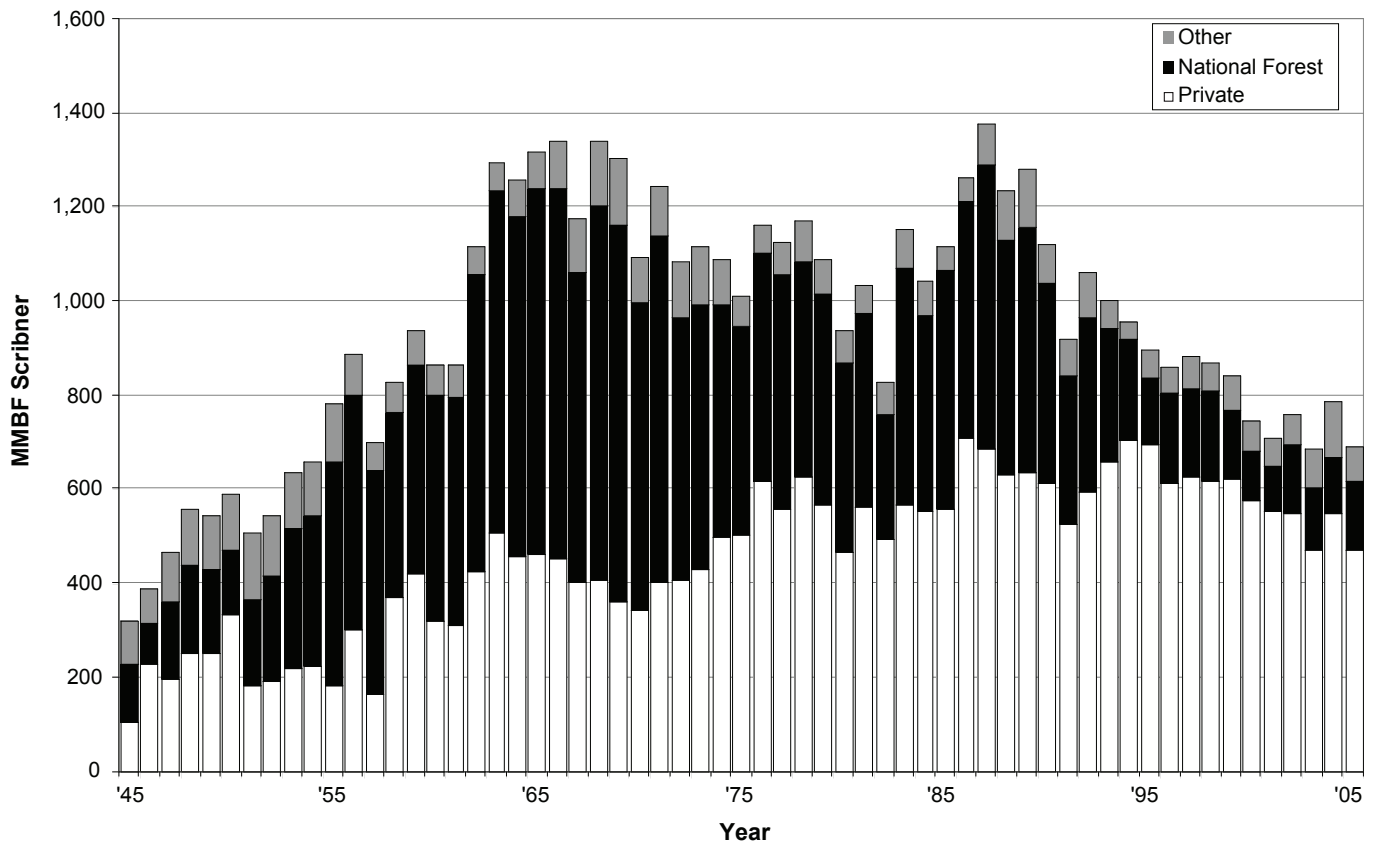
The timber harvest volume from lands in Montana was 785 million board feet (MMBF) Scribner during 2004 (table 2), a decline of nearly 10 percent from the 1998 harvest of 869 MMBF (Keegan and others 2001). Net growth exceeds harvest in Montana by a ratio of 3.39:1.

From the early 1950s through the early 1970s, the National Forests accounted for the majority of Montana’s timber harvest, and from 1960 through 1971 supplied about 60 percent of the volume harvested (fig. 1). The total harvest increased from about 325 MMBF in 1945 to over 1,300 MMBF in the late 1960s, before declining slightly until the sharp drop-off in the recession year of 1982. In 1974, private lands surpassed the National Forests as the leading source of timber harvested for the first time in over two decades. From the mid-1970s through the late 1980s, National Forests accounted for 40 to 45 percent of the total harvest and private lands accounted for 50 to 55 percent. Harvest volumes increased rapidly from 1982, and peaked in 1987 at 1,376 MMBF. Since 1987, the total volume harvested has been declining, primarily due to reductions in timber harvested from National Forests. The volume harvested from National Forests

Table 2—Proportion of Montana timber harvest by ownership class, selected years (sources: Keegan 1980; Keegan and others 1983, 1990, 1995, 2001).

Ownership class	1976	1981	1988	1993	1998	2004
----- Thousand Board Feet, Scribner -----						
Private	657,408	583,413	689,986	694,160	640,709	602,043
Industrial	397,604	351,744	397,853	304,854	354,430	285,324
Non-industrial private	222,130	208,815	235,381	353,092	262,566	265,691
Tribal	37,674	22,854	56,752	36,214	23,713	51,028
Public	503,026	451,664	546,308	307,069	228,699	182,915
National Forest	483,041	412,867	496,803	282,324	190,870	116,965
Other public	19,985	38,797	49,505	24,745	37,829	65,950
All owners	1,160,434	1,035,077	1,236,294	1,001,229	869,408	784,958
----- Percentage of harvest -----						
Private	57	56	56	69	74	77
Industrial	34	34	32	30	41	36
Non-industrial private	19	20	19	35	30	34
Tribal	3	2	5	4	3	7
Public	43	44	44	31	26	23
National Forest	42	40	40	28	22	15
Other public	2	4	4	3	4	8
All owners^a	100	100	100	100	100	100

^aPercentage detail may not sum to 100% due to rounding.



Source: USDA Forest Service, Region One, Missoula, MT.

Figure 1—Montana timber harvest by ownership, 1945-2005.

declined 76 percent from 1987 to 1995, and their proportion of the total harvest dropped from over 40 percent to approximately 20 percent. Harvest volume on private lands declined after 1987, but by 1995 had rebounded to the level seen in 1987. However, because of the dramatic decline in National Forest harvest, the proportion of the total harvest contributed by private land increased from 50 percent in 1987 to nearly 80 percent in 1995. Since 1995, harvest volumes on both National Forest and private land have decreased. Most of the decrease since 1995 can be attributed to reduced harvesting on industrial land. Since 1998, the harvest from industrial land dropped from 354 MMBF to 285 MMBF. The harvest from non-industrial private land was relatively constant from 1998 to 2004 (262 MMBF versus 265 MMBF). Since 1995, private lands have accounted for approximately 70 percent of Montana's timber harvest. The harvest from National Forests since 1995 has fluctuated between 95 and 192 MMBF, and has accounted for about 20 percent of the total harvest.

As in previous years, Douglas-fir was the leading species harvested in Montana. Douglas-fir's 38 percent of the harvest is its highest proportion of the total harvest when compared to previous years (table 3). Lodgepole pine, which in previous years was firmly entrenched behind Douglas-fir with the second-largest proportion of Montana's harvest, fell to the third most-harvested species in 2004. The proportion of ponderosa pine increased from 15 percent in 1998 to 19 percent in 2004, making it the second most-harvested species. The increased proportion of ponderosa pine is likely due to increasing harvest levels on non-industrial private lands and increased harvest in Eastern Montana (fig. 2). The decreased proportion of lodgepole pine can be attributed to decreasing harvests from National Forest land, which contain most of the lodgepole pine inventory in Montana (Conner and O'Brien 1993).

The proportion of logs harvested for various products in 2004 remained essentially unchanged from 1998 (table 4). Sawlogs accounted for 76 percent of the 2004 harvest, veneer logs 16 percent, and other products the remaining 8 percent. The small decline in the proportion of veneer logs (from 18 percent in 1998) was offset by an increase in the amount of logs harvested for other products, particularly pulpwood.

The four counties making up the Northwest Montana region provided nearly half of Montana's 2004 harvest, led by Flathead and Lincoln counties, which had the top two harvest volumes in the state (table 5). Although Northwest Montana still provides the bulk of Montana's timber harvest, both the volume and proportion of the state total that the region provided declined between 1976 and 1998. Since 1998, the volume harvested from Northwest Montana has continued to decrease—from 415 MMBF to 383 MMBF—though that volume represents a 1 percentage point increase in proportion of the state harvest. The 2004 volume harvested from Northwest Montana is just 53 percent of what

Table 3—Proportion of Montana timber harvest by species, selected years
(sources: Keegan 1980; Keegan and others 1983, 1990, 1995, 2001).

Species	1976	1981	1988	1993	1998	2004
----- Percentage of harvest (MBF, Scribner) -----						
Douglas-fir	27	27	27	29	34	38
Ponderosa pine	15	12	17	19	15	19
Lodgepole pine	21	25	28	26	25	18
Western larch	20	16	14	12	10	12
Spruces	7	8	7	6	8	7
Other species ^a	11	12	7	8	7	6
All species ^b	100	100	100	100	100	100

^aOther species include: true firs, western white pine, western redcedar, western hemlock, aspen and cottonwood, and other softwood species.

^bPercentage detail may not sum to 100% due to rounding.

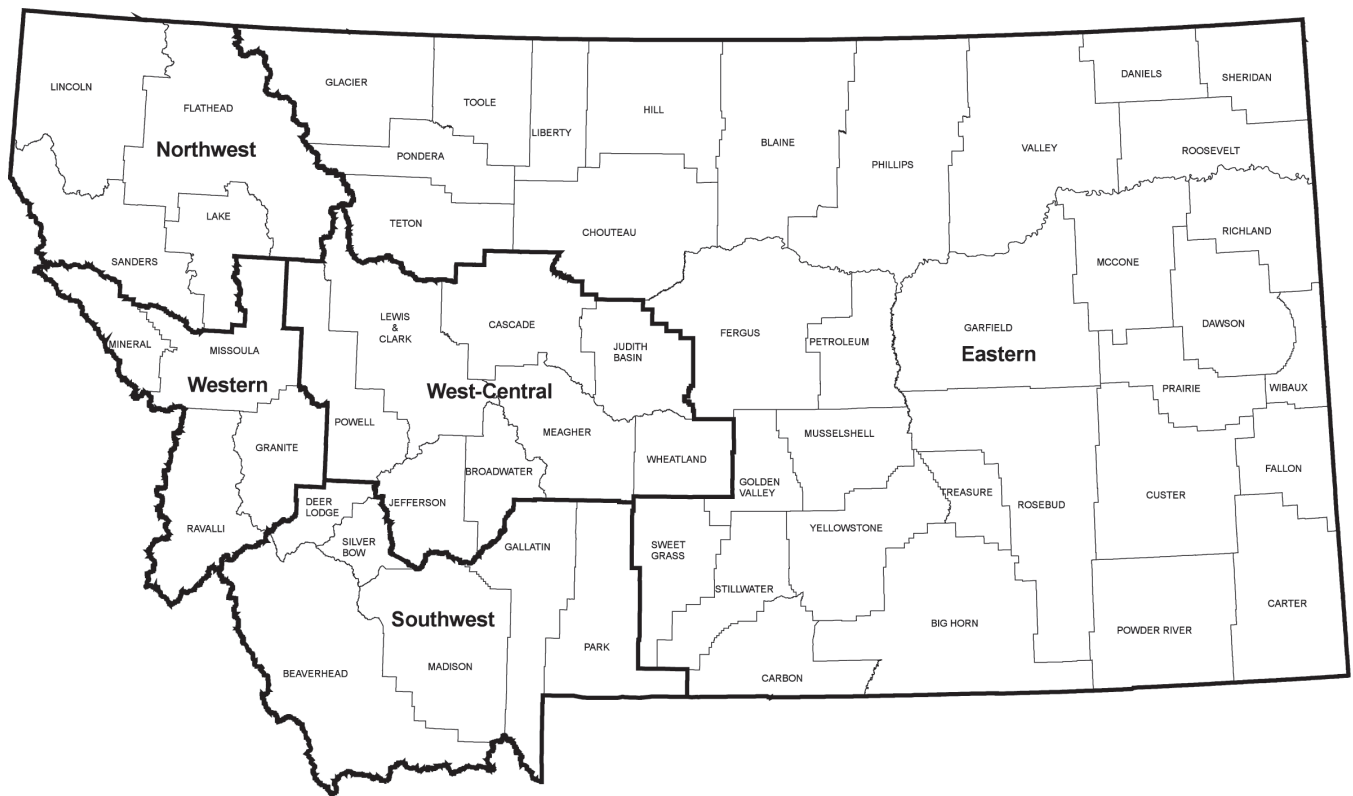


Figure 2—County regions of Montana.

Table 4—Proportion of Montana timber harvest by product, selected years
(sources: Keegan 1980; Keegan and others 1983, 1990, 1995, 2001).

Species	1976	1981	1988	1993	1998	2004
----- Percentage of harvest (MBF, Scribner) -----						
Sawlogs	74	71	81	79	77	76
Veneer logs	22	22	17	17	18	16
Other timber products ^a	4	7	3	5	6	8
All products ^b	100	100	100	100	100	100

^aOther timber products include logs used for pulpwood, posts and poles, house logs, cedar products, log furniture, and industrial fuelwood.

^bPercentage detail may not sum to 100% due to rounding.

it was in 1976. The four counties in the Western Montana region accounted for almost one-quarter of Montana's harvest. Western Montana's harvest volume has declined since 1976, but its proportion of the harvest has slightly increased. In the six counties of Southwest Montana, harvest volumes fluctuated between 60 and 90 MMBF through 1993, then in 1998 and 2004 dropped to less than one-half of their previous levels. Southwest Montana's proportion of the statewide harvest also declined. The declines in volumes harvested in the Northwest, Western, and Southwest regions were due in large part to the reductions in harvest from National Forests and industrial timberlands.

Table 5—Montana timber harvest (MMBF, Scribner) by county, selected years (sources: Keegan 1980; Keegan and others 1983, 1990, 1995, 2001).

County	1976		1981		1988		1993		1998		2004	
	MMBF, Scribner	Percent of Total	MMBF, Scribner	Percent of Total	MMBF, Scribner	Percent of Total	MMBF, Scribner	Percent of Total	MMBF, Scribner	Percent of Total	MMBF, Scribner	Percent of Total
Flathead	232	20.0	245	23.6	255	20.6	150	15.0	148	17.0	156	19.8
Lake	42	3.6	28	2.7	53	4.3	53	5.3	38	4.4	33	4.2
Lincoln	293	25.2	267	25.8	324	26.2	208	20.8	153	17.6	119	15.1
Sanders	153	13.2	93	9.0	93	7.5	107	10.7	76	8.7	75	9.6
Northwest Montana	720	62.0	633	61.1	725	58.6	519	51.8	415	47.7	383	48.7
Granite	25	2.1	23	2.3	29	2.4	21	2.1	31	3.6	25	3.2
Mineral	50	4.3	45	4.4	40	3.3	32	3.2	20	2.3	41	5.2
Missoula	146	12.6	120	11.6	141	11.4	136	13.6	129	14.8	109	13.9
Ravalli	35	3.0	41	4.0	36	2.9	40	4.0	23	2.6	13	1.7
Western Montana	256	22.0	229	22.3	246	20.0	229	22.9	203	23.3	189	24.0
Beaverhead	17	1.5	10	1.0	16	1.3	5	0.5	2	0.2	6	0.8
Deer Lodge	5	0.4	8	0.7	6	0.5	11	1.1	8	0.9	4	0.5
Gallatin	29	2.5	36	3.5	29	2.3	30	2.9	4	0.5	8	1.0
Madison	2	0.2	3	0.3	18	1.4	9	0.9	11	1.3	5	0.7
Park	21	1.8	8	0.8	16	1.3	11	1.1	6	0.7	8	1.1
Silver Bow	6	0.5	3	0.2	3	0.2	5	0.5	1	0.1	5	0.7
Southwest Montana	80	6.9	68	6.5	88	7.0	72	7.0	32	3.7	37	4.8
Broadwater	4	0.3	7	0.7	2	0.2	4	0.4	4	0.5	2	0.3
Cascade	1	0.1	1	0.1	5	0.4	1	0.1	10	1.2	3	0.4
Jefferson	13	1.1	8	0.7	8	0.7	3	0.3	6	0.7	12	1.5
Judith Basin	-	0.0	1	0.1	-	0.0	3	0.3	5	0.6	0	0.1
Lewis & Clark	18	1.6	26	2.5	17	1.4	13	1.3	30	3.5	21	2.7
Meagher	16	1.4	17	1.6	15	1.2	12	1.2	27	3.1	6	0.8
Powell	36	3.1	20	1.9	56	4.6	43	4.3	50	5.7	46	5.9
Wheatland	-	0.0	-	0.0	1	0.1	1	0.1	4	0.5	-	0.0
West-Central Montana	87	7.6	80	7.6	105	8.6	80	8.0	136	15.8	92	11.7
Big Horn	-	0.0	3	0.3	12	1.0	13	1.3	12	1.4	16	2.0
Fergus	11	0.9	9	0.9	11	0.9	24	2.4	9	1.0	15	2.0
Musselshell	3	0.3	2	0.1	4	0.3	13	1.3	6	0.7	1	0.2
Powder River	-	0.0	1	0.1	15	1.2	11	1.1	8	0.9	18	2.3
Rosebud	-	0.0	6	0.6	12	1.0	8	0.8	11	1.3	6	0.8
Other counties	3	0.2	4	0.4	19	1.6	34	3.4	26	3.1	28	3.5
Eastern Montana	17	1.4	26	2.4	73	6.0	102	10.3	73	8.4	84	10.8
Unspecified	-	0.0	-	0.0	-	0.0	-	0.0	10	1.1	-	0.0
All counties^a	1,160	100	1,035	100	1,236	100	1,001	100	869	100	785	100

^aPercentage detail may not sum to 100% due to rounding.

In contrast to the western regions, harvest volumes in the West-Central Montana and Eastern Montana regions have increased since 1976. The increase is most notable in Eastern Montana, where the proportion of the harvest has steadily increased from less than 2 percent in 1976 to nearly 11 percent in 2004. Harvest volume increased from 17 MMBF to 84 MMBF over the same time period due to increased harvest from private land. In West-Central Montana, harvest volume and the proportion of the statewide harvest have generally increased since 1976. However, since 1998, the harvest volume decreased 44 MMBF, which is the largest harvest decline since 1998 for any of Montana's geographic regions. This was due to decreased harvesting on all ownerships except industrial land, with National Forests in this region accounting for half of the 44 MMBF drop since 1998. West-Central Montana's proportion of the statewide harvest also declined by 4 percentage points over the same time period, and the region was the only one of Montana's five regions to experience a proportionate decline in harvest; all other regions increased their proportion of the harvest since 1998.

During 2004, private lands provided the majority of each species (table 6). Industrial timberlands provided more Douglas-fir (121 MMBF), lodgepole pine (49 MMBF), western larch (46 MMBF), spruce (19 MMBF), and other species (15 MMBF) than any other ownership, while NIPF lands accounted for the majority of ponderosa pine (71 MMBF). NIPF lands also accounted for significant volumes of Douglas-fir, lodgepole pine, spruce,

Table 6—Montana timber harvest by ownership class and species, 2004.

Ownership class	Douglas-fir	Lodgepole pine	Ponderosa pine	Western larch	Spruces	Other species ^a	All species ^b
<i>Thousand board feet, Scribner</i>							
Private	235,923	101,582	125,356	67,359	41,300	30,522	602,043
Industrial	121,151	49,220	34,810	46,108	19,320	14,715	285,324
Non-industrial private	97,806	44,719	71,113	19,456	17,929	14,668	265,691
Tribal	16,967	7,644	19,433	1,795	4,051	1,139	51,028
Public	65,278	37,256	26,706	23,671	16,987	13,018	182,915
National Forest	40,930	25,761	15,518	13,433	12,533	8,790	116,965
Other public	24,348	11,495	11,188	10,238	4,453	4,228	65,950
All owners	301,201	138,837	152,062	91,030	58,287	43,541	784,958
<i>Percentage of harvest</i>							
Private	30.1	12.9	16.0	8.6	5.3	3.9	76.7
Industrial	15.4	6.3	4.4	5.9	2.5	1.9	36.3
Non-industrial private	12.5	5.7	9.1	2.5	2.3	1.9	33.8
Tribal	2.2	1.0	2.5	0.2	0.5	0.1	6.5
Public	8.3	4.7	3.4	3.0	2.2	1.7	23.3
National Forest	5.2	3.3	2.0	1.7	1.6	1.1	14.9
Other public	3.1	1.5	1.4	1.3	0.6	0.5	8.4
All owners^b	38.4	17.7	19.4	11.6	7.4	5.5	100.0

^aOther species include: true firs, western white pine, western redcedar, western hemlock, aspen and cottonwood, and other softwood species.

^bPercentage detail may not sum to 100% due to rounding.

and other species. Private lands also provided the majority of volume harvested for each timber product (table 7). As in previous years, NIPF lands were the leading source of sawlogs (209 MMBF), house logs (4 MMBF), and other products (28 MMBF), while industrial lands provided the most veneer logs (84 MMBF).

Douglas-fir accounted for the majority of sawlogs, veneer logs, and other products, while lodgepole pine was the most frequently harvested species for house logs (table 8). Sawlogs accounted for the largest volume within each species. Dead trees accounted for 9 percent (nearly 68 MMBF) of the timber volume harvested during 2004; while in 1998, they accounted for almost 12 percent (about 101 MMBF) of the harvest.

Table 7—Montana timber harvest by ownership class and product, 2004.

Ownership class	Sawlogs	Veneer logs	House logs	Other products ^a	All products ^b
<i>Thousand board feet, Scribner</i>					
Private	436,232	111,555	3,808	50,448	602,043
Industrial	179,427	83,885	70	21,942	285,324
Non-industrial private	208,976	25,259	3,528	27,929	265,691
Tribal	47,830	2,411	210	577	51,028
Public	157,811	15,104	3,167	6,833	182,915
National Forest	105,311	5,628	2,376	3,650	116,965
Other public	52,500	9,476	792	3,183	65,950
All owners	594,043	126,659	6,975	57,281	784,958
<i>Percentage of harvest</i>					
Private	55.6	14.2	0.5	6.4	76.7
Industrial	22.9	10.7	0.0	2.8	36.3
Non-industrial private	26.6	3.2	0.4	3.6	33.8
Tribal	6.1	0.3	0.0	0.1	6.5
Public	20.1	1.9	0.4	0.9	23.3
National Forest	13.4	0.7	0.3	0.5	14.9
Other public	6.7	1.2	0.1	0.4	8.4
All owners^b	75.7	16.1	0.9	7.3	100.0

^aOther products include logs used for pulpwood, posts and poles, cedar products, log furniture, and industrial fuelwood.

^bPercentage detail may not sum to 100% due to rounding.

Table 8—Montana timber harvest by species and product, 2004.

Species	Sawlogs	Veneer logs	House logs	Other products ^a	All products ^b
----- Thousand board feet, Scribner -----					
Douglas-fir	195,424	84,645	712	20,420	301,201
Ponderosa pine	139,348	2,873	21	9,820	152,062
Lodgepole pine	118,802	1,542	3,740	14,754	138,838
Western larch	51,024	34,413	377	5,216	91,030
Spruces	51,384	582	1,741	4,580	58,287
Other species ^c	38,060	2,605	385	2,490	43,540
All species	594,043	126,659	6,975	57,281	784,957
----- Percentage of harvest -----					
Douglas-fir	24.9	10.8	0.1	2.6	38.4
Ponderosa pine	17.8	0.4	0.0	1.3	19.4
Lodgepole pine	15.1	0.2	0.5	1.9	17.7
Western larch	6.5	4.4	0.0	0.7	11.6
Spruces	6.5	0.1	0.2	0.6	7.4
Other species ^c	4.8	0.3	0.0	0.3	5.5
All species ^b	75.7	16.1	0.9	7.3	100.0

^aOther products include logs used for pulpwood, posts and poles, cedar products, log furniture, and industrial fuelwood.

^bPercentage detail may not sum to 100% due to rounding.

^cOther species include: true firs, western white pine, western redcedar, western hemlock, cottonwood and aspen, and other softwood species.

Timber Flow Into and Out of Montana

During 2004, the majority (90 percent) of Montana's timber harvest was processed in-State, but for the first time since 1988, Montana had a net outflow of timber. Timber processors in Montana brought in 37 MMBF of timber from other states and Canada while mills in adjacent states used 75 MMBF of timber harvested from Montana (table 9). Montana was a net importer of timber during 1976, 1981, 1993, and 1998 (Keegan 1980; Keegan and others 1983, 1995, 2001) and a net exporter of timber in 1988, with a net flow of almost 34 MMBF going to mills outside the state (Keegan and others 1990). As in previous years, nearly all of the timber exported from Montana during 2004 stayed within the United States and was processed in Idaho, South Dakota, Washington, or Wyoming.

Saw and veneer logs accounted for the vast majority (74 MMBF) of timber harvested in Montana and shipped to other states for processing as well as the majority (20 MMBF) of timber imported into the state for processing. The largest share (11 MMBF) of sawlogs came from Idaho, with the remainder coming from Canada and Wyoming. House logs were also a significant portion (14 MMBF) of timber imports into Montana, and more than one-half (8 MMBF) of the house logs imported into Montana came from Canada.

Table 9—Timber flow into and out of Montana, 2004.

Timber products	Log flow into Montana	Log flow out of Montana	Net imports (net exports)
----- Thousand board feet, Scribner -----			
Saw and veneer logs	20,394	73,889	(53,495)
House logs	13,591	330	13,261
Other products ^a	3,108	399	2,709
All products	37,094	74,618	(37,524)

^aOther products include logs for pulpwood, posts and poles, cedar products, log furniture, and industrial fuelwood.

Timber Flow Within Montana

Because the majority of Montana's mills and timber-processing capacity are found in the Western and Northwest regions, timber harvested in those regions is usually processed in those regions, while timber harvested in other regions generally flows toward the western regions. This results in a general east-to-west timber flow within Montana.

Of the 383 MMBF harvested in the four counties of Northwest Montana, 78 percent was processed in those counties, which, when compared to other regions, was the highest percentage processed in the region from which it was harvested. Ten percent of Northwest Montana's harvest was processed in the Western Montana region, and 6 percent was processed in Idaho. Western Montana was the only other region in Montana that processed the majority of its harvest, with 50 percent of its harvest remaining there for processing. Mills in Northwest Montana received 36 percent of the harvest from Western Montana. Of the 571 MMBF harvested in Northwest Montana and Western Montana combined, 500 MMBF was processed in those two regions. An additional 91 MMBF from other regions of Montana was processed in Northwest and Western Montana. Together, these two regions processed 75 percent of Montana's 2004 timber harvest.

The majority of timber harvested in other regions of Montana was processed in Western or Northwest Montana or in other states. Sixty-four percent of Southwest Montana's harvest was processed in Western Montana, while just 22 percent was processed in Southwest Montana. Forty-eight percent of the 92 MMBF harvested from West-Central Montana was processed in Western Montana, and 43 percent was processed in West-Central Montana. More than one-half of the timber harvested in Eastern Montana during 2004 was processed in other states, namely South Dakota and Wyoming, while another 22 percent was processed in Western Montana. Just 2 percent of the timber harvested in Eastern Montana was processed in that region.

Utilization of Montana's Timber Harvest

Montana's 2004 timber harvest was approximately 209.5 million cubic feet (MMCF), exclusive of bark (fig. 3), and went to timber-processors both within and outside of the state. Of this volume, 161.7 MMCF went as logs to sawmills, 25.1 MMCF went to plywood plants, 1.4 MMCF went to log home manufacturers, and 21.2 MMCF went to other facilities, including producers of posts and poles, cedar products, energy products, and residue-related products. Volumes are presented in cubic feet rather than board feet Scribner because the cubic measure better expresses the total amount of wood fiber in the log, thus accounting for both mill residues and timber products. The following conversion factors, converting Scribner board foot volume to cubic feet, were developed from log size specifications, as well as product and residue recovery information, provided by processors of Montana's 2004 timber harvest:

- 5.04 board feet per cubic foot for veneer logs
- 4.75 board feet per cubic foot for house logs
- 3.70 board feet per cubic foot for sawlogs
- 2.49 board feet per cubic foot for all other timber products

Of the 161.7 MMCF of timber received by sawmills, 69.2 MMCF (43 percent) became finished lumber or other sawn products, and about 4.4 MMCF was lost to shrinkage. The remaining 88.2 MMCF became mill residue. About 87.9 MMCF of sawmill residue was utilized both within Montana and in other States—5.3 MMCF sold or used internally for biomass energy; and 82.6 MMCF for pulp, particleboard, medium density fiberboard (MDF), livestock bedding, fuel pellets, or mulch. Only 0.3 MMCF (<0.5 percent) of sawmill residue remained unused. About 11.0 MMCF of wood fiber delivered

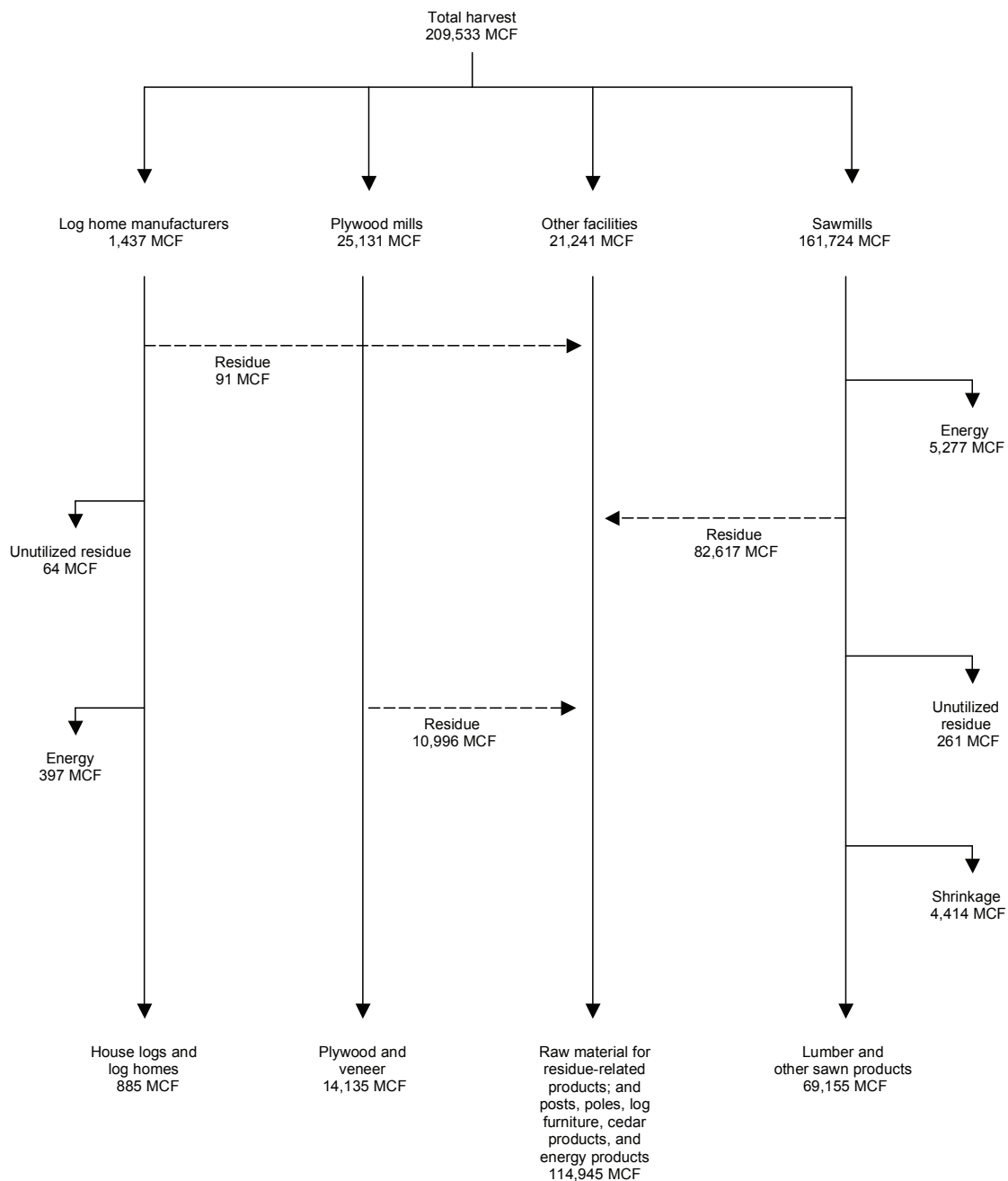


Figure 3—Montana timber harvest and flow, 2004.

to plywood plants became residue that was utilized internally or by other sectors of the forest products industry, while 14.1 MMCF became finished plywood or veneer. Of the 1.4 MMCF of timber received by log home manufacturers, 0.9 MMCF (62 percent) became house logs. The remaining 0.5 MMCF became mill residue. Most house log residue (72 percent) was used for energy, while 16 percent was used by other sectors and about 12 percent remained unused. The 21.2 MMCF of timber received by other timber-processing facilities was utilized for solid wood products such as posts, poles, log furniture, and cedar products, or was combined with residues from other sectors for use in residue-related products like pulp and energy products.

Montana's Forest Products Industry

During 2004, Montana's primary forest products industry consisted of 215 active facilities¹ in 28 counties (table 10). The majority of facilities tended to be located near the forest resource in the western and southern portions of the state (fig. 4). The log home sector, manufacturing log homes and house logs, had the largest number of facilities operating in Montana during 2004. While the number of sawmills and post and pole plants decreased since 1998, the number of log home facilities, log furniture manufacturers, and "other products" facilities increased since 1998.

Table 10—Active Montana primary wood products facilities by county and product during 2004 and other years (sources: Keegan 1980; Keegan and others 1983, 1990, 1995, 2001).

County	Lumber	Plywood	Pulp and board	Post and poles	Log homes	Log furniture	Other products ^a	All products
Flathead	10	2	1	3	11	3	2	32
Lake	3	-	-	1	4	3	1	12
Lincoln	2	-	-	-	6	2	3	13
Sanders	4	-	-	2	4	1	-	11
Northwest Montana	19	2	1	6	25	9	6	68
Granite	2	-	-	1	-	-	-	3
Mineral	3	-	-	2	1	2	2	10
Missoula	4	1	2	4	8	1	-	20
Ravalli	5	-	-	1	20	8	2	36
Western Montana	14	1	2	8	29	11	4	69
Beaverhead	2	-	-	2	1	-	-	5
Gallatin	-	-	-	-	10	1	1	12
Madison	-	-	-	1	6	2	-	9
Park	2	-	-	1	1	1	-	5
Silver Bow	1	-	-	-	-	-	-	1
Southwest Montana	5	-	-	4	18	4	1	32
Broadwater	1	-	-	-	-	-	1	2
Cascade	2	-	-	-	2	-	-	4
Jefferson	2	-	-	2	1	2	-	7
Judith Basin	1	-	-	-	-	-	-	1
Lewis & Clark	3	-	-	1	-	1	-	5
Meagher	1	-	-	-	1	-	-	2
Powell	2	-	-	-	3	-	-	5
West-Central Montana	12	-	-	3	7	3	1	26
Carbon	-	-	-	-	5	-	-	5
Chouteau	-	-	-	-	-	1	-	1
Fergus	1	-	-	-	-	-	-	1
Liberty	1	-	-	-	-	-	-	1
Musselshell	2	-	-	1	-	-	-	3
Stillwater	1	-	-	-	-	1	-	2
Sweetgrass	1	-	-	-	2	-	-	3
Yellowstone	1	-	-	-	2	-	1	4
Eastern Montana	7	-	-	1	9	2	1	20
2004 Total	57	3	3	22	88	29	13	215
1998 Total	73	4	3	29	75	25	11	220
1993 Total	86	4	3	31	59	4	10	197
1988 Total	87	4	3	37	35	2	15	183
1981 Total	142	4	3	35	27	0	17	228
1976 Total	98	5	3	37	19	0	16	178

^aOther products include biomass energy, cedar shakes and shingles, decorative bark and mulch, fuel pellets, and utility poles.

¹ Another 34 facilities did not actively receive or process timber during 2004 or had ceased operation prior to 2004 but still had operable equipment installed, and five facilities were preparing to begin operations in 2005.

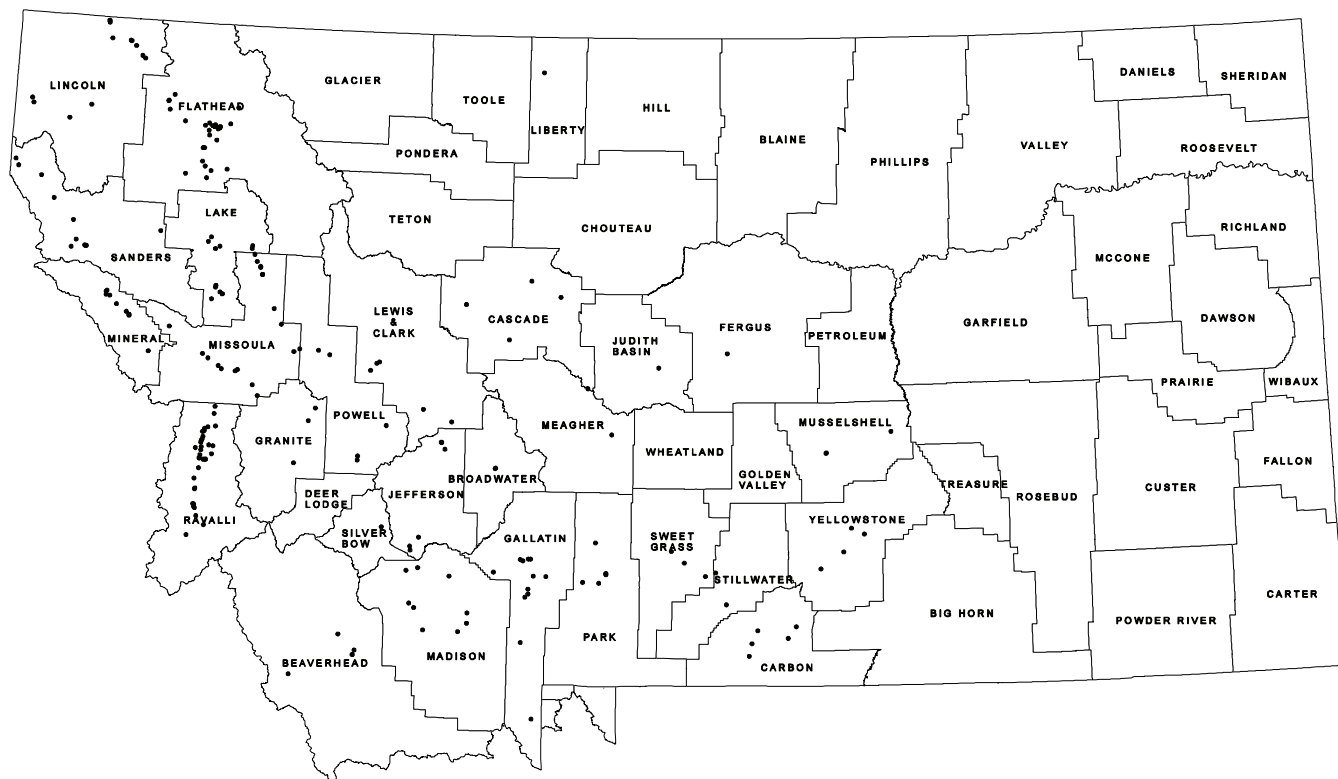


Figure 4—Location of active timber-processing facilities in Montana, 2004.

Timber Received by Montana Mills

Montana mills received over 747 MMBF Scribner of timber for processing during 2004. Timber receipts refers to the volume of timber delivered to Montana mills from both in-state and out-of-state sources. Timber receipts for Montana mills differs from the state's timber harvest because some timber harvested in Montana was processed in other states, and some of the timber processed in Montana was harvested outside the state.

National Forests were the leading supplier of timber to Montana mills in 1976, 1981, and 1988, supplying 40 percent or more of the state's receipts each year (Keegan 1980; Keegan and others 1983 and 1990; table 11). However, as harvest levels from National Forests have continued to decline, so has the industry's use of National Forest timber. In 1993, non-industrial private lands were the leading source of timber received by Montana mills (Keegan and others 1995), while in 1998 and 2004 industrial lands were the leading timber supplier of Montana mills.

Private lands supplied the majority of each timber product, except house logs, processed by Montana mills during 2004 (table 12). As in 1998, industrial land was the leading supplier of sawlogs and veneer logs (266 MMBF) in 2004. Canadian and unspecified out-of-state lands supplied the majority of house log volume used by Montana log home manufacturers. Non-industrial private land provided the majority of volume (29 MMBF) for other products. In 1976, 1981, and 1988, National Forests were the leading source of sawlogs and veneer logs (Keegan 1980; Keegan and others 1983 and 1990). In 1993, non-industrial private land supplied more sawlogs and veneer logs than any other ownership, and industrial land was the second-largest source ahead of National Forests (Keegan and others 1995).

Table 11—Proportion of Montana timber receipts (MBF, Scribner) by ownership class, selected years (sources: Keegan 1980; Keegan and others 1983, 1990, 1995, 2001).

Ownership class	1976	1981	1988	1993	1998	2004
----- Percentage of receipts -----						
Private	55	56	55	67	73	74
Industrial	35	34	34	31	43	39
Non-industrial private	17	20	18	33	27	31
Tribal	3	2	4	3	3	5
Public	45	44	45	33	27	26
National Forest	44	41	40	30	22	15
Other public ^a	2	4	5	2	5	11
All owners^b	100	100	100	100	100	100

^aIncludes Canadian timber.

^bPercentage detail may not sum to 100% due to rounding.

Table 12—Montana timber receipts by ownership class and product, 2004.

Ownership class	Saw and veneer logs	House logs	Other products ^a	All products
----- Thousand board feet, Scribner -----				
Private	497,721	5,315	51,471	554,507
Industrial	266,465	70	21,648	288,183
Non-industrial private	194,629	4,956	29,246	228,831
Tribal	36,627	289	577	37,493
Public	164,314	4,128	8,470	176,912
National Forest	102,993	3,336	5,287	111,615
Other public	61,322	792	3,183	65,296
Canadian and unspecified^b	5,172	10,794	49	16,015
All owners	667,207	20,236	59,990	747,433

^aOther products include logs used for pulpwood, posts and poles, log furniture, and industrial fuelwood.

^bIncludes timber receipts from Canada and unspecified out-of-state sources.

As in previous years, sawlogs and veneer logs constituted the vast majority (89 percent) of Montana's timber receipts although the proportion of other timber products doubled from previous years (table 13). Logs used for other timber products, including posts and poles, house logs, log furniture, pulpwood, and industrial fuelwood, accounted for 11 percent of receipts in 2004, versus 6 percent in 1998. The increasing proportion of other timber products is due to a combination of factors: a general decline in the total volume of timber harvested and processed in Montana, an increase in the amount of pulpwood harvested since 1998, growth in the log home sector, and declines in Montana's sawmill and plywood/veneer sectors.

Table 13—Proportion of Montana timber receipts (MBF, Scribner) by product, selected years (sources: Keegan 1980; Keegan and others 1983, 1990, 1995, 2001).

Species	1976	1981	1988	1993	1998	2004
----- Percentage of receipts -----						
Saw and veneer logs	96	92	97	95	94	89
Other timber products ^a	4	8	3	5	6	11
All products ^b	100	100	100	100	100	100

^aOther timber products include logs used for posts and poles, house logs, pulpwood, log furniture, and industrial fuelwood.

^bPercentage detail may not sum to 100% due to rounding.

Douglas-fir was the leading species received by Montana mills, accounting for over 40 percent of receipts (table 14). Douglas-fir accounted for the largest proportion of sawlogs and veneer logs, as well as other products, while lodgepole pine provided the largest proportion of house log receipts. Sawlog and veneer log receipts were the largest volume for each species. Industrial land was the leading source of each species received by Montana mills, with the exception of ponderosa pine, where non-industrial private land was the leading supplier (table 15). More Douglas-fir was received from each ownership class than any other species, except for Canadian and unspecified out-of-state ownerships, which supplied more lodgepole pine than any other species.

Table 14—Montana timber receipts by species and product, 2004.

Species	Saw and veneer logs	House logs	Other products ^a	All products ^b
	----- Thousand board feet, Scribner -----			
Douglas-fir	279,165	2,096	21,201	302,462
Lodgepole pine	123,095	10,530	16,216	149,841
Ponderosa pine	94,932	271	9,928	105,131
Western larch	81,894	1,088	5,282	88,264
Spruces	53,544	5,268	5,187	63,998
Other species ^c	34,577	983	2,177	37,737
All species	667,207	20,236	59,990	747,433
----- Percentage of receipts -----				
Douglas-fir	37.3	0.3	2.8	40.5
Lodgepole pine	16.5	1.4	2.2	20.0
Ponderosa pine	12.7	0.0	1.3	14.1
Western larch	11.0	0.1	0.7	11.8
Spruces	7.2	0.7	0.7	8.6
Other species ^c	4.6	0.1	0.3	5.0
All species ^b	89.3	2.7	8.0	100.0

^aOther products include logs used for pulpwood, posts and poles, log furniture, and industrial fuelwood.

^bPercentage detail may not sum to 100% due to rounding.

^cOther species include: true firs, western white pine, western redcedar, western hemlock, cottonwood and aspen, and other softwood species.

Table 15—Montana timber receipts by ownership class and species, 2004.

Ownership class	Species						
	Douglas-fir	Lodgepole pine	Ponderosa pine	Western larch	Spruces	Other species ^a	All species ^b
----- Thousand board feet, Scribner -----							
Private	235,080	102,889	82,761	65,230	41,666	26,881	554,507
Industrial	122,064	49,976	35,518	46,532	19,620	14,474	288,183
Non-industrial private	96,032	45,236	41,424	16,904	17,966	11,268	228,831
Tribal	16,984	7,677	5,819	1,795	4,080	1,139	37,493
Public	65,298	40,126	21,974	21,866	17,548	10,100	176,912
National Forest	40,484	28,342	12,533	11,490	12,921	5,845	111,615
Other public	24,814	11,784	9,440	10,376	4,628	4,254	65,296
Canadian and unspecified^c	2,084	6,826	397	1,168	4,784	756	16,015
All owners	302,462	149,841	105,132	88,264	63,998	37,737	747,433
----- Percentage of receipts -----							
Private	31.5	13.8	11.1	8.7	5.6	3.6	74.2
Industrial	16.3	6.7	4.8	6.2	2.6	1.9	38.6
Non-industrial private	12.8	6.1	5.5	2.3	2.4	1.5	30.6
Tribal	2.3	1.0	0.8	0.2	0.5	0.2	5.0
Public	8.7	5.4	2.9	2.9	2.3	1.4	23.7
National Forest	5.4	3.8	1.7	1.5	1.7	0.8	14.9
Other public	3.3	1.6	1.3	1.4	0.6	0.6	8.7
Canadian and unspecified^c	0.3	0.9	0.1	0.2	0.6	0.1	2.1
All owners^b	40.5	20.0	14.1	11.8	8.6	5.0	100.0

^aOther species include: true firs, western white pine, western redcedar, western hemlock, cottonwood and aspen, and other softwood species.

^bPercentage detail may not sum to 100% due to rounding.

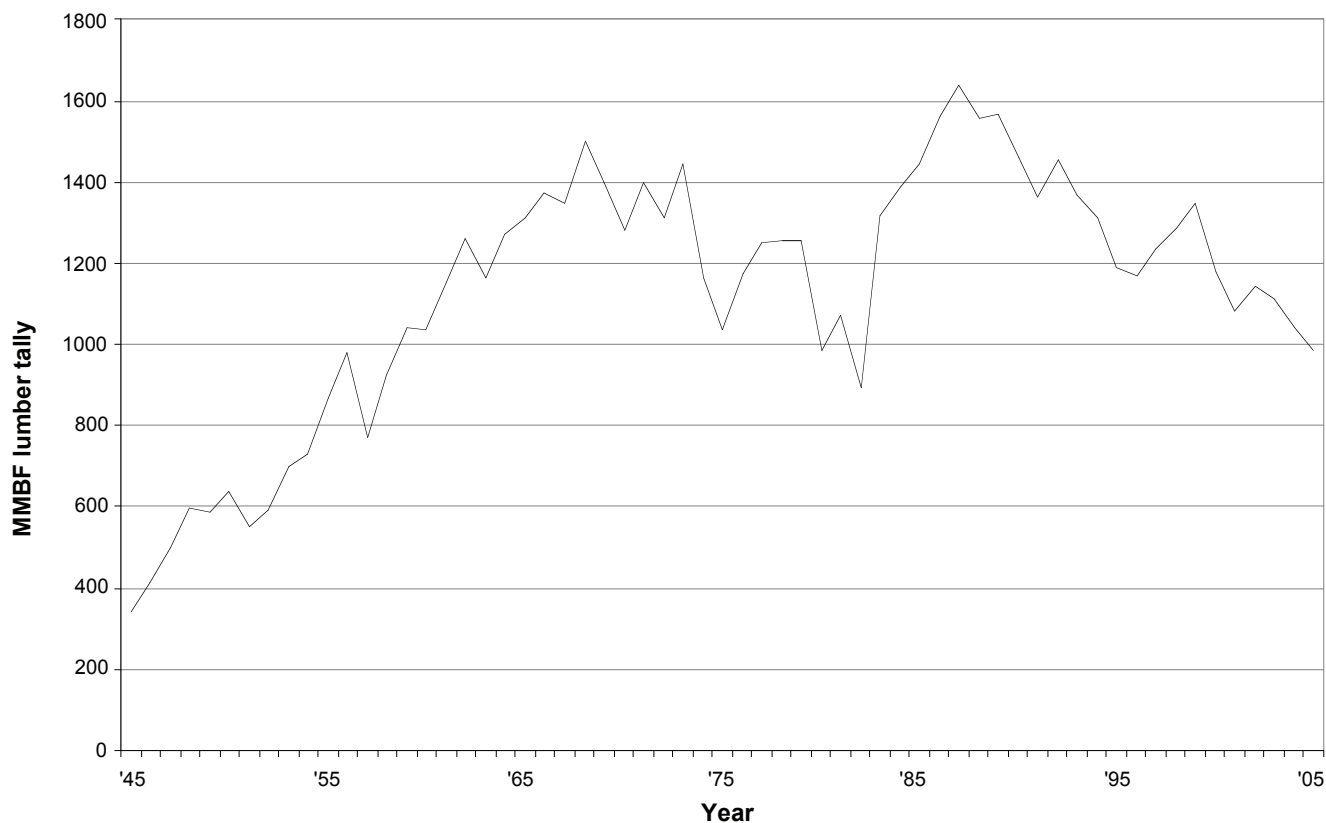
^cIncludes timber receipts from Canada and unspecified out-of-state sources.

Sawmill Sector

Montana's sawmill sector, although having fewer facilities than the log home sector, is the largest sector of Montana's forest products industry in terms of sales value, employment, and the volume of timber processed. Montana's 57 sawmills produced 1,040 MMBF (lumber tally) of lumber and other sawn products in 2004, accounting for about \$400 million in sales, nearly 3 percent of total U.S. softwood lumber production, and just under 2 percent of U.S. consumption (WWPA 2005).

Virtually all of the timber used by the sawmill sector came from softwood species, with Douglas-fir, lodgepole pine, and ponderosa pine most commonly used. Lumber is the most common product produced at Montana sawmills, although small amounts of structural timbers and other specialized products, such as flooring, siding, moulding, and paneling are also produced. About 77 percent of the lumber produced is dimension lumber used in construction applications.

Over the past 60 years, Montana's lumber production has increased from 342 MMBF in 1945 to 1,040 MMBF in 2004 (fig. 5). Montana's peak lumber production occurred in 1987, when 1,640 MMBF of lumber were produced. Factors influencing lumber production through this period include fluctuating lumber and wood products markets, timber availability, increased milling efficiency, and competition for raw material with the plywood industry.



Source: Western Wood Products Association (WWPA), 1964-2005.

Figure 5—Montana lumber production, 1945-2005.

From 1945 through the 1960s, Montana's lumber production grew steadily as timber harvest on both private and public land increased. Sawmills used about 95 percent of the timber harvested in the state, but that dropped to about 85 percent by the end of the 1960s as the plywood industry emerged in Montana. Although plywood plants use material that could be processed into lumber, lumber production continued to increase because of increasing timber harvest levels, as well as increased recovery of lumber per unit volume processed. In the 1970s, Montana's plywood sector doubled in size, while timber harvests, particularly on National Forest lands, decreased. These two factors resulted in decreasing lumber production during that decade, and the proportion of timber processed by sawmills decreased from 85 percent to 75 percent.

By the end of the 1970s, a severe recession caused a sharp decline in wood products markets, resulting in Montana's lowest lumber production (895 MMBF in 1982) since the 1950s. At the same time, mills acquired, but did not harvest timber. When markets improved later in the 1980s, mills harvested the timber that was under contract, creating a temporary abundance of timber that contributed to record lumber production in Montana. Continued increases in milling efficiency and accelerated harvest from industry lands also contributed to high production levels.

Since the late 1980s, Montana's lumber production has steadily declined, primarily due to timber availability constraints. While Montana's timber harvest has steadily decreased since the late 1980s, no where has that decrease been more severe than on National Forest lands. From 1985 through 1989, the average annual harvest from National Forests was about 525 MMBF Scribner per year. Since 1995, the timber harvest from National Forests in Montana has not exceeded 200 MMBF annually, and has averaged 146 MMBF, or 27 percent of the average harvest seen in the late 1980s. Additionally, a shrinking harvest from industrial land has exacerbated timber availability problems. The harvest from industrial land declined 20 percent from 1998 to 2004. The inability of mills to procure timber led to mill closures and declines in milling capacity. Fifteen mills, each processing more than 10 MMBF Scribner of timber, closed between 1990 and 1998.

The late 1990s saw a temporary increase in production due to strong markets. However, by 2000, markets were once again weakening, and severe wildfire seasons, continued declines in National Forest harvest, and declines in the harvest from industrial land resulted in a further restricted timber supply, decreased lumber production, and additional mill closures. From 1999-2004, four large sawmills closed, as well as numerous small mills, and statewide lumber production dropped from 1,287 MMBF in 1998 to 1,040 MMBF in 2004. In 2005, another large sawmill closed, and production was estimated at slightly less than 1,000 MMBF.

Montana sawmills produced 1,040 MMBF of lumber by processing 521 MMBF Scribner of timber in 2004, for an overrun of 2.00. This was up from an overrun of 1.30 in 1976 and 1.78 in 1998 (table 16). Increases in overrun are attributable to several factors:

- improvements in milling technology such as: sensors that optimize sawing patterns to recover the greatest volume or value from each log, improved sawing accuracy, thinner kerf saws, and curve-sawing technology
- decreasing log size, which leads to an underestimate of lumber than can be recovered from timber when using the Scribner log scale
- restricted timber supply, which results in mills recovering more lumber from low-quality logs that have log scale volume deductions for defect
- product mix—dimension lumber and studmills typically have higher overruns than mills producing board and shop lumber

Table 16—Montana lumber overrun, selected years
(sources: Keegan 1980; Keegan and others 1983,
1990, 1995, 2001).

Year	Timber processed	Lumber produced	Overrun
	<i>MMBF^a Scribner</i>	<i>MMBF^a Lumber tally</i>	
1976	905	1,176	1.30
1981	739	1,071	1.45
1988	985	1,558	1.58
1993	782	1,367	1.75
1998	725	1,287	1.78
2004	521	1,040	2.00

^aMMBF = million board feet.

The number of Montana's sawmills has been declining since 1981 (table 17), and the proportion of lumber production has been increasingly concentrated in larger sawmills (table 18). In 1956, the peak of the post-World War II housing boom, 333 sawmills were operating in Montana, but only 26 produced more than 10 MMBF of lumber annually. By 1966, the number of sawmills in operation had been reduced to 148; however, the number of mills producing more than 10 MMBF increased to 37. Mills producing more than 10 MMBF accounted for 90 percent of lumber production in 1966, versus 67 percent in 1956. The number of sawmills continued to decline through 1976, when 98 sawmills were operating in Montana. The number of large mills decreased to 30, but their proportion of total production increased to 96 percent.

Table 17—Number of Montana sawmills by annual lumber production, selected years (sources: Setzer and Wilson 1970; Schweitzer and others 1975; Keegan 1980; Keegan and others 1983, 1990, 1995, 2001).

Year	Annual lumber production			Total mills
	<i>Less than 10 MMBF^a</i>	<i>10 MMBF^a to 50 MMBF</i>	<i>More than 50 MMBF^b</i>	
1956	307	26	b	333
1966	111	37	b	148
1973	86	22	7	115
1976	68	24	6	98
1981	114	23	5	142
1988	58	16	13	87
1993	60	14	12	86
1998	54	8	11	73
2004	43	3	11	57

^aMMBF = million board feet, lumber tally.

^bMills with production over 50 MMBF are included in the 10 MMBF to 50 MMBF category.

Table 18—Proportion of Montana lumber production by sawmill size class, selected years (sources: Setzer and Wilson 1970; Keegan 1980; Keegan and others 1983, 1990, 1995, 2001).

Year	Less than 10 MMBF ^a	More than 10 MMBF ^a	Total lumber production	Average production per mill
	<i>Percentage of production</i>			<i>Million board feet</i>
1956	33	67	979	2.97
1962	13	87	1,259	8.51
1966	10	90	1,375	11.96
1976	4	96	1,176	12.00
1981	8	92	1,071	7.54
1988	4	96	1,558	17.91
1993	4	96	1,367	15.90
1998	2	98	1,287	17.63
2004	3	97	1,040	18.24

^aMMBF = million board feet, lumber tally.

By 1981, the trend in declining numbers of sawmills had reversed itself, and the number of sawmills in Montana climbed to 142, with 28 producing more than 10 MMBF of lumber. The increase in the number of mills was due to an increase in the number of small sawmills, from 68 in 1976 to 114 in 1981. Large mills still accounted for 92 percent of total lumber production in Montana. From 1988 through 1998, the number of small mills operating in Montana remained relatively stable, but the number of mills producing over 10 MMBF decreased from 29 in 1988 to 19 in 1998. However, the proportion of production from mills producing over 10 MMBF of lumber increased from 96 percent in 1988 to 98 percent in 1998.

Since 1998, both the number of small and large mills has decreased. Montana had 57 sawmills operating in 2004, the fewest of any previous census; 43 were small sawmills and 14 were large mills producing more than 10 MMBF annually. Of the 14 largest mills, eight produce dimension lumber and studs. The proportion of total production from large mills decreased to 97 percent, but the average production per mill, 18.24 MMBF, was higher than previous years. Of the 14 large mills, 11 produced more than 50 MMBF, accounting for 87.5 percent of lumber production (table 19). Mills producing between 10 and 50 MMBF accounted for nearly 10 percent of the 1,040 MMBF of lumber produced in 2004. Of the 43 small mills, 9 produced between 1 MMBF and 10 MMBF of lumber, while the remaining 34 produced less than 1 MMBF each. Since 2004, one mill producing over 10 MMBF has permanently closed, and other mills have permanently or temporarily curtailed production in response to timber availability issues.

Table 19—Lumber production by Montana sawmills, 2004.

Lumber production size class	Number of mills	Percentage of production	Lumber production	Average production per mill
<i>Million board feet</i>				
More than 50 MMBF ^a	11	87.5	909	82.67
10 to 50 MMBF	3	9.8	101	33.83
1 to 10 MMBF	9	2.1	22	2.46
Less than 1 MMBF	34	0.7	7	0.20
Total	57	100	1,040	18.24

^aMMBF = million board feet, lumber tally.

Log Home Sector

The number of log home manufacturers in Montana has increased in every census year, from 19 in 1976 to 88 in 2004, and there are more facilities in the log home sector than any other sector of Montana's forest products industry. Centers of activity for Montana's log home industry are Ravalli County (20 mills), Flathead County (11 mills), and Gallatin County (10 mills). Despite an increase in the number of manufacturers in the log home sector compared to 1998, sales dropped from \$112 million (in 2004 dollars) during 1998 to just under \$82 million in 2004. Production also declined from 6.8 million lineal feet in 1998 to 6.0 million lineal feet in 2004.

The drop in sales and production and increase in number of facilities can be attributed to the closure of some larger log home manufacturers since 1998. New house log manufacturers that began operating since 1998 have tended to be smaller operations with fewer employees and less production. As with the sawmill sector, the availability of raw material for the log home sector has been problematic. Despite an abundance of dead lodgepole pine found predominately on National Forest land in Montana, log home manufacturers have been forced to look to other regions, including Canada, to

obtain raw material. In 2004, 67 percent (13.6 MMBF) of the 20.2 MMBF of timber received by Montana's log home manufacturers came from outside Montana, including 7.7 MMBF from Canada. Litigation and appeals have tied up National Forest timber slated for removal as a part of post-fire salvage and rehabilitation efforts, causing uncertainty for log home manufacturers in Montana (Backus 2006). In addition, the log home industry in surrounding states is growing, increasing competition for log home manufacturers in Montana.

Montana's log home manufacturers offer three styles of house logs: sawn, machined (lathe turned or machine contoured), or hand-hewn. Some manufacturers focus on log railings and other accent pieces. Various methods of construction, including Swedish cope, double-round tongue and groove, American chinked, and D-style, are available. Various degrees of assembly are also offered, ranging from house log packages to shells and completed homes.

In 2004, machined logs accounted for 41 percent of sales, compared to 46 percent in 1998. Hand-hewn logs accounted for 51 percent of sales, compared to 36 percent in 1998. Sawn logs were 7 percent of sales, compared to 11 percent in 1998. About \$750 thousand of sales from the log home sector in 2004 consisted of specialty products, such as log railings and accent pieces.

Other Sectors

Other sectors of Montana's forest products industry include plywood and veneer plants, manufacturers of posts, poles, and other roundwood products, manufacturers of log furniture, and facilities that utilize mill residues as their primary input.

Three plywood plants operated in Montana in 2004, one fewer than operated during 1998. Since 2004, the plywood sector has experienced additional declines in Montana, with one plant permanently closing due to market conditions and a shortage of available logs. Douglas-fir and western larch are the primary species used for plywood and veneer, although small amounts of other species are also used. Plywood produced in Montana is generally used in industrial applications or for construction. Plywood plants in Montana produced 444 million square feet (MMSF), 3/8" basis, of plywood in 2004², compared to 654 MMSF in 1998 (Keegan and others 2001). Montana's annual plywood production peaked in 1989 at 725 MMSF, and fluctuated around 600 MMSF annually through the 1990s and the early 2000s.

The post, pole, and other roundwood products sector consists of manufacturers of fence posts, small poles, and rails used in fence construction. These products are often treated with wood preservatives, but untreated products are also available. Since 1988, when 37 post and pole manufacturers operated in Montana, the number of manufacturers in this sector has steadily declined (table 10). In 2004, 22 post and pole manufacturers operated in Montana, and total sales from the sector were about \$10 million. One post and pole manufacturer began operations in Montana in 2005. Post and pole manufacturers prefer to use lodgepole pine over other species. As a result, post and pole manufacturers have not only seen a decreased supply of their preferred species, but have also been forced to compete with other mills, such as studmills that are capable of using smaller-diameter timber and pulp mills that periodically use small roundwood for raw material. Stricter regulations related to preservative treatments have also contributed to declines in this sector.

²Adair, C. 2005. Personal communication. Market Research Director, The Engineered Wood Association (APA). P.O. Box 11700, Tacoma, WA 98411.

In contrast to the post and pole sector, the log furniture sector has seen an increase in the number of facilities since 1988. During 2004, 29 log furniture manufacturers operated in Montana, compared to 25 in 1998, four in 1993, and two in 1988. There is considerable turnover of manufacturers in this sector, as very little capital or equipment is required to manufacture log furniture, making it easy to start up and stop operation. Like post and pole manufacturers, makers of log furniture also prefer to use smaller (2- to 6-inch diameter) lodgepole pine. A number of products are manufactured by log furniture manufacturers in Montana, but headboards, footboards, and frames for beds, chairs, tables, and bedroom furniture are the most common items. Sales value from Montana's log furniture sector was about \$7 million in 2004.

Montana's residue-utilizing sector consists of a number of types of facilities, including one pulp and paper mill, one particleboard plant, one medium-density fiberboard (MDF) plant, four wood pellet plants, six producers of bark and landscape products, and two facilities that utilize mill residues to produce heat for public schools. The primary input for each of these facilities is wood residue produced as a byproduct from manufacturing other wood products, most notably lumber and plywood. These facilities play an important role in Montana's forest products industry, not only for the products that they provide, but also as an outlet for wood fiber residue from sawmills and plywood plants. The sales value of mill residue and residue-related products from Montana facilities exceeded \$460 million during 2004.

Most mill residue volume is used by facilities manufacturing pulp, particleboard, and MDF. These facilities utilize clean chips, sawdust, and planer shavings from sawmills and plywood plants to produce pulp and board products. Montana's only pulp mill has been in operation since the late 1950s. Since its opening, the mill has undergone several expansions, and currently has the capacity to produce 575,000 tons per year of kraft linerboard (Paperloop 2005). The particleboard and MDF plants opened during the 1970s, and both plants have also seen several expansions since their opening. The particleboard plant currently has the capacity to produce 150 MMSF (3/4" basis) per 8-hour shift, while the MDF plant's current capacity is 220 MMSF (3/4" basis) per 8-hour shift (Random Lengths 2005).

Other portions of Montana's residue-utilizing sector have also seen expansion in recent years. The number of facilities producing bark and landscape products increased from three in 1998 to six in 2004. These facilities produce landscape products such as decorative bark, mulch, and compost. The number of producers of wood pellets for home heating increased from three in 1998 to four in 2004.

A new development in the residue-utilizing sector since 1998 has been implementation of "Fuels for Schools" projects. These facilities were designed to operate using chipped slash and forest residues from fire/fuel hazard reduction projects to provide economical heat in public schools. To this point, however, the primary input for these facilities has been mill residues. In 2004, two such facilities, at Darby and Victor, were operating. Since 2004, similar facilities at Thompson Falls and Philipsburg have also begun operating. Construction is in progress for wood energy facilities associated with schools in Browning, Deer Lodge, Eureka, Kalispell, Townsend, and Troy, as well as the University of Montana-Western in Dillon.

Industry Capacity

Montana's timber-processing facilities report shift capacity and annual production capacity in volume of outputs that could be produced given a sufficient supply of raw material, firm market demand for their products, and ordinary maintenance and downtime. Facilities also report the number and length of daily shifts and number of annual operating days. Sawmills report annual capacity and shift capacity in MMBF of lumber,

plywood plants in MMSF (3/8" basis), post and pole and log furniture manufacturers in number of pieces, and log home manufacturers in thousands of lineal feet. Although different units are used by each industry sector to measure output, a common unit, MBF Scribner, is used by each sector to describe timber input. Calculating capacity in terms of timber input allows capacity for different sectors to be summed together, which in turn provides a better understanding of the entire forest products industry's size and ability to process timber. The measurement of capacity in units of timber input is referred to as timber-processing capacity, and is calculated by dividing each mill's stated production capacity by its recovery per board foot Scribner of timber processed (Keegan and others 2006b). Four sectors—the sawmill sector, plywood sector, utility pole sector, and log home sector—use sawtimber-sized material as their primary input, while post and pole and log home manufacturers use smaller material. Capacity for sawtimber users is discussed separately from non-sawtimber users.

In 2004, annual sawtimber processing capacity was 934 MMBF, Scribner, and 70 percent (656 MMBF) of capacity was utilized (table 20).³ Sawtimber processing

Table 20—Sawtimber processing capacity and utilization, selected years
(sources: Keegan 1980; Keegan and others 1983, 1990, 1995, 2001).

Plant Type	Processing capacity	Volume processed	Percentage of capacity utilized
----- Million Board Feet, Scribner -----			
1976			
Sawmills	1,259	905	72%
Other sawtimber users ^a	330	285	86%
Total	1,589	1,190	75%
1981			
Sawmills	1,207	739	61%
Other sawtimber users ^a	276	241	87%
Total	1,483	980	66%
1988			
Sawmills	1,237	985	80%
Other sawtimber users ^a	324	241	74%
Total	1,561	1,226	79%
1993			
Sawmills	964	783	81%
Other sawtimber users ^a	287	234	82%
Total	1,251	1,016	81%
1998			
Sawmills	844	725	86%
Other sawtimber users ^a	247	221	89%
Total	1,091	946	87%
2004			
Sawmills	743	521	70%
Other sawtimber users ^a	191	135	71%
Total	934	656	70%

^aOther sawtimber users include plywood and veneer plants, house log manufacturers, and utility pole plants.

³ Volume of timber utilized may differ from total mill receipts for these sectors due to changes in log inventories at individual mills.

capacity has steadily declined since the late 1980s (fig. 6). Capacity remained steady at nearly 1,600 MMBF during the late 1970s then slightly declined during the recession years of the early 1980s before climbing to peak levels (1,595 MMBF in 1987) in the late 1980s. Since then, reductions in timber harvest have lead to steady declines in capacity, even during periods of high lumber prices and high demand.

The percentage of annual sawtimber-processing capacity utilized has fluctuated since 1976, when 75 percent was utilized. In 1982, during a severe recession, capacity utilization dropped to a low of 53 percent. By the late 1980s, the percentage of utilized capacity had rebounded to about 80 percent, and it stayed at that level through the early 1990s. From 1996 through 2001, capacity utilization ranged from 84 to 88 percent. Capacity utilization declined to 70 percent in 2004, which is the lowest level of utilization since 1982. The lower level of utilization was due to timber availability constraints that prevented mills from taking advantage of strong markets during 2004. Because sawmills account for the bulk of processing capacity, the percent of total sawtimber capacity utilized generally follows the percent of processing capacity utilized at sawmills.

Sawmills have consistently accounted for about 80 percent of sawtimber processing capacity. Annual sawtimber processing capacity at Montana's sawmills was 743 MMBF Scribner in 2004, and sawmills utilized 70 percent of their capacity by processing 521 MMBF Scribner of timber 2004. Capacity utilization rates differ by the size of sawmill, with larger mills typically utilizing a greater percentage of their processing capacity. Montana's sawmills with processing capacities greater than 10 MMBF (Scribner) accounted for 95 percent (708.4 MMBF) of the sawtimber processing capacity, utilizing 71 percent of capacity. Sawmills processing less than 10 MMBF (Scribner) accounted

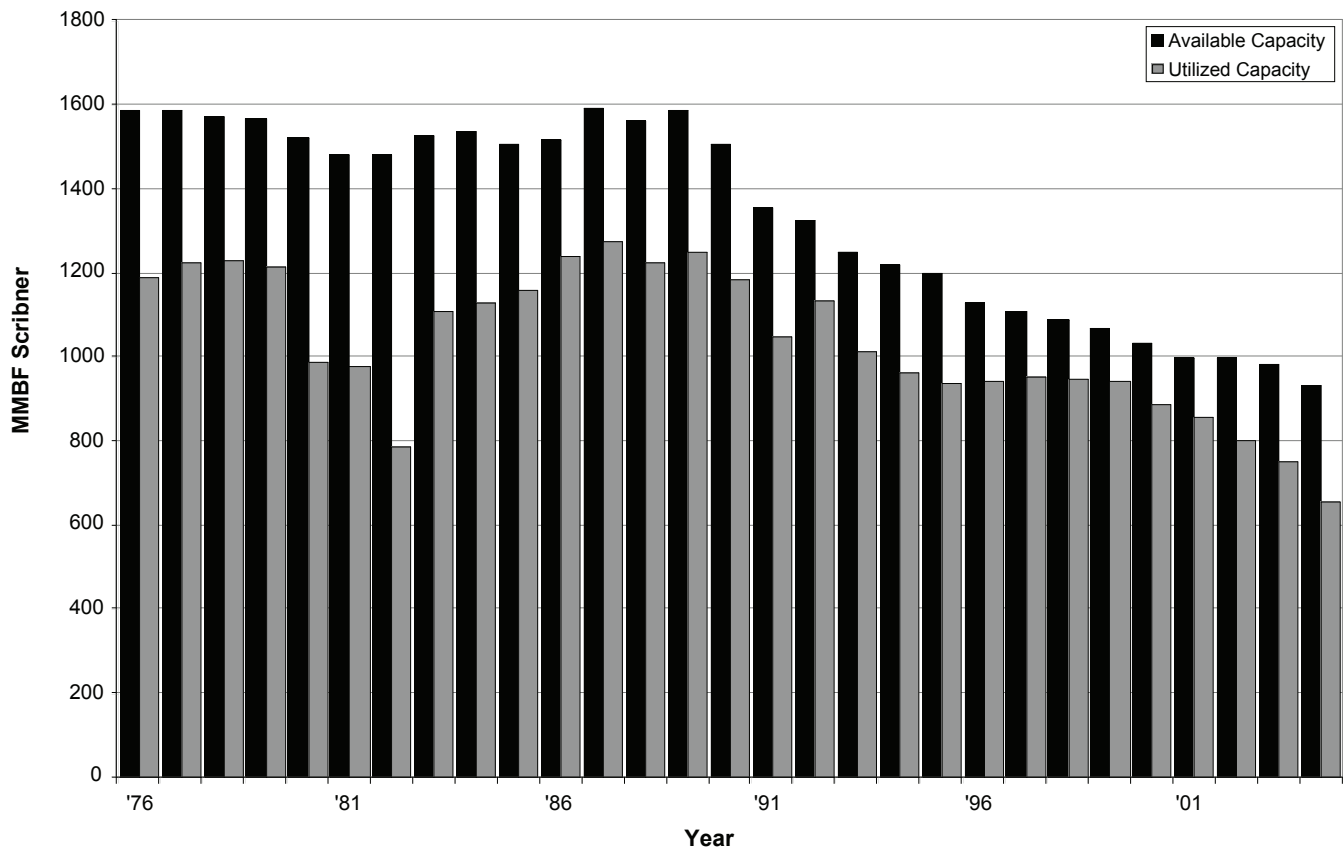


Figure 6—Montana timber-processing capacity and utilization, 1976-2004.

for the remaining 5 percent (34.4 MMBF), and utilized 60 percent of their capacity. Sawmills with timber-processing capacities greater than 10 MMBF expressed their annual capacity in terms of two 8- or 10-hour shifts or three 8-hour shifts daily for a 220- to 260-day operating year. Sawmills with processing capacities less than 10 MMBF usually expressed annual capacity in terms of one 8- or 10-hour shift for an operating year of not more than 240 days.

Other users of sawtimber—plywood and veneer plants, house log manufacturers, and utility pole manufacturers—account for about 20 percent of sawtimber processing capacity. These facilities had 191 MMBF Scribner of sawtimber processing capacity in 2004, and utilized 71 percent of their capacity by processing 135 MMBF of timber. In previous surveys, capacity for plywood and veneer plants was reported separately from house log and utility pole manufacturers; however, their capacity has been combined in this report to prevent disclosure of firm-level data. Plywood plants historically have used over 90 percent of their processing capacity, while house log and utility pole plants have not used more than 63 percent of their processing capacity in any previous survey year (Keegan 1980; Keegan and others 1983, 1990, 1995, 2001). Plywood plants are the largest of other sawtimber users and tend to operate at high levels of capacity utilization, which boosts overall capacity utilization. Montana's plywood facilities expressed their annual capacities in terms of three 8-hour shifts for a 240- to 290-day operating year. Log home manufacturers usually expressed their annual production capacity in terms of one 8-hour shift per day for an operating year not exceeding 240 days.

Non-sawtimber users, such as post and pole plants, cedar products, and log furniture manufacturers also reported their shift and annual production capacity. These facilities are typically small operations, and capacity can be influenced by the operators as much as the processing equipment. For example, the operators of many of these facilities choose to harvest their own timber, which in turn limits the number of days that they can operate processing equipment. In 2004, annual timber-processing capacity for non-sawtimber users was 15.3 MMBF Scribner with 44 percent (6.8 MMBF) of capacity utilized. These facilities usually expressed their annual production capacity in terms of one 8-hour shift per day for an operating year of 250 days or less.

Mill Residue Production and Utilization

Wood residue from the manufacturing of primary wood products is the major source of material for pulp and paper mills, board plants, and other manufacturers of residue-based products. Mill residue is also used for fuel by sawmills, plywood plants, and pulp mills, as well as by schools in the "Fuels for Schools" program. The outlets provided by the residue-utilizing sector are very important to Montana's forest products industry, because the residue would be difficult and costly to dispose of without these outlets. Mill residue falls into three general categories: 1) coarse residue including chippable material such as slabs, edging, and trim, log ends, and defective veneer, 2) fine residue including sawdust, sander dust, and planer shavings, and 3) bark. The volume of mill residue produced during a given year is closely linked to lumber and plywood production in that year. In addition, milling equipment, species and size of logs, amount of defect in logs, and market conditions also influence the amount of residue generated by timber processors.

Factors quantifying the volume of residue generated by sawmills in bone-dry units (BDU, 2,400 lbs. oven-dry weight) per thousand board feet of lumber produced were developed for each of Montana's sawmills (table 21). In 2004, just over 1 BDU of residue was generated per MBF of lumber produced. Coarse residue accounts for about one-half of the residue produced per unit of lumber, with sawdust, planer shavings, and bark accounting for 15 to 20 percent each. Since 1981, the total residue factor for

Table 21—Montana sawmill residue factors, selected years (sources: Keegan 1980; Keegan and others 1983, 1990, 1995, 2001).

Type of residue	1976	1981	1988	1993	1998	2004
----- BDU per MBF lumber tally ^a -----						
Coarse	0.45	0.47	0.51	0.48	0.49	0.47
Sawdust	0.24	0.25	0.22	0.23	0.22	0.19
Planer Shavings	0.22	0.22	0.18	0.16	0.17	0.15
Bark	0.25	0.23	0.21	0.21	0.19	0.20
Total	1.16	1.17	1.12	1.08	1.07	1.01

^aBone-dry unit (BDU = 2,400 lb of oven-dry wood) of residue generated for every 1,000 board feet of lumber manufactured.

sawmills has been decreasing. Decreases in the factors for sawdust and planer shaving are attributable to improved milling technology and a shift toward producing more dimension lumber, which has a greater nominal thickness (2" to 5") than boards (less than 2"). The decrease in the bark factor is likewise due to improved milling technology. The coarse residue factor has varied slightly but has not decreased to the extent of other factors because of the increased use of smaller-diameter logs, which tend to create somewhat more residue despite the technological improvements that make lumber recovery possible from the smaller logs.

The total volume of residue produced by Montana's sawmills and plywood plants during 2004 was 1.2 million BDU (table 22). This is the least residue production compared to previous survey years (Keegan 1980; Keegan and others 1983, 1990, 1995, 2001), and corresponds to decreased lumber production in 2004 compared to previous survey years. In contrast to the low level of residue production, the utilization of residue reached record highs in 2004, with virtually all residue from sawmills and plywood plants utilized. Nearly three-quarters of all residue was used for pulp and board, and 20 percent was used as fuel for energy. The remainder was used for landscape products or animal bedding. Less than 0.25 percent of residue from sawmills and plywood plants was not utilized in 2004.

Coarse residue accounted for nearly half of the residue volume produced by sawmill and plywood plants (594,629 BDU), and 98 percent of that was used by pulp and board mills. Virtually all remaining coarse residue (9,281 BDU) was used for energy, except for 0.25 percent (1,056 BDU) that was unutilized.

Table 22—Production and disposition of residues from Montana sawmills and plywood plants, 2004.

Residue type	Total utilized	Pulp and board	Energy	Landscape products, animal bedding, and	Unutilized	Total produced
				other uses		
----- Bone-dry units ^a -----						
Coarse	593,573	583,973	9,281	320	1,056	594,629
Fine	360,929	312,148	41,146	7,635	1,437	362,367
Sawdust	202,404	165,616	35,047	1,741	937	203,341
Planer shavings	158,525	146,532	6,099	5,894	500	159,025
Bark	260,078	-	195,691	64,387	240	260,318
All residues	1,214,580	896,121	246,117	72,342	2,733	1,217,314
----- Percentage of residue use by type -----						
Coarse	99.8	98.2	1.6	0.1	0.2	100
Fine	99.6	86.1	11.4	2.1	0.4	100
Sawdust	99.5	81.4	17.2	0.9	0.5	100
Planer shavings	99.7	92.1	3.8	3.7	0.3	100
Bark	99.9	-	75.2	24.7	0.1	100
All residues	99.8	73.6	20.2	5.9	0.2	100

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

Fine residues from sawmills and plywood plants totaled 362,367 BDU in 2004, of which 56 percent was sawdust and 44 percent was planer shavings. Most sawdust (81 percent) was used by pulp and board mills, with 17 percent used for energy and 1 percent for landscape products or animal bedding. With planer shavings, a higher proportion (92 percent) was used by pulp and board mills, while nearly equal amounts (4 percent each) were used for energy and landscape products or animal bedding. All told, pulp and board mills used 86 percent of fine residues as raw material for their products, while 11 percent was used for energy and 2 percent was used for mulch or animal bedding. Less than 0.5 percent of fine residues were not utilized.

During 2004, Montana sawmills and plywood plants produced 260,318 BDU of bark residue. Three-quarters of bark residue was used for energy, and most of the remaining 25 percent was used for landscape products or animal bedding. Less than 0.1 percent of bark was not utilized.

Other manufacturers, including house log manufacturers, post and pole plants, cedar products, and log furniture manufacturers produce a small volume of residues. In 2004, these facilities produced 40,781 BDU, of which 88 percent (35,901 BDU) was used. The most common use for this material was energy (22,723 BDU), followed by landscape products, animal bedding, and other uses (13,178 BDU). The remaining residue from these facilities (4,880 BDU) was not utilized.

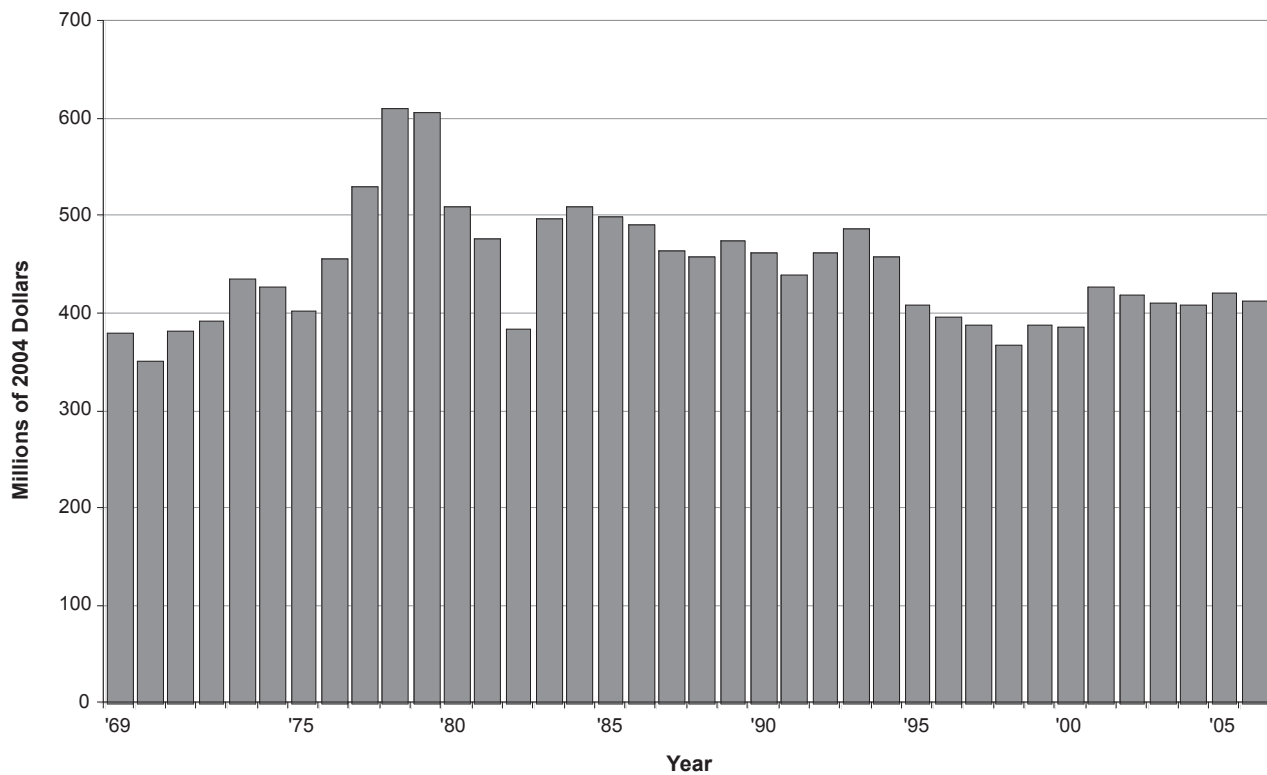
Economic Aspects of Montana's Forest Products Industry _____

Most of the primary and secondary forest products industry has traditionally been reported in three standard industrial classifications (SIC) as defined by the U.S. Office of Management and Budget (OMB 1987): SIC 08—forestry services; SIC 24—lumber and wood products; and SIC 26—pulp, paper, and allied products. Starting in 2001, the North American Industry Classification System (NAICS) replaced the SIC system, causing some problems with data continuity. The forest products industry can now be found in four categories (OMB 1998): NAICS 113—forestry and logging; NAICS 1153—forestry support activities; NAICS 321—wood product manufacturing; and NAICS 322—paper manufacturing. The total numbers for the industry are comparable between the two systems, albeit in a slightly different combination. Employment and labor income data for this section are taken from the Regional Economic Information System (REIS), published by the U.S. Department of Commerce, Bureau of Economic Analysis (BEA 2006). Data through 2000 are based on the SIC system, whereas data from 2001 to the present are based on NAICS.

Though these industrial classifications give a conservative representation of forest industry employment and labor income, the correspondence is not exact. A number of activities involving several thousand workers associated with forest products are not included: log hauling by independent truckers; truck or rail transport of logs, wood fiber, or finished products; and timber product management activities by government employees. Conversely, some workers in the secondary industry not related to Montana's timber resources are included in these categories, such as truss manufacturers whose activities are more closely related to the region's construction activity.

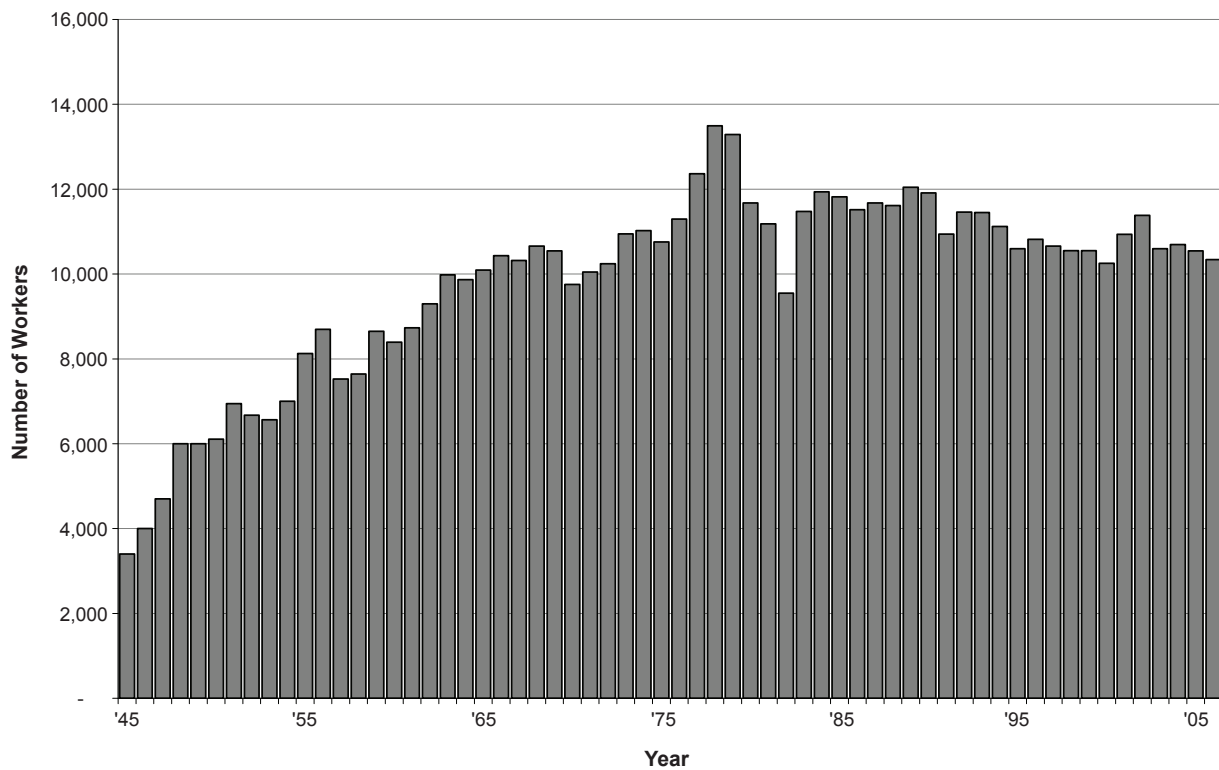
Labor Income and Employment

Over the past 35 years, Montana forest products employment and labor income, when adjusted for inflation (2004 dollars), have followed the same general trends, and the changes from year to year have tended to be greater for labor income (fig. 7) than for employment (fig. 8). Frequently, when the economy is booming, employees are paid bonuses or given raises, but new employees may or may not be hired. Conversely, as



Source: Bureau of Economic Analysis (BEA) 2006.

Figure 7—Montana forest industry labor income, 1969-2006.



Source: Bureau of Economic Analysis (BEA) 2006.

Figure 8—Montana forest industry employment, 1945-2006.

the economy slows, changes in labor income due to shortened workweeks or temporary curtailments may be much larger than changes in employment; the workers are still employed but their income is lower.

In 1969, employment in the forest products sector numbered 10,546 workers, earning close to \$381 million. Through a gradual increase, both employment and labor income peaked in 1978 at 13,494 workers earning over \$611 million. However, while this represented a 15 percent increase in labor income from its 1977 level, employment increased by a mere 9 percent. After increasing throughout most of the 1970s, both employment and labor income fell during the recessions of the early 1980s, reaching a low in 1982 of \$385 million and 9,551 workers. The low numbers represented a 19 percent decrease in labor income since 1981, and a 15 percent decrease in employment. For the remainder of the '80s and through 1993, labor income and employment remained relatively stable, averaging \$477 million and 11,620 workers per year before starting to drop in 1994. Through 2000, labor income average \$400 million per year, with average annual employment of 10,650, a 16 and 8 percent drop, respectively, from the late '80s and early '90s. Again, employment declined by a much lower percentage than labor income. Labor income reached a low in 1998 at \$368 million, whereas employment has continued to decrease since its last high of 12,050 workers in 1989. These decreases were largely due to reductions in the number of hours worked due to the temporary curtailments caused by wildfires, low lumber prices, and limited timber availability.

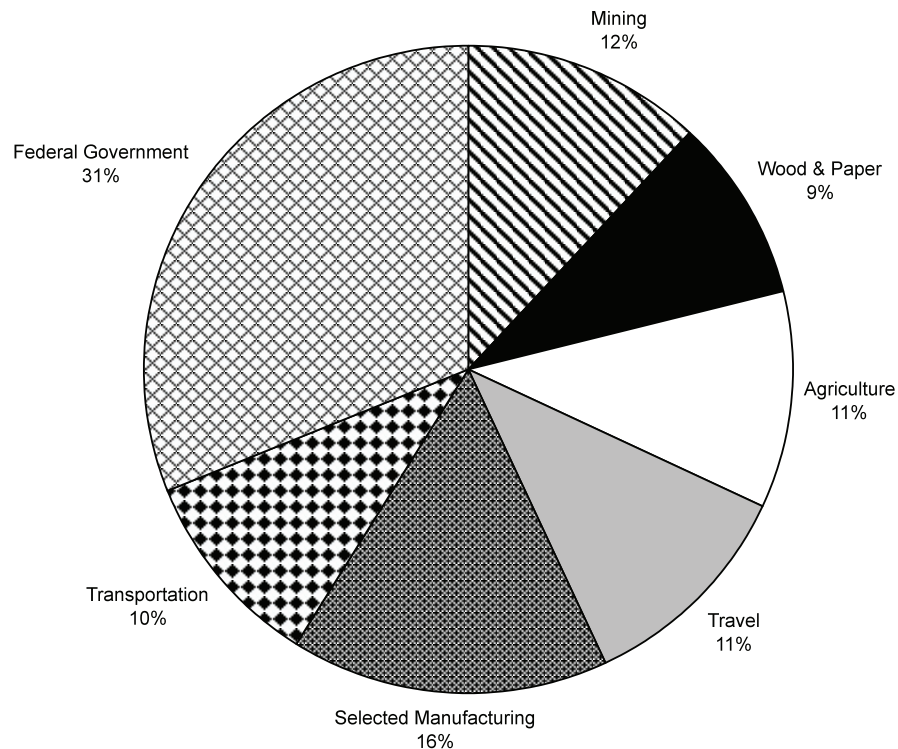
From 2001 through 2006, forest industry employment continued to fall, from 10,937 in 2001, to 10,695 in 2004, reaching 10,340 in 2006, a total drop of 5 percent. Labor income followed a less even path, from \$429 million in 2001, to \$410 million in 2004, rebounding to \$414 million in 2006, a total drop of 3 percent. The larger decline in employment over labor income during the past five years was due in large part to the permanent closure of several larger mills in Montana.

Basic Industries and Trends in the State and Regional Economies

The economic base of a region consists of industries whose economic activity is dependent on factors external to the state or local economy. These "basic" industries are important to an economy because they have the potential to inject new funds by way of payrolls, taxes, and purchases of local goods and services. Changes in these industries have a strong influence on trends in the overall economy because they also stimulate changes in the derivative or non-basic sectors (Polzin 1990, 2006; Polzin and others 1988).

At the state level, Polzin has defined Montana's basic industries as wood and paper products manufacturing, other manufacturing industries (with the exception of printing and publishing), railroad and truck transportation, nonresident travel, the federal government (including military and civilian personnel), mining, and agriculture. Labor income is used as a measure of overall economic activity in Montana.

After increasing dramatically during the 25 years following WWII, to approximately 13 percent, the contribution of Montana's forest products industry to the state's economic base continued to increase through the 1970s and 1980s, reaching approximately 16 percent in the late 1980s (Keegan and others 2001). During the 1990s the forest products industry share of Montana's economic base fell to approximately 10 percent. The estimated \$414 million in labor income in 2006 accounted for 9 percent (fig. 9) of Montana's economic base (Polzin 2007).



Source: Bureau of Economic Analysis (BEA) 2006.

Figure 9—Labor income in basic industries, Montana, 2006.

Regional Dependence on the Forest Products Industry

Though over 40 of Montana's 56 counties have a consistent timber harvest, approximately 75 percent of labor income (\$300 million) occurs in nine western Montana counties⁴, where the forest products industry constitutes a substantial component of the economic base. The forest products industry also accounts for a measurable part of the economic base in several counties in central and southeastern Montana, contributing at least \$1 million in labor income in each of eight counties in that region.⁵

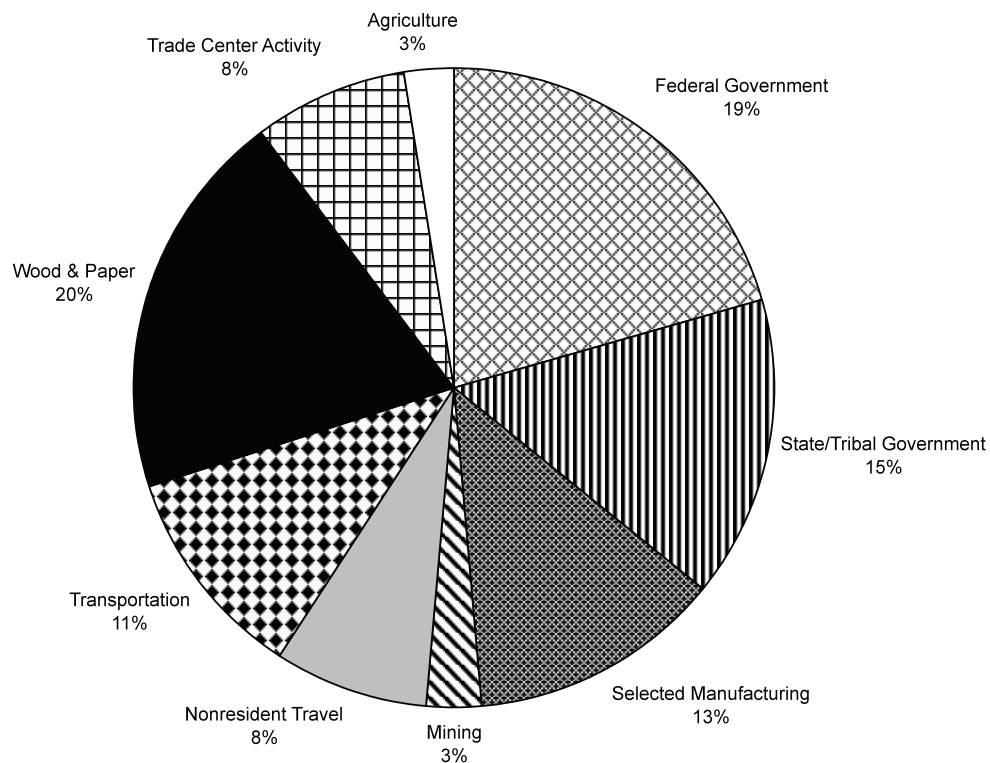
In addition to the industries that were defined as basic at the state level, the regional economic base also includes state and tribal government, as well as some trade center-related activity, such as components of health and business services, retail trade, and construction. Given this definition, the share of western Montana's basic labor income provided by the forest products industry ranged from nearly 40 percent in the late 1960s to about 25 percent in the late 1990s; the \$300 million in western Montana's forest products labor income was an estimated 20 percent of that region's economic base in 2006 (fig. 10).

Products, Markets, and Sales Value

The sales value of primary forest products produced in Montana has increased through the years, from just over \$250 million (2004 dollars) in 1945 to \$1.2 billion in 2004 (fig. 11). Sales growth over the last 60 years was due to growth in the sawmill sector and diversification in the industry, particularly the addition of the residue-utilizing sector.

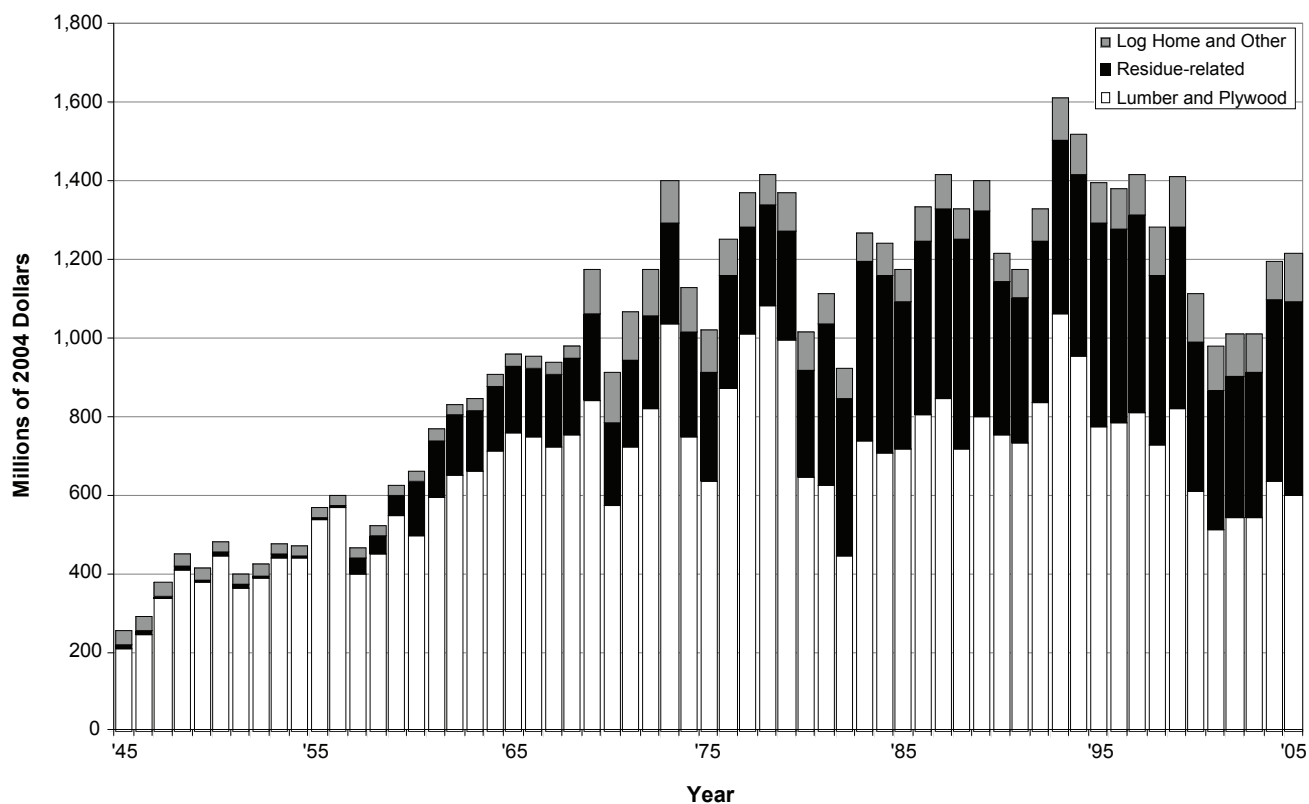
⁴ Flathead, Granite, Lake, Lincoln, Mineral, Missoula, Powell, Ravalli, and Sanders counties.

⁵ Broadwater, Cascade, Gallatin, Jefferson, Lewis & Clark, Madison, Park, and Yellowstone counties.



Source: Bureau of Economic Analysis (BEA) 2006.

Figure 10—Labor income in basic industries, Western Montana, 2006.



Source: Western Wood Products Association (WWPA), 1964-2005; Adair 2005 (see footnote 1).

Figure 11—Sales value of Montana's primary forest products, 1945-2005.

With the emergence of the residue-utilizing sector, the proportion of total sales from lumber and plywood decreased from about 95 percent in 1956 to 53 percent in 2004. While the proportion of sales from lumber and plywood has decreased, the proportion of sales from the residue-utilizing sector and log home sector has increased (table 23). The proportion of sales from other products, such as posts and poles and log furniture, has remained constant at about 1 percent of total sales.

Sales of plywood, lumber, and other sawn products were higher in 2004 than in the previous four years, with sales of nearly \$638 million (table 24). The increase in sales, in spite of decreasing production, is due to strong markets and high lumber prices in 2004. From 2001 through 2003, weak markets and decreasing production due to timber availability constraints led to the lowest sales values from lumber and plywood since the severe recession of 1982. Peak sales from lumber and plywood occurred in 1993, amid strong demand and decreasing production due to declining harvest levels from National Forest land.

During 2004, sales from residue-related products were nearly \$462 million, including the value of mill residues sold to residue-utilizing facilities within and outside of Montana. The majority of sales in this sector are from pulp and paper products, particleboard, and MDF. The \$462 million in sales in 2004 is the highest since 1997, when sales of these products generated over \$505 million (2004 dollars). Sales of house logs and log homes were nearly \$82 million in 2004, down from \$112 million (2004 dollars) from 1998. Sales from posts and poles and log furniture were about \$17.6 million in 2004, up from \$15.8 million (2004 dollars) in 1998.

Table 23—Proportion of finished product sales of Montana's primary wood products sectors, selected years (sources: Keegan 1980; Keegan and others 1983, 1990, 1995, 2001).

Sector	1976	1981	1988	1993	1998	2004
----- Percentage of sales value -----						
Lumber, plywood, and other sawn products	73	58	55	67	60	53
Pulp, board, and residue-related products	24	38	41	28	30	39
House logs and log homes	2	2	3	5	9	7
Other products ^a	2	2	1	1	1	1
All products ^b	100	100	100	100	100	100

^aOther products include: posts and poles, and log furniture.

^bPercentage detail may not sum to 100% due to rounding.

Table 24—Destination and sales value of Montana's primary wood products and mill residue, 2004.

Product	Montana	Rocky Mountains ^a	Far West ^b	Northeast ^c	South ^d	North Central ^e	Other countries ^f	Total
----- Thousand 2004 dollars -----								
Lumber, plywood, and other sawn products	64,935	61,987	74,484	97,496	113,376	213,401	12,262	637,940
House logs and log homes	26,093	24,819	7,139	3,541	8,449	11,051	825	81,918
Residue-related products ^g	41,153	34,764	124,423	40,575	58,665	104,509	57,628	461,716
Other finished products	7,512	3,211	1,781	1,103	1,369	2,362	295	17,633
All products and residues	139,692	124,781	207,827	142,715	181,859	331,324	71,009	1,199,206
----- Percentage of sales -----								
Lumber, plywood, and other sawn products	5	5	6	8	9	18	1	53
House logs and log homes	2	2	1	0	1	1	0	7
Residue-related products ^g	3	3	10	3	5	9	5	39
Other finished products	1	0	0	0	0	0	0	1
All products and residues	12	10	17	12	15	28	6	100

^aRocky Mountains includes Arizona, Colorado, Idaho, Nevada, New Mexico, Utah, and Wyoming.

^bFar West includes Alaska, California, Hawaii, Oregon, and Washington.

^cNortheast includes Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

^dSouth includes Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

^eNorth Central includes Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

^fOther countries includes Canada, Pacific Rim countries, and other countries.

^gResidue-related products include pulp, board, fuel pellets, bark products, and mill residues.

As in 1998, the North Central⁶ and South were the largest markets, respectively, in terms of sales value for lumber, plywood and other sawn products in 2004. The Northeast jumped from the sixth-largest market in 1998 to the third-largest market in 2004, while the Rocky Mountain states dropped from the third-largest market for lumber and plywood in 1998 to the sixth-largest in 2004. Continuing the trend from 1998, the Far West was the largest market for residue-related products in 2004, followed by the North Central states. The majority of sales from house logs and other products remained in Montana and the other Rocky Mountain states.

The North Central region has historically received the largest proportion of wood products from Montana in terms of total sales value (table 25); however, the percentage of sales to that region is decreasing and sales to the South and Northeast have increased. During 2004, 28 percent of Montana's forest products sales were to the North Central region. The Far West received 17 percent of sales, followed by the South (15 percent), Northeast (12 percent), and Montana (12 percent). The percentage of sales to the Rocky Mountain states (excluding Montana) were the second-lowest among all markets for Montana's forest products; however, combining sales from Montana and other Rocky Mountain states would make the overall region the second-largest market, with 22 percent of total sales.

Table 25—Proportion of Montana primary wood product sales by market region, selected years
(sources: Keegan 1980; Keegan and others 1983, 1990, 1995, 2001).

Market area	1976	1981	1988	1993	1998	2004 ^a
----- Percentage of sales -----						
North Central	40	34	40	37	28	28
Far West	15	22	17	15	19	17
South	9	10	10	11	16	15
Northeast	7	6	7	6	9	12
Montana	10	7	5	10	12	12
Rocky Mountains	12	14	11	15	13	10
Other countries ^b	2	3	9	6	4	6
Unknown	5	4	1	0	0	0
All areas ^c	100	100	100	100	101	100

^aIncludes mill residue sales, previous years do not include any residue sales.

^bOther countries include Canada, Pacific Rim countries, and other countries.

^cPercentage detail may not sum to 100% due to rounding.

Current Issues and Outlook

To gain a better understanding of the importance of issues affecting manufacturing in Montana, the Bureau of Business and Economic Research conducts an annual survey of manufacturers in Montana (Dillon and others 2007). Included in this survey are 28 companies accounting for 36 primary wood products manufacturing facilities, including sawmills, plywood plants, post and pole plants, house log and log home manufacturers, and pulp and board plants. These facilities account for over 90 percent of the timber processed and sales value of production in Montana.

⁶ **North Central:** Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin.

South: Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia.

Northeast: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont.

Rocky Mountains: Arizona, Colorado, Idaho, Nevada, New Mexico, Utah, Wyoming.

Far West: Alaska, California, Hawaii, Oregon, Washington

Respondents were asked two open-ended questions regarding major issues affecting their company. The first asked them to list the major issues affecting their plant during 2006, and the second asked them what issues they expected to affect their company during 2007. Timber availability was the most frequently listed major issue in 2006, with over 60 percent of respondents citing it. Markets and labor issues, particularly a shortage of qualified workers, tied as the second-most frequently listed issues, with about 40 percent of respondents listing each as a major issue affecting their company. High fuel/energy costs were listed by about 25 percent of respondents as a major issue in 2006. Timber availability, markets, labor issues, and energy were the top four issues expected to affect primary wood products manufacturers in 2007. Over 60 percent of respondents expected timber availability to be a major issue, while markets and labor issues were again tied as the second-most cited issues with just over one-quarter of respondents listing each. Fewer respondents expected energy/fuel costs to impact their businesses, with only 10 percent of respondents listing this as an expected major issue for 2007.

Survey participants were also asked to rank eight business-related issues, excluding markets, in terms of importance from “very important” to “very unimportant” to their business. No time frame was specified for the issues to be ranked. Among the eight issues respondents were asked to rank, raw material availability was the most important issue, with over 90 percent of respondents ranking it “very important” (fig. 12). Labor-related issues, such as worker compensation rates, health insurance costs, worker compensation rules, and the availability of qualified workers followed raw material availability in terms of importance, with each of those issues ranked as “very important” by over 50 percent of respondents. Energy costs and foreign competition were ranked “very important” by about 30 percent of respondents. Cost of Workforce Development was ranked “very important” by about 10 percent of respondents.

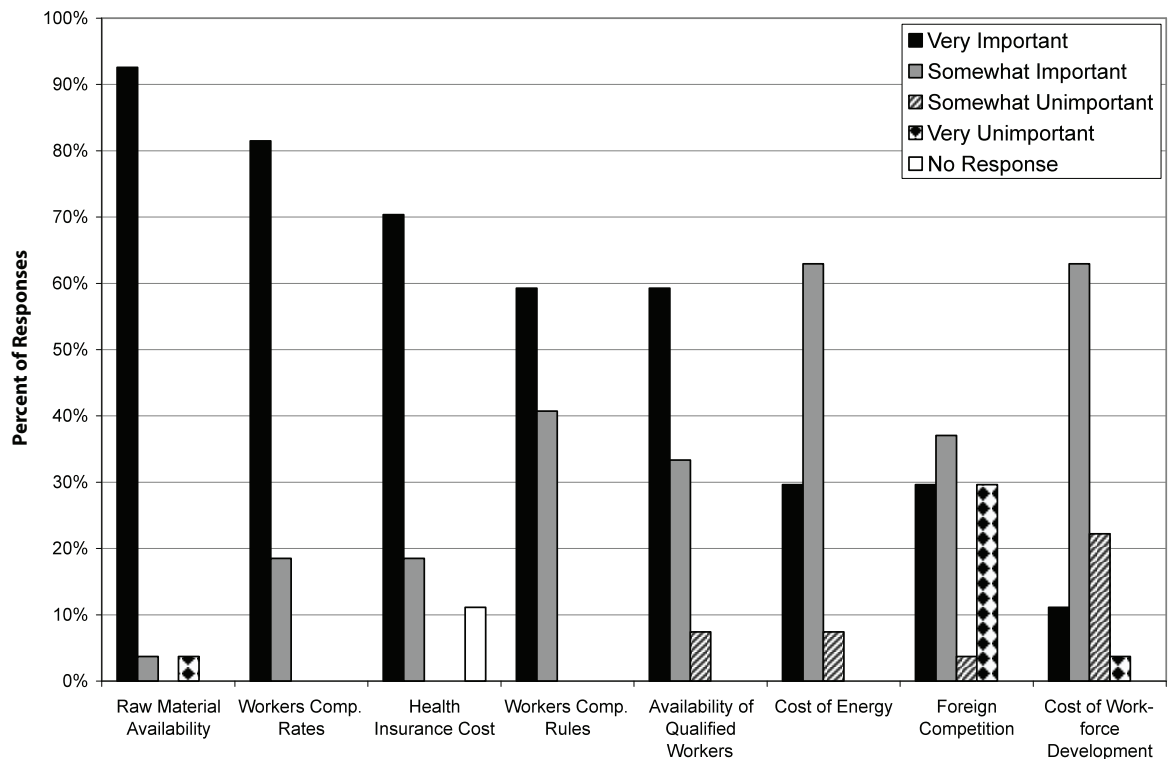


Figure 12—Relative importance of issues facing Montana forest products manufacturers.

As shown by the results of the BBER survey of Montana manufacturers, timber availability is the biggest issue facing Montana's forest products industry. In January 2005, the owner of one of Montana's long-standing large sawmills, which was heavily dependent on National Forest timber surrounding the mill, announced its permanent closure. The mill's owner was very succinct in explaining his reasoning for the mill's closure: "Pure and simple, the anemic Forest Service timber sale program is the overriding factor in our decision to close." The supervisor of the National Forest near the mill agreed with the owner's assessment, saying "They are entirely right. The ideal situation is for us to be able to provide a steady amount of timber. We can do our part on that, but if [timber sales are] held up by litigation, then it's out of our control and it's in the courts' hands" (Mann 2005).

The issues affecting Montana's forest products industry are unlikely to change in the coming years. Timber availability will continue to be a major challenge to the industry, with National Forest difficulties compounded by declining industrial timber inventories and changing patterns in timberland ownership. Global and domestic demand for wood products, the impact of foreign wood products, and energy prices will also continue as factors influencing the industry.

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