



Alaska's Forest Products Industry and Timber Harvest, 2015

Part 2: Industry Sectors, Capacity, and Outputs

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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:

- 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'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.

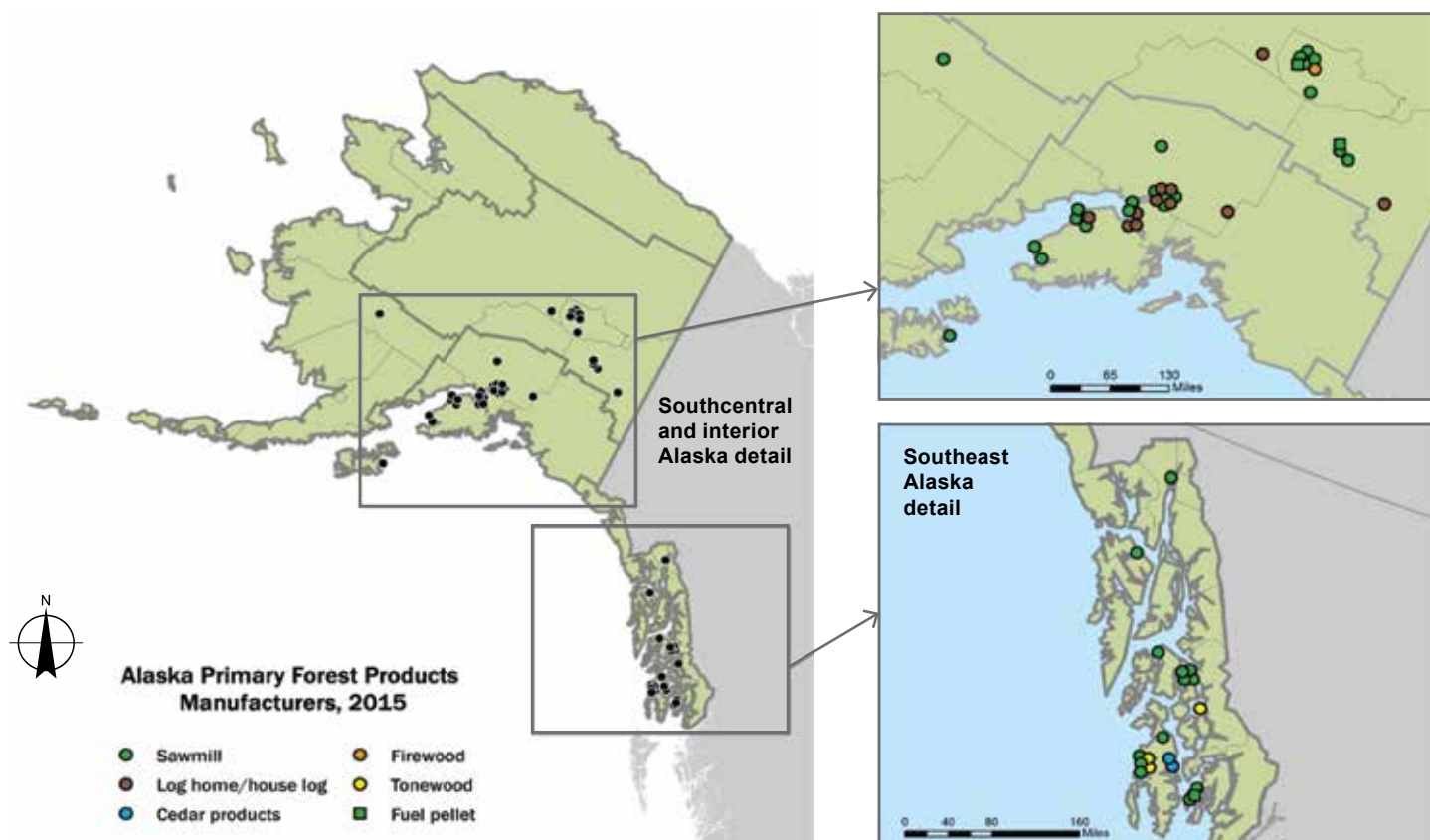


Figure 1—Alaska's primary wood processing facilities active during calendar year 2015.

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,

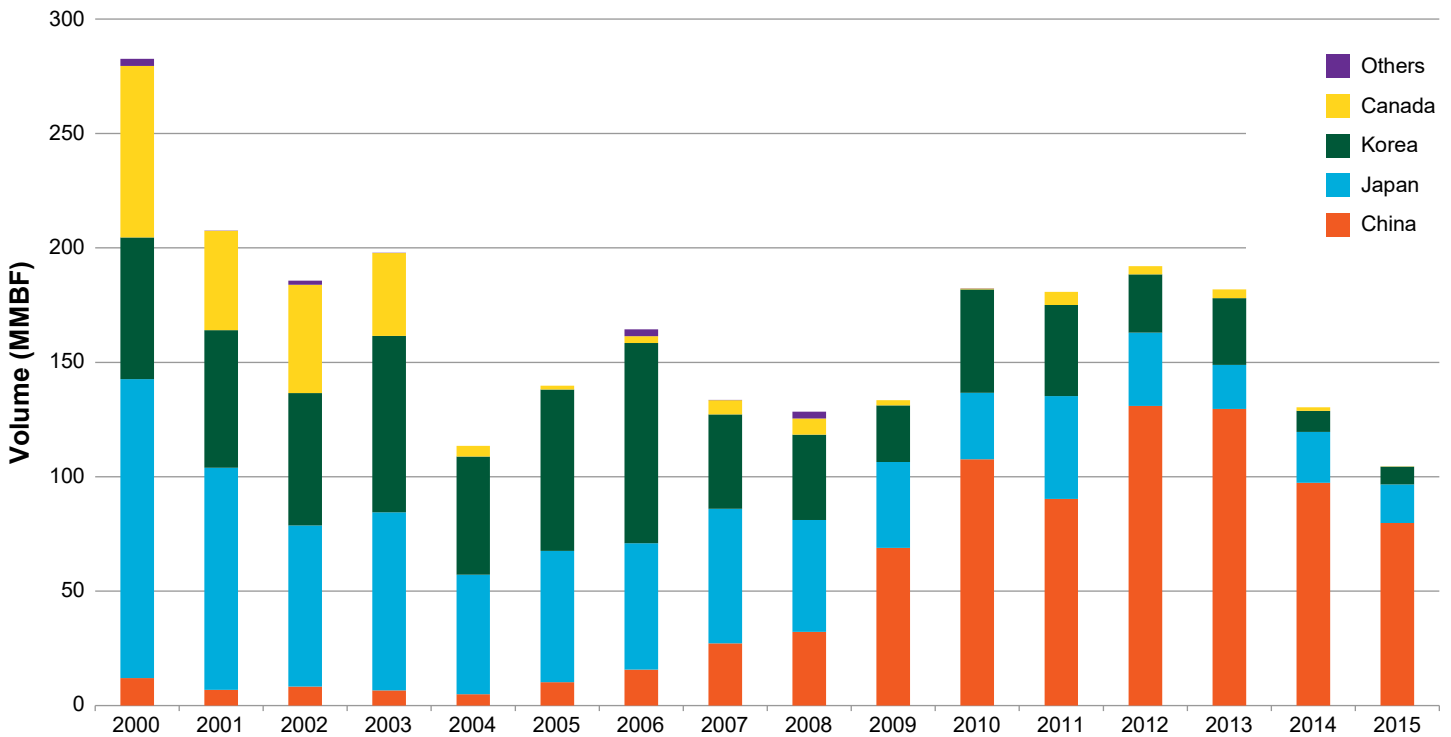


Figure 2—Destination and volume, in million board feet (MMBF), of Alaska log exports by receiving country, 2000 to 2015 (USITC 2016). Source: U.S. International Trade Commission, 2016.

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.

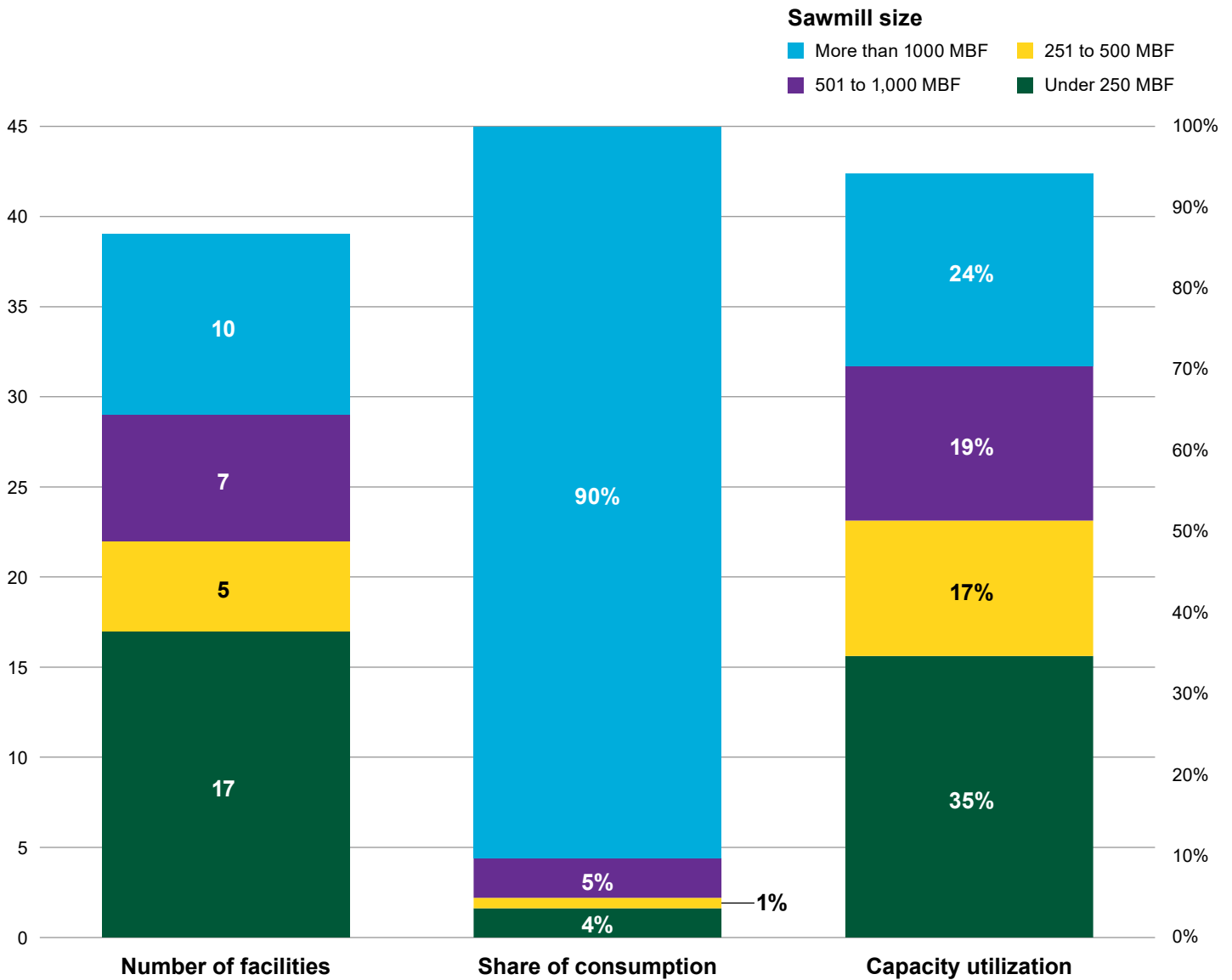


Figure 3—Number of Alaska processing facilities, share of timber volume consumed and capacity utilization by facility size class during 2015.

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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