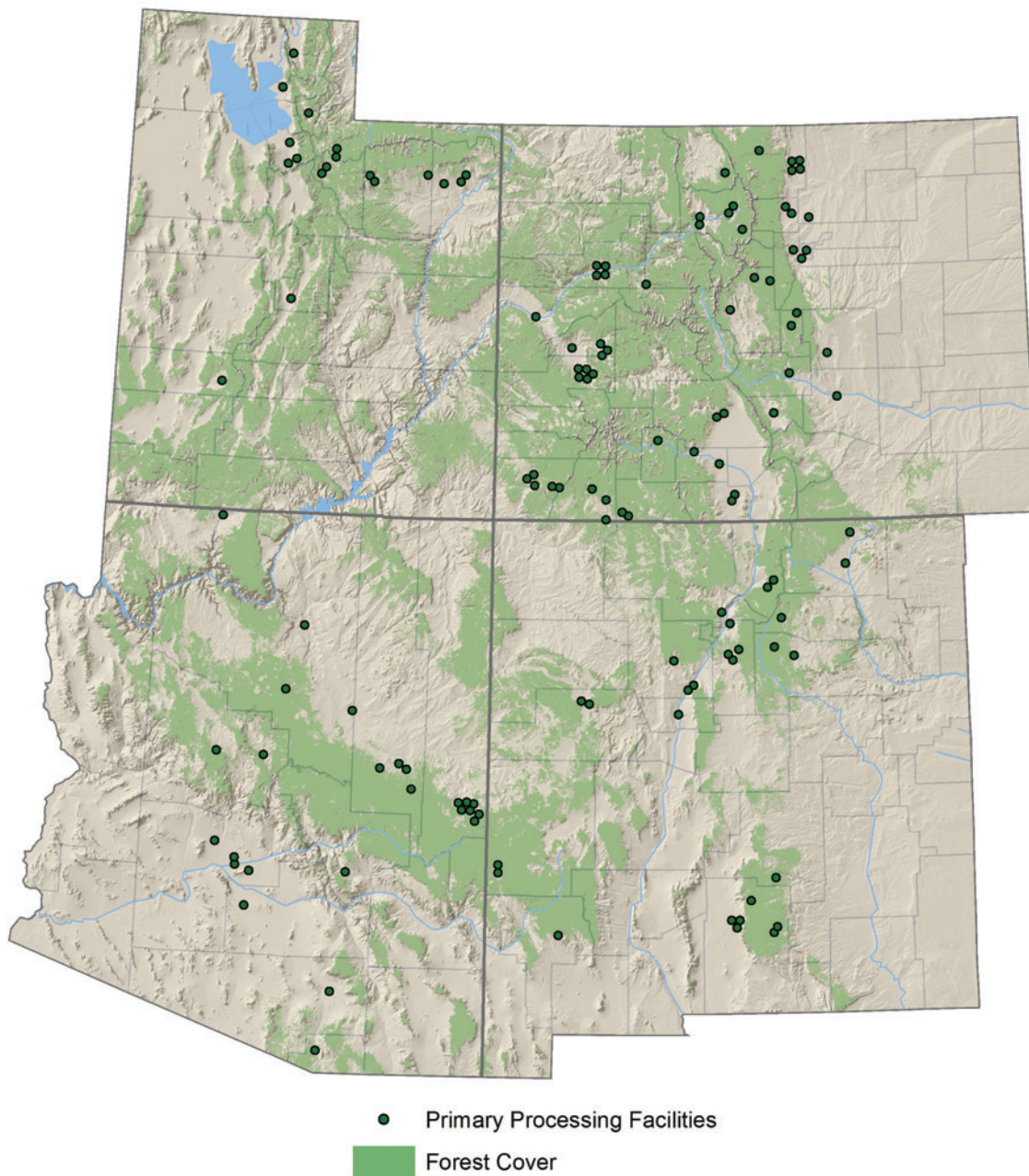


The Four Corners Timber Harvest and Forest Products Industry, 2012



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Abstract

This report traces the flow of timber harvested in the “Four Corners” States (Arizona, Colorado, New Mexico, and Utah) during calendar year 2012, describes the composition and operations of the region’s primary forest products industry, and quantifies volumes and uses of wood fiber. Recent changes in the wood products industry are discussed, as well as trends in timber harvest, production, and sales of primary wood products.

Keywords: forest economics, lumber production, mill residue, primary forest products, timber products

Authors

Colin B. Sorenson is an Economist, U.S. Department of Agriculture, Forest Service, Region One, Missoula, Montana, **Steven W. Hayes** is a Research Forester, **Todd A. Morgan** is Director of Forest Industry Research, **Eric. A. Simmons** is a Research Associate, **Micah G. Scudder** is a Research Forester, and **Chelsea P. McIver** is a Research Specialist, Bureau of Business and Economic Research, University of Montana, Missoula, Montana. **Mike T. Thompson** is a Forester, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Forestry Sciences Laboratory, Ogden, Utah.

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Report Highlights

- During calendar year 2012, more than 201.7 million board feet (MMBF) of timber was harvested from the Four Corners States (Arizona, Colorado, New Mexico, and Utah). Most (73 percent) of the harvested volume came from national forests; the rest came from nonindustrial private and tribal timberlands. Ponderosa pine was the leading species harvested for timber in the Four Corners States during 2012, accounting for 43 percent of the total. Lodgepole pine accounted for 26 percent, followed by Douglas-fir at 12 percent and aspen at 9 percent.
- During 2012, the Four Corners States had a net outflow of timber. Four Corners timber outflow totaled 8.9 MMBF Scribner. Total timber inflow to Four Corners mills was 0.4 MMBF Scribner.
- Timber-processing capacity (in other words, the volume of timber that could be used by existing timber processors if demand for products were firm and sufficient raw material were available) in the Four Corners during 2012 was about 451 MMBF Scribner, representing a 30 percent increase from the 2007 capacity. The increase in processing capacity in the region is primarily due to new or reconfigured mills designed to generate electricity or produce energy products like fuel pellets.
- This report identified 129 primary timber processing facilities active during 2012 in the Four Corners. Among these facilities were 70 sawmills, 22 log home or house log manufacturers, 7 post and pole facilities, 6 log furniture producers, 6 viga and latilla producers, and 18 other facilities.
- During 2012, production of lumber and other sawn products exceeded 185 MMBF lumber tally. Lumber production was 50 MMBF in Arizona, 98 MMBF in Colorado, 25 MMBF in New Mexico, and 12 MMBF in Utah.
- Four Corners timber processors produced 232,366 bone-dry units (BDU) of residue during 2012, of which just 5,783 BDU (3 percent) went unused. Sawmills generated 191,796 BDU—83 percent of all mill residues in the region.
- The Four Corners primary wood product sales value (f.o.b. the producing mill), including mill residues, totaled \$233 million during 2012. Nearly \$153 million (65 percent) of sales were within the Four Corners States. Lumber and other sawn products sales totaled \$73 million or 31 percent of sales.

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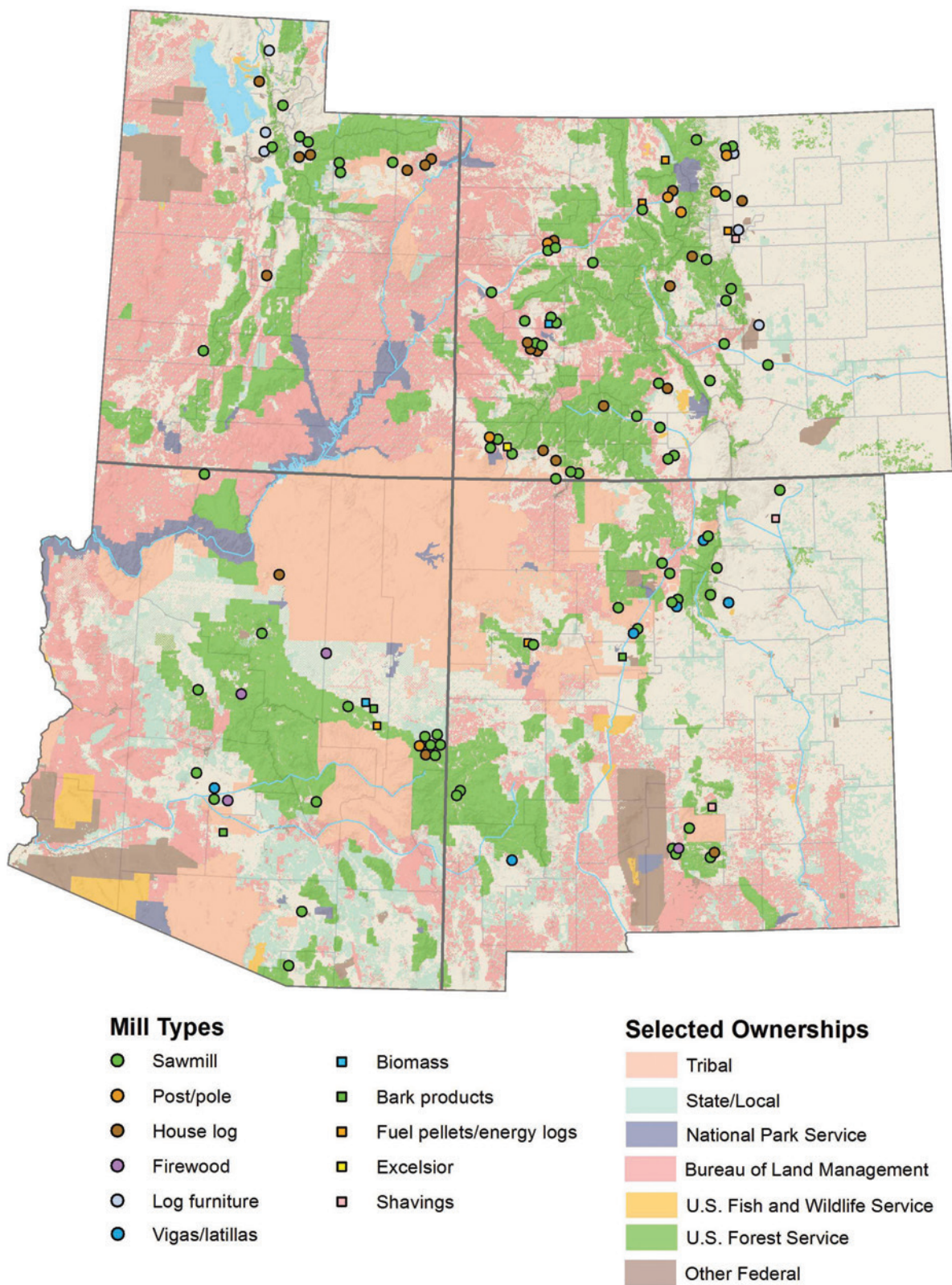


Figure 4C-1—Map of Four Corners primary timber processors.

Introduction

This report details timber harvest and describes the composition and operations of the primary forest products industry in the “Four Corners” States (Arizona, Colorado, New Mexico, and Utah) during calendar year 2012. The report focuses on trends and changes in timber harvest and timber processing since the last industry census of 2007 operations. More information on prior years and historical perspectives can be found in Hayes et al. (2012).

Timber used in the direct manufacture of products is the focus of this report. Products directly manufactured from timber are referred to as “primary products” and include lumber, posts and poles, house logs, log furniture, vigas and latillas, and excelsior. Reconstituted products made from chipped or ground timber, as well as products from mill residue (i.e., bark, sawdust, log ends, chips, and planer shavings) generated in the production of primary products, are also included. These reconstituted primary products include wood pellets, bark products, and fuelwood. Mills manufacturing derivative, or “secondary” products (e.g., window frames, doors, trusses, and furniture) made from primary products were not surveyed for this report.

The major source of data for this report was a census of primary forest products facilities in Arizona, Colorado, New Mexico, and Utah and mills in other States that received timber from the Four Corners States during calendar year 2012. Firms were identified through telephone directories, Internet queries, and directories of the forest products industries (Random Lengths 2012), and with the assistance of State forestry agencies, extension foresters, and the mills themselves. Firms cooperating in the Four Corners census, including out-of-State mills, processed virtually all of the commercial timber harvested from Arizona, Colorado, New Mexico, and Utah in 2012.

This report is the direct result of a cooperative effort between the University of Montana’s Bureau of Business and Economic Research (BBER) and the USDA Forest Service, Interior West Forest Inventory and Analysis (IW-FIA) program. Together, BBER and Forest Service research stations have been conducting periodic mill censuses in the Rocky Mountains since the 1970s. The Forest Industries Data Collection System (FIDACS) was developed by BBER and IW-FIA to collect, compile, and make available State- and county-level information on the operations of the forest products industry and the timber it uses. The FIDACS uses a written questionnaire or phone interview of forest products manufacturers to collect the following information for each facility for a given calendar year: production capacity and employment; volume of raw material received by county and ownership; species and live versus dead proportions of timber received; finished product volumes, types, sales values, and market locations; and utilization and marketing of manufacturing residue. Information collected through the FIDACS is processed, analyzed, and stored at the BBER in Missoula, Montana. Additional information is available by request; however, individual firm-level data are confidential and will not be released.

Four Corners Regional Summary

This chapter discusses the Four Corners region as a whole, providing information on the forest products industry and timber harvest in 2012, with some historical context. It presents ownership and species composition of harvested timber, types of timber products harvested and processed, and movement of timber within the Four Corners and between the region and other States. Timber-processing and production capacities, utilization of mill residues, and forest products sales and employment are also discussed at the regional level.

Timber Harvest

Harvest volumes presented in this report for calendar year 2012 came from the FIDACS census of Four Corners and out-of-State mills receiving timber harvested from the region. Periodic State-level reports (Wilson and Spencer 1967; Setzer and Wilson 1970; Setzer 1971a,b; Green and Setzer 1974; Setzer and Barrett 1977; Setzer and Shupe 1977; Setzer and Throssell 1977a,b; McLain 1985, 1988, 1989; Keegan et al. 1995, 2001a,b; Morgan et al. 2006; Hayes et al. 2012) provided the bulk of historical timber harvest information. Small differences may exist between the numbers reported here and those in harvest and “cut and sold” reports by the Department of the Interior, Bureau of Land Management and the Forest Service. These differences are due to varying reporting units and conversion factors, rounding error, scaling discrepancies between sellers and buyers, and other reporting variations.

During calendar year 2012, more than 201.7 million board feet (MMBF) of timber was harvested from Arizona, Colorado, New Mexico, and Utah. This harvest volume represents just 0.1 percent of the approximately 153.9 billion board feet of sawtimber inventory on nonreserved timberlands in the four States (USDA Forest Service 2014). Of the timber harvested in the Four Corners States in 2012, 49 percent was live and 51 percent was salvage or standing dead when harvested. Timber harvested from Four Corners timberland and manufactured into wood products came from three broad ownership classes: tribal lands, non-industrial private forest (NIPF) land, and public lands. Most (76.3 percent) of the harvested volume came from public lands; the rest (23.7 percent) came from NIPF and tribal timberlands (table 4C-1). Ponderosa pine was the leading species harvested for timber in the Four Corners States during 2012, accounting for 43 percent of the total (table 4C-2). Lodgepole pine accounted for 25.8 percent, followed by Douglas-fir and aspen at 11.7 and 9.3 percent, respectively. Although sawlogs were the leading component of the Four Corners timber harvest in 2012 (table 4C-3), the 2012 sawlog harvest marked a decrease compared to 2007, in terms of thousand board feet (MBF) Scribner and percentage of the total. Trees harvested for fiber logs and industrial fuelwood were 23 percent of the total, a threefold increase from 2007, and house logs fell from 5.9 percent of the 2007 harvest to 3.9 percent of the harvest in 2012.

Table 4C-1—Four Corners timber harvest by ownership class, 2002, 2007 and 2012 (Morgan et al. 2006; Hayes et al. 2012).

Ownership class	2002		2007		2012	
	MBF Scribner	Percentage of harvest	MBF Scribner	Percentage of harvest	MBF Scribner	Percentage of harvest
Private and tribal timberland	234,456	72.5	117,708	55.9	47,739	23.7
Tribal	134,840	41.7	23,714	11.3	8,796	4.4
Private	99,616	30.8	93,994	44.7	38,942	19.3
Public timberland	89,105	27.5	92,700	44.1	153,943	76.3
National Forest	84,536	26.1	86,036	40.9	147,918	73.3
Other public	4,569	1.4	6,664	3.2	6,025	3.0
All owners	323,561	100	210,408	100	201,682	100

Table 4C-2—Four Corners timber harvest by species, 2002, 2007 and 2012 (Morgan et al. 2006; Hayes et al. 2012).

Species	2002		2007		2012	
	MBF Scribner	Percentage of harvest	MBF Scribner	Percentage of harvest	MBF Scribner	Percentage of harvest
Ponderosa pine	186,955	57.8	73,041	34.7	86,696	43.0
Lodgepole pine	21,822	6.7	50,648	24.1	52,115	25.8
Douglas-fir	30,165	9.3	19,065	9.1	23,673	11.7
Aspen	20,399	6.3	28,088	13.3	18,748	9.3
Spruces	46,850	14.5	27,057	12.9	11,490	5.7
Firs	16,882	5.2	12,351	5.9	6,005	3.0
Other species ^a	489	0.2	158	0.1	2,954	1.5
All species	323,562	100	210,408	100	201,682	100

^a Other species include juniper, other softwoods, and hardwoods other than aspen.

Table 4C-3—Four Corners timber harvest by product, 2002, 2007 and 2012 (Morgan et al. 2006; Hayes et al. 2012).

Product	2002		2007		2012	
	MBF Scribner	Percentage of harvest	MBF Scribner	Percentage of harvest	MBF Scribner	Percentage of harvest
Sawlogs	279,317	86.3	174,629	83.0	141,160	70.0
Fiber logs and industrial fuelwood	14,763	4.6	15,144	7.2	46,450	23.0
House logs	20,695	6.4	12,495	5.9	7,906	3.9
Posts and poles	4,104	1.3	5,497	2.6	3,801	1.9
Vigas	3,655	1.1	2,368	1.1	1,649	0.8
Other products ^a	1,029	0.3	275	0.1	717	0.4
All products	323,562	100	210,408	100	201,682	100

^a Other products include furniture logs, pilings, and utility poles.

Timber Flow and Mill Receipts

During 2012, the Four Corners region had a net outflow of timber, with 4.2 percent (8,912 MBF) of the regional harvest flowing to States outside of the Four Corners region for processing (table 4C-4). About 82 percent (7,300 MBF) of this volume was sawlogs. By ownership, timber from national forests flowed to States outside of the region in the largest volumes (6,289 MBF), and timber from State lands accounted for 1,500 MBF. This flow of timber out of the region created a difference in the volume of timber harvested from the Four Corners and the volume received by the region’s mills. Almost all (99.7 percent) of the timber used by primary forest products firms in the Four Corners came from within the four-State region. A small amount of additional volume (0.4 MMBF Scribner) came from Montana, Wyoming, Idaho, Oregon, Mississippi, and Canada.

The 2012 harvest was more than 201.7 MMBF, and total receipts by Four Corners mills were slightly more than 193 MMBF, or 96 percent of the harvest. Sawlogs accounted for the majority (70 percent) of timber received by Four Corners mills (table 4C-5), followed by fuelwood/bioenergy logs (16 percent). The National Forest System (NFS) lands (national forests) supplied the largest share (71 percent) of timber received by mills in the four States, followed by NIPF owners (21 percent) and then tribal landowners (5 percent). Timber-processing capacity (the volume of timber that could be used by existing timber processors if demand for products were firm and sufficient raw material were available) in the Four Corners during 2012 was about 451 MMBF, Scribner. Thus, about 43 percent of timber-processing capacity in the region was utilized during 2012. Although overall timber processing capacity increased 30 percent between 2007 and 2012, most of the increase was capacity to process timber products other than sawlogs and houselogs, such as logs going to biomass energy facilities and fuel pellet manufacturers. The low level of capacity utilization in the region, particularly among sawmills, indicates an ability to increase production as timber availability and markets improve. It also suggests that some mills are running at or below their financial operating limits and may close in the future.

Table 4C-4—Four Corners timber product inflow and outflow^a, 2012.

Timber product	Inflow	Outflow	Net inflow (net outflow)
-----Thousand board feet, Scribner-----			
Sawlogs	35	7,300	(7,265)
House logs	62	705	(643)
Other products ^b	352	907	(556)
All products	449	8,912	(8,464)

^a Inflows are from other States and Canada. Outflows are to other States only.

^b Other products include post and poles, fiber logs, firewood, furniture logs, vigas and industrial fuel wood.

Table 4C-5—Timber received by the Four Corners primary forest products industry by ownership class and product, 2012.

Ownership class	Sawlogs	Fuelwood/ bioenergy	House logs	Post/pole	Other products ^b	All products
<i>-----Thousand board feet, Scribner-----</i>						
Private and tribal timberland	35,668	1,407	2,557	1,336	5,737	46,705
Private	28,762	786	2,512	1,336	4,513	37,908
Tribal	6,905	621	45		1,225	8,796
Public timberland	98,227	28,155	4,706	1,558	13,868	146,514
National Forest	95,459	27,893	4,644	1,410	12,304	141,710
Other owners ^a	2,769	262	62	148	1,564	4,803
All owners	133,895	29,561	7,263	2,894	19,605	193,218
<i>-----Percentage of product by ownership-----</i>						
Private and tribal timberland	26.6	4.8	35.2	46.2	29.3	24.2
Private	21.5	2.7	34.6	46.2	23.0	19.6
Tribal	5.2	2.1	0.6	-	6.2	4.6
Public timberland	73.4	95.2	64.8	53.8	70.7	75.8
National Forest	71.3	94.4	63.9	48.7	62.8	73.3
Other owners ^a	2.1	0.9	0.8	5.1	8.0	2.5
All owners	69.3	15.3	3.8	1.5	10.1	100

^a Other owners include other public ownerships and Canadian imports.

^b Other products include fiber logs, pulp logs, for log furniture, vigas, latillas, and fiber logs.

Forest Products Industry Composition and Operations

The FIDACS census identified 129 primary timber-processing facilities active during 2012 in the Four Corners region. These facilities were 70 sawmills, 22 log home or house log manufacturers, 7 post and pole facilities, 6 log furniture producers, 6 viga and latilla producers, and 18 other facilities.

Primary timber processors in the Four Corners produced an array of products including: dimension lumber, board and shop lumber, timbers, pallet stock, dunnage, excelsior, posts, poles, vigas, latillas, finished house logs, log homes, and log furniture, as well as wood pellets, biomass-generated electricity, firewood, bark, mulch, and pulp chips from mill residues. During 2012, production of lumber and other sawn products exceeded 185 MMBF lumber tally. Contributions from Colorado were 98 MMBF, from Arizona 50 MMBF, from New Mexico 25 MMBF, and from Utah 12 MMBF. Production of house logs, vigas, and latillas totaled 2.8 million lineal feet (MMLF). Facilities in the Four Corners States also produced more than 1.8 million pieces for log furniture, and thousands of posts and poles.

Mill Residue: Quantity, Types, and Use

A substantial portion of the timber processed by primary forest product plants ends up as mill residue. Three types of wood residues are typically generated by the primary wood products industry: coarse or chippable residue consisting of slabs, edging, trim, and log ends; fine residue consisting primarily of planer shavings and sawdust; and bark. The 2012 census collected information on volumes and uses of mill residue. Actual residue volumes, reported in bone-dry units (BDU), were obtained from facilities that sold all or most of their residue. All mills reported how their residue was used on a percentage basis. One BDU is the equivalent of 2,400 pounds of oven-dry wood.

Four Corners timber processors produced 232,366 BDU of residue during 2012, of which just 5,783 BDU (2.5 percent) went unused (table 4C-6). Coarse residue was the region's largest residue component (54 percent of all residue), with just over 1 percent going unused. About 26 percent of coarse residue was used by the pulp and board sector, 38 percent went to the energy sector, and an additional 35 percent went to other uses. Fine residue made up the second largest component (27 percent) in 2012, with sawdust composing 20 percent and shavings 7 percent. All but 964 BDU (1.5 percent) of fine residue was used, primarily as mulch or animal bedding and for biomass energy. Four Corners facilities generated 45,172 BDU of bark while processing timber in 2012, of which 92 percent was utilized. About 54 percent of bark was used as mulch, and 31 percent went to energy. During 2012, sawmills generated 191,795 BDU—83 percent of all mill residue in the region. Residue volume factors, which express mill residue generated per unit of lumber produced, were derived from production and residue output volumes provided by mills (table 4C-7).

Table 4C-6—Production and disposition of Four Corners mill residues, 2012.

Residue type	Total utilized	Pulp and board	Energy	Mulch/ bedding	Unspecified use	Unused	Total produced
<i>-----Bone-dry units^a-----</i>							
Coarse	123,233	32,217	47,064	-	43,952	1,341	124,573
Fine	61,656	-	25,806	33,823	2,027	964	62,620
Sawdust	47,027	-	20,384	25,083	1,561	457	47,485
Planer shavings	14,628	-	5,422	8,740	466	507	15,135
Bark	41,694	-	14,106	24,146	3,441	3,478	45,172
All residues	226,582	32,217	86,977	57,969	49,420	5,783	232,366
<i>-----Percentage of residue type by use-----</i>							
Coarse	98.9	25.9	37.8	0.0	35.3	1.1	53.6
Fine	98.5	0.0	41.2	54.0	3.2	1.5	26.9
Sawdust	99.0	0.0	42.9	52.8	3.3	1.0	20.4
Planer shavings	96.7	0.0	35.8	57.7	3.1	3.3	6.5
Bark	92.3	0.0	31.2	53.5	7.6	7.7	19.4
All residues	97.5	13.9	37.4	24.9	21.3	2.5	100

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

Table 4C-7—Four Corners sawmill residue factors, 2002, 2007, and 2012
(Morgan et al. 2006; Hayes et al. 2012).

Residue type	2002 BDU per MBF	2007 BDU per MBF	2012 BDU per MBF
Coarse	0.56	0.56	0.63
Sawdust	0.19	0.19	0.19
Planer shavings	0.16	0.10	0.06
Bark	0.28	0.17	0.19
Total	1.19	1.02	1.07

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

Primary Forest Products Sales and Industry Employment

Mills responding to the FIDACS survey summarized their calendar year 2012 shipments of finished wood products, providing information on volume, sales value, and geographic destination. Mills usually distributed their products either through their own distribution channels or through independent wholesalers and selling agents. Because of subsequent transactions, the geographic destination reported here may not reflect the final delivery points of shipments.

The Four Corners primary wood product sales value (f.o.b. the producing mill), including mill residue, totaled \$233 million during 2012 (table 4C-8). Nearly \$153 million (65 percent) of these sales were within the Four Corners States, and 31 percent (\$73 million) of all sales were lumber, timbers, and other sawn products, down from 44 percent of sales in 2007. Other products—which include shavings, electricity, fuel pellets, erosion control products, firewood, mulch, clean chips, animal bedding, utility poles, and mill residues—accounted for \$122 million or 52 percent of total sales, compared to 26 percent of sales from this product category in 2007 (Hayes et al. 2012). Colorado led the region with almost \$91 million in sales, of which about \$32 million came from the other products sector (table C15). At \$86 million, Arizona sales were a larger share of the Four Corners region total than in prior industry census years. New Mexico and Utah had sales of \$40 million and \$16 million, respectively, during 2012 (tables A18, N17, and U17).

Table 4C-8—Destination and sales value of Four Corners primary wood products and mill residues, 2012.

Product	Within 4-Corner States	Other Rocky Mtn States ^a	Far West ^b	Northeast ^c	South ^d	North Central ^e	Mexico, Canada, or other ^f	Total
<i>-----Thousand 2012 dollars-----</i>								
Lumber, timbers, and other sawn products	32,724	6,571	1,310	2,525	4,423	13,028	12,007	72,589
House logs and log homes	16,453	1,147	310	1,210	1,473	1,576		22,168
Posts, poles, vigas, latillas, and log furniture	11,074	1,343	1,147	945	885	1,381		16,775
Other products ^g	92,591	3,518	5,399	2,501	7,248	6,761	3,912	121,931
Total	152,842	12,579	8,166	7,181	14,029	22,745	15,920	233,463
<i>-----Percentage of regional sales by product-----</i>								
Lumber, mine timbers, and other sawn products	21.4	52.2	16.0	35.2	31.5	57.3	75.4	31.1
House logs and log homes	10.8	9.1	3.8	16.8	10.5	6.9	-	9.5
Posts, poles, vigas, latillas, and log furniture	7.2	10.7	14.0	13.2	6.3	6.1	-	7.2
Other products ^g	60.6	28.0	66.1	34.8	51.7	29.7	24.6	52.2
Total	65.5	5.4	3.5	3.1	6.0	9.7	6.8	100

^a Other Rocky Mountains includes Idaho, Montana, Nevada.

^b Far West includes Alaska, California, Hawaii, Oregon, and Washington.

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

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

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

^f Other areas consist of products being shipped outside the United States.

^g Other products include shavings, electricity, fuel pellets, erosion control products, firewood, mulch, clean chips, animal bedding, utility poles, and mill residues.

Data reported in the FIDACS mill census were used in conjunction with employment data from the Bureau of Economic Analysis to identify employment in the Four Corners States' primary and secondary forest products industry. The classification of the forest products industry used here follows the North American Industry Classification System (NAICS) available from the U.S. Department of Commerce. In this report, employment in the forest products industry corresponds to the following categories: NAICS 113—forestry and logging; NAICS 1153—forestry support activities; NAICS 321—wood product manufacturing; and NAICS 322—paper manufacturing. These categories include employees who work in both the primary and secondary forest products sector.

Based on the four NAICS sectors (113, 1153, 321, and 322), about 21,300 workers were directly employed in the primary and secondary forest products industry in the Four Corners States during 2012 (U.S. Department of Commerce, BEA 2014). Although employment in the industry increased slightly from 29,900 in 2002 to 32,300 in 2007, the 2012 employment in the forest industry declined 34 percent from 2007. This is indicative of the pervasive impact of the Great Recession, U.S. housing collapse, and slow recovery (Keegan et al. 2012).

About 4,000 workers were employed in harvesting and processing timber or in private sector land management in the Four Corners region during 2012. The remaining component of the industry can be classified as secondary and employed about 17,300 workers. Based on the periodic industry censuses conducted, employment in timber processing mills decreased from 2,200 in 2002, to 1,700 in 2007, and 1,350 in 2012. The secondary wood and paper industry relies on the output of the primary industry from the Four Corners States and other regions for raw materials; this is in contrast to the primary industry, which sources the vast majority of raw material from within the four-State region. Therefore, the primary industry is more closely linked to the timber resource and land management policy in the region.

Arizona

This chapter reviews Arizona's 2012 timber harvest and forest products industry activities and changes that occurred since the 2007 industry census conducted by Hayes et al. (2012). Details of timber harvest, flow, and use are followed by descriptions of the primary processing sectors, capacity and utilization statistics, and mill residue characteristics. The chapter concludes with information on primary wood products industry sales by Arizona mills.

Timber Harvest, Flow, and Use

In 2012, Arizona had about 3.0 million acres of nonreserved timberland (USDA FIDO 2014), with national forests accounting for 74 percent, private and tribal owners accounting for 25 percent, and other public agencies accounting for the remaining 1 percent (table A1). All private timberland was classified as NIPF timberland. With the exception of several Native American tribes, Arizona had no large tracts of timberland owned by entities operating primary wood

Table A1—Arizona nonreserved timberland by ownership class (U.S. Department of Agriculture, FIDO 2014).

Ownership class	Thousand acres	Percentage of nonreserved timberland
National Forest	2,227	74
Private and tribal	756	25
Other public	39	1
Total	3,022	100

processing facilities. Sawtimber volume on nonreserved timberlands was about 5.1 billion cubic feet (USDA FIDO 2014) or 30.5 billion board feet Scribner in 2013.

Timber Harvest

Arizona's 2012 timber harvest was 71.4 MMBF Scribner (table A2), up 33 percent from the 2007 harvest (Hayes et al. 2012), but still just 56 percent of the 2002 harvest (Morgan et al. 2006). Since 2007, a major trend has been increased harvest of timber products other than sawlogs. Although overall harvest was up by one-third, the sawlog harvest was down by 8 percent and amounted to 66 percent of the total in 2012, compared to 95 percent of the total in 2007 (Hayes et al. 2012). In terms of ownership, timber harvest on private and tribal lands as a percentage of the total harvest declined sharply from 2007 to 2012, while the share of the harvest on National Forest System lands more than doubled (table A3). This period saw increased forest management through stewardship contracts and coincided with implementation of the 10-year White Mountain Stewardship Project, which began in August 2004 (Sitko and Hurteau 2010). The decrease in private and tribal harvest was influenced by the fact that Arizona's major users of private and tribal timber during 2007 were inactive during 2012. Salvage harvest of dead timber was prevalent, with 56 percent of the harvest coming from dead trees in 2012, versus just 8 percent in 2007. This large increase in salvage harvest in 2012 was most likely due to salvage operations from the Wallow Fire, which burned more than 535,000 acres in 2011 (USDA Forest Service 2011).

Table A2—Arizona timber products harvested by ownership class, 2012.

Ownership class	Sawlogs	House logs	Other products ^a	All products
-----Thousand board feet, Scribner-----				
National Forest	44,802	1,420	22,447	68,669
Tribal timberland	1,662	5	558	2,225
Private timberland	270	60	63	393
State	130			130
All owners	46,864	1,485	23,069	71,418
-----Percentage of harvested product by ownership-----				
National Forest	95.6	95.6	97.3	96.2
Tribal timberland	3.5	0.3	2.4	3.1
Private timberland	0.6	4.0	0.3	0.6
State	0.3	-	-	0.2
All owners	65.6	2.1	32.3	100

^a Other products include industrial fuelwood, fiber logs, energywood logs, posts and poles, and viga logs.

Table A3—Proportion of Arizona timber harvest by ownership class, selected years (Setzer 1971a; Setzer and Throssell 1977; McLain 1988; Keegan et al. 2001a; Morgan et al. 2006; Hayes et al. 2012).

Ownership class	1966	1974	1984	1998	2002	2007	2012
	-----Percentage of harvest-----						
Private and tribal timberland	25.0	41.0	33.5	63.0	84.4	59.0	3.8
Private	1.0	-	33.5	3.0	1.6	51.0	0.6
Tribal	24.0	41.0	-	60.0	82.8	8.0	3.2
Public timberland	75.0	59.0	66.5	37.0	15.6	41.0	96.2
National Forest	75.0	59.0	66.2	37.0	15.6	40.0	96.1
Other public	-	-	0.3	-	-	1.0	0.2
All owners	100	100	100	100	100	100	100

Historically, 80 percent or more of the State's annual timber harvest has come from three counties: Apache, Coconino, and Navajo. Apache County had the highest timber harvest in the State in 2007 (Hayes et al. 2012), but Coconino County led Arizona's 2012 timber harvest with 45 percent of total volume. Apache County followed with 34 percent in 2012 (table A4), followed by Navajo County with 13 percent.

Ponderosa pine continued to be the leading species harvested among all product types in Arizona in 2012 (table A5), accounting for 84 percent of total harvest, down from 86 percent in 2007 (table A5). Douglas-fir, white and subalpine firs, and Engelmann spruce were harvested in relatively small quantities (table A6). The 2012 harvest of 23.1 MMBF marked a tenfold increase in harvest of timber products other than sawlogs and house logs from 2007 levels (table A7; Hayes et al. 2012). These other products included industrial fuelwood, fiber logs, posts, poles, and viga logs.

Timber Flow

The majority (97 percent) of Arizona's 2012 timber harvest was processed in-State. However, Arizona had a net outflow of timber. Just over 1.8 MMBF of

Table A4—Arizona timber harvest by county, selected years (McLain 1988; Keegan et al. 2001a; Morgan et al. 2006; Hayes et al. 2012).

County	1984	1998	2002	2007	2012	1984	1998	2002	2007	2012
	-----MBF Scribner-----					-----Percentage-----				
Apache	171,128	15,641	6,350	31,610	23,916	44.7	20.5	5.0	58.8	33.5
Coconino	150,727	15,314	14,889	14,353	32,118	39.4	20.1	11.6	26.7	45.0
Gila	931	5,405	39,960	1,960	2,729	0.2	7.1	31.2	3.6	3.8
Graham	-	-	1,100	1,100	-	-	-	0.9	2.0	-
Greenlee	4,623	1,515	-	-	-	1.2	2.0	-	-	-
Maricopa	-	-	-	-	-	-	-	-	a	a
Navajo	52,745	38,384	64,027	3,094	8,938	13.8	50.3	49.9	5.8	12.5
Pima	-	33	-	-	12	-	a	-	-	0.0
Santa Cruz	-	-	-	48	120	-	-	-	0.1	0.2
Yavapai	2,220	20	1,895	1,612	3,585	0.6	a	1.5	3.0	5.0
Total ^b	382,674	76,312	128,220	53,777	71,418	100	100	100	100	100

^a Less than 0.05 percent.

^b Percentage detail may not sum to 100% due to rounding.

Table A5—Proportion of Arizona timber harvest by species, selected years (McLain 1988; Keegan et al. 2001a; Morgan et al. 2006; Hayes et al. 2012).

Species	1984	1998	2002	2007	2012
-----Percentage of harvest-----					
Ponderosa pine	90.6	87.5	94.8	86.4	83.6
Douglas-fir	4.5	6.9	2.4	3.6	8.1
Other species ^a	0.2	1.2	<0.05	1.4	4.3
White fir	2.4	1.3	1.5	3.1	2.6
Engelmann spruce	2.3	3.1	1.2	5.5	1.4
All species ^b	100	100	100	100	100

^a Other species include juniper, other softwoods, and hardwoods.

^b May not sum due to rounding.

Table A6—Arizona timber harvest by species, selected years (McLain 1988; Keegan et al. 2001a; Morgan et al. 2006; Hayes et al. 2012).

Species	1984	1998	2002	2007	2012
-----MBF Scribner-----					
Ponderosa pine	346,851	66,804	121,614	46,483	59,714
Douglas-fir	17,217	5,264	3,129	1,915	5,754
Other species ^a	722	943	26	769	3,053
White fir	9,214	961	1,900	1,662	1,886
Engelmann spruce	8,667	2,340	1,551	2,948	1,010
All species ^b	382,674	76,312	128,220	53,777	71,418

^a Other species include juniper, other softwoods, and hardwoods.

^b May not sum due to rounding.

Table A7—Arizona timber harvest by species and product, 2012.

Species	Sawlogs	House logs	Other products ^a	All products
-----Thousand board feet, Scribner-----				
Ponderosa pine	39,432	1,460	18,822	59,714
Douglas-fir	3,492		2,262	5,754
Other species ^b	1,628		1,426	3,053
True firs ^c	1,886			1,886
Engelmann spruce	426	25	559	1,010
All species	46,864	1,485	23,069	71,418
-----Percentage of product by species-----				
Ponderosa pine	84.1	98.3	81.6	83.6
Douglas-fir	7.5	-	9.8	8.1
Other species ^b	3.5	-	6.2	4.3
True firs ^c	4.0	-	-	2.6
Engelmann spruce	0.9	1.7	2.4	1.4
All species	65.6	2.1	32.3	100

^a Other products include industrial fuelwood, fiber logs, energywood logs, posts and poles, and viga logs.

^b Other species include juniper, other softwoods, and hardwoods.

^c True firs include white and subalpine fir.

Table A8—Timber product flow into and out of Arizona, 2012.

Timber product	Log flow into Arizona	Log flow out of Arizona	Net inflow (net outflow)
-----Thousand board feet, Scribner-----			
Sawlogs	9	1,800	(1,792)
House logs and viga logs	10	25	(15)
All products	19	1,825	(1,807)

Table A9—Ownership of timber products received by Arizona forest products industry, 1998, 2002, 2007 and 2012 (Keegan et al. 2001a; Morgan et al. 2006; Hayes et al. 2012).

Ownership class	1998		2002		2007		2012	
	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total
Private and tribal timberland	48,102	71.1	58,108	76.3	31,706	60.8	2,623	3.8
Tribal	45,964	68.0	56,150	73.8	4,400	8.4	2,220	3.2
Private	2,138	3.2	1,958	2.6	27,306	52.4	403	0.6
National Forests	19,510	28.9	18,006	23.7	20,427	39.2	66,858	96.0
State lands	-	-	-	-	-	-	130	0.2
All owners	67,612	100	76,114	100	52,133	100	69,611	100

Table A10—Timber received by Arizona forest products industry by ownership class and product, 2012.

Ownership class	Sawlogs	House logs	Other products ^a	All products
-----Thousand board feet, Scribner-----				
Private and tribal timberland	1,932	60	631	2,623
Private	270	60	73	403
Tribal	1,662	558	2,220	
Public timberland	43,141	1,400	22,447	66,988
National Forest	43,011	1,400	22,447	66,858
State lands	130	130		
All owners	45,073	1,460	23,079	69,611
-----Percentage of product by owner-----				
Private and tribal timberland	4.3	4.1	2.7	3.8
Private	0.6	4.1	0.3	0.6
Tribal	3.7	-	2.4	3.2
Public timberland	95.7	95.9	97.3	96.2
National Forest	95.4	95.9	97.3	96.0
State lands	0.3	-	-	0.2
All owners	64.7	2.1	33.2	100

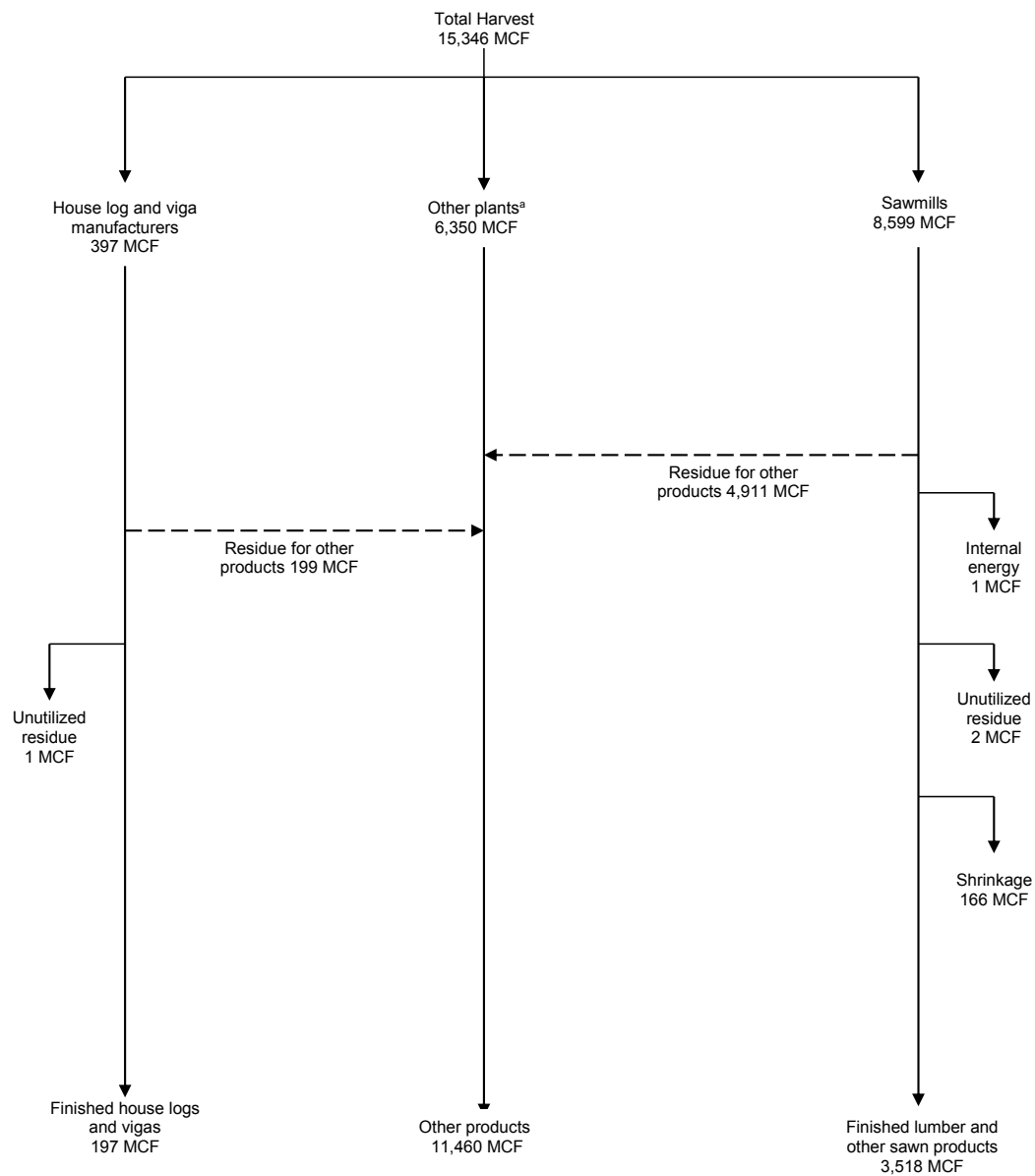
^a Other products include industrial fuelwood, fiber logs, energywood logs, posts and poles, and viga logs.

Arizona timber was processed in Colorado, while a very small amount of timber flowed from New Mexico and Oregon for processing in Arizona (table A8).

Timber processors in Arizona received 69,611 MBF of timber in 2012. In prior census years, timber delivered to Arizona mills came from a variety of ownerships; in contrast, the vast majority (96 percent) of timber was from national forest land in 2012 (table A9). Timber receipts from tribal lands were just 3.2 percent of the total in 2012, and less than 1 percent of receipts came from private and State lands (A10).

Timber Use

Arizona's 2012 timber harvest—15,346 thousand cubic feet (MCF), exclusive of bark (fig. A1)—was used by several manufacturing sectors both within and outside Arizona. Of this volume, 8,599 MCF was delivered as logs to sawmills, 397 MCF went to house log and viga manufacturers, and 6,350 MCF went to other plants, including firewood, wood pellet, and post and pole manufacturers, as well as to residue-utilizing facilities including bioenergy plants and mulch



^a Other plants include firewood, wood pellet, post and pole manufacturers, as well as residue-utilizing facilities including bioenergy facilities and mulch and animal bedding producers.

Figure A1—Arizona timber harvest and flow, 2012.

and animal bedding producers. Volumes are presented in cubic feet rather than board feet Scribner because both mill residue and timber products are displayed.

The following conversion factors were used to convert Scribner board foot volume to cubic feet:

- 5.93 board feet per cubic foot for house logs and viga
- 5.95 board feet per cubic foot for sawlogs
- 1.8 board feet per cubic foot for all other products

Of the 8,599 MCF of timber received by sawmills, 3,518 MCF (41 percent) was processed into finished lumber or other sawn products, and about 166 MCF was lost to shrinkage. The remaining 4,914 MCF (57 percent) yielded mill residue. About

4,911 MCF of sawmill residue was utilized by other sectors within Arizona and in other States. With major outlets for mill residue use in the State, including a biomass energy facility and a fuel pellet manufacturer, only 2 MCF of sawmill residue remained unused. House log and viga manufacturers received 387 MCF of timber, of which 197 MCF (50 percent) became finished house logs and vigas. The remaining 200 MCF became mill residue. About 199 MCF of house log residue was used by other sectors, and about 1 MCF remained unused. Of the 6,350 MCF of timber received by other manufacturers, all was either utilized for solid wood products such as posts, vigas, latillas, or firewood, or used in residue-related products like mulch, livestock bedding, and fuel pellets, or for biomass energy production.

Forest Industry Sectors

Arizona's primary forest products industry in 2012 consisted of 25 active manufacturers in 8 counties (table A11). Facilities tended to be located near the forest resource along the northern side of the Mogollon Plateau, with concentrations in southern Apache and Navajo Counties (fig. A2). The sawmill sector, which manufactures lumber and other sawn products, was the largest sector operating in 2012 with 14 facilities—6 more than the number operating in 2007. Two Arizona facilities primarily produced house logs and log homes, three fewer than reported in 2007. Three firewood producers, one viga and latilla manufacturer, one post and pole plant, two bark and mulch producers, a biomass energy facility, and a fuel pellet manufacturer were also actively purchasing or utilizing timber in 2012. These nine firms were indicative of the trend of increased diversity of timber-processors in Arizona since the end of the 1980s.

Primary wood products sales increased, as did the variety of producers, since 2007, with finished product sales in 2012 more than twice the sales value reported in 2007 (table A12). Although sales value from Arizona sawmills increased 45 percent from 2007, the largest source of the sales increase was from other mills,

Table A11—Active Arizona primary wood products facilities by county and product, 2012
(McLain 1988; Keegan et al. 2001a; Morgan et al. 2006; Hayes et al. 2012).

County	Lumber	House logs and vigas	Other products ^a	Pulp and paper	Total
Apache	5	1	1		7
Coconino	2	1	1		4
Gila	1				1
Maricopa	2		2		4
Navajo	1		3		4
Pima	1				1
Pinal			1		1
Santa Cruz	1				1
Yavapai	1		1		2
2012 Total	14	2	9	0	25
2007 Total	8	5	4	0	17
2002 Total	11	5	7	0	23
1998 Total	6	4	2	1	13
1990 Total	14	3	1	1	19
1984 Total	20	0	2	1	23

^a Other products include industrial fuelwood, fuel pellets, biomass energy, posts and poles.

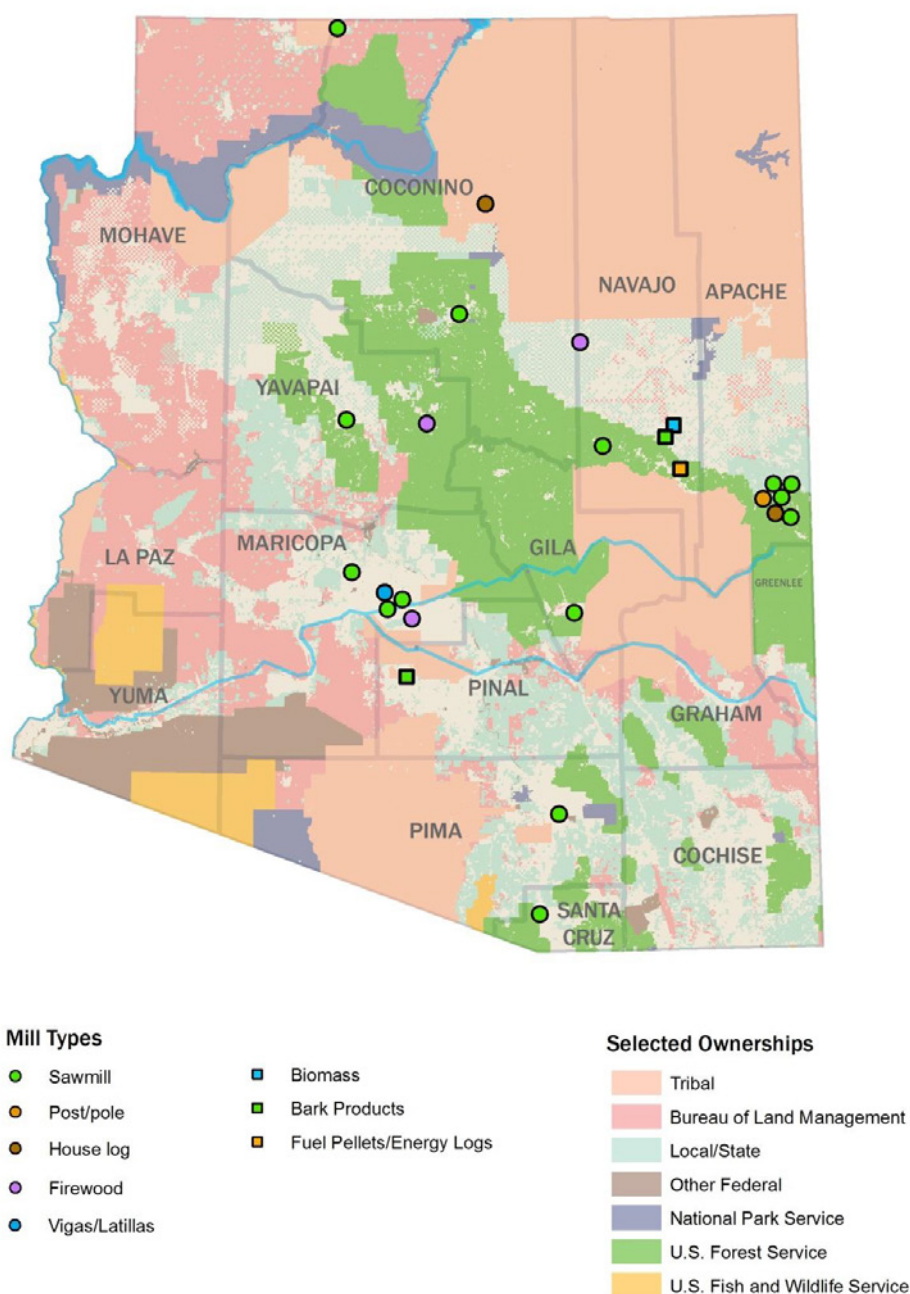


Figure A2—Map of Arizona primary timber processors.

which nearly tripled from 2007 to 2012. In 2012, sales from the house log and other products manufacturers exceeded \$51 million, and accounted for 61 percent of finished products sales. Much of this increase was due to increased sales of residue-related products including biomass energy, fuel pellets, and bark products.

Sawmill Sector

The number of active Arizona sawmills increased from 8 to 14 between 2007 and 2012, although total lumber production decreased slightly from about 55 MMBF in 2007 to 49 MMBF in 2012 (table A13). A number of the State's largest sawmills closed between 1998 and 2007, and this trend continued through 2012 as a larger proportion of the State's lumber production shifted to small

Table A12—Finished product sales of Arizona’s primary wood products sectors, selected years (WWPA various years; Keegan et al. 2001a; Morgan et al. 2006; Hayes et al. 2012).

Sector	1984	1990	1998	2002	2007	2012
<i>-----Thousands of 2012 dollars-----</i>						
Sawmills	193,169	158,069	33,452	30,217	22,335	32,403
Log home and other sectors ^a	271	622	2,613	7,853	17,551	51,397
Total ^b	193,440	158,692	36,064	38,070	39,886	83,800

^a Other sectors include producers of industrial fuelwood, fuel pellets, biomass energy, posts and poles, and viga logs.

^b All sales are reported F.O.B. the manufacturer’s plant. Sales of mill residues, mulch, and paper not included for comparison to previous years.

Table A13—Arizona sawmills by production size class, selected years (Setzer and Wilson 1970; WWPA 1992, 1993; Keegan et al. 2001a; Morgan et al. 2006; Hayes et al. 2012).

Year	Under 10 MMBF ^a	Over 10 MMBF ^a	Total
<i>-----Number of sawmills-----</i>			
2012	14	^c	14
2007	8	^c	8
2002	9	2	11
1998	2	4	6
1990	5	9	14
1966	13	10	23
<i>---Percentage of lumber output---</i>			<i>Volume (MBF^b)</i>
2012	100	^c	49,336
2007	100	^c	54,860
2002	25	75	82,658
1998	1	99	80,970
1990	4	96	388,000
1966	11	89	437,000

^a Size class is based on reported lumber production. MMBF denotes million board feet lumber tally.

^b MBF = thousand board feet lumber tally.

^c All mills were included in <10 MMBF to avoid disclosing individual operations.

Note: 2 other mills (house log plants), also had lumber production (840 mbf total)—that production is currently excluded from the 2012 data above.

mills producing less than 10 MMBF annually. Consequently, average annual lumber production per mill continued to decline from 13.5 MMBF in 1998 to 3.5 in 2012 (table A14). The State’s five largest sawmills in 2012 produced an average of 8.5 MMBF, accounting for 86 percent of the lumber production; the remaining nine sawmills had an average lumber production of less than 1 MMBF (table A15).

On average, Arizona sawmills produced approximately 1.20 board feet of lumber for every board foot Scribner of timber processed, for an average overrun of 20 percent in 2012. Overrun was 12 percent in 2007 (Hayes et al. 2012) and 27 percent in 2002 (Morgan et al. 2006). The changes in overrun over time coincide with shifts in the type of timber products processed and the resulting size, condition, and product mix that could be recovered from the harvested timber. In 2002, only 22 percent of the lumber produced by Arizona’s sawmills was dimension and studs; 69 percent of production was board and shop lumber, and

Table A14—Number of Arizona sawmills and average lumber production, selected years (McLain 1988; Setzer and Wilson 1970; Keegan et al. 2001a; Morgan et al. 2006; Hayes et al. 2012).

Year	Number of sawmills	Average lumber production
		<i>MMBF^a</i>
2012	14	3.5
2007	8	6.9
2002	11	7.5
1998	6	13.5
1990	14	27.7
1984	20	19.2
1966	23	19.0
1962	28	11.6
1960	38	8.7

^a MMBF = million board feet lumber tally.

Table A15—Arizona lumber production by mill size, 2012.

Size class ^a	Number of mills	Volume	Percentage of total	Average per mill
		<i>MBF^b</i>		<i>MBF^b</i>
Over 5 MMBF	5	42,318	86	8,464
Under 5 MMBF	9	7,018	14	780
Total	14	49,336	100	3,524

^a Size class is based on reported lumber production. MMBF denotes million board feet lumber tally.

^b MBF = thousand board feet lumber tally.

19 percent was timbers, cants, and pallet stock (Morgan et al. 2006). In 2007, 93 percent of production was timbers, cants, and pallet stock, which produce a lower overrun than smaller dimension lumber products. In 2012, timbers, cants, and pallet stock decreased to 76 percent of products, and dimension and stud lumber increased to 23 percent of production, leading to a slight increase in overrun in 2012 compared to 2007.

The sawmill sector accounted for more than 99 percent of Arizona wood products sales in the 1980s (Keegan et al. 2001a), but that proportion slipped to 79 percent in 2002 and 56 percent in 2007 (Hayes et al. 2012). In 2012, this trend continued and sales from sawmills accounted for just 21 percent (\$18.1 million) of primary wood products sales in the State. Of the lumber and sawn products sales, timbers, cants, and pallet stock accounted for \$12.6 million (69.7 percent), dimension lumber was \$5.1 million (28.2 percent), furniture parts sales were \$0.2 million (1.1 percent), and board and shop lumber accounted for just under \$0.2 million (1.0 percent) of sawn products sales in 2012.

Log Home and Other Products Sectors

The 2012 census of timber processors identified two facilities that process primarily house logs, compared to five facilities in 2007. To avoid disclosing confidential information for individual house log and log home facilities, house log and viga manufacturers are combined. In 2012, the three Arizona facilities categorized as house log or viga manufacturers processed 2.3 MMBF Scribner and generated \$4.4 million in product sales.

The other products sector in Arizona grew rapidly from 2007 to 2012. There were eight facilities in this category during 2012. Of those facilities, three were firewood manufacturers, processing 11.3 MMBF of timber and producing \$11.2 million in sales. The five other facilities active in Arizona during 2012 were a post and pole manufacturer, a pellet mill, two producers of decorative bark or mulch, and a biomass energy plant. These facilities processed both timber and mill residues and sold their finished products for a total of \$35.8 million in 2012.

Capacity and Utilization

Two aspects of capacity were examined for calendar year 2012 in Arizona and the other Four Corners States: production capacity and timber-processing capacity. Production capacity is defined as the amount of finished product that could be produced given sufficient supplies of raw materials and firm market demand for the products, considering normal maintenance and down time. Primary wood products producers specified annual and 8-hour shift production capacities in units of output (for example, MBF of lumber, MLF of house logs, number of vigas) for each firm. Product recovery ratios were calculated for each firm by using reported timber input and product output volumes. Timber-processing capacity was defined as the volume of timber reported in MBF Scribner that could be processed given sufficient supplies of raw materials and firm market demand for the products, and was estimated for each firm by applying the product recovery ratios to production capacity.

Arizona's annual sawmill production capacity was 108,665 MBF of lumber in 2012, a 40 percent increase from 2007. However, nearly 50 MMBF of that capacity existed at mills that were inactive during 2012 and did not manufacture lumber. Producing 49,336 MBF of lumber, sawmills utilized about 51 percent of their lumber production capacity, compared to 70 percent of lumber production capacity used in 2007. Across all industry sectors, total timber-processing capacity was 138,857 MBF Scribner in 2012. Accounting for changes in log inventories, a total of 80,775 MBF Scribner was processed by Arizona firms in 2012, with timber-processing capacity utilization of about 58 percent, down from 69 percent utilization across the industry in 2007.

Mill Residue Volumes, Types, and Uses

In 2012, Arizona mills produced 67,991 BDU, or 81,859 bone-dry tons of mill residue, with 99.9 percent utilized (table A16). Three types of wood fiber residue were produced by Arizona mills: coarse residue (chips) consisting of slabs, edging, trim, peelings, and log ends; fine residue consisting of planer shavings and sawdust; and bark. Coarse residue was the State's largest residue component at 41,171 BDU (60.6 percent) of all residues in 2012. About 19,000 BDU of the coarse material was used for energy, and just over 22,000 BDU went to other various uses (table A16). Fine residue was the second largest component at 13,274 BDU (19.5 percent) of mill residue. Most of the fine residue was used for mulch or animal bedding, with a smaller amount (13.5 percent) being used for energy. Bark accounted for 20 percent of all residue and was largely used for mulch or landscape applications (86 percent) or energy (14 percent) in 2012.

Table A16—Production and disposition of Arizona mill residues, 2012.

Residue type	Total utilized	Pulp and board	Energy	Mulch/ bedding	Unspecified use	Unused	Total produced
<i>-----Bone-dry units^a-----</i>							
Coarse	41,171	-	19,036	-	22,135		41,171
Fine	13,241	-	1,788	11,453	-	33	13,274
Sawdust	12,194	-	1,000	11,194	-	23	12,217
Planer shavings	1,047	-	788	259	-	10	1,057
Bark	13,541	-	1,925	11,600	16	5	13,546
Total	67,953	-	22,749	23,053	22,151	38	67,991
<i>-----Percentage of residue type-----</i>							
Coarse	100.0	-	46.2	-	53.8	-	60.6
Fine	99.8	-	13.5	86.3	-	0.2	19.5
Sawdust	99.8	-	8.2	91.6	-	0.2	18.0
Planer shavings	99.1	-	74.6	24.5	-	0.9	1.6
Bark	100.0	-	14.2	85.6	0.1	0.0	19.9
Total	99.9	-	33.5	33.9	32.6	0.1	100

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

Table A17—Arizona sawmill residue factors, 1998, 2002 and 2007 (Keegan et al. 2001a; Morgan et al. 2006; Hayes et al. 2012).

Residue type	1998	2002	2007	2012
<i>-----BDU/MBF lumber tally^a-----</i>				
Coarse	0.50	0.44	0.68	0.65
Sawdust	0.22	0.15	0.17	0.18
Planer shavings	0.19	0.14	0.12	0.00
Bark	0.21	0.23	0.25	0.24
Total	1.12	0.96	1.22	1.07

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

The amount of residue per MBF of lumber produced by sawmills declined somewhat in 2012, compared to previous mill census years (table A17). Most of the reduction was due to very little planing of lumber.

Primary Forest Products Sales and Industry Employment

Sales from Arizona's primary wood products industry in 2012 totaled \$85.9 million, including finished products and mill residues (table A18). The 2012 census marked a large upswing in sales of products other than lumber. Lumber, timbers, and other sawn products accounted for 21 percent (\$18.1 million) of total sales. House logs and log homes accounted for 4 percent (\$3.8 million), and other products and mill residues accounted for 75 percent (\$64.0 million). Foreign countries, primarily Mexico, were the leading destination for lumber and other sawn products, followed by in-State sales and sales to customers in the other Four Corners States (Colorado, New Mexico, and Utah). Arizona was the leading market area for both house logs and log homes, and the other products category.

Table A18—Destination and sales value of Arizona’s primary wood products and mill residues, 2012.

Product	Arizona	Other 4-Corner States	Other Rocky Mtn States ^a	Far West ^b	Northeast ^c	South ^d	North Central ^e	Other ^f	Total
-----Thousand 2012 dollars-----									
Lumber, timbers, and other sawn products	6,331	2,739	445	515		944		7,107	18,081
House logs and other products ^g	54,263	8,552	1,765	2,826	51		368	7	67,832
Total	60,594	11,291	2,210	3,341	51	944	368	7,114	85,913
-----Percentage of regional sales by product-----									
Lumber, timbers, and other sawn products	10.4	24.3	20.1	15.4	-	100.0	-	-	21.0
House logs and other products ^g	89.6	75.7	-	84.6	-	-	100.0	-	79.0
Total	70.5	13.1	2.6	3.9	0.1	1.1	0.4	8.3	100

^a Other Rocky Mountains includes Idaho, Montana, Nevada.

^b Far West includes Alaska, California, Hawaii, Oregon, and Washington.

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

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

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

^f Other areas consist of products being shipped outside the United States.

^g Other products include electricity, shavings, firewood, fuel pellets, mulch, posts, poles, vigas, latillas, and mill residues.

Based on the four NAICS sectors of the forest industry (113, 1153, 321, and 322), about 6,700 workers were directly employed in the primary and secondary forest products industry in Arizona during 2012 (U.S. Department of Commerce, BEA 2014). This marked a 42 percent decline from 2007 employment in the industry, with most of the loss coming from wood products manufacturing, which declined from over 8,400 jobs in 2007 to about 3,900 in 2012. Just fewer than 800 workers were employed in harvesting and processing timber or in private sector land management (i.e., the primary sector) in 2012, roughly the same level of primary sector employment as in 2007.

Colorado

This chapter focuses on Colorado’s timber harvest and forest products industry during 2012. Details of timber harvest, flow, and use are followed by descriptions of the primary processing sectors, capacity and utilization statistics, and mill residue characteristics. The chapter concludes with information on primary wood products industry sales by Colorado mills. Comparisons with previous years are provided where possible. Limited historical information is available about timber harvesting and mill production and residues in Colorado. The last comprehensive report on the State’s industrial roundwood production and mill residues was conducted in 2007 (Hayes et al. 2012), and data for previous years include 1962 (Spencer and Farrenkopf 1964), 1969 (Setzer 1971b), 1974 (Setzer and Shupe 1977), and 1982 (McLain 1985). Lynch and Mackes (2001) published a study on wood use in Colorado from 1997 to 2000, and

Morgan et al. (2006) reported on the Colorado forest products industry for calendar year 2002.

Timber Harvest, Flow, and Use

In 2012, Colorado had about 10.75 million acres of nonreserved timberland (USDA Forest Service 2014), with national forests accounting for 70 percent, private owners accounting for 21 percent, and other public agencies accounting for the remaining 9 percent (table C1). All private timberland was classified as NIPF timberland. Colorado had no large tracts of timberland owned by entities operating primary wood processing facilities. Sawtimber volume on timberland was estimated at 15.3 billion cubic feet or about 68.7 billion board feet Scribner in 2012 (USDA Forest Service 2014).

Timber Harvest

Colorado's 2012 commercial timber harvest was 82.1 MMBF Scribner (table C2), a 5 percent decrease from the 2007 harvest of 86.5 MMBF Scribner (Hayes et al. 2012). The 2012 harvest was 3 percent more than the 2002 harvest of 79.9 MMBF reported by Morgan et al. (2006), and 26 percent less than the 1982 harvest of 103.5 MMBF Scribner (McLain 1985). Only modest changes in Colorado's total annual timber harvest occurred despite increased salvage of dead timber, which accounted for 56 percent (46.3 MMBF) of the 2012 harvest volume, very similar to 2007 when 55 percent (47.8 MMBF; Hayes et al. 2012) was dead, but more than doubling the 26 percent (20 MMBF) harvest of dead timber in 2002 (Morgan et al. 2006).

Table C1—Colorado nonreserved timberland by ownership class (U.S. Department of Agriculture, FIDO 2014).

Ownership class	Thousand acres	Percentage of nonreserved timberland
National Forest	7,532	70
Private	2,249	21
Other public	965	9
Total	10,746	100

Table C2—Colorado timber harvest by ownership class, 1982, 2002, 2007 and 2012 (McLain 1985; Morgan et al. 2006; Hayes et al. 2012).

Ownership Class	1982		2002		2007		2012	
	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total
Private and tribal timberland	14,814	14.3	45,723	57.4	41,334	47.8	24,332	29.6
Private	14,814	14.3	45,223	56.7	40,810	47.2	24,332	29.6
Tribal	-	0.0	500	0.6	524	0.6	-	0.0
Public timberland	88,618	85.7	33,989	42.6	45,206	52.2	57,737	70.4
National Forest	83,106	80.3	30,631	38.4	43,179	49.9	54,789	66.8
State lands	4,977	4.8	2,749	3.4	1,837	2.1	1,479	1.8
Other public	535	0.5	609	0.8	190	0.2	1,469	1.8
All owners	103,448	100	79,711	100	86,540	100	82,070	100

The share of Colorado's timber harvest from National Forest System lands (national forests) had decreased from over 80 percent in 1982 (McLain 1985) to less than 40 percent in 2002 (Morgan et al. 2006), but this trend was reversed in the last two periodic censuses of the industry. The national forests' share of the harvest increased to 50 percent in 2007 (Hayes et al. 2012) and to 67 percent in 2012 (table C2). Private and tribal landowners provided 30 percent of Colorado's timber harvest for 2012. National forests provided the majority of sawlogs (63 percent) and other products (85 percent) harvested in 2012, but private landowners provided the majority of house logs, and posts and poles (table C3). Sawlogs accounted for about 70 percent (57.4 MMBF) of the total volume harvested, other products and house logs accounted for about 23 percent and 4 percent, respectively, and posts and poles were just over 3 percent of the harvest in 2012.

During 2012, Grand County again led Colorado's timber harvest with almost 24 percent (19.4 MMBF Scribner) of the volume; Teller and Montrose Counties followed with 12 percent and 9 percent, respectively (table C4). For comparison, Grand County's 2007 timber harvest was just over 35 percent (30.4 MMBF Scribner) of the volume and Delta and Mesa Counties followed with 15 and 6 percent, respectively.

As in 2007, lodgepole pine was the leading species harvested in Colorado during 2012, accounting for 50 percent of the volume (table C5). The continued harvest of lodgepole pine at higher rates than other species is likely due to the massive quantity of the species either killed or threatened by mountain pine beetle attack. At 19 percent of the total, spruce was the second leading species harvested in 2012, followed by ponderosa pine with 13 percent of the total and aspen at 9 percent. Lodgepole pine and spruce were the leading species harvested for sawlogs in 2012, accounting for 47 and 24 percent, respectively (table C6). Spruces constituted 46 percent of the house log harvest, and lodgepole pine was also the leading species harvested for posts and poles (93 percent) and other products (59 percent).

Table C3—Colorado timber products harvested by ownership class, 2012.

Ownership class	Sawlogs	House logs	Post and pole	Other products ^a	All products
<i>-----Thousand board feet, Scribner-----</i>					
National Forest	36,201	1,378	1,232	15,979	54,789
Private timberland	18,817	1,608	1,386	2,521	24,332
Other public lands	2,409	62	148	330	2,948
Tribal timberland	-	-	-	-	-
All owners	57,426	3,047	2,766	18,830	82,070
<i>-----Percentage of harvested product by ownership-----</i>					
National Forest	63.0	45.2	44.6	84.9	66.8
Private timberland	32.8	52.8	50.1	13.4	29.6
Other public lands	4.2	2.0	5.3	1.8	3.6
Tribal timberland	-	-	-	-	-
All owners	70.0	3.7	3.4	22.9	100

^a Other products include furniture logs, fiber logs, viga logs, and industrial fuelwood.

Table C4—Colorado timber harvest by county, selected years (Setzer and Shupe 1977; McLain 1985; Morgan et al. 2006; Hayes et al. 2012).

County	1974	1982	2002	2007	2012	1974	1982	2002	2007	2012
	-----MBF Scribner-----					-----Percentage of harvest-----				
Adams	-	-	8	2	1	-	-	a	a	a
Alamosa	397	800	-	0	-	0.2	0.8	-	-	-
Archuleta	24,856	300	1,640	260	890	11.6	0.3	2.1	0.3	1.1
Boulder	90	514	44	3	2	a	0.5	0.1	a	a
Chaffee	-	252	595	48	-	-	0.2	0.7	0.1	-
Clear Creek	-	500	-	0	3,500	-	0.5	-	-	4.3
Conejos	6,007	1,221	740	618	1,355	2.8	1.2	0.9	0.7	1.7
Costilla	-	-	3,684	4,986	2,418	-	-	4.6	5.8	2.9
Custer	2,383	2,526	300	717	150	1.1	2.4	0.4	0.8	0.2
Delta	1,324	933	2,376	13,195	3,462	0.6	0.9	3.0	15.2	4.2
Dolores	12,687	7,801	5,907	3,275	3,000	5.9	7.5	7.4	3.8	3.7
Douglas	213	1,600	40	417	306	0.1	1.5	0.1	0.5	0.4
Eagle	5,221	1,500	200	-	144	2.4	1.5	0.3	-	0.2
Elbert	265	-	-	-	-	0.1	-	-	-	-
El Paso	285	470	240	49	-	0.1	0.5	0.3	0.1	-
Fremont	-	1,100	1,673	348	-	-	1.1	2.1	0.4	-
Garfield	2,218	500	9,321	1,924	622	1.0	0.5	11.7	2.2	0.8
Gilpin	-	-	20	-	-	-	-	a	-	-
Grand	18,406	618	3,113	30,387	19,381	8.6	0.6	3.9	35.1	23.6
Gunnison	12,431	2,336	4,249	4,110	4,243	5.8	2.3	5.3	4.7	5.2
Huerfano	2,192	1,800	500	500	0	1.0	1.7	0.6	0.6	-
Jackson	20,786	16,273	4,373	2,916	2,610	9.7	15.7	5.5	3.4	3.2
Jefferson	-	1,881	361	21	2	-	1.8	0.5	a	a
La Plata	39,950	1,271	2,312	321	510	18.7	1.2	2.9	0.4	0.6
Lake	-	-	844	-	-	-	-	1.1	-	-
Larimer	5,219	2,497	3,145	528	1,152	2.4	2.4	3.9	0.6	1.4
Las Animas	993	1,600	7,057	2,300	170	0.5	1.5	8.9	2.7	0.2
Logan	33	-	-	-	-	a	-	-	-	-
Mesa	5,252	1,765	8,660	4,973	4,798	2.5	1.7	10.9	5.7	5.8
Mineral	11,876	6,531	372	683	629	5.5	6.3	0.5	0.8	0.8
Moffat	158	-	124	-	399	0.1	-	0.2	-	0.5
Montezuma	4,169	15,001	4,495	3,242	2,202	1.9	14.5	5.6	3.7	2.7
Montrose	2,714	7,735	3,029	1,625	7,335	1.3	7.5	3.8	1.9	8.9
Ouray	-	2,565	30	8	129	-	2.5	a	a	0.2
Park	252	2,456	4,369	2,432	911	0.1	2.4	5.5	2.8	1.1
Pitkin	331	-	-	-	149	0.2	-	-	-	0.2
Pueblo	176	-	306	48	-	0.1	-	0.4	0.1	0.0
Rio Blanco	370	10	730	-	-	0.2	a	0.9	-	-
Rio Grande	10,857	9,277	557	100	4,313	5.1	9.0	0.7	0.1	5.3
Routt	10,442	1,976	1,143	2,008	6,593	4.9	1.9	1.4	2.3	8.0
Saguache	11,426	4,802	520	1,459	-	5.3	4.6	0.7	1.7	-
San Juan	-	-	274	-	-	-	-	0.3	-	-
San Miguel	-	2,131	1,020	-	25	-	2.1	1.3	-	a
Summit	-	193	289	2,606	1,072	-	0.2	0.4	3.0	1.3
Teller	46	713	1,049	432	9,598	a	0.7	1.3	0.5	11.7
Total	214,025	103,448	79,711	86,540	82,070	100	100	100	100	100.0

^a Less than 0.05 percent.

Table C5—Colorado timber harvest by species, selected years (Setzer and Shupe 1977; McLain 1985; Morgan et al. 2006; Hayes et al. 2012).

Species	1974	1982	2002	2007	2012	1974	1982	2002	2007	2012
	----- <i>MBF Scribner</i> -----					----- <i>Percentage of harvest</i> -----				
Lodgepole pine	42,187	15,500	12,457	45,026	41,091	19.7	15.0	15.6	52.0	50.1
Spruce ^a	91,638	41,877	19,908	10,203	15,488	42.8	40.5	25.0	11.8	18.9
Ponderosa pine	34,306	22,716	22,526	6,899	10,983	16.0	22.0	28.3	8.0	13.4
Aspen	4,825	12,737	15,292	17,319	7,727	2.3	12.3	19.2	20.0	9.4
Douglas-fir	26,927	6,574	6,959	3,946	5,334	12.6	6.4	8.7	4.6	6.5
True firs ^b	14,142	3,986	2,512	3,132	1,350	6.6	3.9	3.2	3.6	1.6
Other species ^c	-	58	58	14	96	-	0.1	0.1	0.0	0.1
All species	214,025	103,448	79,711	86,539	82,070	100	100	100	100	100

^a Spruce includes Engelmann and blue spruce.

^b True firs include white and subalpine fir.

^c Other species include cottonwood, western redcedar, gambel oak, Rocky Mountain juniper, and pinyon.

Table C6—Colorado timber harvest by species and product, 2012.

Species	Sawlogs	House logs	Posts and poles	Other products ^a	All products
	----- <i>Thousand board feet, Scribner</i> -----				
Lodgepole pine	26,959	485	2,559	11,089	41,091
Spruce ^b	13,849	1,406	50	184	15,488
Ponderosa pine	6,380	532	113	3,959	10,983
Aspen	4,966	163	12	2,586	7,727
Douglas-fir	3,917	424	25	969	5,334
True firs ^c	1,327	0	8	16	1,350
Other species ^d	29	38	0	29	96
All species	57,426	3,047	2,766	18,830	82,070
	----- <i>Percentage of product by species</i> -----				
Lodgepole pine	46.9	15.9	92.5	58.9	50.1
Spruce ^b	24.1	46.1	1.8	1.0	18.9
Ponderosa pine	11.1	17.4	4.1	21.0	13.4
Aspen	8.6	5.3	0.4	13.7	9.4
Douglas-fir	6.8	13.9	0.9	5.1	6.5
True firs ^c	2.3	-	0.3	0.1	1.6
Other species ^d	0.0	1.3	0.0	0.2	0.1
All species	70.0	3.7	3.4	22.9	100

^a Other products include furniture logs, fiber logs, viga logs, and industrial fuelwood.

^b Spruce includes Engelmann and blue spruce.

^c True firs include white and subalpine fir.

^d Other species include gambel oak, Rocky Mountain juniper, pinyon, cottonwood, and western redcedar.

Timber Flow

The majority (98.7 percent) of Colorado's 2012 timber harvest was processed in-State; during 2012 Colorado had a net inflow of about 7.1 MMBF of timber. About 1.1 MMBF was processed in Wyoming, Utah, and New Mexico; there was an inflow of 8.2 MMBF of timber from New Mexico, Utah, Arizona, Wyoming, Montana, and Idaho, for processing in Colorado (table C7).

Timber processors in Colorado received 89,186 MBF of timber in 2012, including 8,183 MBF that was harvested outside the State. National forests provided about 66 percent (58,716 MBF) of the timber delivered to Colorado mills in 2012, with 37—more than 60 percent—of Colorado's timber processors

Table C7—Timber product flow into and out of Colorado, 2012.

Timber product	Log flow into Colorado	Log flow out of Colorado	Net inflow (net outflow)
<i>-----Thousand board feet, Scribner-----</i>			
Sawlogs	4,570	-	4,570
House logs	202	120	82
Other products ^a	3,412	947	2,465
All products	8,183	1,067	7,116

^a Other products include fiber logs, post and pole logs, energywood logs, and industrial fuelwood.

Table C8—Timber received by Colorado forest products industry by ownership class and product, 2012.

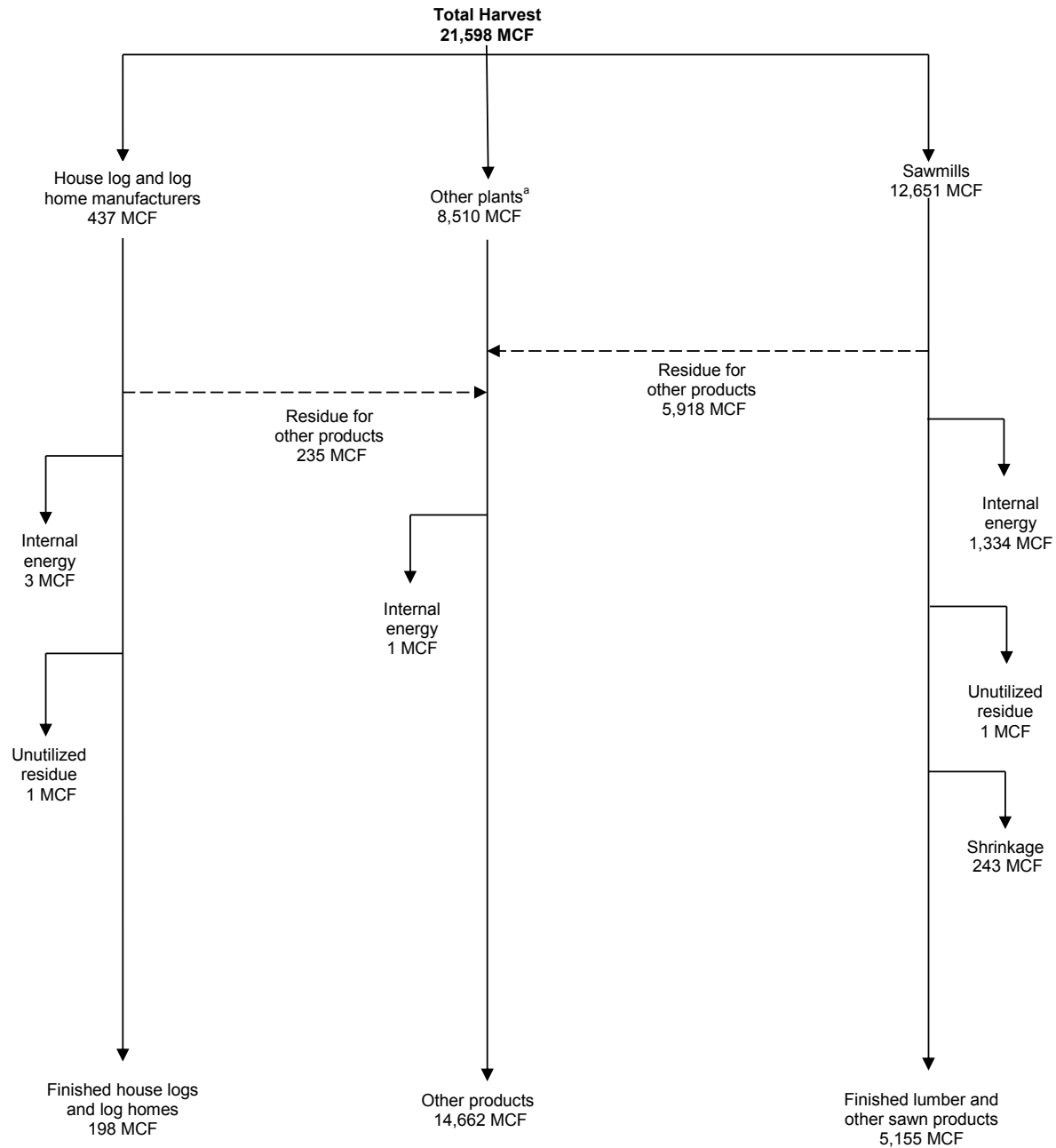
Ownership class	Sawlogs	Posts and poles	House logs	Other products ^a	All products
<i>-----Thousand board feet, Scribner-----</i>					
Private and tribal timberland	18,852	1,263	1,637	4,637	26,389
Private	18,852	1,263	1,592	4,637	26,344
Tribal	45	45			
Public timberland	43,144	741	1,492	17,420	62,796
National Forest	40,736	593	1,430	15,957	58,716
State lands	1,373	16	8	1,216	2,611
Other public	1,036	132	54	247	1,469
Other owners	-	-	-	-	-
Other mills	-	-	-	-	-
Canada	-	-	-	-	-
All owners	61,996	2,004	3,129	22,057	89,186
<i>-----Percentage of product by owner-----</i>					
Private and tribal timberland	30.4	63.0	52.3	21.0	29.6
Private	30.4	63.0	50.9	21.0	29.5
Tribal	-	-	1.4	-	0.1
Public timberland	69.6	37.0	47.7	79.0	70.4
National Forest	65.7	29.6	45.7	72.3	65.8
State lands	2.2	0.8	0.2	5.5	2.9
Other public	1.7	6.6	1.7	1.1	1.6
Other owners	-	-	-	-	-
Other mills	-	-	-	-	-
Canada	-	-	-	-	-
All owners	69.5	2.2	3.5	24.7	100

^a Other products include energywood logs, fiber logs, furniture logs, and industrial fuelwood.

receiving timber cut from national forests. Private and tribal timberlands provided 30 percent of timber receipts with 26,344 MBF coming from private lands and 45 MBF from tribal lands (table C8). The remaining 4 percent of timber receipts were provided by State lands and other public ownerships. During 2012, national forests provided 66 percent of the sawlogs and 46 percent of the house log volume processed in-State. Private and tribal landowners provided 30 percent of sawlogs and 52 percent of house logs. Private timberlands supplied most of the posts and poles processed in Colorado; public timberlands provided the majority of timber for other products (table C8).

Timber Use

Colorado's 2012 timber harvest—about 21,598 MCF, exclusive of bark (fig. C1)—was used by several manufacturing sectors both within and outside of Colorado. Of this volume, 12,651 MCF went as logs to sawmills, 437 MCF went to log home manufacturers, and 8,510 MCF went to post and pole, log furniture, fuel pellet, and excelsior manufacturers.



^a Other plants include fuel pellet, post, pole, log furniture, shavings, and excelsior manufacturers, as well as biomass energy plants.

Figure C1—Colorado timber harvest and flow, 2012.

The following conversion factors were used to convert Scribner board foot volume to cubic feet:

- 4.99 board feet per cubic foot for house logs
- 4.49 board feet per cubic foot for sawlogs
- 2.79 board foot per cubic foot for all other products

Of the 12,651 MCF of timber received by sawmills, 5,155 MCF (41 percent) was processed into finished lumber or other sawn products, and about 243 MCF (2 percent) was lost to shrinkage. The remaining 7,253 MCF (57 percent) became mill residue. About 7,252 MCF of sawmill residue was utilized, of which 1,334 MCF went for internal energy production, the remaining 5,918 MCF was sent to other plants for their use, and about 1 MCF remained unused. Of the 437 MCF of timber received by log home manufacturers, about 198 MCF (45 percent) was manufactured into house logs, and the remaining 239 MCF became mill residue. About 238 MCF of house log residue was utilized, and about 1 MCF remained unused. Of the 8,510 MCF of timber received by other manufacturers combined with 6,153 MCF of residue from sawmills and house log sectors, 14,662 MCF was utilized in solid wood products (such as posts, poles, and log furniture) or was used in the production of fuel pellets and excelsior. About 1 MCF of residues was used for internal energy production and no residue went unused.

Forest Industry Sectors

Colorado's primary forest products industry in 2012 consisted of 58 active manufacturers in 25 counties (table C9). Facilities tended to be located near the forest resource in the central and southwestern portions of the State (fig. C2). The sawmill sector, manufacturing lumber and other sawn products, was the largest sector operating in 2012 with 31 mills; 12 facilities produced house logs and log homes. There were three log furniture producers, six post and pole firms, two excelsior producers, and four energy/fuel pellet facilities operating in 2012. Hayes et al. (2012) identified 64 primary wood-processing plants in 2007: 30 sawmills, 19 house log plants, 5 post and pole facilities, and 10 facilities producing log furniture and other products including an excelsior manufacturer. Changes in Colorado's industry structure over the past 20 years were similar to those experienced throughout the West, with the number of sawmills decreasing (Morgan et al. 2006).

In 2012, sales value of finished products from Colorado's primary wood products industry totaled \$86.9 million. This compares to 2007 sales of \$110 million and 2002 sales of \$119 million, in 2012 dollars (table C10). Sales from sawmills accounted for 44 percent, about the same as in 2007. House log and log home manufacturers accounted for 16 percent, a \$7.7 million drop from 2007. The other products sector accounted for about 40 percent, down about \$5.5 million from 2007.

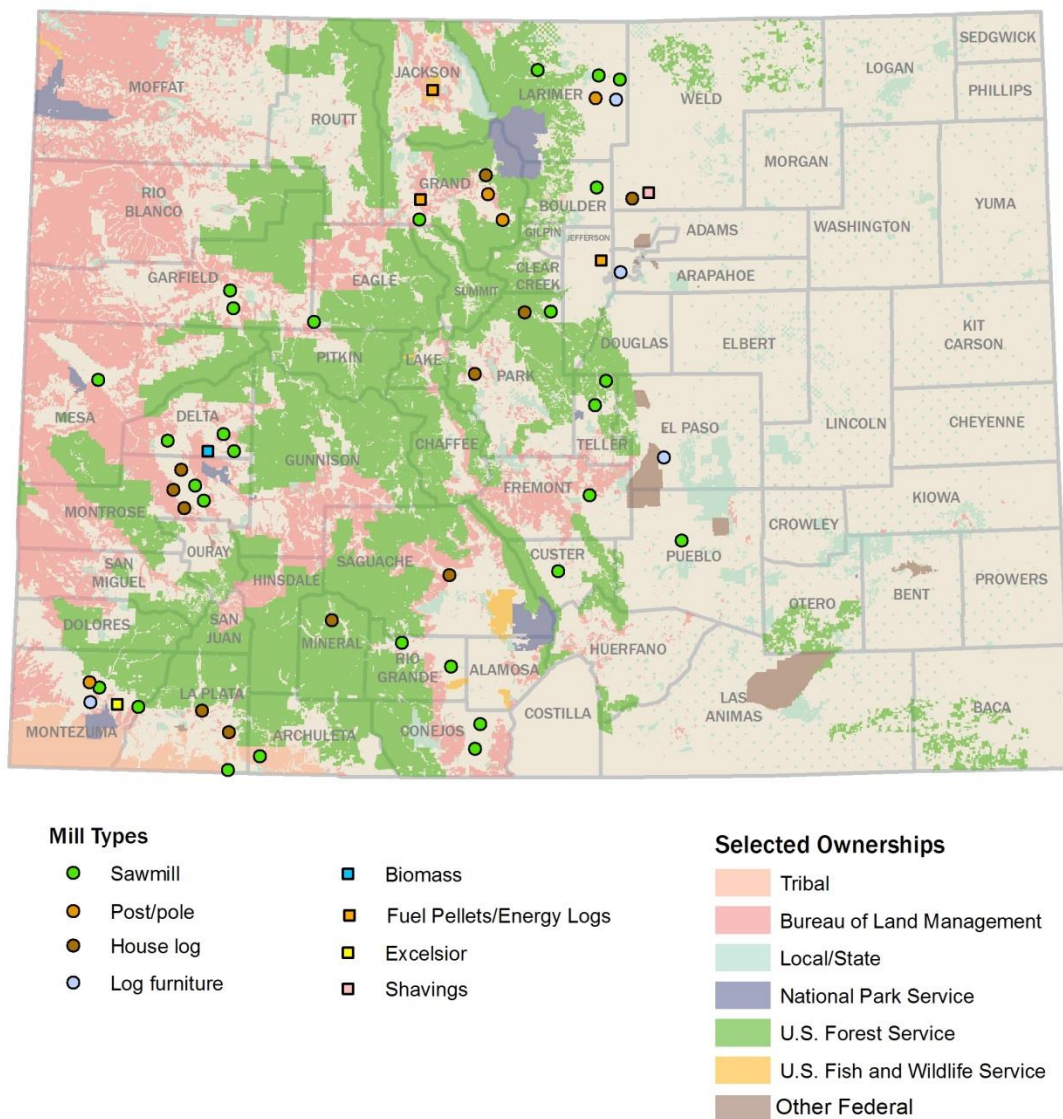


Figure C2—Map of Colorado primary timber processors.

Sawmill Sector

After a decline in the number of sawmills from 84 in 1982 (McLain 1985) to 50 in 2002 and 30 in 2007 (Hayes et al. 2012), 31 sawmills were identified as producing lumber in 2012 (table C11). There was one more sawmill in the State in 2012 compared to 2007, but Colorado lumber production decreased 18 percent from about 116 MMBF in 2007 (Hayes et al. 20012) to 95 MMBF in 2012, with average production decreasing from 3.9 MMBF to 3.1 MMBF per sawmill during the period. The State's eight largest sawmills produced an average of 10.8 MMBF in 2012, with six of these mills producing between 2 and 5 MMBF. The remaining 23 sawmills produced an average of 386 MBF in 2012 (table C12).

Technological improvements have made Colorado mills more efficient. Thinner kerf saws reduce the proportion of the log that becomes sawdust. Additionally, mill-delivered log diameters are believed to have decreased over the past 25 years, with reduced old-growth harvesting and increased use of

Table C9—Active Colorado primary wood products facilities by county and product, 2012
(McLain 1985; Morgan et al. 2006; Hayes et al. 2012).

County	Lumber	House logs and log homes	Other products ^a	Total
Arapahoe			1	1
Archuleta	2			2
Boulder	1	0	1	2
Conejos	2			2
Custer	1			1
Delta	3		1	4
Denver			1	1
Eagle	1			1
El Paso			1	1
Fremont	1			1
Garfield	2	1	1	4
Grand	1	1	3	5
Jackson			1	1
Jefferson			1	1
La Plata	1	2		3
Larimer	3		2	5
Mesa	1			1
Mineral		1		1
Montezuma	3		2	5
Montrose	2	3		5
Park	1	2		3
Pueblo	1			1
Rio Grande	2			2
Saguache	1	1		2
Teller	2			2
Weld		1		1
2012 Total	31	12	15	58
2007 Total	30	19	15	64
2002 Total	50	46	37	133
1982 Total	84	5	6	95

^a Other products include excelsior, fuel pellets, posts, poles, log furniture and biomass/energy.

Table C10—Finished product sales of Colorado's primary wood products sectors, 2002, 2007, and 2012 (Morgan et al. 2006; Hayes et al. 2012).

Sector	2002	2007	2012
<i>---Thousands of 2012 dollars^a---</i>			
Sawmills	51,523	49,176	38,867
House logs and log homes	34,727	21,246	13,524
Other sectors ^b	32,901	40,015	34,465
Total	119,151	110,437	86,856

^a All sales are reported f.o.b. the manufacturer's plant.

^b Other sectors include producers of posts, poles, log furniture, fuel pellets, biomass/energy and excelsior.

restoration and fuels treatments that favor retention of larger trees and the removal of smaller stems. As log diameters decrease, the Scribner log rule, which is used in Colorado, underestimates—by an increasing amount—the volume of lumber that can be recovered from a log, thus increasing overrun. On average, Colorado sawmills produced about 1.58 board feet of lumber for every board

Table C11—Number of Colorado sawmills and average lumber production, selected years (McLain 1985; WWPA 1983; Morgan et al. 2006; Hayes et al. 2012).

Year	Number of sawmills	Average lumber production
		<i>MMBF^a</i>
2012	31	3.1
2007	30	3.9
2002	50	1.7
1982	84	1.4

^a MMBF = million board feet lumber tally.

Table C12—Colorado lumber production by mill size, 2012.

Size class ^a	Number of mills	Volume	Percentage of total	Average per mill
	<i>MBF^b</i>	<i>MBF^b</i>		
Over 2 MMBF	8	86,507	91	10,813
Under 2 MMBF	23	8,887	9	386
Total	31	95,394	100	3,077

^a Size class is based on reported lumber production. MMBF denotes million board feet lumber tally.

^b MBF = thousand board feet lumber tally.

foot Scribner of timber processed for an average overrun of 58 percent in 2012, slightly higher than the 54 percent overrun in 2007 (Hayes et al. 2012) and the 47 percent overrun in 2002 (Morgan et al. 2006).

Sales from sawmills declined from 2007 to 2012, from \$49 million to \$39 million, in 2012 dollars. However, with decreasing overall sales from Colorado timber processors, the sawmill share of total primary mill sales in the State stayed roughly the same at 45 percent in 2012, versus 43 percent in 2002 and 45 percent in 2007 (Hayes et al. 2012; Morgan et al. 2006et al.). In comparison, sawmill sales accounted for 39 and 29 percent of timber processors' finished product sales in Arizona and New Mexico, respectively, during 2012, and historically accounted for 90 percent or more of sales throughout the Interior West (Keegan et al. 2001a,b,c; Morgan et al. 2004b). Dimension lumber and studs accounted for \$24.6 million (63 percent) of sawmill product sales in 2012, board and shop lumber accounted for \$4.9 million (12 percent), timbers accounted for \$3.8 million (10 percent), and other sawn products accounted for \$3.1 million (8 percent). Finally, other miscellaneous products accounted for nearly \$2.6 million (7 percent) of finished product sales from sawmills during 2012.

Log Home Sector

From 1982 to 2002, Colorado's log home industry grew from six to 46 facilities (table C9). By 2007, the number of log home and house log manufacturers had dropped to 19, and there were 12 facilities operating in 2012. Only firms that processed timber and manufactured house logs or log homes, not log home distributors, are included in the censuses. In 2012, Colorado's 12 log home manufacturers processed almost 2.3 MMBF Scribner, produced about 310 thousand lineal feet (MLF) of house logs, and generated \$13.5 million in product sales.

Other Products Sector

Following the same trend as the log home sector, Colorado's producers of posts and poles and other primary wood products significantly expanded production from 1982 to 2002, and production subsequently declined from 2002 to 2012. The number of facilities increased from 6 to 37 between 1982 and 2002, falling to 15 facilities in 2007 and remaining at 15 in 2012 (table C9). In 2012, three of these other products facilities manufactured log furniture, six were post and pole producers, four were biomass/fuel pellets facilities, and two were excelsior plants. Finished products sales by manufacturers of posts and poles exceeded \$4 million, and sales by manufacturers of log furniture, fuel pellets/energy, and excelsior exceeded \$30 million in 2012. Additional detail about this sector is withheld to protect the confidentiality of firm-level information.

Capacity and Utilization

Colorado's annual sawmill production capacity was 176.3 MMBF of lumber in 2012, down from 205.5 MMBF in 2007. Sawmills produced 95.4 MMBF of lumber in 2012, utilizing 54 percent of their lumber production capacity. This was on par with the 2007 capacity utilization rate of 56 percent, when sawmills produced 115.4 MMBF (Hayes et al. 2012). Timber-processing capacity among Colorado sawmills was 116,889 MBF Scribner, with 60,262 MBF Scribner of timber processed, making utilization of timber-processing capacity among sawmills about 52 percent in 2012. Across all industry sectors in the State, total timber-processing capacity was 144.3 MMBF Scribner. Accounting for changes in mills' log inventories, Colorado firms processed 84.2 MMBF Scribner, utilizing about 44 percent of timber-processing capacity across all sectors in 2012. The lower capacity utilization of all sectors compared to sawmills alone indicates that processors other than sawmills were operating well below their processing capacity and could increase production quickly under favorable market conditions.

Mill Residue Volumes, Types, and Uses

Sawmills, the leading timber sector, were also the main residue producers in Colorado. In 2012, sawmills produced 0.99 BDU of residue per MBF of lumber (table C13). Across all sectors, Colorado timber processors produced 108,009 BDU, or about 10,385 MCF of mill residue, with 99.1 percent utilized (table C14). Total residue production declined from 22,749 MCF in 1974 and 12,420 MCF in 1982, but increased from 9,115 MCF in 2002, while the proportion utilized increased from 40 percent in 1974 to 64 percent in 1982 (McLain 1985) and 98.7 percent in 2007 (Hayes et al. 2012). Colorado's decreased residue production stemmed from a combination of increased milling efficiencies and decreased timber volumes processed. Increased residue utilization rates between 1974 and 2012 could be attributable to both a decreased supply of residue in the market, and increased demand for residues as inputs for residue-related product manufacturing.

Coarse residue was the State's largest residue component at 53 percent (57,563 BDU) of all residues in 2012, with 100 percent utilized. Out-of-State

Table C13—Colorado's sawmill residue factors, 2002, 2007 and 2012 (Morgan et al. 2006; Hayes et al. 2012).

Residue type	2002	2007	2012
<i>----BDU/MBF lumber tally^a----</i>			
Coarse	0.42	0.60	0.56
Sawdust	0.17	0.21	0.20
Planer shavings	0.13	0.09	0.09
Bark	0.29	0.14	0.15
Total	1.01	1.04	0.99

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

Table C14—Production and disposition of Colorado mill residues, 2012.

Residue type	Total utilized	Pulp and board	Energy	Mulch/ bedding	Unspecified use	Unused	Total produced
<i>-----Bone-dry units^a-----</i>							
Coarse	57,563	32,217	11,200	-	14,147	-	57,563
Fine	32,797	-	18,323	13,173	1,301	19	32,816
Sawdust	22,732	-	13,689	7,742	1,301	17	22,749
Planer shavings	10,065	-	4,634	5,431	0	2	10,067
Bark	16,671	-	6,804	6,647	3,220	958	17,629
Total	107,031	32,217	36,327	19,820	18,668	978	108,009
<i>-----Percentage of residue type-----</i>							
Coarse	100.0	56.0	19.5	-	24.6	-	53.3
Fine	99.9	-	55.8	40.1	4.0	0.1	30.4
Sawdust	99.9	-	60.2	34.0	5.7	0.1	21.1
Planer shavings	100.0	-	46.0	53.9	0.0	0.0	9.3
Bark	94.6	-	38.6	37.7	18.3	5.4	16.3
Total	99.1	29.8	33.6	18.3	17.3	0.9	100

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

pulp, paper, and reconstituted board facilities used 32,217 BDU of the coarse material, and the remaining volume was used for energy production and unspecified uses (table C14). Fine residues were the second largest component at slightly over 30 percent (32,797 BDU) of mill residues. Almost 100 percent of fine residue was utilized in 2012, primarily for energy, with a little over 40 percent of fine residues going to mulch or animal bedding facilities. Bark accounted for just over 16 percent of all residues and was largely burned for energy, used for mulch, or listed as unspecified uses in 2012, with 16,671 BDU (95 percent) utilized.

Primary Forest Products Sales and Industry Employment

Sales from Colorado's primary wood products industry during 2012 totaled nearly \$91 million, including finished products and mill residues (table C15). Lumber, timbers, and other sawn products accounted for 41 percent (more than \$37 million) of total sales. Other products and mill residues accounted for almost 36 percent (more than \$32 million). Posts and poles and log furniture made up nearly 12 percent (\$10.8 million) of sales, and house logs and log homes

Table C15—Destination and sales value of Colorado’s primary wood products and mill residues, 2012.

Product	Colorado	Other 4-Corner States	Other Rocky Mtn States ^a	Far West ^b	Northeast ^c	South ^d	North Central ^e	Other ^f	Total
<i>-----Thousand 2012 dollars-----</i>									
Lumber, timbers and other									
sawn products	11,573	1,484	5,446	740	1,023	2,458	12,418	2,115	37,257
House logs and log homes	7,135	942	307	274	314	617	668		10,255
Posts, poles, and log furniture	4,760	2,035	953	942	645	503	951		10,788
Other products ^g	11,502	2,264	1,646	2,749	1,908	3,800	6,399	2,224	32,490
Total	34,969	6,723	8,351	4,704	3,890	7,377	20,436	4,339	90,790
<i>-----Percentage of product sales by region-----</i>									
Lumber, timbers and other									
sawn products	31.1	4.0	14.6	2.0	2.7	6.6	33.3	5.7	41.0
House logs and log homes	69.6	9.2	3.0	2.7	3.1	6.0	6.5	-	11.3
Posts, poles, and log furniture	44.1	18.9	8.8	8.7	6.0	4.7	8.8	-	11.9
Other products ^g	35.4	7.0	5.1	8.5	5.9	11.7	19.7	6.8	35.8
Total	38.5	7.4	9.2	5.2	4.3	8.1	22.5	4.8	100

^a Other Rocky Mountains includes Idaho, Montana, Nevada.

^b Far West includes Alaska, California, Hawaii, Oregon, and Washington.

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

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

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

^f Other areas consist of products being shipped outside the United States.

^g Other products include erosion control products, wood pellets, shavings, mulch, firewood, clean chips, and mill residues.

accounted for 11 percent (more than \$10 million). Colorado was the leading market area for log homes, posts, poles, log furniture, and other products with in-State sales accounting for 38.5 percent of total sales. The North Central United States accounted for 22.5 percent of total sales, 33.3 percent of lumber, timbers, and other sawn products sales, and 19.7 percent of other products sales. The other Four Corners States (Arizona, New Mexico, and Utah) accounted for just 7.4 percent of total sales, the majority of which were posts and poles and log furniture, as well as log home products. Other Rocky Mountain States and the South were major market areas for lumber and other products, including excelsior and mill residues.

Employment in Colorado’s forest industry, defined as the sum of employment in forestry and logging, forestry support, wood product manufacturing, and paper manufacturing, has declined in recent years, although it remains an important source of jobs in many communities around the State. There were about 6,700 jobs in the industry in Colorado in 2012, compared to 9,250 in 2007 (U.S. Department of Commerce, BEA 2014). About 2,050 workers were employed in the “primary” industry—harvesting and processing timber or in private sector land management—during 2012, and the remaining component of the industry can be classified as secondary, employing approximately 4,650 workers in 2012. From 2007 to 2012, employment in Colorado’s forest industry declined nearly 30 percent overall. However, primary forest industry employment actually increased over that period, with the employment decrease coming entirely from the secondary industry.

This chapter focuses on New Mexico’s timber harvest and forest products industry during 2012, and discusses changes that occurred since the 2007 industry census conducted by Hayes et al. (2012). Details of timber harvest, flow, and use are followed by descriptions of the primary processing sectors, capacity and utilization statistics, and mill residue characteristics. This chapter concludes with information on sales from New Mexico’s primary wood products industry.

Timber Harvest, Flow, and Use

In 2012, New Mexico had approximately 4.24 million acres of nonreserved timberland (USDA Forest Service 2014), with national forests accounting for 63 percent of the total, private and tribal owners accounting for 33 percent, and other public agencies accounting for the remaining 4 percent (table N1). All private timberland was classified as NIPF timberland. With the exception of several Native American tribes, New Mexico had no large tracts of timberland owned by entities operating primary wood processing facilities. Sawtimber volume on nonreserved timberlands was estimated at 5.8 billion cubic feet or about 32.5 billion board feet Scribner in 2012 (USDA, FIDO 2014).

Timber Harvest

New Mexico’s 2012 commercial timber harvest was 28,839 MBF Scribner, 73 percent of the 2007 harvest (Hayes et al. 2012), 39 percent of the 2002 harvest (Morgan et al. 2006), and 30 percent of the 1997 harvest (Keegan et al. 2001b). Of the timber harvested in New Mexico in 2012, 89 percent was live and 11 percent was salvage or standing dead when harvested. As recently as 1989, 210 MMBF Scribner of timber was harvested annually in New Mexico, with 65 percent of that volume coming from the national forests (Keegan et al. 2001b). Although the public share of New Mexico’s timber harvest had fallen to just 12 percent by 1997, that percentage was slightly higher in 2002 (Morgan et al. 2006) and 2007 (table N2; Hayes et al. 2012), and National Forest System (national forests) accounted for nearly 50 percent of harvested volume in 2012. Sawlogs accounted for 78 percent (22.5 MMBF) of the total volume harvested. National forests provided the majority of sawlogs, vigas, and house logs harvested in New Mexico in 2012; the remaining volume was split between private and tribal timberlands (table N3). The largest share (48 percent) of other products, including posts, poles, furniture logs, fiber logs, and fuelwood, was harvest from private timberland.

Table N1—New Mexico nonreserved timberland by ownership class (U.S. Department of Agriculture, FIDO 2014).

Ownership class	Thousand acres	Percentage of nonreserved timberland
National Forest	2,674	63
Private and tribal	1,412	33
Other public	158	4
Total	4,244	100

Table N2—New Mexico timber harvest by ownership class, 1997, 2002, 2007 and 2012 (Keegan et al. 2001b; Morgan et al. 2006; Hayes et al. 2012).

Ownership class	1997		2002		2007		2012	
	MBF ^a Scribner	Percentage of total	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total
Private and tribal timberland	85,903	88.0	64,201	86.3	33,001	83.0	14,496	50.3
Private	61,853	63.4	36,821	49.5	14,971	37.6	7,965	27.6
Tribal	24,050	24.6	27,380	36.8	18,030	45.3	6,531	22.6
Public timberland	11,723	12.0	10,160	13.7	6,769	17.0	14,343	49.7
National Forest	11,723	12.0	10,160	13.7	5,644	14.2	14,343	49.7
State timberland	-	-	-	-	1,125	2.8	-	-
All owners	97,626	100	74,361	100	39,770	100	28,839	100

^a MBF = thousand board feet

Table N3—New Mexico timber products harvested by ownership class, 2012.

Ownership class	Sawlogs	Vigas	House logs	Other products ^a	All products
<i>-----Thousand of board feet, Scribner-----</i>					
National Forest	11,921	810	44	1,568	14,343
Private timberland	5,355	335	15	2,260	7,965
Tribal timberland	5,243	425	-	863	6,531
State timberland	-	-	-	-	-
All owners	22,519	1,570	59	4,691	28,839
<i>-----Percentage of harvested product by ownership-----</i>					
National Forest	52.9	51.6	74.6	33.4	49.7
Private timberland	23.8	21.3	25.4	48.2	27.6
Tribal timberland	23.3	27.1	-	18.4	22.6
State timberland	-	-	-	-	-
All owners	78.1	5.4	0.2	16.3	100.0

^a Other products include posts, poles, furniture logs, fiber logs, and industrial fuelwood.

The 2012 New Mexico harvest was spread across 12 counties, with 5 counties contributing more than 75 percent of the harvest (table N4). In 2012, Lincoln County led New Mexico's timber harvest with 19 percent of the total volume; Otero, Rio Arriba, and Colfax Counties followed, with 18, 16, and 14 percent, respectively. Historically, Rio Arriba was among the State's three leading timber-producing counties, contributing 15 percent or more of annual harvest volumes. But in 2007 it accounted for only about 4 percent. Colfax County, however, was not a significant contributor to New Mexico's annual harvest until recently, only occasionally accounting for more than 10 percent of harvest in previous censuses (Setzer and Wilson 1970; McLain 1989; Keegan et al. 2001b; Morgan et al. 2006; Hayes et al. 2012).

Ponderosa pine continued to be the leading species harvested in New Mexico, accounting for 54 percent of the harvest in 2012; Douglas-fir retained its long-held position as the second most harvested species (table N5). White and subalpine firs and Engelmann spruce together accounted for 12 percent of the 2012 harvest. Ponderosa pine was the leading species harvested for sawlogs, vigas, and house logs in 2012 (table N6). Douglas-fir and true firs were a

Table N4—New Mexico timber harvest by county, selected years (Setzer and Wilson 1970; McLain 1989; Keegan et al. 2001b; Morgan et al. 2006; Hayes et al. 2012).

County	1966	1986	1997	2002	2007	2012	1966	1986	1997	2002	2007	2012
	-----MBF Scribner-----						-----Percentage-----					
Bernalillo	691	-	490	100	-		0.3	-	0.5	0.1	-	-
Catron	25,588	29,494	2,973	250	1,500	3,009	10.6	17.7	3.0	0.3	3.8	10.4
Cibola	-	13,857	7,973	15	-	1,523	-	8.3	8.2	^a	-	5.3
Colfax	32,853	4,000	18,450	3,777	9,423	4,030	13.6	2.4	18.9	5.1	23.7	14.0
Eddy	-	548	-	-	-		-	0.3	-	-	-	-
Grant	538	663	-	-	279	646	0.2	0.4	-	-	0.7	2.2
Lincoln	-	1,450	198	-	1,800	5,495	-	0.9	0.2	-	4.5	19.1
Los Alamos	54	-	-	-	-		^a	-	-	-	-	-
McKinley	36,692	-	2,000	-	-		15.1	-	2.0	-	-	-
Mora	957	3,830	2,040	10,864	215	224	0.4	2.3	2.1	14.6	0.5	0.8
Otero	17,335	16,982	36,866	30,825	18,835	5,121	7.2	10.2	37.8	41.5	47.4	17.8
Rio Arriba	37,156	69,367	17,107	17,869	1,733	4,472	15.3	41.7	17.5	24.0	4.4	15.5
Sandoval	66,619	5,932	4,360	1,200	2,190	1,849	27.5	3.6	4.5	1.6	5.5	6.4
San Juan	-	8,159	500	-	-		-	4.9	0.5	-	-	-
San Miguel	9,140	2,075	2,259	8,100	795	365	3.8	1.2	2.3	10.9	2.0	1.3
Santa Fe	-	2,865	-	670	1,000	601	-	1.7	-	0.9	2.5	2.1
Socorro	2,739	-	1,025	220	-		1.1	-	1.0	0.3	-	-
Taos	6,767	7,066	1,245	175	2,000	1,506	2.8	4.2	1.3	0.2	5.0	5.2
Torrance	-	-	120	175	-		-	-	0.1	0.2	-	-
Valencia	4,548	-	20	120	-		1.9	-	^a	0.2	-	-
Total ^b	242,313	166,342	97,626	74,361	39,770	28,839	100	100	100	100	100	100

^a Less than 0.05 percent.

^b Percentage detail may not sum to 100% due to rounding.

Table N5—New Mexico timber harvest by species, selected years (Setzer and Wilson 1970; McLain 1989; Keegan et al. 2001b; Morgan et al. 2006; Hayes et al. 2012).

Species	1966	1986	1997	2002	2007	2012
	-----Percentage of harvest-----					
Ponderosa pine	49	68	57	50	47	54
Douglas-fir	17	16	26	22	25	19
Other species ^a	15	4	< 0.5	2	8	15
True firs ^b	5	9	11	16	17	8
Engelmann spruce	14	3	7	10	3	4
All species	100	100	100	100	100	100

^a Other species include aspen, lodgepole pine, and southwestern white pine.

^b True firs include white and subalpine fir.

substantial component of the sawlog harvest; Engelmann spruce was a minor component of house logs at 20 percent. Engelmann spruce and Douglas-fir were also small components of the viga harvest. Other species like aspen and juniper were the leading species harvested for other products, a category that includes posts, poles, furniture logs, and firewood logs. Ponderosa pine was also a significant component to the other products category.

Table N6—New Mexico timber harvest by species and product, 2012.

Species	Sawlogs	Vigas	House logs	Other products ^a	All products
----- <i>Thousand of board feet, Scribner</i> -----					
Ponderosa pine	13,165	1,033	47	1,381	15,625
Douglas-fir	4,121	365	-	1,018	5,504
Other species ^b	751	-	-	2,011	2,762
White and subalpine fir	2,071	71	-	221	2,363
Lodgepole pine	1,566	-	-	-	1,566
Engelmann spruce	846	101	12	60	1,019
All species	22,520	1,570	59	4,691	28,839
----- <i>Percentage of product by species</i> -----					
Ponderosa pine	58.5	65.8	79.5	29.4	54.2
Douglas-fir	18.3	23.3	-	21.7	19.1
Other species ^b	3.3	-	-	42.9	9.6
White and subalpine fir	9.2	4.5	-	4.7	8.2
Lodgepole pine	7.0	-	-	-	5.4
Engelmann spruce	3.8	6.4	20.5	1.3	3.5
All species	78.1	5.4	0.2	16.3	100.0

^a Other products include posts, poles, furniture logs, fiber logs, and industrial fuelwood.

^b Other species include alligator juniper, Southwestern white pine, and Aspen.

Timber Flow

The majority (78 percent) of New Mexico's 2012 timber harvest was processed in-State. About 3.8 MMBF of New Mexico timber was processed in Colorado, and 2.5 MMBF in Texas, while a small amount of timber from Colorado and Montana was processed in New Mexico (table N7).

Timber processors in New Mexico received 22,934 MBF of timber in 2012, including 418 MBF that was harvested outside the State. Timber receipts dropped nearly 40 percent since 2007, when New Mexico mills received 37,917 MBF of timber. Ownership sources of timber delivered to New Mexico mills changed substantially since 2007, with the proportion from private and tribal lands decreasing from 79 percent to nearly 56 percent in 2012 (table N8). National forests supplied 44 percent of timber delivered to New Mexico's mills in 2012, an increase from just 18 percent in 2007. Similar to other States in the four-State region, New Mexico's national forests provided forest products manufacturers in 2012 with a large portion of timber products, supplying more than 41 percent of sawlogs, 45 percent of vigas, 100 percent of the house logs, and 57 percent of other products, mostly posts and poles and firewood logs (table N9).

Table N7—Timber product flow into and out of New Mexico, 2012.

Timber product	Log flow into New Mexico	Log flow out of New Mexico	Net inflow (net outflow)
----- <i>Thousand board feet, Scribner</i> -----			
Sawlogs	-	4,309	(4,309)
House logs	-	15	(15)
Other products ^a	418	2,000	(1,582)
All products	418	6,324	(5,906)

^a Other products include vigas, furniture logs, fiber logs, and industrial fuelwood.

Table N8—Ownership of timber products received by New Mexico mills, 1997, 2002, 2007 and 2012 (Keegan et al. 2001b; Morgan et al. 2006; Hayes et al. 2012).

Ownership class	1997		2002		2007		2012	
	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total
Private and tribal timberland	82,238	90.6	58,698	85.2	30,023	79.2	12,763	55.7
Private	57,788	63.6	31,318	45.5	11,993	31.6	6,531	28.5
Tribal	24,450	26.9	27,380	39.8	18,030	47.6	6,232	27.2
National Forests	8,562	9.4	10,160	14.8	6,769	17.9	10,103	44.1
State lands	-	-	-	-	1,125	3.0	68	0.3
All owners	90,800	100	68,858	100	37,917	100	22,934	100

Table N9—Timber received by New Mexico forest products industry by ownership class and product, 2012.

Ownership class	Sawlogs	Vigas	House logs	Other products ^a	All products
----- <i>Thousand of board feet, Scribner</i> -----					
National Forest	7,613	810	44	1,636	10,103
Tribal timberland	5,243	425	-	863	6,531
Private timberland	5,355	583	-	294	6,232
State lands	-	-	-	68	68
All owners	18,211	1,818	44	2,861	22,934
----- <i>Percentage of product by owner</i> -----					
National Forest	41.8	44.6	100.0	57.2	44.1
Tribal timberland	28.8	23.4	-	30.2	28.5
Private timberland	29.4	32.1	-	10.3	17.8
State lands	-	-	-	2.4	0.3
All owners	79.4	7.9	0.2	12.5	100

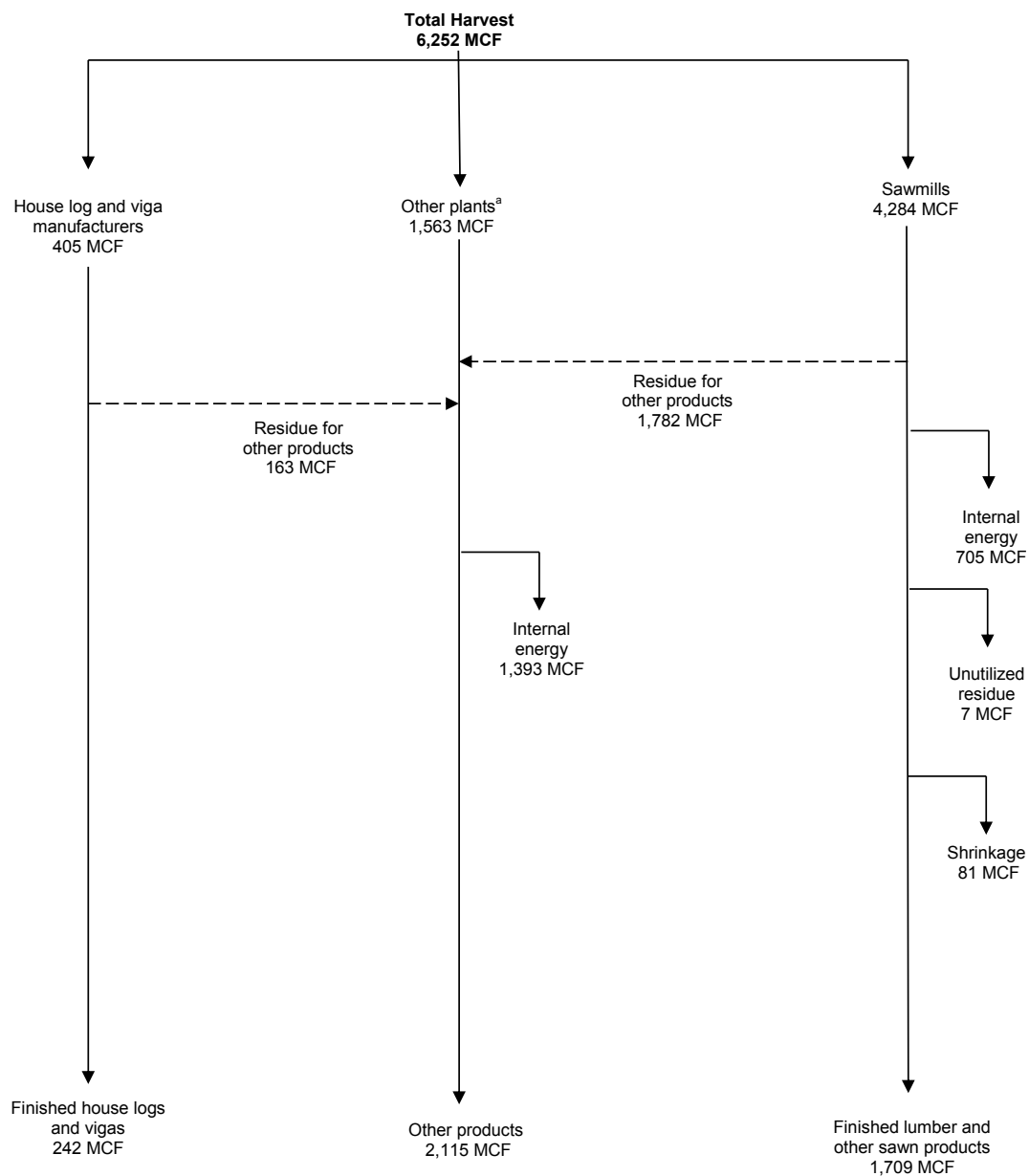
^a Other products include posts, poles, fiber logs, and industrial fuelwood.

Timber Use

New Mexico's 2012 timber harvest—approximately 6,252 MCF, exclusive of bark (fig. N1)—was used by several manufacturing sectors both within and outside of New Mexico. Of this volume, 4,284 MCF went as logs to sawmills, 405 MCF went to log home and viga manufacturers, and 1,563 MCF went to other plants, including post and pole, log furniture, and excelsior manufacturers. The following conversion factors were used to convert Scribner board foot volume to cubic feet:

- 5.58 board feet per cubic foot for sawlogs
- 4.49 board feet per cubic foot for house logs and vigas
- 2.1 board foot per cubic foot for all other products

Of the 4,284 MCF of timber received by sawmills, 1,709 MCF (40 percent) was manufactured into finished lumber or other sawn products, and about 81 MCF (2 percent) was lost to shrinkage. The remaining 2,494 MCF (58 percent) became mill residue. About 2,487 MCF (99 percent) of sawmill residue was utilized, of which 1,782 MCF of residue was used for other products and 705 MCF



^a Other plants include firewood, shavings, and excelsior manufacturers.

Figure N1—New Mexico timber harvest and flow, 2012.

was utilized for internal energy use at the mill. About 7 MCF remained unused. Of the 405 MCF of timber received by log home and viga manufacturers, about 242 MCF (60 percent) was used for house logs and vigas. The remaining 163 MCF became mill residue, all of which was utilized. Of the 1,563 MCF of timber received by other manufacturers, combined with the additional 1,945 MCF of residue from the other sectors, about 2,115 MCF (60 percent) was utilized in solid wood products such as posts, poles, fuel wood, and log furniture, or was used in the production of excelsior. Thirty-seven percent (1,393 MCF) of the residues from these other sectors was utilized in internal energy production, and none went unused.

Forest Industry Sectors

New Mexico's primary forest products industry in 2012 consisted of 28 active manufacturers in 13 counties (table N10). Facilities tended to be located near the forest resource in north-central New Mexico and in Otero County (fig. N2). The sawmill sector, manufacturing lumber and other sawn products, was the largest sector operating during 2012, with 17 facilities—5 more mills identified than were operating in 2007. Five facilities produced vigas and latillas, the same as in 2007. The number of other products manufacturers operating in 2012 increased to eight, with one post and pole manufacturer, one log home producer, one bark products facility, one fuelwood/pellet facility, two firewood producers, and two wood shaving/excelsior facilities. Primary wood products sales as well as the number of producers increased in 2012, with finished product sales in 2012 increasing 31 percent in real (inflated-adjusted) dollars since 2007 (table N11). The increase in sales was due to the dramatic increase in other products sales and a slight increase in viga and latilla sales. Other products sales more than doubled from 2007 to 2012. Since 1986, other products sales have been increasing while lumber and sawn products sales have been declining, both in quantity and as proportions of total sales. In 2012, sales from other products manufacturers accounted for 61 percent of finished products sales, compared to 39 percent in 2007, and 17 percent in 2002.

Sawmill Sector

Total lumber production in New Mexico dropped 70 percent in 10 years, from about 81.5 MMBF in 2002 to less than 25 MMBF in 2012. To avoid disclosure of individual firm information, the number of sawmills by production

Table N10—Active New Mexico primary wood products facilities by county and product, 2012 (McLain 1989; Keegan et al. 2001b; Morgan et al. 2006; Hayes et al. 2012).

County	Lumber	Vigas and latillas	Other ^a	Total
Bernalillo	0	0	1	1
Catron	2			2
Cibola	1		1	2
Colfax	1		1	2
Grant		1		1
Lincoln			1	1
Mora	1			1
Otero	4		2	6
Rio Arriba	2			2
Sandoval	2	1		3
San Miguel	1	1		2
Santa Fe	2	1		3
Taos	1	1		2
2012 Total	17	5	6	28
2007 Total	12	5	7	24
2002 Total	21	8	7	36
1997 Total	22	15	7	44
1986 Total	26	5-10	10	41-46

^a Other products include posts, poles, house logs, firewood, pellets, shavings, erosion control products and bark products.

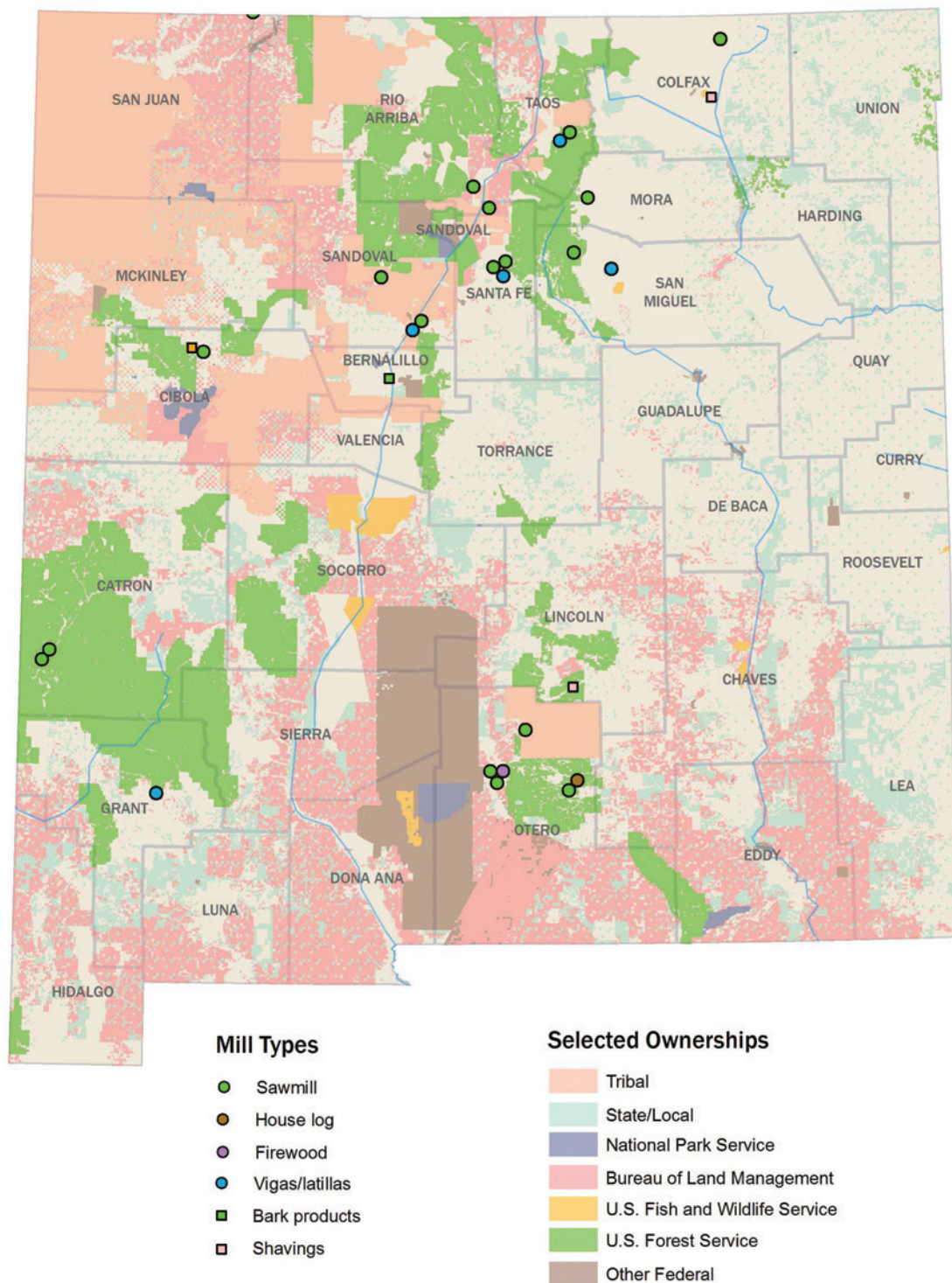


Figure N2—Map of New Mexico primary timber processors.

size class cannot be reported (table N12). As a result of the number of smaller mills and the reduction in total production, average annual lumber production fell 57 percent from 3.3 MMBF per mill in 2007 to 1.4 MMBF per mill in 2012 (table N13). In 2012, the State's six largest sawmills produced an average of 3.5 MMBF, accounting for 86 percent of lumber production in New Mexico. The remaining 11 mills had an average annual lumber production of less than 321 MBF per mill (table N14).

Table N11—Finished product sales of New Mexico's primary wood products, selected years (McLain 1989; Miller Freeman, Inc. 1998; Keegan et al. 2001b; Morgan et al. 2006; Hayes et al. 2012).

Product	1986	1997	2002	2007	2012
-----Thousand 2012 dollars-----					
Lumber and sawn products	125,422	57,996	42,514	13,774	10,708
Vigas and latillas	4,862	13,707	5,704	3,438	3,712
Other products ^a	6,077	6,271	9,612	11,029	22,670
Total ^b	136,361	77,975	57,830	28,241	37,090

^a Other products include posts, poles, log homes, log furniture, pellets and bark products.

^b All sales are reported f.o.b. the manufacturer's plant.

Table N12—New Mexico sawmills by production size class, selected years (Setzer and Wilson 1970; McLain 1989; Keegan et al. 2001b; Morgan et al. 2006; Hayes et al. 2012).

Year	Under 10 MMBF ^a	Over 10 MMBF ^a	Total
-----Number of Sawmills-----			
2012	17	^c	17
2007	12	^c	12
2002	18	3	21
1997	18	4	22
1986	17	9	26
1966	58	6	64
1962	85	^c	85
1960	117	^c	117
---Percentage of lumber output--- Volume (MBF ^b)			
2012	100	^c	24,450
2007	100	^c	39,823
2002	12	88	81,515
1997	10	90	108,675
1986	12	88	232,000
1966	38	62	262,848
1962	100	^c	242,500
1960	100	^c	224,400

^a Size class is based on reported lumber production. MMBF denotes million board feet lumber tally.

^b MBF = thousand board feet lumber tally.

^c In 1960, 1962, 2007 and 2012 all mills were included in <10 MMBF to avoid disclosing individual operations.

On average, New Mexico sawmills produced about 1.25 board feet of lumber for every board foot Scribner of timber processed in 2012. Overrun averaged 28 percent in 2007 (Hayes et al. 2012). The slight decrease in overrun from 2007 to 2012 was likely due to the shift in products produced, with an increase in timbers and board and shop lumber, and a decrease in dimension and stud lumber from 2007. In 2012, lumber produced by New Mexico's sawmills consisted of: 47 percent dimension and studs, 37 percent timbers, and 16 percent board and shop lumber. Timbers accounted for \$4.3 million (40 percent) of sawmill product sales in 2012, dimension lumber was about \$4.3 million (40 percent), and board and shop lumber accounted for \$ 2.1 million (20 percent).

Table N13—Number of New Mexico sawmills and average lumber production, selected years (McLain 1989; Setzer and Wilson 1970; Keegan et al. 2001b; Morgan et al. 2006; Hayes et al. 2012).

Year	Number of sawmills	Average production per mill
		<i>MMBF^a</i>
2012	17	1.4
2007	12	3.3
2002	21	3.9
1997	22	4.9
1986	25	9.2
1966	64	4.1
1962	85	2.9
1960	117	1.9

^a MMBF = million board feet lumber tally.

Table N14—New Mexico lumber production by mill size, 2012.

Size class ^a	Number of mills	Volume	Percentage of total	Average per mill
		<i>MBF^b</i>		<i>MBF^b</i>
Over 1 MMBF	6	20,920	86	3,487
Under 1 MMBF	11	3,530	14	321
Total	17	24,450	100	1,438

^a Size class is based on reported lumber production. MMBF denotes million board feet lumber tally.

^b MBF = thousand board feet lumber tally.

Viga and Latilla Sector

New Mexico's viga and latilla sector was fairly stable between 2007 and 2012. The same viga and latilla manufacturers were identified in 2012 as in 2007, and even though quantity sold decreased, an increase in average price led to an overall sales increase of \$274,000 (8 percent) in 2012 dollars. In 2012, the five firms operating in the sector processed 1,818 MBF Scribner, versus 2,412 MBF processed in 2007 (Hayes et al. 2012). Production was just over 597 thousand lineal feet (MLF) of vigas and latillas in 2012, a decline from 2007 when more than 828 MLF were produced. Due to the part-time nature of many viga and latilla operations, the sector could respond quickly with increased production and sales if demand for traditional styles of construction should increase and if sufficient timber were available.

Other Products Sector

The same mills generally produced other primary wood products in 2012 as in 2007; one new pellet facility opened during this 5-year period. Product sales by manufacturers of posts, poles, log homes, firewood, pellets, and bark and mulch, and by wood shavings producers, exceeded \$22.6 million in 2012; this was an increase of almost 106 percent over the period. Inflation-adjusted sales from the sector were about \$11 million in 2007. Additional detail about the sector is withheld to maintain the confidentiality of individual firms.

Capacity and Utilization

New Mexico's annual lumber production capacity was 63,020 MBF lumber tally in 2012. Sawmills produced 24,450 MBF of lumber and utilized about 39 percent of their production capacity. Across all industry sectors, total timber-processing capacity was 60,687 MBF Scribner. Accounting for changes in log inventories, 22,934 MBF Scribner was processed by New Mexico firms in 2012, with total timber-processing capacity utilization about 38 percent. Sawtimber-processing capacity was 170,000 MBF Scribner in 1997, with 48 percent utilized (Keegan et al. 2001b). By 2002, sawtimber-processing capacity had dropped to 88,162 MBF Scribner, with 65,116 MBF Scribner (74 percent) utilized (Morgan et al. 2006). In 2007, sawtimber-processing capacity was 67,425 MBF Scribner, with 39,823 MBF Scribner (59 percent) utilized (Hayes et al. 2012). Decreases in capacity in the sawmill sector have resulted from the permanent closing of large sawmills since 2002, which were operating well below capacity. With the relatively low timber harvest levels of the past 10 to 15 years, many mills were unable to procure enough timber to operate profitably. With capacity utilization levels below 50 percent, additional mills can be expected to close unless timber harvest levels increase and markets for wood products continue to improve.

Mill Residue Volumes, Types, and Uses

When the Arizona paper mill changed to recycled inputs, and the New Mexico particleboard plant closed between 1997 and 2002, markets for mill residues in the region underwent major changes. Sawmills had to develop new markets for the residues, use more residues in their own operations, and factor residue disposal costs into their business decisions. Despite this major change in outlets for mill residue, subsequent industry censuses have shown that residue utilization rates have remained high.

During 2012, New Mexico mills produced 39,705 BDU of mill residue with 96.4 percent being utilized (table N15). Residue production decreased in 2012 and the proportion utilized increased from 2007, when New Mexico sawmills generated 42,896 BDU, utilizing 91.4 percent (Hayes et al. 2012). The decrease in total residue volume generated was due primarily to a smaller volume of timber being processed. In 2007, sawmills produced 1.03 BDU per MBF of lumber; by 2012 that residue factor had increased to 1.11 BDU per MBF of lumber, similar to the 2002 residue factor (table N16).

Coarse residue (chips) was the State's largest residue component at 40.7 percent (16,142 BDU) of all residue in 2012, with 100 percent utilized. Energy facilities used about 14,436 BDU of the coarse material, with the remaining utilized volume going to unspecified uses (table N15). Fine residues—sawdust and planer shavings—were the second largest component at 32.7 percent (12,994 BDU) of mill residue. Virtually all (98.9 percent) of fine residue was utilized in 2012, primarily as mulch or animal bedding and for energy production. Bark accounted for 26.6 percent of all residue and was largely used for energy and mulch, with 9,293 BDU (87.9 percent) utilized in 2012.

Table N15—Production and disposition of New Mexico mill residues, 2012.

Residue type	Total utilized	Pulp and board	Energy	Mulch/ bedding	Unspecified use	Unused	Total produced
<i>-----Bone-dry units^a-----</i>							
Coarse	16,142	-	14,436	-	1,706	-	16,142
Fine	12,856	-	5,695	7,152	10	138	12,994
Sawdust	10,470	-	5,695	4,772	2	122	10,591
Planer shavings	2,387	-	-	2,380	7	16	2,403
Bark	9,293	-	5,378	3,898	17	1,276	10,570
Total	38,292	-	25,509	11,050	1,733	1,414	39,705
<i>-----Percentage of residue type-----</i>							
Coarse	100.0	-	89.4	-	10.6	-	40.7
Fine	98.9	-	43.8	55.0	0.1	1.1	32.7
Sawdust	98.8	-	53.8	45.1	0.0	1.2	26.7
Planer shavings	99.4	-	-	99.1	0.3	0.6	6.1
Bark	87.9	-	50.9	36.9	0.2	12.1	26.6
Total	96.4	-	64.2	27.8	4.4	3.6	100.0

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

Table N16—New Mexico sawmill residue factors, 1997, 2002, 2007 and 2012 (Keegan et al. 2001b; Morgan et al. 2006; Hayes et al. 2012).

Residue type	1997	2002	2007	2012
<i>----BDU/MBF lumber tally^a----</i>				
Coarse	0.52	0.56	0.58	0.58
Sawdust	0.29	0.20	0.17	0.20
Planer shavings	0.18	0.15	0.06	0.09
Bark	0.23	0.21	0.22	0.24
Total	1.22	1.12	1.03	1.11

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

Primary Forest Products Sales and Industry Employment

Sales from New Mexico's primary wood products industry in 2012 totaled slightly over \$40 million, including finished products and mill residue (table N17). Other products and mill residues accounted for 64 percent (\$25.8 million) of total sales. Lumber, timbers, and other sawn products accounted for 27 percent of sales (\$10.7 million); vigas and latillas accounted for 9 percent (\$3.7 million). New Mexico was the leading market area for each of the product categories, accounting for 44 percent of lumber sales, 53 percent of viga and latilla sales, and 73 percent of other products and mill residue sales. Other areas outside the United States (mostly Mexico) accounted for 26 percent of lumber sales. The other Four Corners States (Arizona, Colorado, and Utah) were the second leading market area for vigas and latillas, and the South was the second leading destination for the other products category.

Based on the four NAICS sectors of the forest industry (113, 1153, 321, and 322), about 2,300 workers were directly employed in the primary and secondary forest products industry in New Mexico during 2012 (U.S. Department of

Table N17—Destination and sales value of New Mexico's primary wood products and mill residues, 2012.

Product	New Mexico	Other 4-Corner States	Other Rocky Mtn States ^a	Far West ^b	Northeast ^c	South ^d	North Central ^e	Other ^f	Total
-----Thousand 2012 dollars-----									
Lumber, timbers and other sawn products	4,653	1,762	114	45	903	445		2,785	10,708
Vigas and latillas	1,961	1,239	360			152			3,712
Other products ^g	18,711	1,186	107		580	3,449	61	1,682	25,776
Total	25,326	4,187	581	45	1,483	4,046	61	4,467	40,197
-----Percentage of product sales by region-----									
Lumber, timbers and other sawn products	43.5	16.5	1.1	0.4	8.4	4.2	-	26.0	26.6
Vigas and latillas	52.8	33.4	9.7	-	-	4.1	-	-	9.2
Other products ^g	72.6	4.6	0.4	-	2.3	13.4	0.2	6.5	64.1
Total	63.0	10.4	1.4	0.1	3.7	10.1	0.2	11.1	100.0

^a Other Rocky Mountains includes Idaho, Montana, Nevada.

^b Far West includes Alaska, California, Hawaii, Oregon, and Washington.

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

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

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

^f Other areas consist of products being shipped outside the United States.

^g Other products include mulch, shavings, posts, poles, utility poles, log homes, firewood, fuel pellets, and mill residues.

Commerce BEA 2014). This marked a 29 percent decline from the employment in the industry in 2007. Most of the decline came from wood products manufacturing, which fell from over 2,000 jobs to just over 1,300 in 2012. Approximately 700 workers were employed in harvesting and processing timber or in private sector land management (i.e., the primary sector) in 2012, a decline of about 70 jobs from the 2007 level.

Utah

This chapter focuses on Utah's timber harvest and forest products industry during 2012. Details of timber harvest, flow, and use are followed by descriptions of the primary processing sectors, capacity and utilization statistics, and mill residue characteristics. The chapter concludes with information on primary wood products industry sales by Utah mills. Comparisons to previous years are provided where possible. Limited historical information is available about timber harvesting and mill production and residues in Utah. The last comprehensive study of the State's industrial roundwood production and mill residues was conducted in 2007 (Hayes et al. 2012), and data for previous years include 1966 (Setzer and Wilson 1970), 1969 (Setzer 1971c), 1970 (Green and Setzer 1974), 1974 (Setzer and Throssell 1977b), 1992 (Keegan et al. 1995), and 2002 (Morgan et al. 2006).

Timber Harvest, Flow, and Use

In 2012, Utah had approximately 3.7 million acres of nonreserved timberland (USDA Forest Service 2014) with national forests accounting for 75 percent, private and tribal owners accounting for 16 percent, and other public agencies accounting for the remaining 9 percent (table U1). All private timberland was classified as NIPF timberland. Utah had no large tracts of timberland owned by entities operating primary wood processing facilities. Sawtimber volume on nonreserved timberlands was estimated at 4.3 billion cubic feet (USDA Forest Service 2014) or about 22.2 billion board feet Scribner in 2012.

Timber Harvest

Utah's 2012 commercial timber harvest was 19.4 MMBF Scribner (table U2), 36 percent less than the 2007 harvest of approximately 30.3 MMBF (Hayes et al. 2012), 53 percent less than the 2002 harvest of around 41 MMBF Scribner (Morgan et al. 2006), and almost 70 percent less than the 1974 harvest of 62 MMBF (Setzer and Throssell 1977b). Of the timber harvested in Utah during 2012, 37 percent was live and 63 percent was salvage or standing dead when harvested. Utah harvest has declined from each of the ownerships, but the largest share of the decrease in Utah's total annual timber harvest since 1992 has been due to the decline in National Forest timber harvest. In 1992, National Forest timber accounted for almost 50.0 MMBF (77 percent) of the annual harvest (Keegan et al. 1995). As in most of the Western States, decreasing Federal timber harvests during the 1990s led to greater shares of annual timber harvest coming from other ownerships. National Forest System lands (national forests) still provided most of the State's harvest (52 percent) in 2012, but the

Table U1—Utah nonreserved timberland by ownership class (U.S. Department of Agriculture, FIDO 2014).

Ownership class	Thousand acres	Percentage of nonreserved timberland
National Forest	2,807	75
Private and tribal	606	16
Other public	330	9
Total	3,743	100

Table U2—Utah timber harvest by ownership class, 1992, 2002, 2007 and 2012 (Keegan et al. 1995; Morgan et al. 2006; Hayes et al. 2012).

Ownership class	1992		2002		2007		2012	
	MBF ^a Scribner	Percentage of total	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total
Private and tribal timberland	11,385	17.6	16,282	39.5	11,669	38.5	6,292	32.5
Public timberland	53,289	82.4	24,987	60.5	18,652	61.5	13,064	67.5
National Forest	49,989	77.3	23,776	57.6	15,490	51.1	10,117	52.3
Other public ^b	3,300	5.1	1,211	2.9	3,162	10.4	2,947	15.2
All owners	64,674	100	41,269	100	30,321	100	19,356	100

^a MBF=thousand board feet.

^b Other public includes BLM and State.

volume and share supplied by private and tribal owners continues to be an important component. During 2012, private and tribal landowners accounted for 32.5 percent (6.3 MMBF) of Utah's timber harvest, although this harvest volume represented a 46 percent decline from 2007. At 15 percent of the total, the share of harvest from U.S. Department of the Interior, Bureau of Land Management and State lands in Utah was the highest among Four Corners States in 2012.

National forests provided most (76 percent) of the house logs harvested in 2012. In the harvest of sawlogs, national forests were evenly split with private timberlands and the other public ownership combined; each provided about 50 percent of the sawlog harvest (table U3). For other products (such as furniture logs, posts and poles, and fiber logs) the other public ownership provided the majority of timber at 72 percent. Sawlogs accounted for about 74 percent (14.3 MMBF) of the total volume harvested in 2012, house logs were 17 percent, and other products accounted for about 9 percent.

In 2012, Summit County led Utah's timber harvest with 33 percent (6.4 MMBF) of total volume. Uintah was second with almost 12 percent (2.3 MMBF) followed by three Counties: Emery, Rich, and Sanpete, each providing 7.7 percent (1.5 MMBF) (table U4). In 2007, Wasatch County led Utah's timber harvest, with 14 percent (4.3 MMBF Scribner) of total volume; Sanpete and Garfield Counties followed with 13 and 10 percent, respectively (Hayes et al. 2012). In 2002, Kane and Summit Counties led the harvest with 5.5 MMBF (13 percent) and 4.1 MMBF (10 percent) of the harvest, respectively (Morgan et al. 2006).

Lodgepole pine was the leading species harvested in Utah, accounting for almost 41 percent (7.9 MMBF) of the harvest in 2012, spruces accounted for 31 percent, Douglas-fir 11 percent, and aspen and cottonwood 10 percent (table U5). This represents a shift in species harvested, as spruces, including Engelmann and blue spruce, were the leading species harvested in Utah in 2002 (Morgan et al. 2006) and 2007 (Hayes et al. 2012). During the 1960s and 1970s, ponderosa

Table U3—Utah timber products harvested by ownership class, 2012.

Ownership class	Sawlogs	House logs	Other products ^a	All products
<i>-----Thousand board feet, Scribner-----</i>				
National Forests	7,300	2,508	309	10,117
Private and tribal timberland	5,320	807	165	6,292
Other public ^b	1,730		1,217	2,947
All owners	14,350	3,315	1,691	19,356
<i>-----Percentage of harvested product by ownership-----</i>				
National Forests	50.9	75.7	18.3	52.3
Private and tribal timberland	37.1	24.3	9.8	32.5
Other public ^b	12.1	-	72.0	15.2
All owners	74.1	17.1	8.7	100

^a Other products include industrial fuelwood, furniture logs, fiber logs, posts, and poles.

^b Other ownership class include BLM and State.

Table U4—Utah timber harvest by county, selected years (Setzer and Throssell 1977b; Keegan et al. 1995; Morgan et al. 2006; Hayes et al. 2012).

County	1974	1992	2002	2007	2012	1974	1992	2002	2007	2012
	-----MBF Scribner-----					-----Percentage-----				
Beaver	155	2,952	633	468	200	0.2	4.6	1.5	1.5	1.0
Cache	1,389	175	1,180	1,150	-	2.2	0.3	2.9	3.8	-
Carbon	260	100	1,670	1,564	1,480	0.4	0.2	4.0	5.2	7.6
Daggett	3,193	2,850	375	-	25	5.1	4.4	0.9	-	^a
Davis	-	-	135	-	-	-	-	0.3	-	-
Duchesne	2,539	1,767	3,469	1,793	515	4.1	2.7	8.4	5.9	2.7
Emery	250	-	45	284	1,500	0.4	-	0.1	0.9	7.7
Garfield	8,502	7,047	3,446	3,141	965	13.6	10.9	8.4	10.4	5.0
Grand	5,000	-	20	1,925	-	8.0	-	^a	6.3	-
Iron	-	1,435	773	1,554	200	-	2.2	1.9	5.1	1.0
Juab	-	-	1	-	-	-	-	0.0	-	-
Kane	6,480	4,117	5,520	60	-	10.4	6.4	13.4	0.2	-
Millard	30	-	342	-	-	^a	-	0.8	-	-
Morgan	11	25	250	150	100	^a	^a	0.6	0.5	0.5
Piute	440	620	3,288	500	-	0.7	1.0	8.0	1.6	-
Rich	2,159	-	3,000	-	1,500	3.5	-	7.3	-	7.7
Salt Lake	-	-	65	59	74	-	-	0.2	0.2	0.4
San Juan	5,000	4,503	1,444	1,865	1,400	8.0	7.0	3.5	6.2	7.2
Sanpete	520	3,750	2,468	3,800	1,500	0.8	5.8	6.0	12.5	7.7
Sevier	715	3,663	1,703	1,483	155	1.1	5.7	4.1	4.9	0.8
Summit	5,589	10,000	4,107	2,700	6,430	8.9	15.5	10.0	8.9	33.2
Uintah	14,652	16,624	2,715	1,398	2,300	23.5	25.7	6.6	4.6	11.9
Utah	20	-	323	793	-	^a	-	0.8	2.6	-
Wasatch	1,606	2,908	3,750	4,300	1,012	2.6	4.5	9.1	14.2	5.2
Washington	-	-	375	1,334	-	-	-	0.9	4.4	-
Wayne	3,905	2,110	110	-	-	6.3	3.3	0.3	-	-
Weber	50	20	60	-	-	0.1	^a	0.1	-	-
Total	62,465	64,666	41,268	30,321	19,356	100	100	100	100	100

^a Less than 0.05 percent.

Table U5—Proportion of Utah timber harvest by species, selected years (Setzer and Wilson 1970; Setzer 1971c; Setzer and Throssell 1977b; Keegan et al. 1995; Morgan et al. 2006; Hayes et al. 2012).

Species	1966	1969	1974	1992	2002	2007	2012
	-----Percentage of harvest-----						
Lodgepole pine	18	18	27	46	23	13	41
Spruces	19	13	22	35	44	42	31
Douglas-fir	3	11	8	4	8	11	11
Aspen and cottonwood	^c	^c	4	5	10	29	10
Ponderosa pine	50	43	33	5	13	3	4
True firs ^a	4	7	3	5	2	2	2
Other species ^b	6	8	3	^c	^c	^c	1
All species	100	100	100	100	100	100	100

^a True firs include white, subalpine, and corkbark fir.

^b Other species include juniper and western white pine.

^c Less than 0.5 percent

pine was the leading species harvested, accounting for 30 to 50 percent of the harvest; lodgepole pine and spruces each accounted for 15 to 25 percent of the total (Setzer and Wilson 1970; Setzer 1971c; Green and Setzer 1974; Setzer and Throssell 1977b).

Table U6—Utah timber harvest by species and product, 2012.

Species	Sawlogs	House logs	Other products ^c	All products
<i>-----Thousand board feet, Scribner-----</i>				
Lodgepole pine	7,117	478	291	7,887
Spruces	3,366	2,633	158	6,157
Douglas-fir	2,014	118	23	2,155
Aspen and cottonwood	657	6	1,210	1,873
Ponderosa pine	824	0	0	824
True firs ^a	319	79	8	406
Other species ^b	55	0	1	56
All species	14,350	3,315	1,691	19,356
<i>-----Percentage of product by species-----</i>				
Lodgepole pine	49.6	14.4	17.2	40.7
Engelmann spruce	23.5	79.4	9.4	31.8
Douglas-fir	14.0	3.6	1.4	11.1
Aspen and cottonwood	4.6	0.2	71.5	9.7
Ponderosa pine	5.7	0.0	0.0	4.3
True firs ^a	2.2	2.4	0.5	2.1
Other species ^b	0.4	^d	^d	0.3
All species	74.1	17.1	8.7	100

^a True firs include white, subalpine, and corkbark fir.

^b Other species include juniper, western white pine and hardwoods.

^c Other products include industrial fuelwood, furniture logs, fiber logs, posts, and poles.

^d Less than 0.1 percent

Lodgepole pine was the leading species harvested for sawlogs in 2012, accounting for 7.1 MMBF (50 percent) followed by spruce and Douglas-fir (24 and 14 percent, respectively) (table U6). Aspen and cottonwood accounted for slightly more than 1.2 MMBF (72 percent) of the volume harvested for other products. Spruce was the leading species for house logs with 79 percent.

Timber Flow

More than half (58 percent) of Utah's 2012 timber harvest was processed in-State, and Utah had a net outflow of almost 7.9 MMBF of timber to other States. About 3.4 MMBF was processed in Wyoming, 2.4 MMBF in Colorado, and 2.2 MMBF in Idaho; there was an inflow of 167 MBF from Colorado, Idaho, and Canada for processing in Utah mills (table U7).

Timber processors in Utah received 11,488 MBF of timber in 2012. Private and tribal timberlands provided 5,177 MBF (45 percent) of the timber delivered to Utah mills in 2012 (table U9). National forests provided 52.5 percent (6,034 MBF) of timber receipts, with half of Utah's timber processors receiving timber cut from national forests. In 2012, Utah mills' timber receipts were 58 percent lower than in 2007, when the national forests supplied 56 percent (15,502 MBF) of the timber, and private and tribal owners supplied 42 percent (11,587 MBF). During 2012, national forests provided Utah timber processors with 67 percent of house logs, 48 percent of sawlogs, and 68 percent of other timber products including furniture logs (table U9). Private and tribal landowners provided 50 percent of sawlogs, 33 percent of house logs, and 13 percent of other timber products. State lands provided 2 percent of the timber received by mills in Utah.

Table U7—Timber product flow into and out of Utah, 2012.

Timber product	Log flow into Utah	Log flow out of Utah	Net inflow (net outflow)
---Thousand board feet, Scribner---			
Sawlogs	-	5,735	(5,735)
House logs	120	805	(685)
Other products ^a	47	1,495	(1,448)
All products	167	8,035	(7,868)

^a Other products include industrial fuelwood, furniture logs, fiber logs, posts, and poles.

Table U8—Ownership of timber products received by Utah mills, 1992, 2002, 2007 and 2012 (Keegan et al. 1995; Morgan et al. 2006; Hayes and other 2012).

Ownership class	1992		2002		2007		2012	
	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total	MBF Scribner	Percentage of total
Private timberland	11,341	19.3	9,241	28.4	11,587	42.2	5,177	45.1
Public timberland	46,927	79.9	23,245	71.5	15,732	57.3	6,264	54.5
National Forest	46,595	79.3	21,898	67.3	15,502	56.4	6,034	52.5
State lands	332	0.6	1,346	4.1	230	0.8	230	2.0
Other owners ^a	485	0.8	33	0.1	152	0.6	47	0.4
All owners	58,753	100	32,518	100	27,470	100	11,488	100.0

^a Other owners include the BLM, Canada, and (for 1992) unknown owners.

Table U9—Timber received by Utah forest products industry by ownership class and product, 2012.

Ownership class	Sawlogs	House logs	Other products ^b	All products
-----Thousand board feet, Scribner-----				
Private timberland	4,285	860	32	5,177
Public timberland	4,330	1,770	164	6,264
National Forest	4,100	1,770	164	6,034
State lands	230	-	-	230
Other owners ^a	-	-	47	47
All owners	8,615	2,630	243	11,488
-----Percentage of product by owner-----				
Private and tribal timberland	49.7	32.7	13.2	45.1
Public timberland	50.3	67.3	67.5	54.5
National Forest	47.6	67.3	67.5	52.5
State lands	2.7	-	-	2.0
Other owners ^a	-	-	19.3	0.4
All owners	75.0	22.9	2.1	100

^a Other owners include the BLM and Canada.

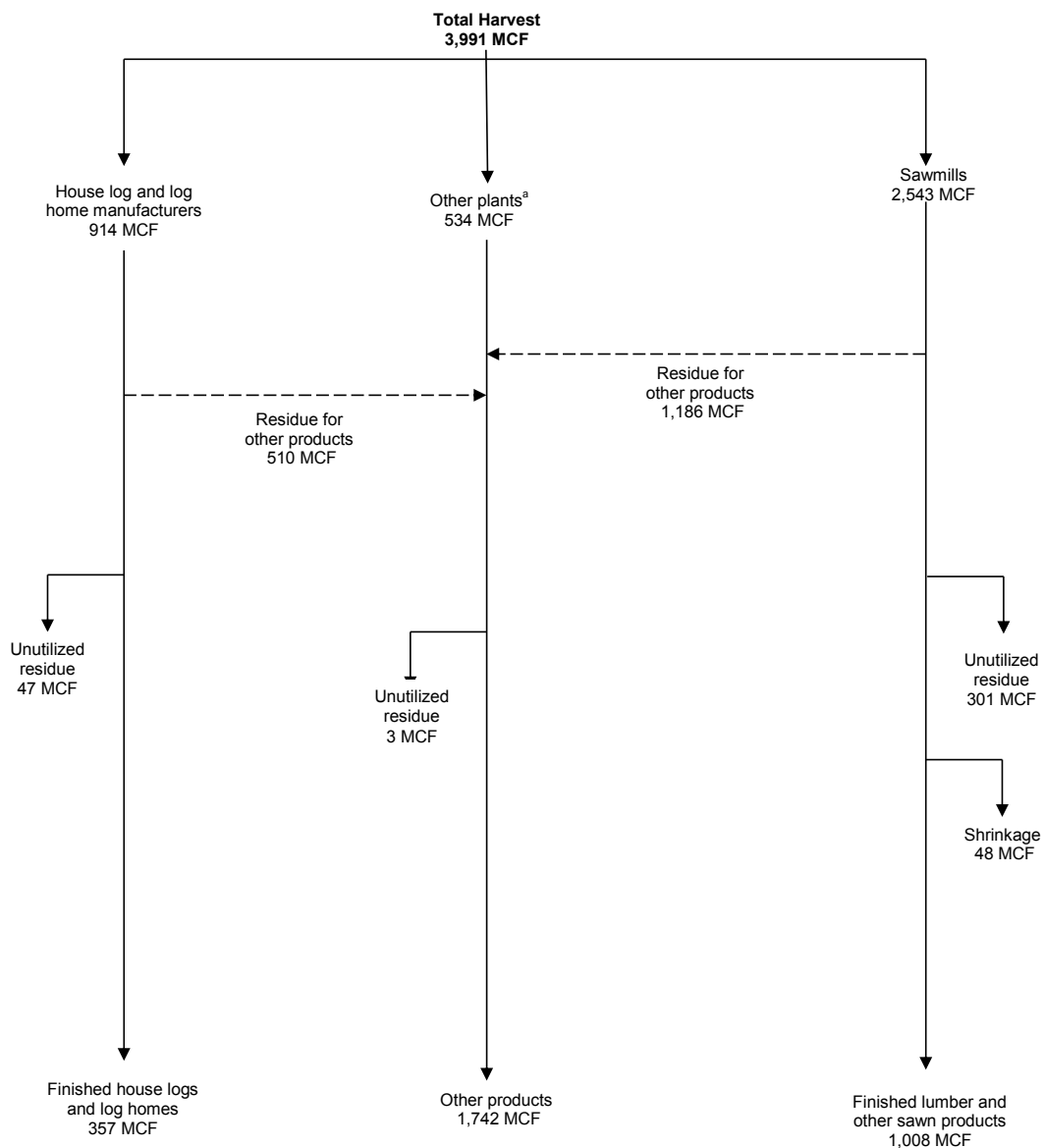
^b Other products include furniture logs, fiber logs, posts and poles.

Timber Use

Utah's 2012 timber harvest—approximately 3,991 MCF, exclusive of bark (fig. U1)—was used by several manufacturing sectors both within and outside of Utah. Of this volume, 2,543 MCF went as logs to sawmills, 914 MCF went to log home manufacturers, and 534 MCF went to other plants, including log furniture, post and pole, and fire/fuel wood facilities. The following conversion factors were used to convert Scribner board foot volume to cubic feet:

- 5.56 board feet per cubic foot for house logs
- 5.08 board feet per cubic foot for sawlogs
- 2.75 board foot per cubic foot for all other products

Of the 2,543 MCF of timber received by sawmills, 1,008 MCF (40 percent) was milled into finished lumber or other sawn products, and about 48 MCF



^a Other plants include post, pole, log furniture, and excelsior manufacturers.

Figure U1—Utah timber harvest and flow, 2012.

was lost to shrinkage. The remaining 1,487 MCF (58 percent) was mill residue. About 701 MCF of sawmill residue was utilized, and about 786 MCF (53 percent) remained unused. Of the 914 MCF of timber received by log home manufacturers, about 357 MCF (39 percent) was processed into house logs, while the remaining 557 MCF became mill residue. About 510 MCF of house log residue was utilized, and about 47 MCF remained unused. Of the 534 MCF of timber received by the other plants, combined with the residues (1,211 MCF) from the other sectors, about 1,742 MCF was utilized as solid wood products such as log furniture, posts and poles, and fire/fuel wood. About 3 MCF of residues from these other sectors went unused.

Forest Industry Sectors

Utah's primary forest products industry in 2012 consisted of 18 active manufacturers in 10 counties (table U10). Facilities tended to be located near the forest resource along the mountainous central spine of the State (fig. U2). Changes in Utah's industry structure over the past 30 years were similar to those experienced throughout the West, with the number of sawmills decreasing and the number and diversity of other manufacturers increasing (Keegan et al. 1995, 2001a,b; Morgan et al. 2004a,b, 2006; Hayes et al. 2012). The sawmill sector (manufacturing lumber and other sawn products) had the most facilities, with 8 mills in 2012. Seven facilities produced house logs and log homes, and there were three log furniture and other products facilities operating in 2012. For comparison, Hayes et al. (2012) identified 27 facilities operating during 2007. Morgan et al. (2006) identified 49 primary wood-processing plants in 2002.

Both the number of primary wood products producers and their sales decreased again between 2007 and 2012. Sales of finished products in 2012 of \$15.1 million were about 49 percent lower than 2007 sales (\$29.8 million, adjusted for inflation) (table U11). This substantial decline was evident across all

Table U10—Active Utah primary wood products facilities by county and product, 2012
(Keegan et al. 1995; Morgan et al. 2006; Hayes et al. 2012).

County	Lumber	Log homes and house logs	Log furniture and other products ^a	Total
Beaver	1			1
Cache			1	1
Duchesne	3			3
Morgan	1			1
Salt Lake	1		2	3
Sanpete		1		1
Summit	2			2
Uintah		3		3
Wasatch		2		2
Weber		1		1
2012 Total	8	7	3	18
2007 Total	12	10	5	27
2002 Total	23	14	12	49
1992 Total	34	13	4	51

^a Other products include posts, poles, and bark products.

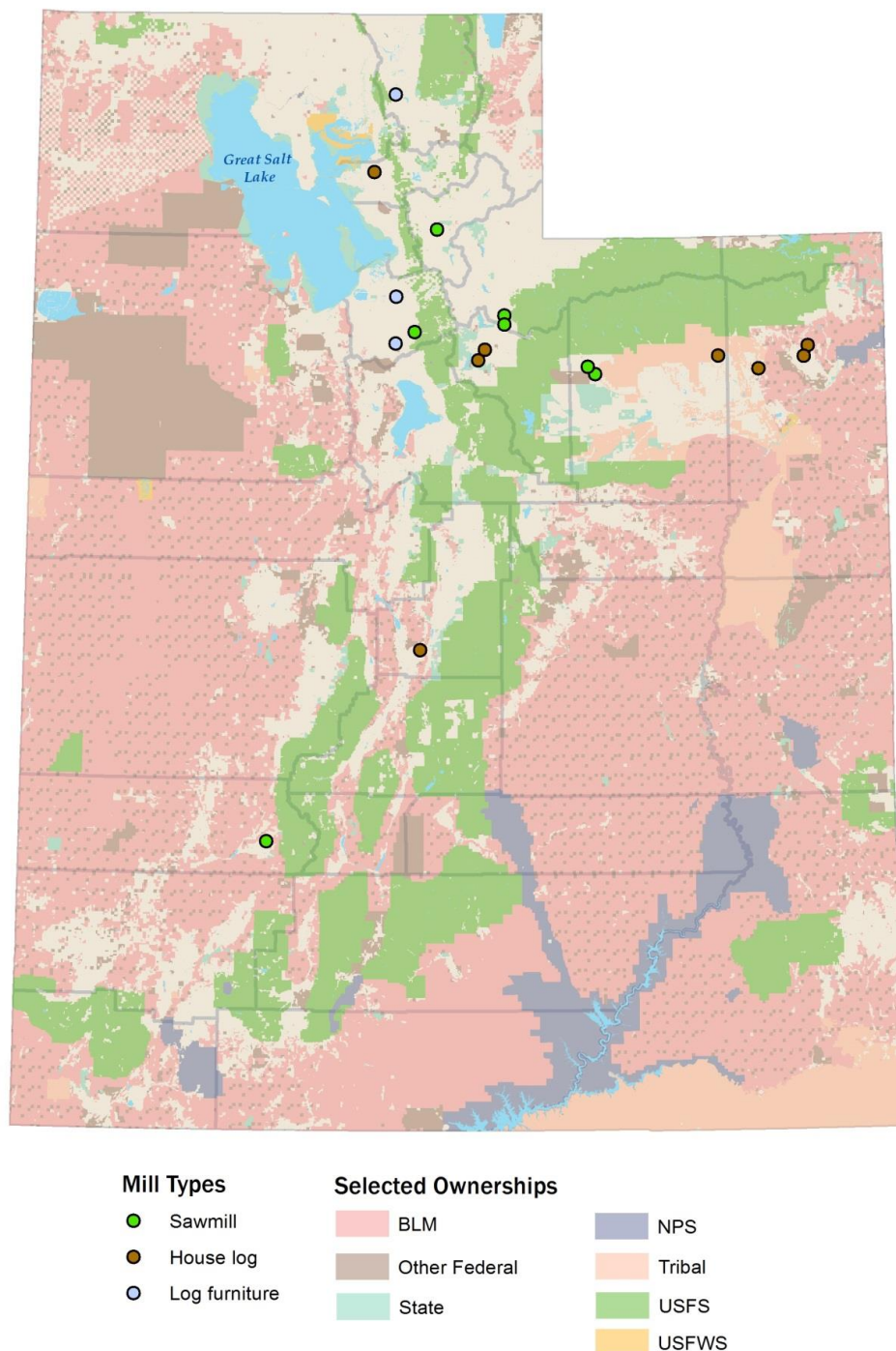


Figure U2—Map of Utah primary timber processors.

sectors: lumber, log home, and other sector sales. Lumber sales were down \$5.4 million from the 2007 totals, and log home manufacturers' sales decreased by \$6.2 million; the sales of other products decreased by \$3.1 million. In 2012, lumber sales accounted for less than 23 percent of finished product sales, versus 30 percent in 2007, 40 percent in 2002, and 73 percent in 1992. House logs and log homes accounted for a larger percentage (nearly 68 percent) of sales in 2012 than in 2002 and 2007 (roughly 55 percent of sales in both years). Other products sales declined nearly 69 percent in 2012 but remained close to 9 percent of total sales in 2012.

Table U11—Finished product sales of Utah's primary wood products sectors, 1992, 2002, 2007, 2012 (Keegan et al. 1995; Morgan et al. 2006; Hayes et al. 2012).

Sector	1992	2002	2007	2012
-----Thousands of 2012 dollars-----				
Sawmills	29,902	15,970	8,859	3,443
Log home sector	10,053	22,935	16,434	10,264
Other sectors ^a	1,072	3,592	4,547	1,425
Total	41,027	42,497	29,840	15,131

^a Other sectors include producers of posts, poles, and log furniture. Mill residues, firewood, mulch, and bark products not included for comparison to previous years.

Sawmill Sector

Utah's sawmill sector has been in decline for several decades. Lumber production in 2012 was 58 percent lower than in 2007, 64 percent lower than in 2002, 85 percent lower than in 1992, and 87 percent lower than in 1966, while the number of mills declined 33, 65, 76, and 84 percent over the same periods (table U12). Most of the production loss was among the State's larger mills, which produced more than 1 MMBF of lumber annually. The greatest loss in number of milling facilities was among the small mills. The proportion of lumber production by large versus small mills decreased from the 2007 level of 94 percent with larger mills contributing 87 percent of the production in 2012, but the average annual lumber production per mill returned to the 2002 level (table U13). Average annual lumber production among the State's four largest mills was about 2.1 MMBF lumber tally in 2012 (table U14), compared to 4.3 MMBF among five mills in 2007. The remaining four small mills had an average lumber production of 303 MBF in 2012, compared to the 2007 average production of 182 MBF at seven small mills (Hayes et al. 2012).

Table U12—Utah sawmills by production size class, selected years (Setzer and Wilson 1970; Keegan et al. 1995; Morgan et al. 2006; Hayes et al. 2012).

Year	Under 1 MMBF ^a	Over 1 MMBF ^a	Total
-----Number of sawmills-----			
2012	4	4	8
2007	7	5	12
2002	17	6	23
1992	25	9	34
1966	37	13	50
---Percentage of lumber output---			Volume (MBF ^b)
2012	13	87	9,553
2007	6	94	22,892
2002	13	87	26,524
1992	13	87	63,637
1966	10	90	72,000

^a Size class is based on reported lumber production. MMBF = million board feet lumber tally.

^b MBF = thousand board feet lumber tally.

Table U13—Number of Utah sawmills and average lumber production, selected years (Setzer and Wilson 1970; Keegan et al. 1995; Morgan et al. 2006; Hayes et al. 2012).

Year	Number of sawmills	Average production per mill
		<i>MMBF^a</i>
2012	8	1.2
2007	12	1.9
2002	23	1.2
1992	34	1.9
1966	50	1.4

^a MMBF = million board feet lumber tally.

Table U14—Utah lumber production by mill size, 2012.

Size class ^a	Number of mills	Volume	Percentage of total	Average per mill
		<i>MBF^b</i>		<i>MBF^b</i>
Over 1 MMBF	4	8,343	87	2,086
Under 1 MMBF	4	1,210	13	303
Total	8	9,553	100	1,194

^a Size class is based on reported lumber production. MMBF denotes million board feet lumber tally.

^b MBF = thousand board feet lumber tally.

On average, Utah sawmills produced about 1.25 board feet of lumber for every board foot Scribner of timber processed. This average overrun of 25 percent in 2012 is slightly higher than the 2007 overrun of 20 percent (Hayes et al. 2012). The increase in overrun over the past 5 years indicates a possible shift in products manufactured, smaller or higher quality logs utilized, or sawmills' investment in new milling technology to help improve their efficiency.

Sales from sawmills accounted for just 23 percent (\$3.4 million) of Utah timber processors' finished products sales in 2012. This proportion of sales from sawmills was the smallest of the Four Corners States. Sales from sawmills accounted for more than 39 percent of sales in Arizona, 29 percent of sales in New Mexico, and more than 45 percent in Colorado during 2012. Dimension lumber and studs accounted for almost \$1.4 million (40 percent) of sawmill product sales in 2012; timbers and cants accounted for \$913 thousand (27 percent). Board and shop lumber accounted for \$540 thousand (16 percent) and other sawn products accounted for the balance (17 percent) of finished products sales from sawmills.

Log Home Sector

Sales value from Utah's log home sector decreased over the past 5 years. This sector lost facilities during the period; seven house log manufacturers were identified in 2012—three fewer than in 2007. Only firms that processed timber and manufactured house logs or log homes, not log home distributors, were included in the 1992, 2002, 2007 and 2012 censuses. In 2012, Utah's seven log home manufacturers processed 2.6 MMBF of timber, produced about 731 MLF of house logs, and generated about \$10.3 million in product sales. By sales value,

Utah's log home sector is the third largest in the Western United States behind Montana and Colorado.

Other Products Sector

The number of facilities in Utah's other products sector decreased significantly in the past 10 years, with less than one-quarter as many facilities operating in 2012 as in 2002. Sales of the other products sector have also greatly decreased proportionally from 2007. There were three other product facilities in 2012 that produced log furniture. Sales of log furniture totaled almost \$1.4 million in 2012. Additional detail about the sector is withheld to protect the confidentiality of firm-level information.

Capacity and Utilization

Utah's annual sawmill lumber production capacity was 51.1 MMBF in 2012. Sawmills produced 9.6 MMBF (lumber tally) of lumber and utilized 19 percent of their production capacity. This was the lowest level of sawmill production capacity utilization in the Four Corners States in 2012. Timber-processing capacity among Utah sawmills was 38,269 MBF Scribner, with 8,994 MBF Scribner of timber processed, making utilization of timber-processing capacity among sawmills about 24 percent in 2012. Such low levels of capacity utilization often signal the closing of mills and this was no exception for Utah, which saw the closing of four sawmills and increased outflow of timber to be processed in other States. Across all industry sectors, total timber-processing capacity was 66,082 MBF Scribner. Accounting for changes in mills' log inventories, a total of 13,197 MBF Scribner was processed by Utah firms in 2012, making timber-processing capacity utilization about 20 percent across all sectors.

Mill Residue Volumes, Types, and Uses

Across all sectors, Utah timber processors produced 16,661 BDU (about 1,602 MCF) of mill residue, with 80 percent being utilized (table U15). Total residue production in 2012 declined from 2,654 MCF in 2007, and the proportion utilized also decreased from 87 percent in 2007 (Hayes et al. 2012). Utah's decreased residue production was a function of decreased timber processing in 2012 compared to prior years. Residue utilization declined by 7 percentage points, with a greater share of bark and fine residues going unused, compared to 2007. Sawmills, the leading timber processors, were also the main residue producers in Utah, producing 1.13 BDU of residue per MBF of lumber in 2012 (table U16).

Coarse residue was the State's largest residue component at 58 percent (9,697 BDU) of all residues in 2012, with 86.2 percent utilized. In-State facilities used 5,964 BDU of the coarse material for unspecified uses, with the remaining utilized volume going to energy. Fine residues—sawdust and planer shavings—were the second largest component at 21 percent (3,536 BDU) of mill residues. More than 78 percent of fine residue was utilized in 2012, primarily as mulch or animal bedding, with about one-fifth of fine residues going to unspecified uses.

Table U15—Production and disposition of Utah mill residues, 2012.

Residue type	Total utilized	Pulp and board	Energy	Mulch/ bedding	Unspecified use	Unused	Total produced
<i>-----Bone-dry units^a-----</i>							
Coarse	8,357	-	2,393	-	5,964	1,341	9,697
Fine	2,762	-	-	2,045	717	774	3,536
Sawdust	1,632	-	-	1,375	258	295	1,927
Planer shavings	1,129	-	-	670	459	479	1,609
Bark	2,189	-	-	2,001	188	1,239	3,428
Total	13,307	-	2,393	4,046	6,868	3,354	16,661
<i>-----Percentage of residue type-----</i>							
Coarse	86.2	-	24.7	-	61.5	13.8	58.2
Fine	78.1	-	-	57.8	20.3	21.9	21.2
Sawdust	84.7	-	-	71.3	13.4	15.3	11.6
Planer shavings	70.2	-	-	41.7	28.5	29.8	9.7
Bark	63.8	-	-	58.4	5.5	36.2	20.6
Total	79.9	-	14.4	24.3	41.2	20.1	100

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

Table U16—Utah sawmill residue factors, 1992, 2002, 2007 and 2012 (Keegan et al. 1995; Morgan et al. 2006; Hayes et al. 2012).

Residue type	1992	2002	2007	2012
<i>-----BDU/MBF lumber tally^a-----</i>				
Coarse	0.56	0.48	0.44	0.64
Sawdust	0.19	0.19	0.21	0.14
Planer shavings	0.06	0.10	0.15	0.10
Bark	0.28	0.21	0.20	0.25
Total	1.09	0.98	1.00	1.13

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

Bark accounted for 21 percent of all residues, with 3,216 BDU (36 percent) going unused.

The reduced residue utilization rate in Utah represents a challenge for the State's timber processors. Without buyers/users of mill residue, the residue can present a disposal problem and increase costs for timber processors. In many other Western States without the traditional residue users like particle board plants or pulp mills, mill residues are increasingly being used for biomass energy, as decorative landscaping mulch, and as animal bedding.

Primary Forest Products Sales and Industry Employment

Sales from Utah's primary wood products industry during 2012 totaled \$16.7 million, including finished products and mill residues (table U17). House logs and log homes accounted for 45 percent (\$7.2 million) of total sales (and manufacturers in the house log category had another \$3 million in sales of other products, primarily lumber). Lumber, timbers, and other sawn products accounted for about 39 percent (\$6.5 million); other products and mill residues

accounted for 16 percent (nearly \$3.0 million). Utah was the leading market area for lumber, log homes, posts, poles, and log furniture, with in-State sales accounting for almost 38 percent of total sales. The other Four Corners States (Arizona, Colorado, and New Mexico) accounted for 21 percent of total sales, with lumber and sawn products accounting for 61 percent of sales in the region. The North Central region accounted for 11 percent of total sales, with log homes accounting for 45 percent of sales to the region. Other Rocky Mountain States followed the Four Corners States as a major market area for lumber and other sawn products as well as for house logs and log homes.

There were about 5,600 jobs in Utah's primary and secondary forest industry during 2012, representing a 32 percent decline from the more than 8,200 jobs in the industry in 2007. Based on the 2012 industry census and employment data from the Bureau of Economic Analysis (U.S. Department of Commerce, BEA 2014), about 460 (8 percent) of Utah's forest industry jobs were in the primary sector, or jobs that involve harvesting and processing of timber and mill residues. The remaining 5,140 jobs in Utah's forest sector are considered secondary, or jobs that involve further processing of primary sector outputs.

Table U17—Destination and sales value of Utah's primary wood products and mill residues, 2012.

Product	Utah	Other 4-Corner States	Other Rocky Mtn States ^a	Far West ^b	Northeast ^c	South ^d	North Central ^e	Total
-----Thousand 2012 dollars-----								
Lumber, timbers, and other sawn products	2,013	2,170	566	9	599	576	610	6,544
House logs and log homes	2,550	1,197	840	37	858	856	840	7,178
Other products ^f	1,759	200	30	30	300	230	430	2,979
Total	6,321	3,567	1,436	76	1,758	1,662	1,880	16,700
-----Percentage of regional sales by product-----								
Lumber, timbers, and other sawn products	31.8	60.8	39.4	12.4	34.1	34.7	32.4	39.2
House logs and log homes	40.3	33.6	58.5	48.3	48.8	51.5	44.7	43.0
Other products ^f	27.8	5.6	2.1	39.3	17.1	13.8	22.9	17.8
Total	37.9	21.4	8.6	0.5	10.5	10.0	11.3	100

^a Other Rocky Mountains includes Idaho, Montana, Nevada.

^b Far West includes Alaska, California, Hawaii, Oregon, and Washington.

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

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

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

^f Other products include posts, poles, log furniture, and mill residues.

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