



Alaska's Forest Products Industry and Timber Harvest, 2015

Part 1: Timber Harvest, Products, and Flow

Kate C. Marcille, Erik C. Berg, Todd A. Morgan, and Glenn A. Christensen

Introduction

This resource bulletin is part of a series of reports presenting findings from a University of Montana Bureau of Business and Economic Research (BBER) census of Alaska's primary forest products industry. Part 1 of this series presents information on the volume of timber harvested in Alaska during 2015 by product, ownership, species, and resource area. It also describes the flow of timber within the state, across state lines, and exports to countries outside the United States.

This survey effort is the third application of its kind in Alaska (Berg et al. 2014, Halbrook et al. 2009), and presents information collected from a census of primary manufacturers in the state that receive timber harvested in Alaska. Primary forest product manufacturers are firms that process timber into products such as lumber, as well as facilities such as wood pellet plants that use the wood fiber directly from timber processors. Using a written questionnaire, or a telephone or in-person interview, timber-processing and residue-utilizing facilities provided information about their 2015 operations for the following:

- Plant location, production capacity, and employment
- Volume of raw material received by county and ownership origin
- Species of timber volume received and corresponding live/dead proportions
- Finished product volumes, types, sales value, and market locations
- Volume, utilization, and marketing of manufacturing residue

For facilities that did not respond to the survey, data collected in previous surveys were updated using current data collected for facilities of a similar size with a similar product type and location, as well as information on market trends and prices. For the 2015 Alaska mill census, data were received for 51 of the 60 active, in-state facilities, which accounted for 85 percent of primary manufacturers. While some facility data were estimated, 80 percent of the 2015 harvest volume was captured through direct census of manufacturers or published information. Unlike other western states (ODF 2015, WA-DNR 2015), no single state agency compiles and comprehensively reports statewide timber harvest statistics for Alaska. For this report, timber harvest estimates were based on several sources, including BBER mill census data collected from primary processors; U.S. Department of Agriculture (USDA), Forest Service cut and sold reports; Timber Supply and Demand (706a) reports to Congress under the Alaska National Interest Lands Conservation Act (ANILCA) (Alexander 2012); State of Alaska Division of Forestry personal correspondence; as well as trade and export data compiled from the U.S. International Trade Commission (USITC).

The BBER and USDA Forest Service, Pacific Northwest Research Station's Forest Inventory and Analysis (FIA) program cooperated in the analysis and preparation of this report. With the FIA programs at the Pacific Northwest and Rocky Mountain Research Stations, BBER has developed the Forest Industries Data Collection System (FIDACS) to collect, compile, and

make available state and county information on forest products industry operations. Because this study is based on a census, rather than a statistical sample of mills, there is no statistical error associated with the estimates presented. Possibilities of reporting and measurement errors exist but are minimized by cross-checking data against other public and private information sources, and by checking the data for internal consistency. Summary data tables and figures are reviewed by wood products researchers, state and federal agency personnel, and members of the state's forest products industry. However, company-level data are confidential and will not be released.

Alaska's Timber Resource

Coastal Alaska contains approximately 6.2 million acres of timberland, varying in ownership and species composition from north to south (Miles, n.d.). Nearly 79 percent of Alaska's timberlands are publicly owned, with the majority represented by Forest Service

holdings. The Tongass National Forest includes 3.4 million acres of coastal timberland, while the Chugach National Forest encompasses approximately 0.4 million acres of timberland. Additional federal ownership designations account for approximately 77,000 acres of Alaska's timberland. Alaska's Division of Forestry manages approximately 951,000 acres of timberland (Miles, n.d.). Privately held timberland, including Alaska Native corporations recognized under the Alaska Native Claims Settlement Act (ANCSA), account for approximately 1.3 million acres of Alaska's inventoried timberland. Alaska has the second-lowest proportion of forest classified as timberland of all 50 states. Of this low proportion of timberlands, publicly held timberlands account for the majority of sawtimber volume (fig. 1) (Miles, n.d.).

Similarly, 77 percent—approximately 110,893 million board feet (MMBF) Scribner—of sawtimber volume is found on National Forest System (NFS) land (Christensen 2017).

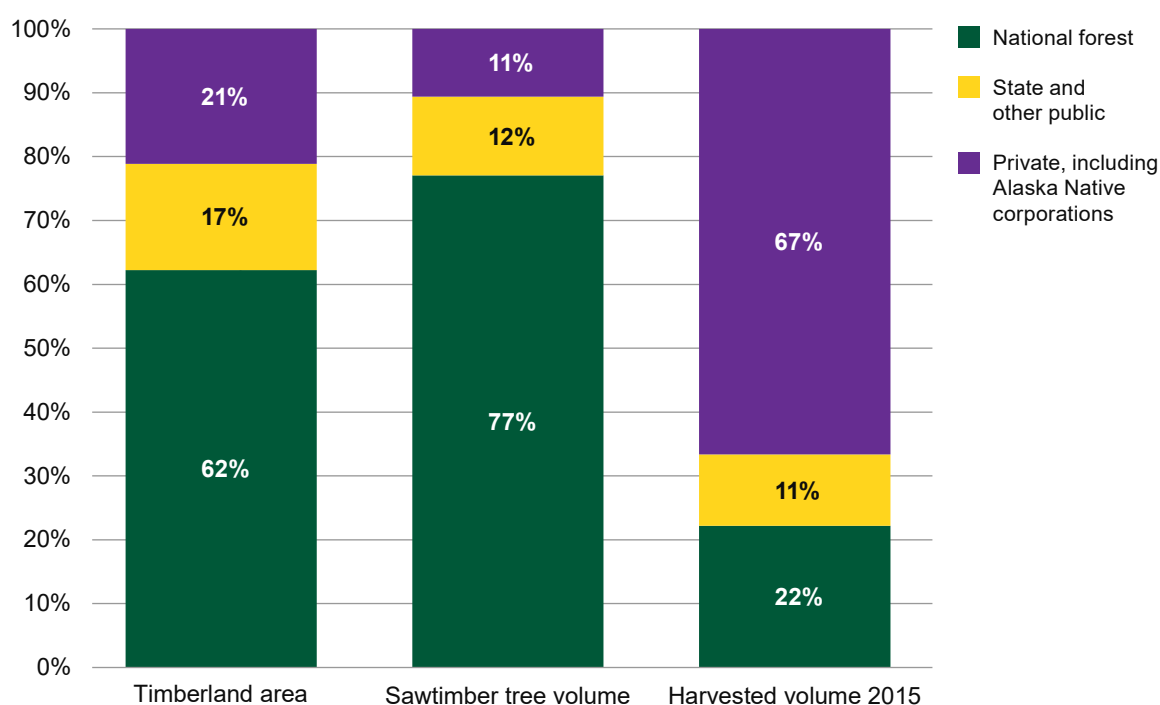


Figure 1—Characteristics of Alaska's timberland and timber harvest by ownership class, 2015 (BBER 2016, Miles, n.d.).

Sitka spruce (*Picea sitchensis* (Bong.) Carrière) accounts for roughly 25 percent (34,474 MMBF Scribner) of Alaska's sawtimber volume, while western hemlock (*Tsuga heterophylla* (Raf.) Sarg) represents the largest proportion of statewide sawtimber volume at 55 percent (79,305 MMBF Scribner) (Christensen 2017). National forests accounted for 22 percent of the total timber harvest in 2015, while private lands contributed the majority (67 percent) of timber harvest volume. Timberland information for this report is based on the FIA coastal Alaska permanent-plot-derived forest statistics. Historically, characterizing changes over time across the entire state of Alaska's timberlands has been challenging because there is no annualized permanent forest inventory for interior Alaska. However, during 2016, the FIA program initiated the systematic collection of plot measurements in the interior region to start addressing the challenges associated with previously missing forest inventory data.

Alaska's Timber Harvest

Timber harvest volume in 2015 was estimated at 136.4 MMBF Scribner, or approximately 25.3 million cubic feet (MMCF). Alaska's timber harvest volume has continued to decrease; it was 268.3 MMBF in 2005 (Halbrook et al. 2009) and 175.4 MMBF in 2011 (Berg et al. 2014). Within a decade, timber harvest volume in Alaska has decreased by nearly 50 percent (fig. 2). This decreasing trend has been observed across other western states in response to shifting forest policies as well as dynamic wood product markets. The Great Recession and subsequent drop in U.S. home construction between 2007 and 2009 reduced the demand for lumber and other wood products through 2010 and 2011 (Keegan et al. 2012). Though domestic home construction and

overseas demand have led to improvements across wood products markets, Alaska harvest levels continued to decrease between 2011 and 2015.

International log exports continue to be a large driver of harvesting activity in Alaska, representing more than 75 percent of the total timber harvest in 2015. This represents a decrease in the proportion of timber harvest exported relative to 2011 levels, when approximately 87 percent of the total timber harvested was exported. Private individuals and Alaska Native corporations are the predominant export entities in Alaska. However, as of 2007, the Limited Supply Shipping Policy of the USDA Forest Service allowed the regional forester to authorize the Tongass National Forest to export roundwood logs from public lands (Hines 1987, USDA FS 2017). Log exports across many other western states represent a small fraction of harvested volume, and most timber volume harvest across the West is processed at either in-state or neighboring state facilities (Berg et al. 2014; McIver et al. 2013, 2015; Simmons et al. 2016).

Harvest Ownership and Product Type

Although most of the timberland in Alaska is held under public ownership, privately held lands—including those managed by Alaska Native corporations—accounted for the majority of the timber harvested in 2015 (fig. 1). Private lands supplied 67 percent (90.8 MMBF Scribner) of Alaska's 2015 harvest volume (table 1); this represented both a decrease in volume harvested (128 MMBF) and overall proportion (73 percent) of total harvest from 2011 levels (Berg et al. 2014). Conversely, harvest across public ownerships represents an increasing proportion of the total harvest, with national forest timber harvest accounting for

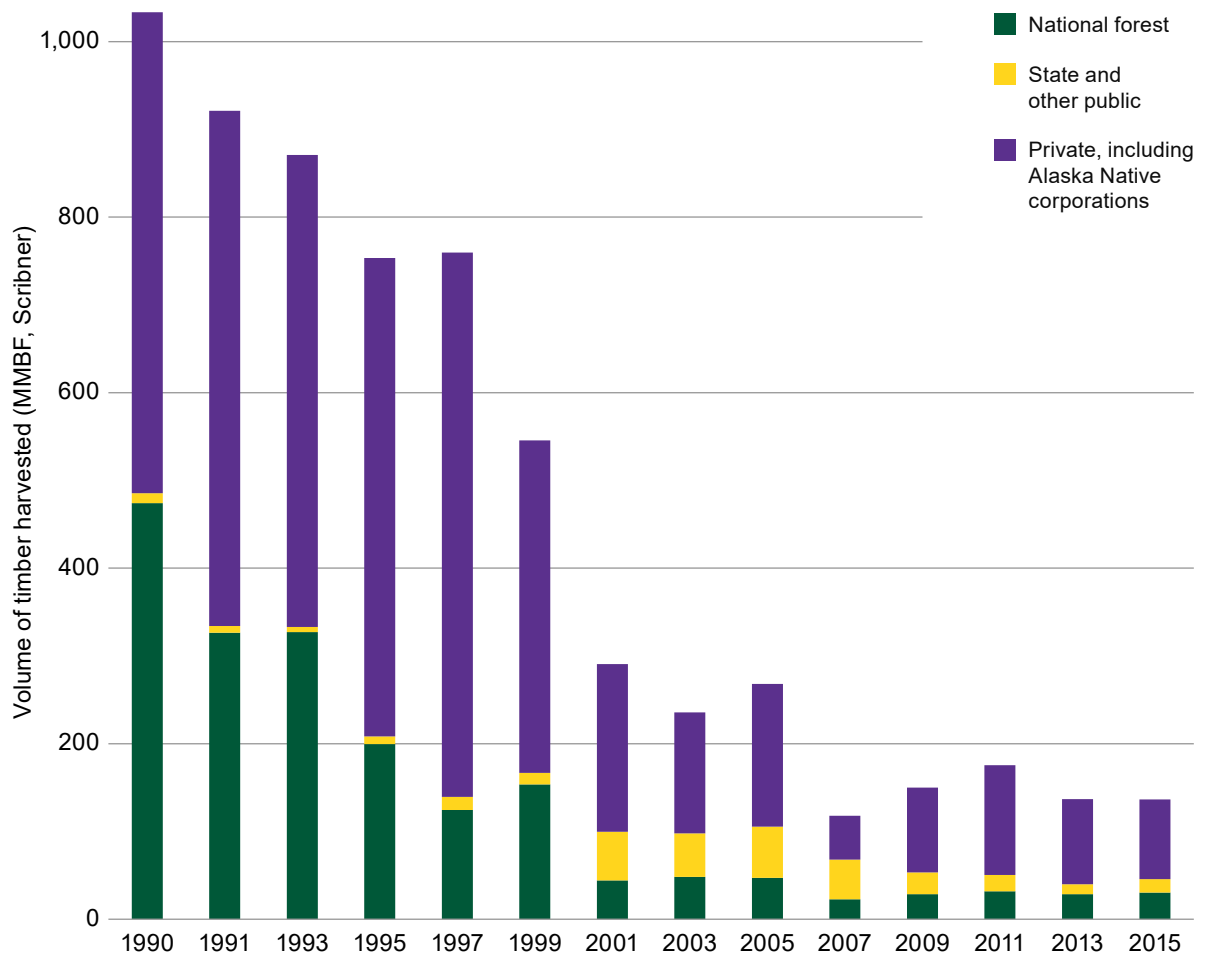


Figure 2—Alaska's timber harvest volume by ownership, selected years (Alexander 2012, BBER 2016, Berg et al. 2014, Brackley et al. 2009, USITC 2016, Zhou 2013, Zhou and Warren 2012).

approximately 30.3 MMBF (22 percent) of the volume in 2015, compared with approximately 28.7 MMBF (16 percent) in 2011.

Sawlogs, including export logs as well as logs used to produce lumber and other sawn products, have consistently been the predominant timber product harvested in Alaska. In 2015, sawlogs accounted for nearly 94 percent (127.8 MMBF) of the total timber harvest (table 1). Private lands provided most sawlogs (70 percent), while national forests supplied approximately 23 percent of sawlog volume.

Fuelwood used in the production of industrial heat, residential firewood, as well as wood pellet production, was the second-largest product type harvested in 2015. Fuelwood's

proportion of Alaska's timber harvest nearly doubled between 2011 and 2015, accounting for about 4 percent (5.7 MMBF) of the 2015 harvest. State and other public lands provided nearly all the fuelwood volume. House logs accounted for almost 1 percent of the harvest volume in 2015, similar to the proportion in 2011. Most of the house log volume came from state land (64 percent), followed by private lands (21 percent), and national forests (15 percent). Timber harvest volume used for other products exceeded house log harvest volume by more than 250 thousand board feet (MBF) in 2015, a notable increase from 2011. Predominantly sourced from national forests, other timber products include cedar

Table 1—Alaska timber harvest by ownership class and product type, 2015

Ownership class	Sawlogs	House logs	Fuelwood	Other products ^a	All products	2011 All products ^b
----- Thousand board feet Scribner -----						
Private, including Alaska Native corporations	89,244	281	823	501	90,848	127,990
National forest	28,961	194	60	1,071	30,286	28,688
State and other public	9,556	846	4,835	—	15,237	18,590
All owners	127,761	1,321	5,718	1,572	136,371	175,267

Note: Totals may not sum because of rounding, — = 0.

^aOther timber products include tonewood and cedar products.

^bBerg et al. (2014)

Table 2—Alaska timber harvest by species and product type, 2015

Species	Sawlogs	Other products ^{a,b}	All products
----- Thousand board feet Scribner -----			
Sitka spruce	96,115	279	96,393
Western hemlock	14,594	117	14,711
Western redcedar	12,188	1,294	13,483
White spruce	2,530	5,196	7,726
Birch species	734	1,280	2,014
Alaska yellow-cedar	1,425	247	1,671
Other ^c	174	198	373
All species	127,761	8,610	136,371

Note: Totals may not sum because of rounding.

^aOther products include house logs, fuelwood logs, cedar product logs, and tonewood.

^bProducts by species were combined to prevent disclosure.

^cOther species include cottonwood, quaking aspen, black spruce, poplar, and red alder.

products (shakes, shingles, and fencing) as well as tonewood used to craft musical instruments. While the combined category of these other wood products only accounted for 1 percent of the total harvest in 2015, the volume increased fourfold from 2011.

Harvest by Species

At more than 96 MMBF Scribner, Sitka spruce was the leading species harvested in Alaska in 2015 (table 2). Sitka spruce was also Alaska's predominant international export species. Historically, Alaska's timber harvest has been led by Sitka spruce, accounting for 47 percent (126.8 MMBF) of the total harvest volume in 2005 (Halbrook et al. 2009), 64 percent

(111 MMBF) in 2011 (Berg et al. 2014), and increasing to 70 percent in 2015. Western hemlock and western redcedar (*Thuja plicata* Donn ex D. Don) each accounted for roughly 10 percent of the overall harvest in 2015. Western hemlock, as a proportion of total harvest, has continued to decline from 28 percent (77.5 MMBF) in 2005, to 20 percent (35 MMBF) in 2011, and a notable decrease to nearly 11 percent (14.6 MMBF) in 2015. Though the proportion of the overall harvest represented by western hemlock has fallen over the past decade, it still comprises most of the growing stock volume on timberland in southeast Alaska (Miles, n.d.). White spruce (*Picea glauca* (Moench) Voss)

and a mix of birch species (*Betula neoalaskana* Sarg. and *Betula papyrifera* Marsh.) both experienced increases in volume harvested from 2011 to 2015, with most of their harvest occurring across interior Alaska.

Harvest by Geographic Source and Timber Flow

The geographic sources of Alaska's timber harvest have been divided into five resource areas (fig. 3). Interior Alaska was the only resource area to experience an increase in harvest volume between 2011 and 2015. Harvest volume in interior Alaska increased by about 1.4 MMBF, accounting for approximately 6 percent (7.9 MMBF) of the total timber harvest in 2015. While combined harvest volume in southcentral and western Alaska fell to 52.5 MMBF, the proportional contribution of timber harvest from these areas increased slightly in 2015. The southcentral and western regions of Alaska were combined in this report and in related

data tables to avoid disclosure of individual mill information. Harvest volume from southeast Alaska experienced the most dramatic shift, decreasing by 25 percent between 2011 and 2015 and accounting for 76 MMBF in 2015. Southeast boroughs and census areas contributed nearly 60 percent of all the sawlog volume harvested in 2015, compared with the more than 80 percent of sawlog harvest volume in 2011. Interior Alaska accounted for 84 percent of the fuelwood products harvested in 2015. Most of the harvest for house log and log home products originated in southcentral and western Alaska (48 percent) followed by interior Alaska (39 percent).

Overall, timber harvest in 2015 shifted away from southeast Alaska toward the southcentral, western, and interior resource areas. However, southeast Alaska still accounts for approximately 56 percent of the timber harvest volume and contains the majority of the state's manufacturing infrastructure and capacity.

Approximately 105 MMBF (77 percent) of the 2015 Alaska timber harvest were international log exports, and 23 percent of statewide harvest was received by Alaska processing facilities. Alaska facilities did not report sending logs to out-of-state facilities for additional processing, nor did they report receiving timber from any other states or countries.

Most of Alaska's sawmills and timber-processing capacity are in southeast Alaska. Across all of Alaska's geographic resource areas, nearly 100 percent of the timber harvested (excluding volume intended for export) in each region was also processed in the same resource area, indicating limited timber flow between resource areas within Alaska. The small exception was the approximately 3 percent of harvest from southcentral Alaska which flowed to southeast Alaska for processing.



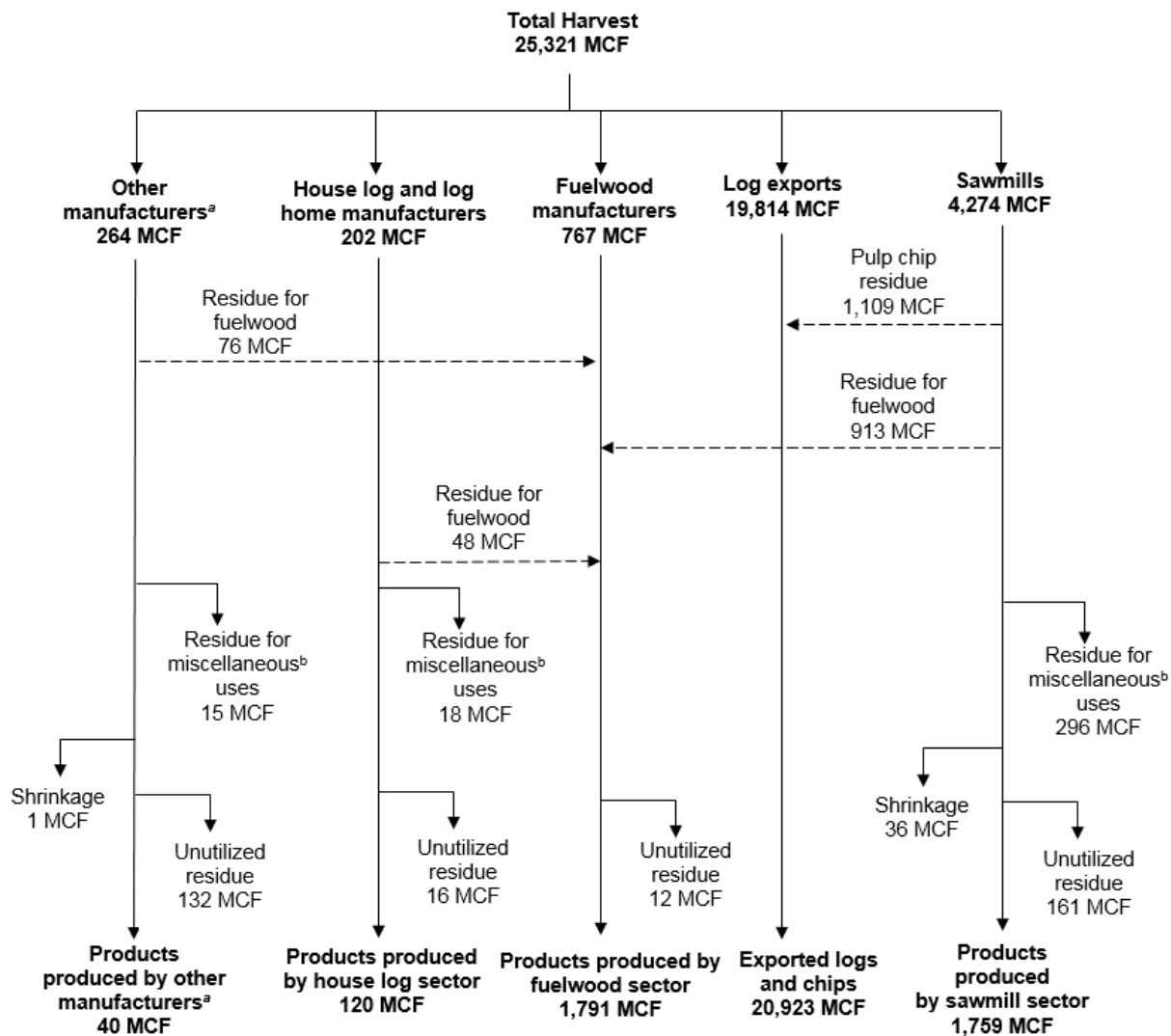
Figure 3—Alaska's geographic resource areas.

Utilization of Alaska's Timber Harvest

Alaska's 2015 timber harvest was approximately 25.3 MMCF, excluding bark (fig. 4). This total harvest volume flowed to a variety of in-state timber processing facilities and to other countries as log exports. The majority, 78 percent (19.8 MMCF) was exported as logs, 17 percent (4.3 MMCF) went to sawmills, 3 percent (767 thousand cubic feet [MCF]) went to fuelwood manufacturers, 1 percent (264 MCF) went to producers of

tonewood and cedar products, while the remaining 1 percent (202 MCF) went to house log and log home manufacturers.

Of the volume received and processed by Alaska facilities (5.5 MMCF), approximately 19 percent (1 MMCF) became residue used for fuelwood, while 6 percent (329 MCF) became residue for a suite of miscellaneous uses, including landscape mulch and animal bedding. Of the nearly 4.3 MMCF of volume received by sawmills, more than 41 percent (1.8 MMCF) became finished lumber or other



^a Other manufacturers include manufacturers of tonewood and cedar products.

^b Miscellaneous uses include landscape mulch and animal bedding.

Figure 4—Alaska's 2015 timber harvest by product type and final disposition.

sawn products. Approximately 321 MCF of wood fiber was unused. Log export sort yards are also a source of residue (TSS Consultants 2000); however, BBER was unable to obtain recent and accurate data on sort yard residue and biomass volumes.

See also, “Part 2: Industry Sectors, Capacity, and Outputs;” “Part 3: Sales, Employment, and Contributions to the Statewide Economy;” and “Part 4: Alaska Data Tables.”

Metric Equivalents

When you know:	Multiply by:	To find:
Acres	0.405	Hectares
Cubic feet	0.0283	Cubic meters

Species List

Sitka spruce (*Picea sitchensis* (Bong.) Carrière)

Western hemlock

(*Tsuga heterophylla* (Raf.) Sarg)

Western redcedar

(*Thuja plicata* Donn ex D. Don)

White spruce (*Picea glauca* (Moench) Voss)

Alaska paper birch (*Betula neoalaskana* Sarg.)

Paper birch (*Betula papyrifera* Marsh.)

Glossary

board foot or board feet—A unit of measure applied to lumber that is 1 foot by 1 foot by 1 inch (30.48 centimeters by 3.48 centimeters by 2.54 centimeters) (or its equivalent) and also associated with roundwood as to its potential yield of such products.

board foot to cubic foot ratio (BFCF)—

The University of Montana’s Bureau of Business and Economic Research developed conversion factors for each timber processing sector (by state) to convert Scribner board foot volume to cubic foot using the methods outlined in Keegan et al. (2010). Ratios have changed through time

as a result of changes in product recovery, residue production, and shifts in log diameter size utilized.

cubic foot or cubic feet—A unit of true volume that measures 1 foot by 1 foot by 1 foot (30.48 centimeters by 30.48 centimeters by 30.48 centimeters).

fuelwood—Refers to wood used in the production of industrial heat and steam and residential firewood as well as wood pellet production. Pellets can be produced from mill residues (e.g., sawdust and shavings) as well as chipped roundwood.

house log—Roundwood timber used to construct log homes. Products manufactured from house logs can be sawn, scribed by hand, notched, or milled by lathe to meet customer construction needs. House log timber is often dead (by choice, because “green” logs usually require drying before they can be used for construction) and of lower value than sawlogs.

production capacity (owner reported)—

Potential ability of a facility to produce output per shift or 240-day work year, assuming one 8-hour shift per day, firm market demand for products, and sufficient supply of raw materials. For sawmills, expressed as thousand board feet (MBF) lumber tally per shift or per year. Production capacity included in University of Montana’s Bureau of Business and Economic Research reports is directly reported by facility owners or managers as MBF lumber tally output per work year for sawmills and thousand lineal feet of house log output per work year for log home manufacturers.

residue—The wood-fiber or bark byproduct remaining after timber processing of primary products such as lumber, plywood, posts and poles, house logs, etc. Three types of residue are generally generated:

(1) coarse (chips, edgings, slabs, trim, mis-cuts, and log ends), (2) fine (sawdust and planer shavings), and (3) bark.

sawlog—A log that meets minimum regional standards of diameter, length, and defect, intended for sawing.

Scribner—A diagram log rule originating in the 1800s that assumes 1-inch (2.54 centimeters) boards and 0.25-inch (0.64 centimeters) kerf, and is based on diameter at the small end of the log, disregards taper, and does not provide for overrun. Note: The Scribner rule underestimates lumber yield on small logs and long logs with taper.

timber-processing capacity—The volume of timber reported in thousand board feet (MBF) Scribner that could be processed given sufficient supplies of raw materials and firm market demand for products. Timber-processing capacity is estimated for each facility by applying the product recovery ratios to production capacity. This essentially gauges the volume of timber facilities could use if they operated at their self-reported production capacity, and is expressed as MBF Scribner log scale of timber per shift or per work year. University of Montana's Bureau of Business and Economic Research computes a facility's timber-processing capacity by dividing its production capacity by its product recovery ratio. Timber-processing capacity is generally expressed in MBF Scribner log scale, regardless of wood products manufacturing sector, and is therefore useful in characterizing the timber consumption potential of an entire state's forest products industry.

tonewood—Roundwood specifically processed (typically from large-diameter timber) for the production of musical instruments.

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Alaska's Forest Products Industry and Timber Harvest, 2015

Part 2: Industry Sectors, Capacity, and Outputs

Kate C. Marcille, Erik C. Berg, Todd A. Morgan, and Glenn A. Christensen

Introduction

This resource bulletin is part of a series of reports presenting findings from a census of Alaska's primary forest products industry. Part 2 of the series presents information on the forest products industry sectors that processed timber and mill residue into finished wood products in 2015. All dollar figures included have been adjusted for inflation to constant 2015 dollars, unless otherwise noted.

This survey effort is the third application of its kind in Alaska (Berg et al. 2014, Halbrook et al. 2009) and presents information collected from a census of primary manufacturers in the state that receive timber harvested in Alaska. Primary forest product manufacturers are firms that process timber into products such as lumber, as well as facilities such as wood pellet plants that use the wood fiber directly from timber processors. Using a written questionnaire, telephone or in-person interview, timber processing and residue-utilizing facilities provided information about their 2015 operations for the following:

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- Species of timber volume received and corresponding live/dead proportions
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The University of Montana's Bureau of Business and Economic Research (BBER) and the U.S. Department of Agriculture (USDA), Forest Service's Pacific Northwest Research Station's (PNW) Forest Inventory and Analysis (FIA) program cooperated in the analysis and preparation of this report. With the FIA programs at the Pacific Northwest and Rocky Mountain Research Stations, BBER has developed the Forest Industries Data Collection System (FIDACS) to collect, compile, and make available state and county information on forest products industry operations. Because this study is based on a census, rather than a statistical sample of firms, there is no statistical error associated with the estimates presented. Possibilities of reporting and measurement errors exist but are minimized by cross-checking data against other public and private information sources and by checking the data for internal consistency. Summary data tables and figures are reviewed by wood products researchers, state and federal agency personnel, and members of the state's

forest products industry. However, company-level data are confidential and will not be released.

Alaska's Forest Products Industry

The 2015 mill census identified 60 active primary forest products manufacturers in Alaska (fig. 1). Most of these manufacturers are concentrated near the expansive and productive forest resources of southeast (42 percent) and the coastal timber of southcentral (35 percent) Alaska. A smaller proportion of primary processing facilities are located across interior Alaska (20 percent), near the state-owned forests of the Tanana Valley. Alaska's facilities produced an array of products, including lumber, house logs, firewood, wood pellets, tonewood (wood used to make musical instruments), and cedar products. In addition, residue generated from the production of these

primary products was repurposed into additional products, including chips for heat or energy, landscape mulch, and animal bedding.

Alaska's forest products industry generated more than \$114 million in sales in 2015, including residues and international log exports. Total sales value in 2015 represented a 20 percent overall decrease from 2011, primarily driven by a reduction in sawlog export volume. International log exports represent a large proportion of Alaska's forest industry, and the volume exported decreased approximately 42 percent between 2011 and 2015. Primary products, such as lumber and house logs, processed by Alaska's primary facilities were valued at \$23.3 million, free on board (or f.o.b.) the producing mill in 2015, an increase of 28 percent over 2011 primary product sales.

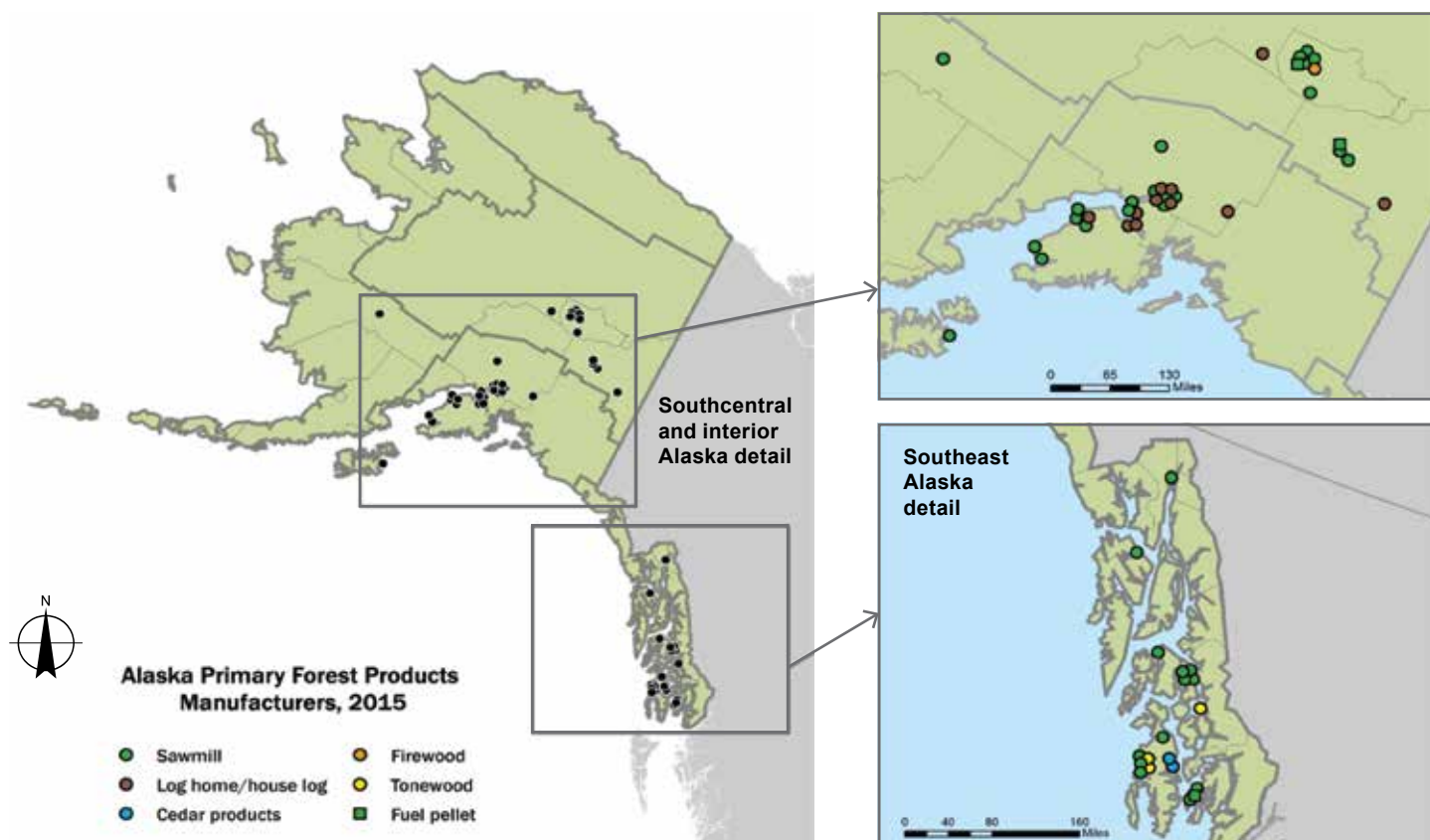


Figure 1—Alaska's primary wood processing facilities active during calendar year 2015.

Table 1—Timber volume received by Alaska facilities by ownership class and product, 2015

Ownership class	Sawlogs ^a	House logs	Fuelwood ^b	Other products ^c	All products, 2015
----- Thousand board feet Scribner -----					
Private, including Alaska Native corporations	1,244	281	823	501	2,848
National forest	15,545	194	60	1,071	16,870
State and other public	5,880	846	4,835	—	11,561
All owners	22,669	1,321	5,718	1,572	31,280

Note: Totals may not sum because of rounding, — = 0.

^aTimber exports not included.

^bIncludes timber used for residential firewood, industrial fuelwood for pellet manufacturing, and chips for park/playground fill.

^cIncludes cedar product and tonewood logs.

There were 17 fewer facilities active during 2015 compared to 2011 (Berg et al. 2014). The decrease in processing facilities between 2011 and 2015 contrasted with the relatively small fluctuations in active facility count between 2005 and 2011 (Berg et al. 2014, Halbrook et al. 2009). During the 2015 census, 6 new facilities were identified, and approximately 14 facilities previously active during 2011 were idle during 2015—idle facilities maintained their existing equipment but did not process any timber. The number of active facilities decreased across all sectors of the forest industry, with the exception of tonewood manufacturing. The sawmill sector exhibited the largest decrease in number of facilities with 11 fewer active in 2015, while the house log sector experienced the largest proportional decline (39 percent) in facilities since 2011.

Newly identified active facilities in 2015 were predominantly located in southeast Alaska. The majority of Alaska's facilities that have closed since the 2011 census have been sawmills and house log manufacturers predominately located in southcentral Alaska. Conversely, the sectors of fuelwood, cedar products, and tonewood collectively increased 11 percent from 2011 to 2015. The sawmill sector, manufacturing lumber and related sawn products, constitutes the largest sector of Alaska's forest products industry. Multiproduct

processing facilities are common across Alaska, complicating the categorization of facility type and manufacturer information, as well as reporting by product type over time.

Timber Received by Alaska's Processing Facilities

Alaska's primary wood processing facilities received more than 31 million board feet (MMBF) Scribner of timber in 2015 (table 1), approximately 34 percent more than was received in 2011. For most western states, timber received by in-state mills represents the majority of the state's timber harvest volume (McIver et al. 2013, 2015; Simmons et al. 2016). However, international log exports in Alaska account for a much larger proportion of the total harvest, and primary processors received approximately 23 percent of the 2015 timber harvest. Alaska facilities did not report receiving any timber from other states or countries.

While 67 percent of Alaska's timber harvest volume was from private and Alaska Native corporation lands, they only accounted for 9 percent (2.8 MMBF Scribner) of the timber received by Alaska facilities in 2015. This was down from 14 percent (3.4 MMBF) in 2011, but similar to the 8.3-percent contribution (3.7 MMBF) in 2005. Public timberland provided the remaining volume,

with 37 percent (11.6 MMBF) of timber receipts originating from state and other public lands, up from 7.8 MMBF in 2011. National forest lands accounted for 54 percent (16.9 MMBF) of timber received by Alaska facilities, representing a 2 percent increase over the 2011 volume (12 MMBF).

Sitka spruce (*Picea sitchensis* (Bong.) Carrière) was the predominant species harvested in Alaska during 2015, however,

western redcedar (*Thuja plicata* Donn ex D. Don) was the most common species received by Alaska facilities, accounting for 35 percent of all products manufactured in 2015 (table 2). The 10.9 MMBF Scribner of western redcedar received by wood product manufacturers represented an increase of nearly 10 percent since 2011, and accounted for approximately 42 percent of the sawlog volume received. Western hemlock (*Tsuga heterophylla* (Raf.)

Table 2—Timber volume received by Alaska facilities by species and product type, 2015

Species	Sawlogs ^a	House logs	Fuelwood ^b	Other products ^c	All products, 2015
----- Thousand board feet Scribner -----					
Western redcedar	9,597	28	12	1255	10,891
White spruce	2,530	942	4,254	—	7,726
Sitka spruce	7,443	180	28	71	7,722
Birch species	734	48	1,232	0	2,014
Western hemlock	1,579	44	23	50	1,696
Alaska yellow-cedar	612	57	7	183	858
Other ^d	174	22	162	15	373
All species	22,669	1,321	5,718	1,572	31,280

Note: Totals may not sum because of rounding, — = 0.

^aTimber exports not included.

^bIncludes timber used for residential firewood, industrial fuelwood for pellet manufacturing, and chips for park/playground fill.

^cIncludes cedar products and tonewood logs.

^dSpecies combined to avoid disclosure. Other species include cottonwoods, balsam poplar, quaking aspen, red alder, and black spruce.

Table 3—Alaska annual lumber production and average overrun by sawmill size, 2015

Annual lumber production size class	Number of sawmills	2015 lumber production ^a	Percentage of total	Average overrun
		MBF ^b		MBF
<150 MBF lumber tally	31	1,516	5	1.04
150 to 500 MBF lumber tally	3	1,013	3	1.17
>500 MBF lumber tally	5	28,190	92	1.36
2015 state total	39	30,719	100	1.33
2011 state total ^c	50	20,558		1.19
2005 state total ^d	50	54,861		1.27

Note: Totals may not sum because of rounding. Average overruns are MBF lumber tallies per MBF Scribner of logs.

^aDoes not include sawn products from the house log sector.

^bThousand board feet.

^cFrom Berg et al. (2014).

^dFrom Halbrook et al. (2009).

Sarg) accounted for 5 percent (1.7 MMBF) of timber volume received by facilities in 2015, down from approximately 13 percent (3.1 MMBF) in 2011.

Sawlogs constituted the vast majority (72 percent) of the timber received by Alaska's facilities. Logs used for fuelwood products, including industrial fuelwood for pellet manufacturing, accounted for 18 percent in 2015, roughly the same proportion as in 2011. Timber volume processed into house logs saw a slight increase in volume, but represented a smaller overall proportion. Though cedar and tonewood products collectively accounted for only 5 percent of the total timber volume received by facilities, this represented an increase of 1.2 MMBF (more than 300 percent) from 2011. Two previously unknown tonewood manufacturers and expansion of existing cedar product facilities contributed to this increase.

Trends by Sector

Sawmill sector—

Alaska's 39 sawmills produced more than 30 MMBF (lumber tally) of lumber and other sawn products in 2015 (table 3). Sawmills were the largest sector of Alaska's primary forest products industry in terms of number of active facilities, employment, and the volume of timber processed. Southeast Alaska supports a majority of the sawmill timber-processing capacity, while other resource areas are predominantly characterized by small, portable circle or band sawmills (Berg et al. 2014). Despite a reduction in active sawmills between 2011 and 2015, production of lumber and other sawn products increased 10 MMBF (47 percent) from 2011. Sales from lumber production were approximately \$12 million in 2015, accounting for 52 percent of the total sales value of Alaska's primary wood products. This is a 22-percent increase over 2011, when inflation adjusted

sales of lumber and other sawn products were \$9.9 million (Berg et al. 2014).

Lumber production varied considerably among Alaska's sawmills, nearly 80 percent of which produce less than 150 thousand board feet (MBF) lumber tally annually. The state's five largest sawmills accounted for 92 percent of lumber output in 2015, indicating the continued concentration of Alaska's forest industry in fewer large sawmills. Alaska sawmills produced approximately 1.33 board feet of lumber for every board foot Scribner of timber processed. This average overrun of 33 percent, while small in comparison to other western states, is approximately 12 percent higher than the 2011 statewide average overrun. This increase could be a function of more timber being processed by larger mills in 2015, as some smaller sawmills have since ceased operations. Additionally, production of firewood and fuelwood residues has decreased since 2011, as production has shifted back toward lumber in response to recovering markets and lower fuel oil and natural gas prices.

Log home sector—

Multiproduct log home and sawmill facilities produced most of Alaska's house log outputs in 2015. The number of active log home facilities declined with only 11 actively operating during 2015. The facilities in southcentral and western Alaska continued to lead house log production during 2015 (table 4), though combined production across these resource areas fell by 25 percent. Despite facilities manufacturing log homes (including sawmills) receiving a similar volume of timber in 2015 as in 2011 (approximately 1,300 MBF Scribner), production fell by more than 15 percent between census years. The log home sector generated approximately \$5.5 million in sales during 2015, with all sales to Alaska markets.

Table 4—House log, fuelwood, and other product production by resource area, 2015^a

Resource area	House logs	Fuelwood products ^b	Other products ^c
	<i>Thousand lineal feet</i>	<i>Bone-dry units^d</i>	<i>Thousand board feet lumber tally</i>
Southeast	68	724	1,604
Southcentral and western ^e	137	1,854	—
Interior	113	12,390	—
All areas	318	14,969	1,604

Note: Totals may not sum because of rounding, — = 0.

^aDoes not include lumber and other sawn products.

^bIncludes firewood, wood pellets, and wood chips for recreational uses.

^cIncludes cedar products and tonewood.

^dBone-dry unit (BDU) = 2,400 pounds of oven dry wood.

^eResource areas combined to avoid disclosure.

Other products sector—

Alaska's 10 additional primary facilities produced "other products" during 2015, including fuelwood and energy products, cedar products, and tonewood. The proportion of timber harvest going toward these other products nearly doubled from 2011 to 2015, in large part because of newly identified facilities and business expansions. Tonewood manufacturers produce wood products necessary for assembling musical instruments, such as guitars, cellos, violins, and other string instruments. Many of these products are sold internationally. Cedar products consist primarily of shakes and shingles, with a small volume of split-rail fencing produced in 2015. Most tonewood and cedar product facilities are located in southeast Alaska where the state's large-diameter Sitka spruce and redcedar timber resources are located. Interior Alaska was dominated by fuelwood products (table 4) in 2015. Fuelwood products, including firewood and wood pellets, increased by 12 percent from 2011 to 2015.

Export sector—

International log exports continued to play an important role in Alaska's forest industry, and accounted for the majority of volume

harvested in 2015. International log export data were retrieved in cubic meters (m³) from the U.S. International Trade Commission (USITC) online database and converted to thousand board feet (MBF) Scribner using a conversion factor of 7.0 m³/MBF (Daniels et al., in press). During 2015, an estimated 105 MMBF of softwood logs were exported from Alaska's ports (USITC 2016). Approximately 77 percent of Alaska's timber was exported, and the majority (75 percent) of sales revenues generated during 2015 were derived from log exports to other countries. While the majority of Alaska log exports were sent to Japan in 2000, by 2009, China was the predominant market, and approximately 76 percent of volume leaving the Anchorage Customs District in 2015 was sent to China (fig. 2). The majority of softwood log exports originating in Alaska were shipped from the ports of Anchorage and Ketchikan (Zhou 2013, Zhou and Warren 2012). Sitka spruce was the primary species exported, followed by western hemlock. Between 2005 and 2015, Alaska's log exports reached a decadal high in 2012 but began decreasing in 2013—falling by 28 percent in 2014 and by an additional 20 percent in 2015. Log exports were approximately 42 percent lower in 2015 relative to 2011,

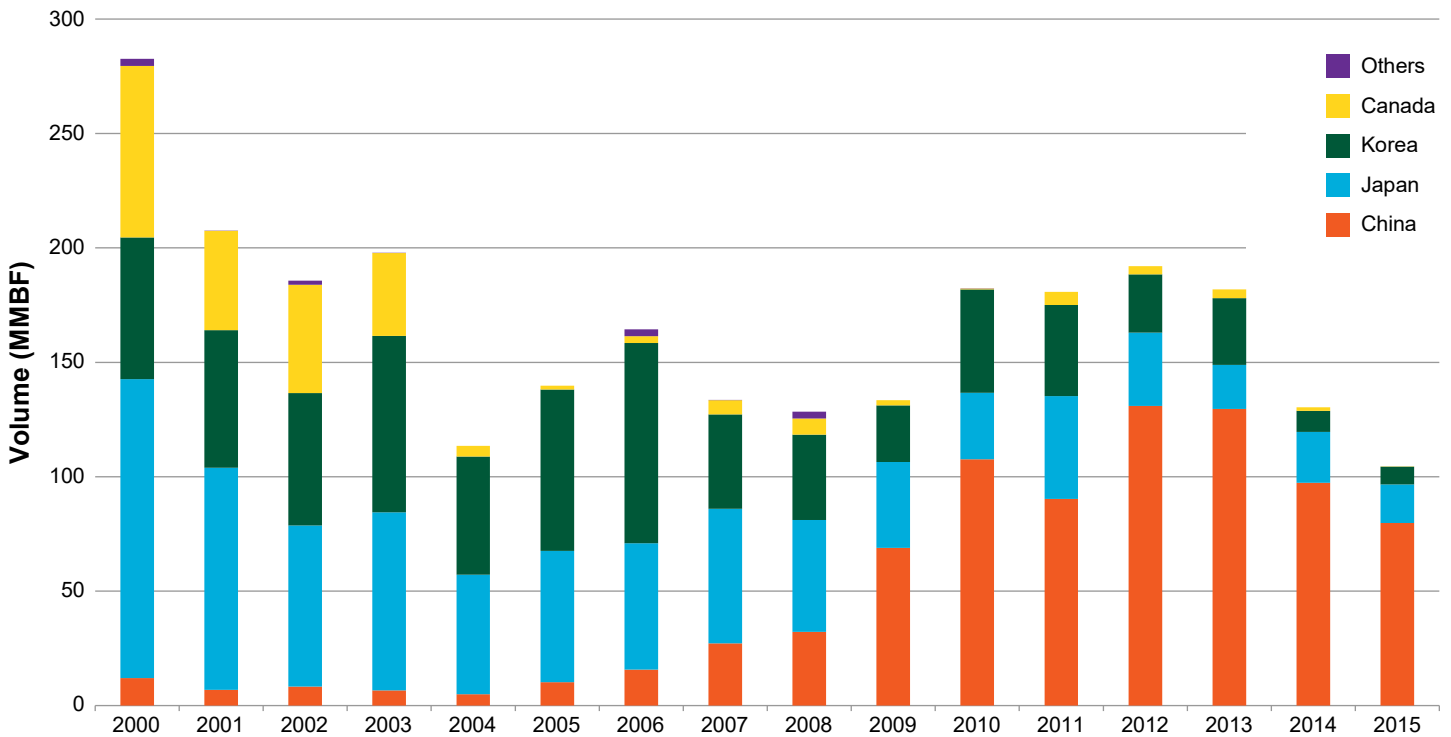


Figure 2—Destination and volume, in million board feet (MMBF), of Alaska log exports by receiving country, 2000 to 2015 (USITC 2016). Source: U.S. International Trade Commission, 2016.

indicating fluctuations in global supply and demand within softwood log markets. As timber harvest decreased from 2011 to 2015, the proportion of total harvest received by Alaska processing facilities increased from 13 percent in 2011 to 23 percent in 2015. This may indicate the ability of Alaska wood product manufacturers to shift toward increased in-state processing during downturns in the international log export market.

Timber-Processing Capacity

Alaska timber processors provided their 8-hour shift and annual production (output) capacities for 2015. Self-reported production capacity measures the potential production of a facility, given sufficient supplies of raw materials and firm market demand. Statewide production capacity fell alongside the reduction in active Alaska primary processing facilities during 2015. While lumber production levels

increased, lumber production capacity fell by 9.5 percent from 2011 to 2015 (table 5). House log production capacity decreased significantly (52 percent) between 2011 and 2015. Interior Alaska saw the most dramatic drop in house log production capacity falling by 77 percent. Pellet plants were excluded from estimates of capacity because they did not process roundwood in 2015.

Sawmill timber-processing capacity figures were calculated by dividing reported lumber production capacity by the facility's calculated lumber recovery rate (board feet of lumber per board foot Scribner of timber). Timber-processing capacity is expressed in units of MBF Scribner log scale, regardless of wood products manufacturing sector, and is therefore useful in characterizing the timber consumption potential of the state's entire primary forest products industry. Annual timber-processing capacity of active sawmills and house log facilities combined was approximately 121.4

Table 5—Alaska production capacity^a by resource area and sector, 2015

Resource area ^b	Lumber production capacity	House log production capacity
	<i>MBF lumber tally</i>	<i>Thousand lineal feet</i>
Southeast	98,255	210
Southcentral and western ^c	6,787	417
Interior	19,298	200
All resource areas, 2015	124,340	827
All resource areas, 2011 ^d	137,331	1,740
All resource areas, 2005 ^e	240,159	2,603

Note: Totals may not sum because of rounding. MBF = thousand board feet.

^aIncludes only facilities active during survey year.

^bSee part 4 for a list of borough and census areas located within each resource area.

^cResource areas combined to avoid disclosure.

^dFrom Berg et al. (2014).

^eFrom Halbrook et al. (2009).

MMBF Scribner in 2015, down approximately 8.5 percent from 2011. The sawmill sector accounted for about 80 percent of annual timber-processing capacity at approximately 97.9 MMBF Scribner. Although overall timber-processing capacity has continued to decrease, capacity utilization in the combined sawmill and house log sectors increased to more than 20 percent in 2015, close to 2005 utilization levels (Halbrook et al. 2009). Despite the declining number of active primary processors in Alaska, sawmills processed more volume in 2015 and were able to utilize more capacity. The 10 largest Alaska sawmills, facilities with annual timber-processing capacity exceeding 1 MMBF, processed 90 percent of sawmill timber receipts and utilized nearly 24 percent of their capacity (fig. 3).

Mill Residue

As indicated in part 1 of this series, a proportion of the wood fiber processed by primary forest products manufacturers ends up as mill residue. Residue disposal can be difficult and expensive for many of Alaska's

timber processors. In some cases, facilities are able to market and sell their residues generating added revenue. The three types of wood residues include (1) coarse residue (chips, slabs, edging, trim and log ends), (2) fine residue (planer shavings and sawdust), and (3) bark. In Alaska, residue factors, bone-dry units (BDU)¹ of residue per MBF lumber tally, were computed for “sole purpose” sawmills that produced only lumber as a primary product.

Alaska's primary forest products manufacturers generated approximately 34,923 BDU, a nearly 41 percent increase from 2011. In 2015, nearly 91 percent of this residue was utilized, similar to the proportion used in 2011, with only 9 percent unused. A general increase in facilities reporting uses of residues, including animal bedding, mulch, and landscape material was observed in 2015. Wood pellet manufacturing decreased in interior Alaska during 2015, thus decreasing demand for sawmill residue and leading primary producers to seek new markets for their residue.

¹ One bone-dry unit (BDU) equals 2,400 pounds of oven dry wood.

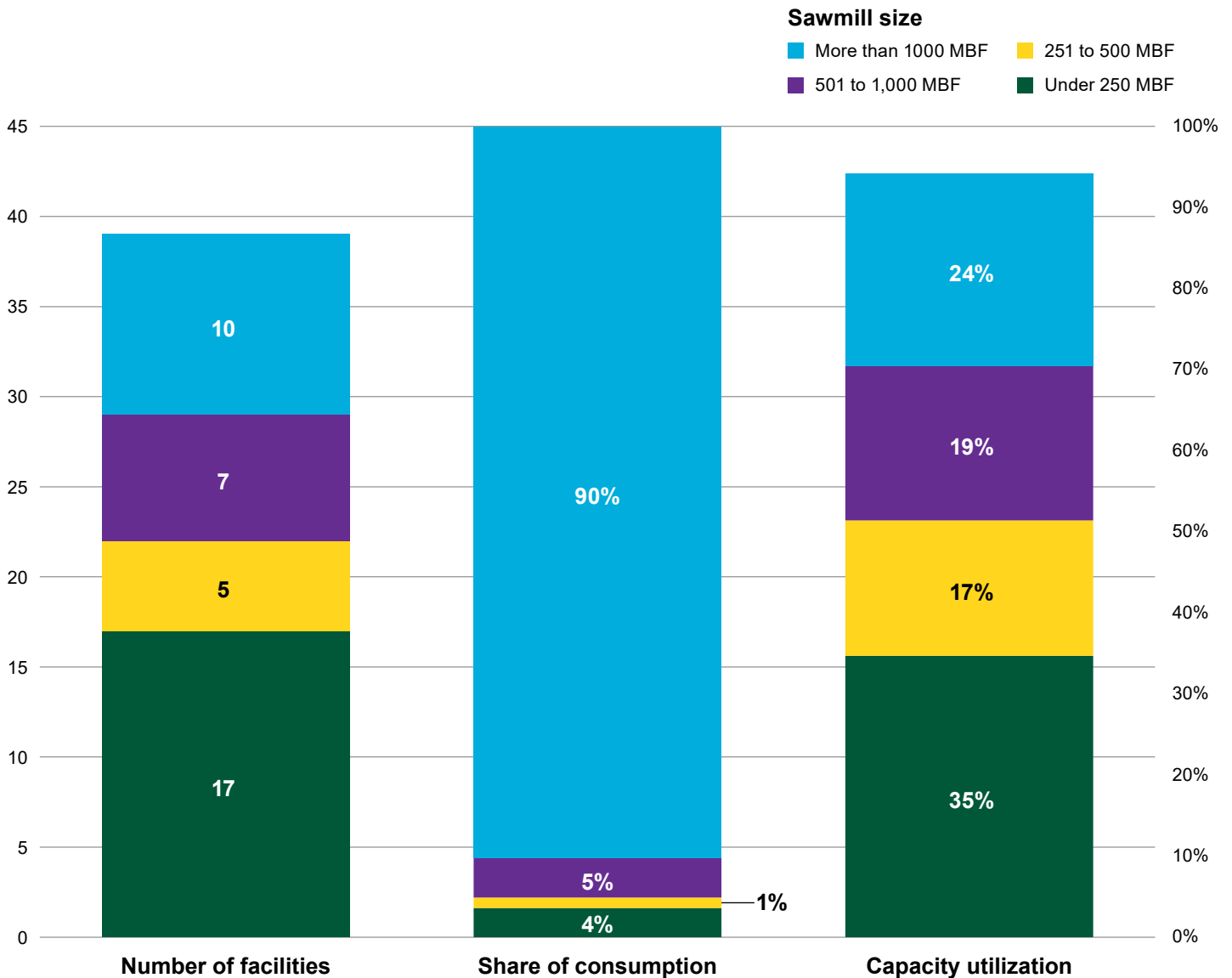


Figure 3—Number of Alaska processing facilities, share of timber volume consumed and capacity utilization by facility size class during 2015.

See also, “Part 1: Timber Harvest, Products, and Flow;” “Part 3: Sales, Employment, and Contributions to the Statewide Economy;” and “Part 4: Alaska Data Tables.”

Metric Equivalents

When you know:	Multiply by:	To find:
Cubic feet	0.0283	Cubic meters

Species List

Alaska yellow-cedar (*Callitropsis nootkatensis* (D. Don) Oerst. ex D.P. Little)
 Sitka spruce (*Picea sitchensis* (Bong.) Carrière)

Western hemlock (*Tsuga heterophylla* (Raf.) Sarg)
 Western redcedar (*Thuja plicata* Donn ex D. Don)
 Cottonwood (*Populus balsamifera* L. ssp. *Trichocarpa* (Torr. & A. Gray ex Hook.)
 Quaking aspen (*Populus tremuloides* Michx.)
 Birch sp.
 Black spruce (*Picea mariana* (Mill.) Britton, Sterns & Poggenb.)
 Balsam poplar (*P. balsamifera* L. var. *angustifolia* (James) S. Watson)
 Red alder (*Alnus rubra* Bong.)

Glossary

board foot or board feet—A unit of measure applied to lumber that is 1 foot by 1 foot by 1 inch (30.48 centimeters by 3.48 centimeters by 2.54 centimeters) (or its equivalent) and also associated with roundwood as to its potential yield of such products.

bone-dry unit (BDU)—The amount of wood residue that weighs 2,400 pounds (1,088 kilograms) at 0 percent moisture content. One BDU equals approximately 9.49 cubic yards or 96 cubic feet (2.7 cubic meters) of solid wood.

cubic foot or cubic feet—A unit of true volume that measures 1 foot by 1 foot by 1 foot (30.48 centimeters by 30.48 centimeters by 30.48 centimeters).

fuelwood—Refers to wood used in the production of industrial heat and steam and residential firewood as well as wood pellet production. Pellets can be produced from mill residues (e.g., sawdust and shavings) as well as chipped roundwood.

house log—Roundwood timber used to construct log homes. Products manufactured from house logs can be sawn, scribed by hand, notched, or milled by lathe to meet customer construction needs. House log timber is often dead (by choice, because “green” logs usually require drying before they can be used for construction) and of lower value than sawlogs

lumber recovery rate—The volume of lumber recovered (in board feet) per cubic foot of log processed.

lumber tally—The volume of sawn products, usually expressed in board feet.

overrun—The volume of lumber actually obtained from a log in excess of the estimated volume of the log, based on log scale.

product recovery ratios—Finished product volume divided by timber input volume (output in sector-specific units per input in Scribner). For sawmills, expressed as thousand board feet (MBF) lumber tally/ MBF log scale (Scribner in this report). Recovery ratios are used to assess recovery trends and in other useful calculations, including board feet Scribner per cubic foot of logs processed. An expression of relative mill processing efficiency.

production capacity (owner reported)—Potential ability of a facility to produce output per shift or 240-day work year, assuming one 8-hour shift per day, firm market demand for products, and sufficient supply of raw materials. For sawmills, expressed as thousand board feet (MBF) lumber tally per shift or per year. Production capacity included in University of Montana’s Bureau of Business and Economic Research reports is directly reported by facility owners or managers as MBF lumber tally output per work year for sawmills and thousand lineal feet of house log output per work year for log home manufacturers.

recovery—The volume of output per unit of input, a measure of mill efficiency. Recovery factors (output in sector-specific units per input in Scribner) are used to express the relationship between inputs and outputs, and are subsequently translated into cubic feet and used to estimate total cubic feet of log input recovered in product.

residue—The wood-fiber or bark byproduct remaining after timber processing of primary products such as lumber, plywood, posts and poles, house logs, etc. Three types of residue are generally generated: (1) coarse (chips, edgings, slabs, trim, mis-cuts, and log ends), (2) fine (sawdust and planer shavings), and (3) bark.

residue factors—For each industry sector, these factors express the average number of bone-dry units of various types of residue available per unit of product output.

sawlog—A log that meets minimum regional standards of diameter, length, and defect, intended for sawing.

Scribner—A diagram log rule originating in the 1800s that assumes 1-inch (2.54 centimeters) boards and 0.25-inch (0.64 centimeters) kerf, and is based on diameter at the small end of the log, disregards taper, and does not provide for overrun. Note: The Scribner rule underestimates lumber yield on small logs and long logs with taper.

timber-processing capacity—The volume of timber reported in thousand board feet (MBF) Scribner that could be processed given sufficient supplies of raw materials and firm market demand for products. Timber-processing capacity is estimated for each facility by applying the product recovery ratios to production capacity. This essentially gauges the volume of timber facilities could use if they operated at their self-reported production capacity, and is expressed as MBF Scribner log scale of timber per shift or per work year. University of Montana's Bureau of Business and Economic Research computes a facility's timber-processing capacity by dividing its production capacity by its product recovery ratio. Timber-processing capacity is generally expressed in MBF Scribner log scale, regardless of wood products manufacturing sector, and is therefore useful in characterizing the timber consumption potential of an entire state's forest products industry.

tonewood—Roundwood specifically processed (typically from large-diameter timber) for the production of musical instruments.

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Alaska's Forest Products Industry and Timber Harvest, 2015

Part 3: Sales, Employment, and Contributions to the Statewide Economy

Kate C. Marcille, Chelsea P. McIver, Erik C. Berg, Todd A. Morgan, and Glenn A. Christensen

Introduction

This resource bulletin is part of a series of reports presenting findings from a census of Alaska's primary forest products industry. Part 3 of the series presents information on sales value and employment associated with primary wood products manufacturing, the economic contribution of forest products manufacturing in the state, and an analysis of the changes in the broader forest industry over time. All dollar figures included have been adjusted for inflation to constant 2015 dollars, unless otherwise noted.

This survey effort is the third application of its kind in Alaska (Berg et al. 2014, Halbrook et al. 2009), and presents information collected from a census of primary manufacturers in the state that receive timber harvested in Alaska. Primary forest product manufacturers are businesses that process timber into products such as lumber, as well as facilities such as wood pellet plants that use the wood fiber directly from timber processors. Using a written questionnaire, or a telephone or in-person interview, timber-processing and residue-utilizing facilities provided information about their 2015 operations for the following:

- Plant location, production capacity, and employment
- Volume of raw material received by county and ownership origin
- Species of timber volume received and corresponding live/dead proportions

- Finished product volumes, types, sales value, and market locations
- Volume, utilization, and marketing of manufacturing residue

For facilities that did not respond to the survey, data collected in previous surveys were updated using current data collected for facilities of a similar size with a similar product type and location, as well as information on market trends and prices. For the 2015 Alaska mill census, data were received for 51 of the 60 active, in-state facilities, which accounted for 85 percent of primary manufacturers. While some collected facility data required estimation methods to finalize, 80 percent of the harvest volume in 2015 was captured through quantitative methods.

The University of Montana's Bureau of Business and Economic Research (BBER) and the U.S. Department of Agriculture (USDA), Forest Service, Pacific Northwest Research Station's Forest Inventory and Analysis (FIA) program cooperated in the analysis and preparation of this report. With the FIA programs at the Pacific Northwest and Rocky Mountain Research Stations, BBER has developed the Forest Industries Data Collection System to collect, compile, and make available state and county information on forest products industry operations. Because this study is based on a census, rather than a statistical sample of businesses, there is no statistical error associated with the estimates presented. Possibilities

of reporting and measurement errors exist but are minimized by cross-checking data against other public and private information sources, and by checking the data for internal consistency. Summary data tables and figures are reviewed by wood products researchers, state and federal agency personnel, and members of the state's forest products industry. However, company-level data are confidential and will not be released.

Alaska's Primary Product Sales Value and Markets

The 2015 mill census identified 60 active primary forest products manufacturers in Alaska that produce an array of products, including lumber and other sawn products, house logs, fuelwood, tonewood (wood for making musical instruments), cedar products, and wood pellets. Alaska's forest industry reported an estimated total sales value of primary wood products, international log exports, and residue-related products of more than \$114 million dollars, free on board (or f.o.b.) the producing mill (table 1). This represented a 19-percent decrease from the \$141 million in sales reported in 2011 (Berg et al. 2014). A similar decline in sales value was observed from 2005 to 2011, and total sales value in 2015 was approximately 35 percent lower than in 2005 (Halbrook et al. 2009).

Excluding residues and log exports, the sales value generated by the primary wood products industry exceeded \$23 million in 2015. In contrast to the overall decline in total forest industry sales value, sales by Alaska manufacturers increased approximately 28 percent over 2011 primary product sales. The majority (66 percent) of wood products

manufactured in Alaska were sold within the state, a proportional decrease relative to in-state sales in 2011 (73 percent). Lumber and other sawn products accounted for more than half (52 percent) of total primary product sales. About 49 percent of all lumber produced in Alaska was sold within the state, down from 56 percent in 2011, while sales of lumber to west coast states accounted for 39 percent, up from 33 percent.

In 2015, a majority (86 percent) of the primary products other than lumber manufactured in Alaska were sold within the state. This represented a decrease from the proportion of other products—house logs, firewood, cedar products, and tonewood—sold in-state in 2011 (nearly 92 percent). In 2015, out-of-state markets accounted for an increasing proportion of other product sales. Within the “other product” category, cedar and tonewood products accounted for the majority of out-of-state and international sales. Manufactured house log and log home products accounted for approximately \$5.5 million in in-state sales.

While some of the residues generated from the manufacturing of primary wood products in 2015 remained unused, more than 31,000 bone-dry units (BDU)¹ were repurposed and sold in the form of firewood, garden mulch, animal bedding, and wood chips used for playground fill and landscaping. Estimated sales generated from residues dramatically increased from 2011 (\$1.2 million) to 2015 (\$4.9 million). Approximately 40 percent of utilized residues were coarse residue—including chips, edgings, slabs, cull sections of logs, and log ends—sold as pulp chips to out-of-state markets.

¹ One bone-dry unit (BDU) equals 2,400 pounds (1088.6 kilograms) of oven dry wood.

Table 1—Destination and sales value of Alaska's primary wood products, residue, and exports, free on board the producing facility in 2015

Product	Alaska	West coast ^a	Other states	Pacific Rim	Canada	2015 total
----- Thousands of 2015 dollars -----						
Lumber	5,897	4,708	633	891	38	12,167
Other ^b	9,531	723	454	250	190	11,147
Total primary product	15,427	5,431	1,087	1,141	228	23,314
Residues ^c						4,886 ^e
Sawlog and pulpwood exports ^d						86,207 ^e
2015 total sales value						114,407
2011 total sales value ^f						141,158
2005 total sales value ^g						177,278

Note: Totals may not sum because of rounding.

^aWest coast states include California, Hawaii, Oregon, and Washington.

^bOther products include house logs, firewood, wood pellets, cedar products and tonewood.

^cResidue products include firewood, garden mulch, animal bedding and wood chips for park/playground fill and landscaping.

^dUnited States International Trade Commission (USITC) Dataweb tool.

^eData pooled across destinations to prevent disclosure of confidential information.

^fFrom Berg et al. (2014).

^gFrom Halbrook et al. (2009).

International exports of sawlogs and chipped roundwood eclipsed all other sales in 2015. As mentioned in parts 1 and 2 of this series, most timber harvested in Alaska is exported. Log and chip exports accounted for 75 percent (\$86 million) of Alaska's total wood products sales value in 2015. This represented a decrease from the 2011 estimated export sales value of \$121 million (29 percent). In 2011 and 2015, the vast majority of log exports were shipped to Pacific Rim countries, predominantly China (USITC 2016). The decrease in exported log volume, as well as shifts in global log market prices, resulted in the overall decrease in total sales value from Alaska's forest products industry from 2011 to 2015 (fig. 1). While the value of log exports to China increased approximately 6 percent from 2011 to 2015, exports to Japan fell 50 percent and exports to Korea decreased by 69 percent. However, over the same period, Alaska mills were able to increase lumber production and generate higher sales (table 1), indicating some

flexibility to shift away from unfavorable international log export markets to domestic production.

While overall log export value decreased, the average value (dollars/thousand board feet [MBF]) to all countries increased from 2011 to 2015, with the exception of Canada (USITC 2016). Similarly, the combined average value across all export species increased from \$673/MBF in 2011 to \$851/MBF in 2015 (USITC 2016). Sitka spruce (*Picea sitchensis* (Bong.) Carrière) accounted for 74 percent of log export sales in 2015, while western redcedar (*Thuja plicata* Donn ex D. Don) had the highest average value at more than \$1,400/MBF (USITC 2016). Between 2011 and 2015, several shifts were observed across Alaska log exports species composition and destination country (table 2). Average price increased from 2011 to 2015 for Sitka spruce and western redcedar, while western hemlock (*Tsuga heterophylla* (Raf.) Sarg) saw a slight decrease. Alaska log exports to Korea fell in

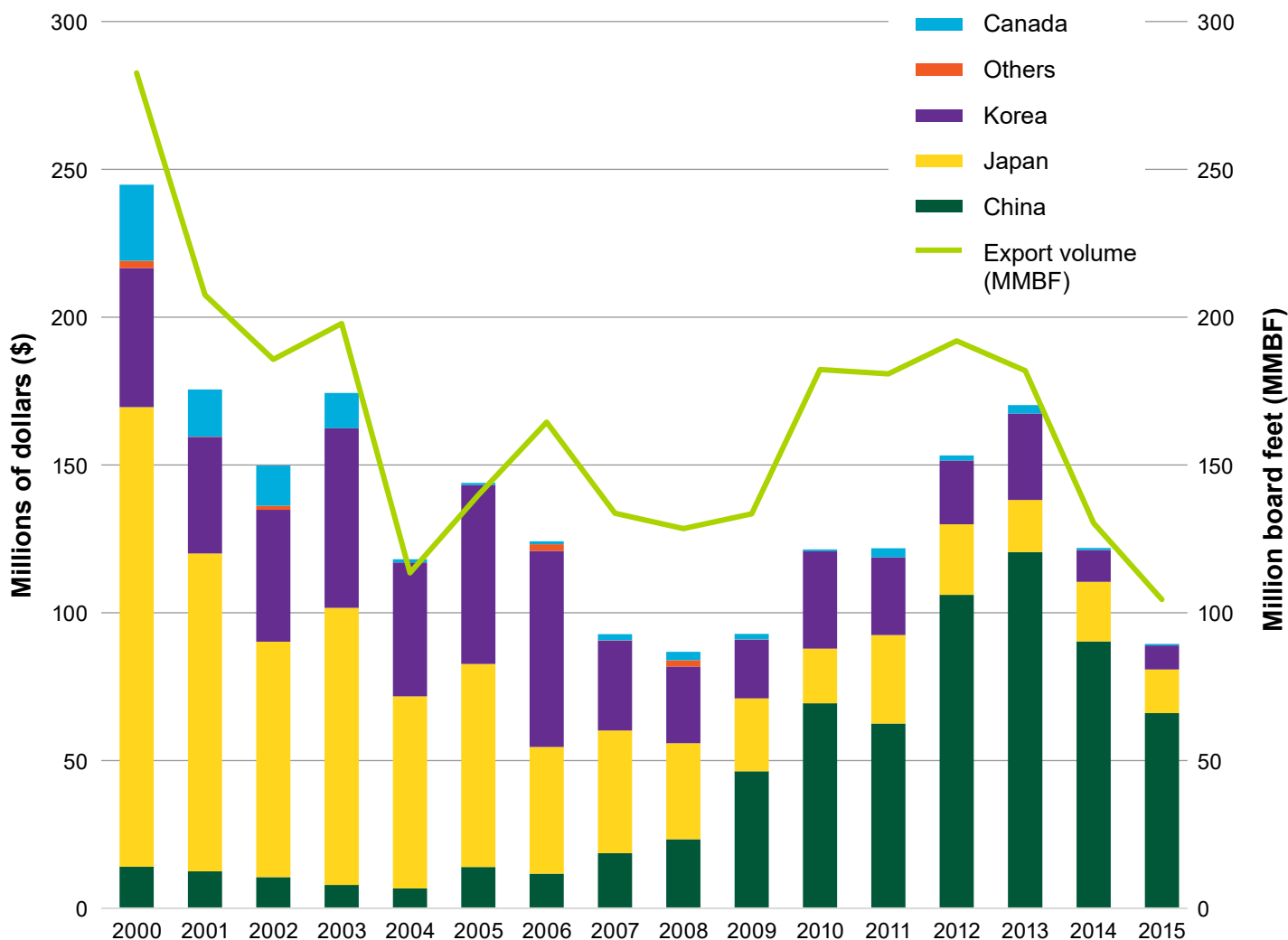


Figure 1—Total value of Alaska log exports (inflation-adjusted 2015 millions of dollars) by destination country and total export volume (MMBF), 2000 to 2015 (USITC 2016). Volumes from USTIC (2016) converted using 7.0 m³/MBF (Daniels et al., in press).

2015, predominantly in spruce (100 percent decline) and western hemlock (47 percent decline). However, the proportion of exported redcedar logs destined for Korea increased nearly 73 percent from 2011 to 2015. Similarly, while Japan received a smaller proportion of exported spruce and hemlock logs, western redcedar exports increased approximately 30 percent. Conversely, China received a higher proportion of both spruce (49 percent increase) and hemlock (68 percent increase) in 2015, while receiving no red cedar log exports by 2015 (USITC 2016). Shifts in global log export

markets and changes in demand by destination and species continue to influence the log export sector of Alaska's forest industry.

Alaska's Forest Industry Employment and Labor Income

The primary forest products manufacturers characterized in BBER's periodic census are just one component of the broader forest industry in Alaska. The classification of the forest industry sectors used here follows the North American Industry Classification System (NAICS) available online via the U.S. Department of Commerce Bureau of

Table 2—Proportion of Alaska log exports by species and destination country in 2011 and 2015^a

Country:	Sitka spruce		Western hemlock		Western redcedar	
	2011	2015	2011	2015	2011	2015
China	57%	84%	42%	70%	12%	0%
Japan	23%	16%	23%	11%	39%	51%
Korea	20%	0%	35%	19%	28%	48%
Canada	0%	0%	0%	0%	20%	1%
Average price (\$/MBF) ^b	601.58	826.67	829.05	820.57	1,294.45	1,464.36

Note: Totals may not sum because of rounding. MBF = thousand board feet.

^aSource: USITC (2016)

^bUSITC export volumes were converted using a derived factor of 7.0 m³/MBF

Economic Analysis (BEA) website.² Alaska's forest industry can be described using three categories: NAICS 113—forestry and logging, NAICS 321—wood products manufacturing, and NAICS 322—paper manufacturing. Paper manufacturing data refers to historical employment levels in Alaska's forest industry. These categories include employees who work in both the primary and secondary wood products and paper manufacturing sectors. It should be noted that these NAICS categories likely underestimate total employment in the forest industry because they do not include log hauling (trucking) companies, lumber and construction material wholesalers, road construction and maintenance contractors, and forest management services performed by government agencies or nonprofit organizations. These publicly available data provide another point of comparison for estimates of employees and labor income for the primary forest products manufacturers to compare with BBER survey data, as well as additional information on the larger forest industry.

Alaska forest industry employment trends have generally paralleled changes in timber harvest volume through time (Berg et al. 2014, Halbrook et al. 2009). Both timber harvest and employment in the forest industry peaked in 1989 and 1990, with more than 4,200 workers (Halbrook et al. 2009). The once-robust pulp and paper sector in Alaska experienced a dramatic drop in employment with the closure of pulp mills in the late 1990s (Berg et al. 2014, Halbrook et al. 2009), and employment in the pulp and paper industry has since ceased. Forestry and logging employment experienced a decline in the early 2000s in response to the termination of the Forest Service's southeast Alaska 50-year timber sale contracts (Alexander 2012, Berg et al. 2014). In 2005, approximately 1,451 workers were employed across the forest industry (wood products manufacturing, forestry, and logging), exhibiting an increase over previous years in response to the housing boom of 2004 and 2005 (Berg et al. 2014). However, by 2011, combined employment in wood products manufacturing, forestry, and logging had fallen

²For this report, BEA estimates from 1990 to 1998 were based on previously published data (Berg et al. 2014, Halbrook et al. 2009) to bridge the shift from standard industrial classification (SIC) codes to North American Industry Classification (NAICS) codes. From 1998 through 2015, the most recent BEA data were used (USDS BEA 2016a, 2016b).

approximately 30 percent to 1,015 workers. Employment in the forest industry grew steadily in the years following 2011, reaching 1,252 workers in 2014 (fig. 2).

In 2015, total employment in the combined sectors of wood products manufacturing, forestry, and logging was an estimated at 1,213 full- and part-time workers (fig. 2) (USDC BEA 2016b). Of these, approximately 702 workers (58 percent) were employed in the wood products manufacturing sector. In addition, we estimate that 511 workers were employed in forestry and logging in 2015.

In addition to the previously mentioned industrial sectors, NAICS 1153—agricultural and forestry support activities, is also a component of the forest industry. Support activities have not been included in previous BBER Alaska industry reports, and BEA data were not sufficient to generate reasonable estimates for forestry support employment in Alaska throughout the entire time series shown in figure 2. In 2011, an estimated 263 workers were employed in support activities for forestry³—increasing the estimate for total forest industry employment to approximately 1,278 workers. By 2015, employees engaged in support activities for forestry increased to 367 workers, bringing the total forest industry employment for 2015 to 1,580 workers.

Workers in the forest industry earned \$111 million in labor income or worker earnings in 2015 (USDC BEA 2016a). Labor income includes wages and salaries, some benefits, and earnings of the self-employed. Employees in forestry and logging earned approximately \$64 million, while workers in the wood products manufacturing sector earned \$42 million. Employees in support activities for forestry

earned approximately \$5.5 million. Since 2005, inflation-adjusted earnings across all sectors have increased, with earnings in the forestry and logging sector approximately 38 percent higher in 2015, while wood products manufacturing earnings increased nearly 150 percent. This trend of rapidly increasing earnings may indicate that existing workers in the forest industry are working more days out of the year in 2015 relative to 2005, likely in parallel to increased lumber production in the state. The average wood products manufacturing employee earned \$60,055 in 2015.

Economic Contribution of Alaska's Wood Products Manufacturing to State Economy

Economic contribution analyses measure gross changes in economic activity that can be associated with an industry, event, or policy on an existing regional economy (Watson et al. 2007). Measuring the economic contribution of Alaska's forest industry captures the direct economic activity associated with the industry as well as economic activity generated throughout the state economy by the existence of the forest products industry (Crandall et al. 2017). For this report, we assess the contribution of Alaska's forest industry as dollars spent on intermediate inputs, taxes, labor and, in turn, by households, generating economic opportunities as additional spending cycles through the state's economy.

Wood products manufacturers, workers engaged in forestry support activities, and forestry and logging workers collectively contribute 1,580 jobs and nearly \$111 million dollars in labor income directly to the state

³Support activities for forestry (NAICS 1153) encompasses a variety of activities, including wildfire suppression and prevention activities, tree thinning and planting, and pest management.

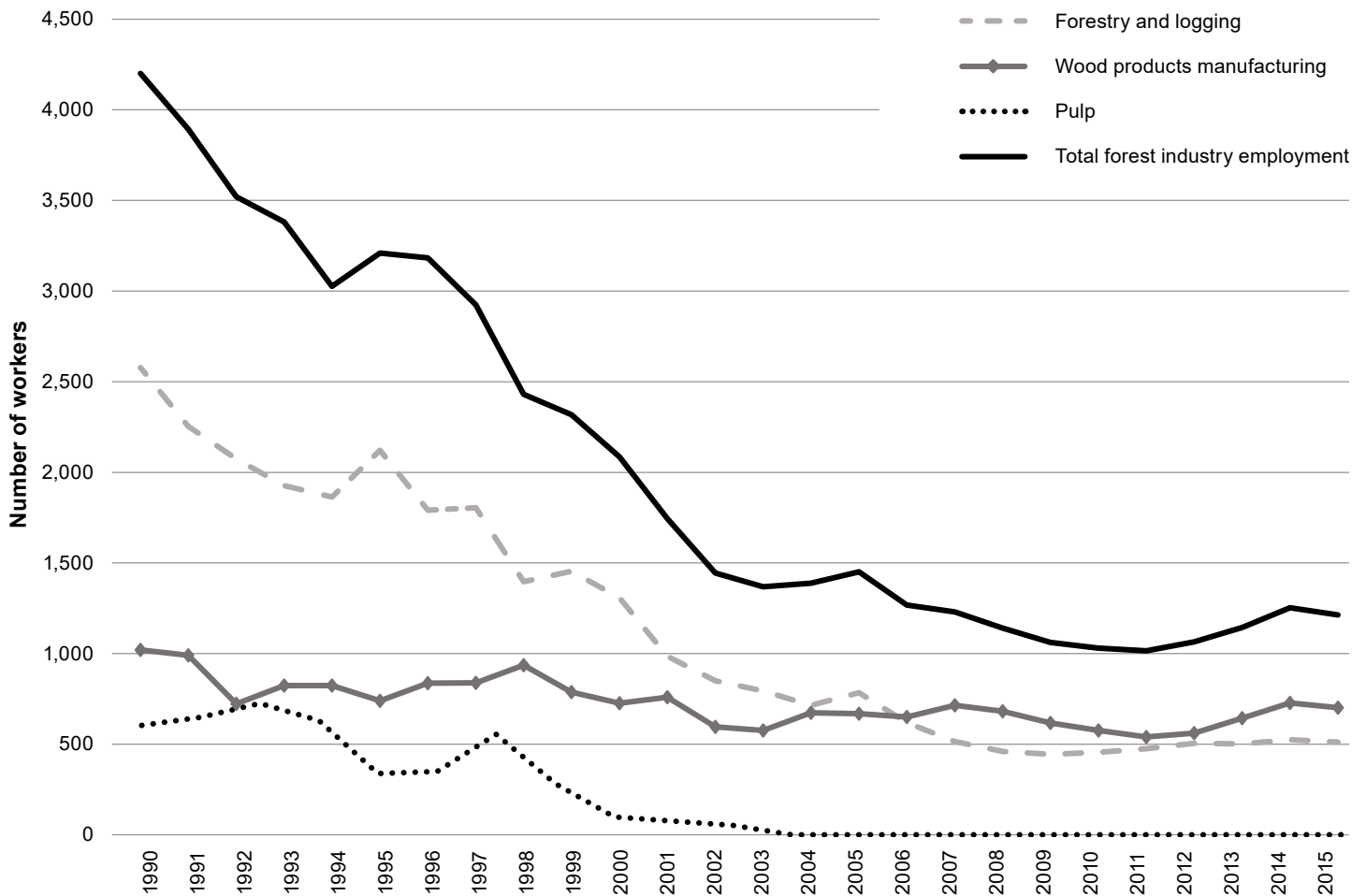


Figure 2—Employment in Alaska's forest industry, 1990 to 2015 (BBER 2016, USDC BEA 2016a).

economy. The activity associated with this direct employment generates additional economic opportunities by relying upon other industries for raw and intermediate inputs and services, thus indirectly bolstering employment and wages in various sectors. Using regional data and existing linkages within Alaska's economy represented by BEA RIMS II multipliers⁴ (USDC BEA 2014), BBER estimates that the wood products manufacturing sector alone supports more than 1,500 full- and part-time jobs and an associated \$118 million dollars in labor income (table 3).

Thus, for every wood products manufacturing job in the state, another 1.2 jobs are supported in related sectors, while for every \$1 paid in labor income by wood products manufacturers, another \$1.81 is paid in supporting sectors, including forestry and logging, forestry support, trucking, wholesale trade, and management.

Additionally, BBER estimates that the 511 people employed in the forestry and logging sector support an additional 541 full- and part-time jobs along with \$43.5 million dollars in labor income in supporting sectors such as

⁴The BEA does not endorse any resulting estimates or conclusions about the contribution of any given sector on an area.

Table 3—Average annual employment and labor income contributions of Alaska's forest industry

Sector	Direct employment	Indirect and induced employment	Total employment contribution ^a	Direct labor income	Indirect and induced labor income	Total labor income contribution ^a
	----- Number of jobs -----			----- Thousands of 2015 dollars -----		
Wood products manufacturing	702	851	1,553	\$42,159	\$76,316	\$118,475
Forestry and logging	511	541	1,052	\$63,756	\$43,526	\$107,282
Forestry support activities	367	69	436	\$5,528	\$1,871	\$7,399
Total forest industry	1,580	^a	^a	\$111,443	^a	^a

^aIndirect and induced employment and labor income should not be summed for multiple sectors because some employment and income shows up as both direct contributions to their sectors and indirect contributions to other sectors.

equipment sales and repair. It should be noted that we do not aggregate sectors and avoid providing estimates of the total employment and labor income contribution for the entire forest industry to avoid double counting, as some employment and labor income shows up as both direct contributions to their sectors as well as indirect contributions to other sectors. In other words, some or all of the direct employment and labor income in the forestry and logging sector would be included with the indirect and induced contributions from wood products manufacturing because these manufacturers rely upon forestry and logging business to supply their raw material inputs.

See also, “Part 1: Timber Harvest, Products, and Flow;” “Part 2: Industry Sectors, Capacity, and Outputs;” and “Part 4: Alaska Data Tables.”

Species List

Sitka spruce (*Picea sitchensis* (Bong.) Carrière)

Western hemlock (*Tsuga heterophylla* (Raf.) Sarg)

Western redcedar (*Thuja plicata* Donn ex D. Don)

Glossary

board foot or board feet—A unit of measure applied to lumber that is 1 foot by 1 foot by 1 inch (30.48 centimeters by 3.48 centimeters by 2.54 centimeters) (or its equivalent) and also associated with roundwood as to its potential yield of such products.

bone-dry unit (BDU)—The amount of wood residue that weighs 2,400 pounds (1,088 kilograms) at 0 percent moisture content. One BDU equals approximately 9.49 cubic yards or 96 cubic feet (2.7 cubic meters) of solid wood.

fuelwood—Refers to wood used in the production of industrial heat and steam and residential firewood as well as wood pellet production. Pellets can be produced from mill residues (e.g., sawdust and shavings) as well as chipped roundwood.

house log—Roundwood timber used to construct log homes. Products manufactured from house logs can be sawn, scribed by hand, notched or milled by lathe to meet customer construction needs. House log timber is often dead (by choice, because “green” logs usually require drying before they can be used for construction) and of lower value than sawlogs.

production capacity (owner reported)—Potential ability of a facility to produce output per shift or 240-day work year,

assuming one 8-hour shift per day, firm market demand for products, and sufficient supply of raw materials. For sawmills, expressed as thousand board feet (MBF) lumber tally per shift or per year. Production capacity included in University of Montana's Bureau of Business and Economic Research reports is directly reported by facility owners or managers as MBF lumber tally output per work year for sawmills and thousand lineal feet of house log output per work year for log home manufacturers.

residue—The wood-fiber or bark byproduct remaining after timber processing of primary products such as lumber, plywood, posts and poles, house logs, etc. Three types of residue are generally generated: (1) coarse (chips, edgings, slabs, trim, mis-cuts, and log ends), (2) fine (sawdust and planer shavings), and (3) bark.

sawlog—A log that meets minimum regional standards of diameter, length, and defect, intended for sawing.

Scribner—A diagram log rule originating in the 1800s that assumes 1-inch (2.54 centimeters) boards and 0.25-inch (0.64 centimeters) kerf, and is based on diameter at the small end of the log, disregards taper, and does not provide for overrun. Note: The Scribner rule underestimates lumber yield on small logs and long logs with taper.

tonewood—Roundwood specifically processed (typically from large-diameter timber) for the production of musical instruments.

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Alaska's Forest Products Industry and Timber Harvest, 2015

Part 4: Alaska Data Tables

Kate C. Marcille, Erik C. Berg, Todd A. Morgan, and Glenn A. Christensen

Introduction

This resource bulletin is part of a series of reports presenting findings from a census of Alaska's primary forest products industry. Part 4 of the series presents data tables characterizing information on Alaska's forest products industry sectors that processed timber and mill residue into finished wood products during 2015. Part 4 of this series includes those tables contained in parts 1 through 3 as well as supplemental tables characterizing additional information on Alaska's forest products industry and timber harvest.

This survey effort is the third application of its kind in Alaska (Berg et al. 2014, Halbrook et al. 2009) and presents information collected from a census of primary manufacturers in the state that receive timber harvested in Alaska. Primary forest product manufacturers are businesses that process timber into products such as lumber, as well as facilities such as wood pellet plants that use the wood fiber directly from timber processors. Using a written questionnaire, or a telephone or in-person interview, timber-processing and residue-utilizing facilities provided information about their 2015 operations for the following:

- Plant location, production capacity, and employment
- Volume of raw material received by county and ownership origin
- Species of timber volume received and corresponding live/dead proportions
- Finished product volumes, types, sales value, and market locations

- Volume, utilization, and marketing of manufacturing residue

For facilities that did not respond to the survey, data collected in previous surveys were updated using current data collected for facilities of a similar size with a similar product type and location, as well as information on market trends and prices. For the 2015 Alaska mill census, data were received for 51 of the 60 active, in-state facilities, which accounted for 85 percent of primary manufacturers. While some collected facility data required estimation methods to finalize, 80 percent of the harvest volume in 2015 was captured through quantitative methods.

The University of Montana's Bureau of Business and Economic Research (BBER) and the U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station's Forest Inventory and Analysis (FIA) program cooperated in the analysis and preparation of this report. With the FIA programs at the Pacific Northwest and Rocky Mountain Research Stations, BBER has developed the Forest Industries Data Collection System (FIDACS) to collect, compile, and make available state and county information on forest products industry operations. Because this study is based on a census, rather than a statistical sample of businesses, there is no statistical error associated with the estimates presented. Possibilities of reporting and measurement errors exist but are minimized by cross-checking data against other public and private information sources, and by checking the data for internal consistency. Summary data tables and figures

are reviewed by wood products researchers, state and federal agency personnel, and members of the state's forest products industry. However, company-level data are confidential and will not be released.

See also, "Part 1: Timber Harvest, Products, and Flow;" "Part 2: Industry Sectors, Capacity, and Outputs;" and "Part 3: Sales, Employment, and Contributions to the Statewide Economy."

Table 1—Alaska timber harvest by ownership class and product type, 2015

Ownership class	Sawlogs	House logs	Fuelwood	Other products ^a	All products	2011 All products ^b
<i>----- Thousand board feet Scribner -----</i>						
Private, including Alaska Native corporations	89,244	281	823	501	90,848	127,990
National forest	28,961	194	60	1,071	30,286	28,688
State and other public	9,556	846	4,835	—	15,237	18,590
All owners	127,761	1,321	5,718	1,572	136,371	175,267
<i>----- Percentage of harvest -----</i>						
Private, including Alaska Native corporations	69.9	21.2	14.4	31.9	66.6	73.0
National forest	22.7	14.7	1.0	68.1	22.2	16.4
State and other public	7.5	64.1	84.6	—	11.2	10.6
All owners	93.7	1.0	4.2	1.2	100.0	100.0

Note: Totals may not sum because of rounding, — = 0.

^aOther timber products include tonewood and cedar products.

^bBerg et al. (2014)

Table 2—Alaska timber harvest by species and product type, 2015

Species	Sawlogs	Other products ^{a,b}	All products	2011 products ^c
<i>----- Thousand board feet Scribner -----</i>				
Sitka spruce	96,115	279	96,393	111,364
Western hemlock	14,594	117	14,711	35,159
Western redcedar	12,188	1,294	13,483	18,362
White spruce	2,530	5,196	7,726	6,173
Birch species	734	1,280	2,014	1,660
Alaska yellow-cedar	1,425	247	1,671	1,786
Other ^d	174	198	373	762
All species	127,761	8,610	136,371	175,267
<i>----- Percentage of harvest -----</i>				
Sitka spruce	75.2	3.2	70.7	63.5
Western hemlock	11.4	1.4	10.8	20.1
Western redcedar	9.5	15.0	9.9	10.5
White spruce	2.0	60.3	5.7	3.5
Birch species	0.6	14.9	1.5	0.9
Alaska yellow-cedar	1.1	2.9	1.2	1.0
Other ^d	0.1	2.3	0.3	0.4
All species	93.7	6.3	100.0	100.0

Note: Totals may not sum because of rounding.

^aOther products include house logs, fuelwood logs, cedar product logs, and tonewood.

^bProducts by species were combined to prevent disclosure.

^cBerg et al. (2014)

^dOther species include cottonwood, quaking aspen, black spruce, poplar, and red alder.

Table 3—Alaska timber harvest by resource area, 2015

Resource area	Harvest Volume	Percentage of total
	<i>Thousand board feet Scribner</i>	
Interior	7,863	5.8
Southcentral and western ^a	52,547	38.5
Southeast	75,961	55.7
State total	136,371	100.0

Note: Totals may not sum because of rounding.

^aResource areas combined to avoid disclosure.

Alaska timber resource areas and associated boroughs and census areas

Interior:

Fairbanks North Star Borough
Denali Borough
Yukon-Koyukuk
Southeast Fairbanks Census Area

Southeast:

Haines Borough
Juneau Borough
Ketchikan Gateway Borough
Prince of Wales-Outer Ketchikan Census Area
Sitka Borough
Skagway-Hoonah-Angoon Census Area
Wrangell-Petersburg Census Area
Yakutat Borough

Southcentral:

Anchorage Borough
Kenai Peninsula Borough
Matanuska-Susitna Borough
Valdez-Cordova Census Area

Western:

Bethel Census Area
Kodiak Island Borough

Table 4—Timber volume received by Alaska facilities by ownership class and product, 2015

Ownership class	Sawlogs ^a	House logs	Fuelwood ^b	Other products ^c	All products, 2015	All products, 2011 ^d	All products, 2005 ^e
	<i>Thousand board feet Scribner</i>						
Private, including Alaska Native corporations	1,244	281	823	501	2,848	3,364	3,743
National forest	15,545	194	60	1,071	16,870	12,099	23,866
State and other public	5,880	846	4,835	—	11,561	7,796	17,252
All owners	22,669	1,321	5,718	1,572	31,280	23,259	44,861
	<i>Percentage of volume received</i>						
Private, including Alaska Native corporations	5.5	21.2	14.4	31.9	9.1	14.5	8.3
National forest	68.6	14.7	1.0	68.1	53.9	52.0	53.2
State and other public	25.9	64.1	84.6	—	37.0	33.5	38.5
All owners	72.5	4.2	18.3	5.0	100.0	100.0	100.0

Note: Totals may not sum because of rounding, — = 0.

^aTimber exports not included.

^bIncludes timber used for residential firewood, industrial fuelwood for pellet manufacturing, and chips for park/playground fill.

^cIncludes cedar product and tonewood logs.

^dFrom Berg et al. (2014).

^eFrom Halbrook et al. (2009).

Table 5—Timber volume received by Alaska facilities by species and product type, 2015

Species	Sawlogs ^a	House logs	Fuelwood ^b	Other products ^c	All products, 2015	All products, 2011 ^d	All products, 2005 ^e
<i>----- Thousand board feet Scribner -----</i>							
Western redcedar	9,597	28	12	1255	10,891	5,671	1,857
White spruce	2,530	942	4,254	—	7,726	6,174	6,154
Sitka spruce	7,443	180	28	71	7,722	5,114	10,877
Birch species	734	48	1,232	0	2,014	1,660	230
Western hemlock	1,579	44	23	50	1,696	3,114	23,539
Alaska yellow-cedar	612	57	7	183	858	373	1,099
Other ^f	174	22	162	15	373	1,153	1,105
All species	22,669	1,321	5,718	1,572	31,280	23,259	44,861
<i>----- Percentage of volume received -----</i>							
Western redcedar	42.3	2.1	0.2	79.8	34.8	24.4	4.1
White spruce	11.2	71.3	74.4	—	24.7	26.5	13.7
Sitka spruce	32.8	13.6	0.5	4.5	24.7	22.0	24.2
Birch species	3.2	3.6	21.5	0.0	6.4	7.1	0.5
Western hemlock	7.0	3.3	0.4	3.2	5.4	13.4	52.5
Alaska yellow-cedar	2.7	4.3	0.1	11.6	2.7	1.6	2.4
Other ^f	0.8	1.6	2.8	0.9	1.2	5.0	2.5
All species	72.5	4.2	18.3	5.0	100.0	100.0	100.0

Note: Totals may not sum because of rounding, — = 0.

^aTimber exports not included.

^bIncludes timber used for residential firewood, industrial fuelwood for pellet manufacturing, and chips for park/playground fill.

^cIncludes cedar products and tonewood logs.

^dFrom Berg et al. (2014).

^eFrom Halbrook et al. (2009).

^fSpecies combined to avoid disclosure. Other species include cottonwoods, balsam poplar, quaking aspen, red alder, and black spruce.

Table 6—Timber volume received by Alaska facilities by resource area and product type, 2015

Resource area	Sawlogs ^a	House logs	Fuelwood ^b	Other products ^c	All products, 2015	All products, 2011 ^d	All products, 2005 ^e
<i>----- Thousand board feet Scribner -----</i>							
Southeast	19,071	166	60	1,572	20,869	13,812	37,982
Southcentral and western ^f	1,061	634	853	0	2,547	3,022	2,900
Interior	2,538	520	4,805	0	7,863	6,425	3,729
All areas	22,669	1,321	5,718	1,572	31,280	23,259	44,861 ^g
<i>----- Percentage of volume received -----</i>							
Southeast	84.1	12.6	1.0	100.0	66.7	59.4	84.7
Southcentral and western ^f	4.7	48.0	14.9	0.0	8.1	13.0	6.5
Interior	11.2	39.4	84.0	0.0	25.1	27.6	8.3
All areas	72.5	4.2	18.3	5.0	100.0	100.0	100.0

Note: Totals may not sum because of rounding.

^aTimber exports not included.

^bIncludes timber used for residential firewood, industrial fuelwood for pellet manufacturing, and chips for park/playground fill.

^cIncludes cedar products and tonewood logs.

^dFrom Berg et al. (2014).

^eFrom Halbrook et al. (2009).

^fResource areas combined to avoid disclosure.

^gIncludes 250,000 board feet from outside the state of Alaska (Halbrook et al. 2009).

Table 7—House log, fuelwood, and other product production by resource area, 2015^a

Resource area	Lumber and other sawn products ^a	House logs	Fuelwood products ^b	Other products ^c
	<i>Thousand board feet lumber tally</i>	<i>Thousand lineal feet</i>	<i>Bone-dry units^d</i>	<i>Thousand board feet lumber tally</i>
Southeast	25,122	68	724	1,604
Southcentral and western ^e	1,315	137	1,854	—
Interior	4,752	113	12,390	—
All areas	31,189	318	14,969	1,604

Note: Totals may not sum because of rounding, — = 0.

^aDoes not include lumber and other sawn products.

^bIncludes firewood, wood pellets, and wood chips for recreational uses.

^cIncludes cedar products and tonewood.

^dBone-dry unit (BDU) = 2,400 pounds of oven-dry wood.

^eResource areas combined to avoid disclosure.

Table 8—Number of active timber processing facilities by borough/census area and product produced, 2015^a

Borough/census area	Lumber	House logs	Other ^b	Total
Anchorage Borough	1	3	—	4
Bethel Census Area	1	—	—	1
Fairbanks North Star Borough	5	—	2	7
Haines Borough	2	—	—	2
Juneau Borough	—	—	—	—
Kenai Peninsula Borough	5	2	—	7
Ketchikan Gateway Borough	2	—	—	2
Kodiak Island Borough	1	—	—	1
Matanuska-Susitna Borough	6	4	—	10
Prince of Wales-Outer Ketchikan Census Area	7	—	6	13
Skagway-Hoonah-Angoon Census Area	2	—	—	2
Southeast Fairbanks Census Area	2	1	1	4
Wrangell-Petersburg Census Area	5	—	1	6
Yukon-Koyukuk	—	1	—	1
2015 State total	39	11	10	60
2011 State total ^c	50	18	9	77
2005 State total ^d	50	20	8	78

^aDoes not include timber exporters.

^bOther facilities include producers of fuelwood, wood pellets, cedar products, and tonewood.

^cFrom Berg et al. (2014).

^dFrom Halbrook et al. (2009).

Table 9—Alaska annual lumber production and average overrun by sawmill size, 2015

Annual lumber production size class	Number of sawmills	2015 lumber production ^a	Percentage of total	Average overrun
		<i>MBF^b</i>		<i>MBF</i>
<150 MBF lumber tally	31	1,516	5	1.04
150 to 500 MBF lumber tally	3	1,013	3	1.17
>500 MBF lumber tally	5	28,190	92	1.36
2015 state total	39	30,719	100	1.33
2011 state total ^b	50	20,558		1.19
2005 state total ^c	50	54,861		1.27

Note: Totals may not sum because of rounding. MBF = thousand board feet. Average overruns are MBF lumber tallies per MBF Scribner of logs.

^aDoes not include sawn products from the house log sector.

^bFrom Berg et al. (2014).

^cFrom Halbrook et al. (2009).

Table 10—Alaska production capacity^a by resource area and sector, 2015

Resource area ^b	Lumber production capacity	House log production capacity
	<i>Thousand feet lumber tally</i>	<i>Thousand lineal feet</i>
Southeast	98,255	210
Southcentral and western ^c	6,787	417
Interior	19,298	200
All resource areas, 2015	124,340	827
All resource areas, 2011 ^d	137,331	1,740
All resource areas, 2005 ^e	240,159	2,603

^aIncludes only facilities active during survey year.^bSee part 4, table 3 for a list of borough/census areas located within resource areas.^cResource areas combined to avoid disclosure.^dFrom Berg et al. (2014).^eFrom Halbrook et al. (2009).**Table 11—Alaska annual timber-processing capacity^a and use by size class and sector, 2015**

Annual timber-processing capacity size class	Number of active facilities	Annual timber-processing capacity		2015 timber use	
		Timber-processing capacity	Sector capacity	Volume processed	Capacity utilization within size class
<i>MBF^b</i>		<i>MBF</i>	<i>Percent</i>	<i>MBF</i>	<i>Percent</i>
Sawmill sector					
<250 MBF	17	2,380	2.4	827	34.7
251 to 500 MBF	5	1,818	1.9	303	16.7
501 to 1,000 MBF	7	5,886	6.0	1,127	19.1
>1,000 MBF	10	87,602	89.7	20,780	23.7
Sawmill sector total	39	97,686	100.0	23,037	23.6
House log and other ^c sectors	18	23,708	100.0	1,652	7.0
Combined sector totals, 2015	57	121,394		24,689	20.3
Combined sector totals, 2011 ^d	77	132,794		20,741	15.6
Combined sector totals, 2005 ^e	77	202,156		46,131	21.4

^aIncludes facilities active during survey year. Does not include timber exporters.^bThousand board feet (MBF), Scribner^cOther sectors include cedar products, tonewood, and firewood (excluding pellet plants) manufacturers.^dFrom Berg et al. (2014).^eFrom Halbrook et al. (2009).

Table 12—Alaska sawmill^a residue factors, 2015

Type of residue	BDU ^b per MBF lumber tally
Coarse	0.60
Sawdust	0.17
Planer shavings	0.09 ^c
Bark	0.17
Total	0.95

^aIncludes sawmills producing only lumber and no other products.

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

^cThis factor represents only the few pristine Alaska sawmills that planed lumber. The combined planer shavings factor was <0.001 for all sawmills that only produced lumber, whether or not the mills reported planer shavings.

Table 13—Production and disposition of mill residue from Alaska's forest products industry, 2015

Type of residue	Residue disposition			Unused	Total
	Pulp chips	Fuelwood ^a	Other uses ^b		
	----- Bone-dry units ^c -----				
Coarse ^d	13,886	4,851	1,067	1,453	21,256
Sawdust	550	4,393	656	490	6,089
Shavings/peelings	—	171	1,126	192	1,490
Bark	—	3,615	1,346	1,127	6,088
All residues	14,436	13,029	4,196	3,262	34,923

^aFuelwood uses include fuel/firewood for heating and wood pellet production.

^bOther uses primarily include animal bedding, mulch, and landscape material.

^cBone-dry unit (BDU) = 2,400 lb of oven-dry wood.

^dCoarse residue includes chips, edgings, slabs, cull sections of logs and log ends.

Table 14—Destination and sales value of Alaska's primary wood products and sawmill residue, free on board (f.o.b.) the producing facility in 2015

Product	Alaska	West coast ^a	Other states	Pacific Rim	Canada	2015 total
	<i>Thousands of 2015 U.S. dollars</i>					
Lumber	5,897	4,708	633	891	38	12,167
Other ^b	9,531	723	454	250	190	11,147
Total primary product	15,427	5,431	1,087	1,141	228	23,314
Residues ^c						4,886 ^e
Sawlog and pulpwood exports ^d						86,207 ^e
Total sales value, 2015						114,407
Total sales value, 2011 ^f						141,158
Total sales value, 2005 ^g						177,278

^aWest coast states include California, Hawaii, Oregon, and Washington.

^bOther products include house logs, firewood, wood pellets, cedar products, and tonewood.

^cResidue products include firewood, garden mulch, animal bedding, and wood chips for park/playground fill and landscaping.

^dUnited States International Trade Commission (USITC) Dataweb tool.

^eData pooled across destinations to prevent disclosure of confidential information.

^fFrom Berg et al. (2014).

^gFrom Halbrook et al. (2009).

Glossary

board foot or board feet—A unit of measure applied to lumber that is 1 foot by 1 foot by 1 inch (30.48 centimeters by 3.48 centimeters by 2.54 centimeters) (or its equivalent) and also associated with roundwood as to its potential yield of such products.

bone-dry unit (BDU)—The amount of wood residue that weighs 2,400 pounds (1,088 kilograms) at 0 percent moisture content. One BDU equals approximately 9.49 cubic yards or 96 cubic feet (2.7 cubic meters) of solid wood.

fuelwood—Refers to wood used in the production of industrial heat and steam and residential firewood as well as wood pellet production. Pellets can be produced from mill residues (e.g., sawdust and shavings) as well as chipped roundwood.

house log—Roundwood timber used to construct log homes. Products manufactured from house logs can be sawn, scribed by hand, notched or milled by lathe to meet customer construction needs. House log timber is often dead (by choice, because “green” logs usually require drying before they can be used for construction) and of lower value than sawlogs

lumber tally—The volume of sawn products, usually expressed in board feet.

overrun—The volume of lumber actually obtained from a log in excess of the estimated volume of the log, based on log scale.

production capacity (owner reported)—Potential ability of a facility to produce output per shift or 240-day work year, assuming one 8-hour shift per day, firm market demand for products, and sufficient supply of raw materials. For sawmills, expressed as thousand board feet (MBF) lumber tally per shift or per year. Production

capacity included in University of Montana’s Bureau of Business and Economic Research reports is directly reported by facility owners or managers as MBF lumber tally output per work year for sawmills and thousand lineal feet of house log output per work year for log home manufacturers.

residue—The wood-fiber or bark byproduct remaining after timber processing of primary products such as lumber, plywood, posts and poles, house logs, etc. Three types of residue are generally generated: (1) coarse (chips, edgings, slabs, trim, mis-cuts, and log ends), (2) fine (sawdust and planer shavings), and (3) bark.

residue factors—For each industry sector, these factors express the average number of bone-dry units of various types of residue available per unit of product output.

sawlog—A log that meets minimum regional standards of diameter, length, and defect, intended for sawing.

Scribner—A diagram log rule originating in the 1800s that assumes 1-inch (2.54 centimeters) boards and 0.25-inch (0.64 centimeters) kerf, and is based on diameter at the small end of the log, disregards taper, and does not provide for overrun. Note: The Scribner rule underestimates lumber yield on small logs and long logs with taper.

timber-processing capacity—The volume of timber reported in thousand board feet (MBF) Scribner that could be processed given sufficient supplies of raw materials and firm market demand for products. Timber-processing capacity is estimated for each facility by applying the product recovery ratios to production capacity. This essentially gauges the volume of timber facilities could use if they operated at their self-reported production capacity, and is

expressed as MBF Scribner log scale of timber per shift or per work year. University of Montana's Bureau of Business and Economic Research computes a facility's timber-processing capacity by dividing its production capacity by its product recovery ratio. Timber-processing capacity is generally expressed in MBF Scribner log scale, regardless of wood products manufacturing sector, and is therefore useful in characterizing the timber consumption potential of an entire state's forest products industry.

tonewood—Roundwood specifically processed (typically from large-diameter timber) for the production of musical instruments.

Species List

Sitka spruce (*Picea sitchensis* (Bong.) Carrière)

Western hemlock (*Tsuga heterophylla* (Raf.) Sarg)

Western redcedar (*Thuja plicata* Donn ex D. Don)

Cottonwood (*Populus balsamifera* L. ssp. *Trichocarpa* (Torr. & A. Gray ex Hook.)

Quaking aspen (*Populus tremuloides* Michx.)

Black spruce (*Picea mariana* (Mill.) Britton, Sterns & Poggenb.)

Balsam poplar (*P. balsamifera* L. var. *angustifolia* (James) S. Watson)

Red alder (*Alnus rubra* Bong.)

Sitka spruce (*Picea sitchensis* (Bong.) Carrière)

Western hemlock (*Tsuga heterophylla* (Raf.) Sarg)

Western redcedar (*Thuja plicata* Donn ex D. Don)

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