Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Pacific Northwest Research Station | General Technical Report PNW-GTR-1023 | May 2024

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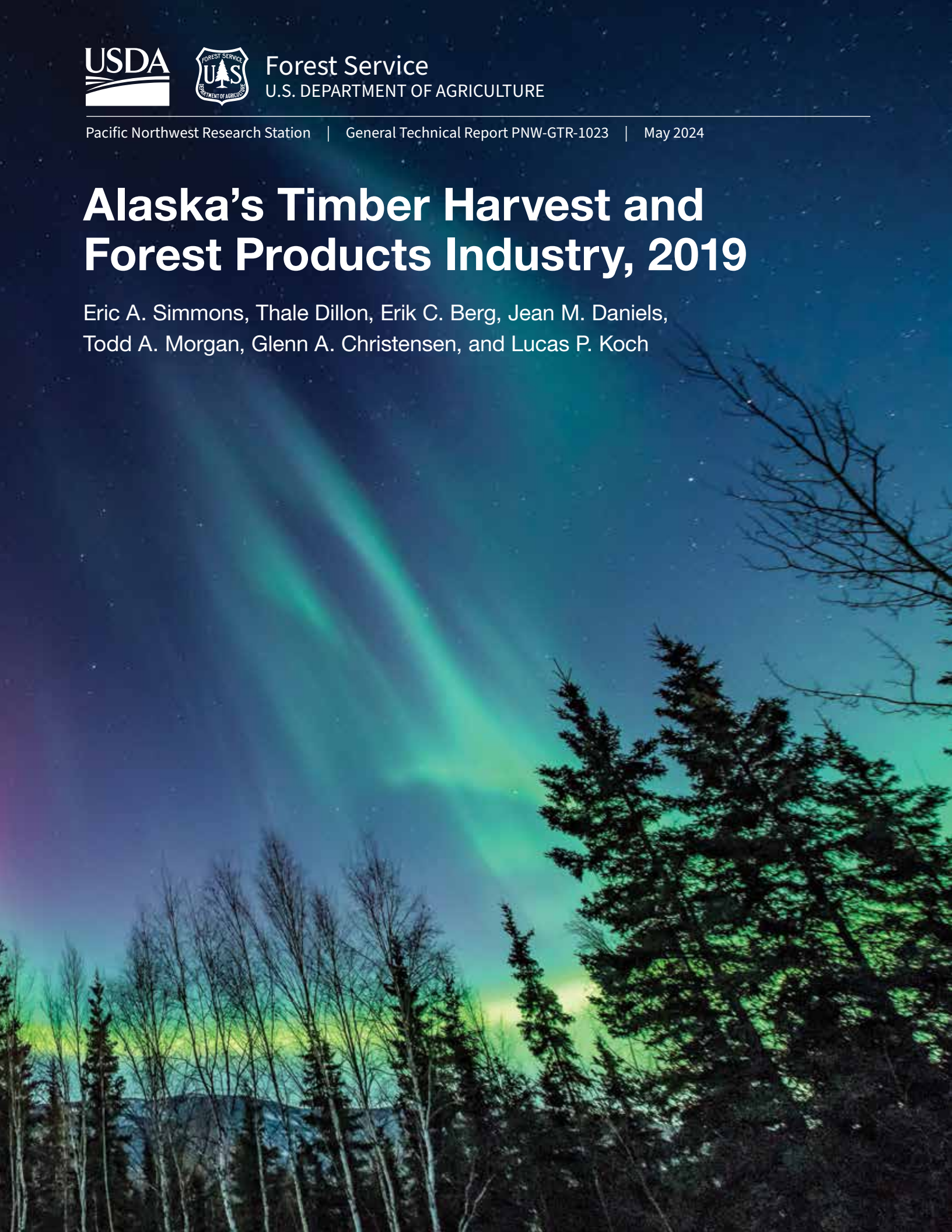

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U.S. Department of Agriculture
Forest Service
Pacific Northwest Research Station
Portland, Oregon
General Technical Report PNW-GTR-1023

Published in cooperation with
University of Montana
Bureau of Business and Economic Research
Missoula, Montana
May 2024

Abstract

Simmons, Eric A.; Dillon, Thale; Berg, Erik C.; Daniels, Jean M.; Morgan, Todd A.; Christensen, Glenn A.; Koch, Lucas P. 2024. Alaska's timber harvest and forest products industry, 2019. Gen. Tech. Rep. PNW-GTR-1023. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 27 p. https://doi.org/10.2737/pnw-gtr-1023.

This report traces the flow of timber harvested in Alaska during calendar year 2019, describes the composition and operations of the state's primary forest products industry, and quantifies volumes and uses of wood fiber. Historical wood products industry changes are discussed, as well as trends in timber harvest, production, log exports, sales of primary wood products, employment, and emerging issues for Alaska's forest industry.

KEYWORDS:
Alaska
Forest economics
Forest products
Lumber production
Mill capacity
Mill residue
Timber harvest

Summary

This report summarizes the timber harvest and primary wood products industry in Alaska during calendar year 2019, with historical trends where appropriate. The Forest Industry Research Program at University of Montana, Bureau of Business and Economic Research (BBER) conducted a census of Alaska's primary wood products facilities in 2020, collecting data on the industry's operations in 2019 in a cooperative effort with the U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Forest Inventory and Analysis (FIA) program.

Alaska's total timber harvest in 2019 was 178.7 million board feet (MMBF) Scribner. Most (71 percent) of the harvested timber was from private lands, including those of Alaska Native corporations. Sawlogs composed 97 percent of the total harvest, continuing trends seen over the past two decades. We identified a total of 48 active primary wood products facilities in Alaska during 2019, 12 fewer than in 2015. The number of timber-processing facilities dropped by more than 40 percent from 2011 to 2019, and timber-processing capacity declined by more than 30 percent over the same period. Annual timber-processing capacity at active Alaska facilities was 92.7 MMBF Scribner during 2019.

Primary wood product sales in Alaska reported as finalized "free on board" shipment by the producing mill, or when delivered "free alongside ship," including log exports and mill residue, totaled more than $155 million during 2019, up from $123 million (2019 dollars) reported in 2015. Exports of sawlogs eclipsed all other revenue sources, with sales totaling $127 million and accounting for 82 percent of Alaska's total primary wood product sales.

In 2019, 1,198 workers engaged in forestry and logging, wood products manufacturing, and forestry support activities, earning $59 million in labor income. The activity associated with this direct employment generated additional economic opportunities as primary forest industries relied on other industries for intermediate inputs and services. BBER estimates that in 2019, the wood products manufacturing sector alone supported an additional 1,146 full- and part-time jobs and an associated $45 million in labor income in other sectors. Thus, for every wood products industry manufacturing job in the state, another 1.2 jobs were generated in supported sectors, while for every $1 paid in labor income by wood products manufacturers another $1.67 was paid in supporting sectors.

Highlights

- We identified a total of 48 active primary wood products facilities in Alaska during 2019—29 sawmills; 8 house log facilities; and 11 producers of fuelwood products, cedar products, log furniture, tonewood (for musical instruments), and novelty items.
- Alaska's total timber harvest in 2019 was 178.7 million board feet (MMBF) Scribner. Most (71 percent) was harvested from private lands, including those of Alaska Native corporations. Sawlogs composed 97 percent of the total harvest.
- Most of Alaska's timber harvest is exported as unprocessed logs. Alaska log exports reported by the United States International Trade Commission decreased by 9 percent between 2015 and 2019.
- Alaska sawmills recovered an average of 1.33 board feet lumber tally per board foot Scribner of log input, showing no change from 2015.
- During 2019, Alaska's 29 sawmills produced 32.3 MMBF Scribner lumber tally of lumber, 5 percent more than in 2015. House log production fell by about 32 percent from 2015 to 2019.
- The number of timber-processing facilities dropped by more than 40 percent from 2011 to 2019, and timber-processing capacity declined by more than 30 percent over the same period. Annual timber-processing capacity at active Alaska facilities was 92.7 MMBF Scribner during 2019.
- Alaska's primary forest products industry shipped products valued at $22.8 million (free on board the producing mill) during 2019. Sawlog and pulpwood exports contributed an additional $127 million to sales, for an overall sales increase of 26 percent from 2015.

Contents

Introduction

This report details the timber harvest in Alaska during calendar year 2019, describes the composition and operations of the state's primary forest products industry, and compares these results to 2015 (Marcille et al. 2021), 2011 (Berg et al. 2014), and 2005 (Halbrook et al. 2009) findings. It presents a brief history of Alaska's forest industry and timber harvest. In this report, Alaska's 2019 timber harvest is characterized by ownership, species composition, types of timber products harvested and processed, and geographic sources. Alaska's forest products industry and timber uses are categorized by major sector. Timber processing capacity and utilization, mill residue, forest product exports, and sales value and employment are also discussed.

The focus of this report is Alaska timber used to manufacture wood products. Products directly manufactured from timber are referred to as "primary products," which include lumber, timbers, house logs, log furniture, cedar products (mostly shingles), and tonewood (used to make musical instruments). Material chipped from timber as well as the disposition of mill residue (i.e., bark, sawdust, slabs, edging, trim, chips, and planer shavings) generated in the production of primary products are also included. Derivative, or secondary products (e.g., window frames, doors, and trusses) are not reported.

Forest Industries Data Collection System

The primary source of data for this report was the University of Montana, Bureau of Business and Economic Research (BBER) statewide census of Alaska's primary timber processors operating during calendar year 2019. Firms were identified through internet searches, telephone directories, forest products industry directories, previous surveys, and expert knowledge. Technical terms are defined in the glossary.

This census of Alaska timber processors is a cooperative effort between BBER and the U.S. Department of Agriculture (USDA) Forest Service, Pacific Northwest (PNW) Research Station, Forest Inventory and Analysis (FIA) program. BBER, in cooperation with the USDA Forest Service FIA programs in the agency's Rocky Mountain and PNW Research Stations, developed the Forest Industries Data Collection System (FIDACS) to collect, compile, and make available state- and county-level information on the operations of the forest products industry. FIDACS is based on a periodic census of primary forest product manufacturers.

Through a written questionnaire or telephone interview, manufacturers provided the following information for each of their facilities during 2019:

- Mill production, capacity, and employment
- Log lengths and small- and large-end diameters preferred and received
- Volume of raw material received by borough/census area and ownership
- Species of timber received and the proportions of live versus dead
- Finished product volumes, types, sales value, and market locations
- Utilization and marketing of manufacturing residue

This effort is the fourth application of FIDACS in Alaska; BBER conducted previous censuses for calendar years 2005 (Halbrook et al. 2009), 2011 (Berg et al. 2014), and 2015 (Marcille et al. 2021). BBER and USDA Forest Service research stations have been reporting on the forest industries in the Rocky Mountain and Pacific coast states for more than 50 years. BBER at the University of Montana in Missoula, Montana stores information collected through FIDACS. Additional information is available by request; however, individual firm-level data are confidential and will not be released.

Recent History

Berg et al. (2014) and Marcille et al. (2021) reported the history of the Alaska forest products industry. This section focuses on more recent trends. Negative financial impacts of the 2007 Great Recession persisted into 2011 and triggered reduction in Alaska forest industry output (Keegan et al. 2012). Although Alaska wood products revenues dropped during this downturn, reductions in product prices were less severe than experienced by facilities in the lower 48 states. The U.S. wood products industry recovered between 2011 and 2019 as U.S. total housing starts increased from more than 600,000 units in 2011 to 1.3 million in 2019 (USDC CB 2022). However, the Alaska wood products industry typically does not conform to broader national macroeconomic trends. Alaska total housing starts remained relatively steady at 2,307 units in 2011 and 2,446 units in 2015, then steeply declined to 1,886 units in 2019 (State of Alaska 2023).

Total sales from Alaska's forest industry declined by about 20 percent between 2011 and 2015, before rebounding

by nearly 26 percent between 2015 and 2019, largely because of demand for softwood log exports. Robust log exports, mostly destined for other Pacific Rim countries, have buoyed the Alaska forest industry for decades (Portman 2012). However, recent planned reductions in timber harvesting activity announced by the Sealaska Native corporation, the primary log exporter in the region, could have a substantial impact on future timber supply, wood product sales, and log exports from Alaska (Resneck 2021).

The 2019 Alaska mill census reflected the continuing decline in USDA Forest Service timber volume harvested from the Tongass National Forest. Tongass timber harvest policies have been contentious, resulting in decades of litigation between environmental advocates and the forest products industry (Resneck 2020). Policy documents supporting the transition to young growth timber harvest such as the 2016 *Tongass National Forest Land and Resource Management Plan* (USDA FS 2016), and the *Southeast Alaska Sustainability Strategy* (USDA FS 2022), outline a path from old-growth to young-growth timber management.

Alaska Timberlands

Timberland information for this report is based on FIA coastal Alaska permanent-plot-derived forest statistics (fig. 1). In 2014, FIA initiated a pilot reduced-scale inventory of interior Alaska through a novel combination of widely spaced permanent forest inventory plots and remote sensing (Pattison et al. 2018). Following the successful 2014 pilot study, FIA implemented the forest inventory survey throughout all interior Alaska. To account for the enormous land area of interior Alaska, FIA uses a modified inventory protocol and schedule compared to that used in other states. Using the modified inventory design, it will take an estimated 15 to 20 years to complete plot measurements in all interior inventory units (Cahoon and Baer 2022).

The coastal Alaska forest inventory unit stretches from Kodiak Island to Ketchikan and covers about 6 million acres of timberland. Most coastal timberland is publicly owned, with 3.4 million acres in the Tongass National Forest, 0.3 million acres in the Chugach National Forest, 0.1 million acres on other federal land, and 0.9 million acres in other public (state and local) ownerships. Alaska Native corporations own about 22 percent of coastal Alaska's timberland (1.3 million acres). Coastal Alaska timberlands support about 29 billion cubic feet in growing stock trees and 145 billion board feet Scribner of mostly conifer sawtimber (USDA FS 2021). Western hemlock (*Tsuga heterophylla* (Raf.) Sarg.) dominates growing stock in the coastal inventory unit at 43 percent of all cubic foot stocking, followed by Sitka spruce (*Picea sitchensis* (Bong.) Carrière) at 36 percent, mountain hemlock (*Tsuga mertensiana* (Bong.) Carrière) at 6 percent, Alaska yellow-cedar (*Cupressaceae Callitropsis nootkatensis* (D. Don) Oerst. ex D.P. Little [Virginia Tech 2022]) at 6 percent, and western redcedar (*Thuja plicata* Donn ex D. Don) at 5 percent. Substantial portions of coastal forest lands lack feasible access for timber harvest operations. More than 90 percent of federally owned coastal forest lands in Alaska are classified as roadless areas or have other management designations that essentially prohibit road building and logging.

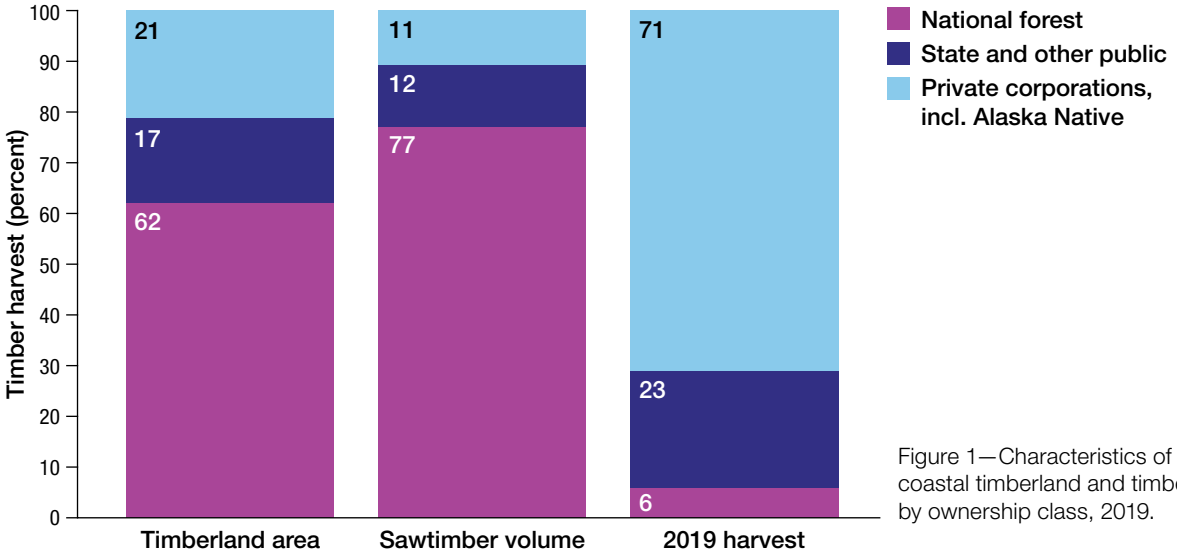

Figure 1—Characteristics of Alaska's coastal timberland and timber harvest by ownership class, 2019.

Unlike much of the forested land in other Western states with second- or third-growth timber, coastal Alaska's timberland age class distribution is skewed toward trees older than 200 years (44 percent of forested acreage) (Cahoon et al. 2020).

Alaska 2019 Timber Harvest and Flow

Timber harvest volume in 2019 was estimated at 178.7 MMBF Scribner, increasing more than 30 percent from the 2015 volume of 136.4 MMBF Scribner. More than 80 percent of Alaska's timber harvest was exported in 2019, following the trend of the past 30 years.

Harvest by Ownership

Timber harvest in Alaska has declined substantially on all ownerships, from nearly 550 MMBF Scribner in 1990 to 178 MMBF Scribner in 2019. Since 2005, more than 60 percent of the statewide total harvest originated from Alaska Native corporation and other private lands (table 1; fig. 2). Alaska Native corporations and other private lands contributed about 73 percent of all sawlogs in 2019. In contrast, national forest timber harvest has been consistently declining, down from 22 percent of all harvested volume in 2015 to 6 percent in 2019. Alaska lands managed by the State of Alaska Department of Natural Resources (ADNR) Division of Forestry and Fire Protection, Alaska Mental Health Trust Authority, and University of Alaska System compose most state and other public-land harvest volumes. State timberlands are a significant supplier of timber, particularly to mills in western, south-central, and interior Alaska. Their contribution increased substantially from 11 percent in 2015 to 23 percent in 2019, stemming from an uptick in harvest from Alaska Mental Health Trust Authority lands (State of Alaska 2010, 2019). Overall, harvest has significantly increased on state and other public lands since 2015, providing most of the timber for the house log, fuelwood, and other product sectors in 2019.

Alaska's total timber harvest in 2019 was 178.7 million board feet Scribner. Most was harvested from private lands, including those of Alaska Native corporations. Sawlogs composed 97 percent of the total harvest.

Table 1—Alaska timber harvest by ownership class and product type for select years

Ownership class	Sawlogs[a]	House logs	Fuelwood	Other products[b]	2019 total harvest	2015 all products	2011 all products	2005 all products
				THOUSAND BOARD FEET SCRIBNER				
Private, including Alaska Native corporations	126,080	62	391	123	126,655	90,848	127,990	162,893
National forest	10,571	184	28	66	10,849	30,286	28,688	47,068
State and other public	36,139	746	1,100	3,171	41,155	15,237	18,590	58,319
All owners	172,789	992	1,519	3,359	178,658	136,371	175,268	268,281
				PERCENT OF HARVEST				
Private, including Alaska Native corporations	73	6	26	4	71	67	73	61
National forest	6	19	2	—	6	22	16	18
State and other public	21	75	72	94	23	11	11	22
All owners[c]	97	1	1	2	100	100	100	100

[a] Sawlogs include logs harvested in and exported from Alaska.
[b] Other timber products include tonewood and cedar products.
[c] Columns may not sum to total because of rounding.
Sources: Berg et al. 2014, Halbrook et al. 2009, Marcille et al. 2021.

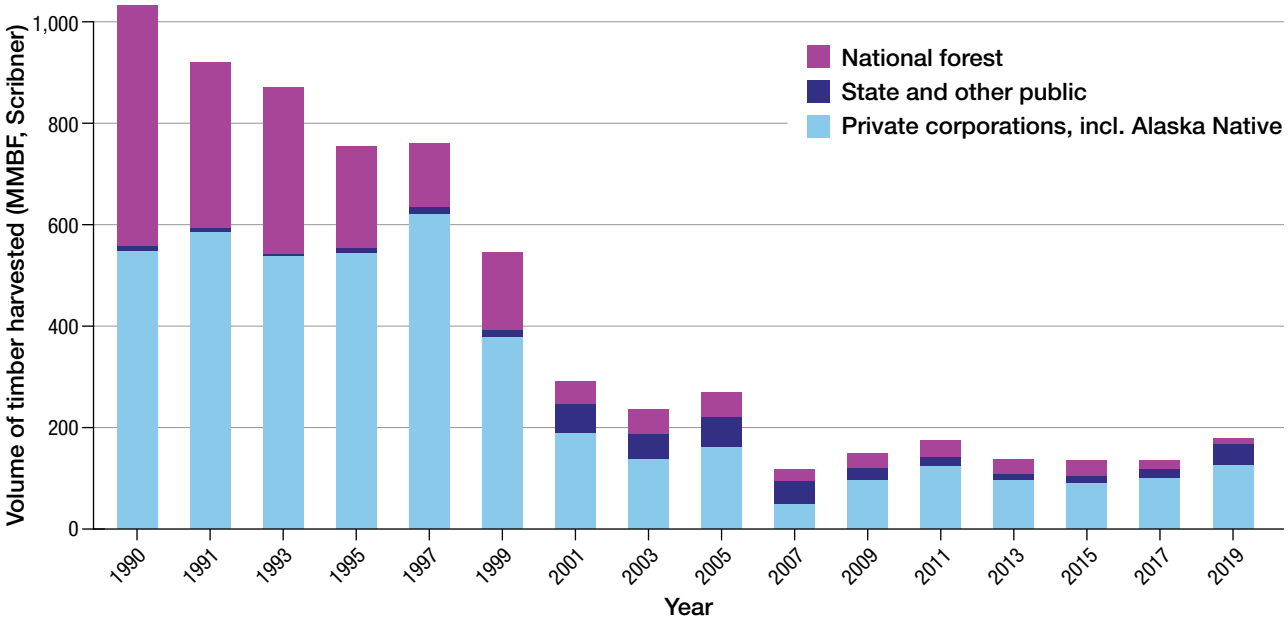

Figure 2—Alaska's timber harvest volume by ownership for select years. (Sources: Alexander 2011, Berg et al. 2014, Brackley et al. 2009, Halbrook et al. 2009, Marcille et al. 2021, USITC 2022).

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

Species	Sawlogs[a]	Other products[b]	2019 All products	2015 All products	2011 All products	2005 All products
	THOUSAND BOARD FEET, SCRIBNER					
Sitka spruce	100,801	176	100,977	96,393	111,364	126,769
Western hemlock	46,388	13	46,401	14,711	35,159	77,488
Western redcedar	19,348	277	19,625	13,483	18,362	15,719
White spruce	1,977	4,200	6,178	7,726	6,173	16,010
Birch species	282	1,028	1,310	2,014	1,660	19,578
Alaska cedar	3,500	2	3,502	1,671	1,786	10,875
Other[c]	494	173	667	373	762	1,841
All species	172,789	5,869	178,658	136,371	175,266	268,280
	PERCENT OF HARVEST					
Sitka spruce	58	3	57	71	64	47
Western hemlock	27	0	26	11	20	29
Western redcedar	11	5	11	10	10	6
White spruce	1	72	3	6	4	6
Birch species	0	18	1	1	1	7
Alaska cedar	2	0	2	1	1	4
Other[c]	0	3	0	0	0	1
All species[d]	97	3	100	100	100	100

[a] Sawlogs include logs harvested in and exported from Alaska.
[b] Other products include house logs, fuelwood logs, cedar product logs, and biomass/energy logs.
[c] Other species include cottonwood, quaking aspen, black spruce, and poplar.
[d] Columns may not sum to total because of rounding.
Sources: Berg et al. 2014, Halbrook et al. 2009, Marcille et al. 2021.

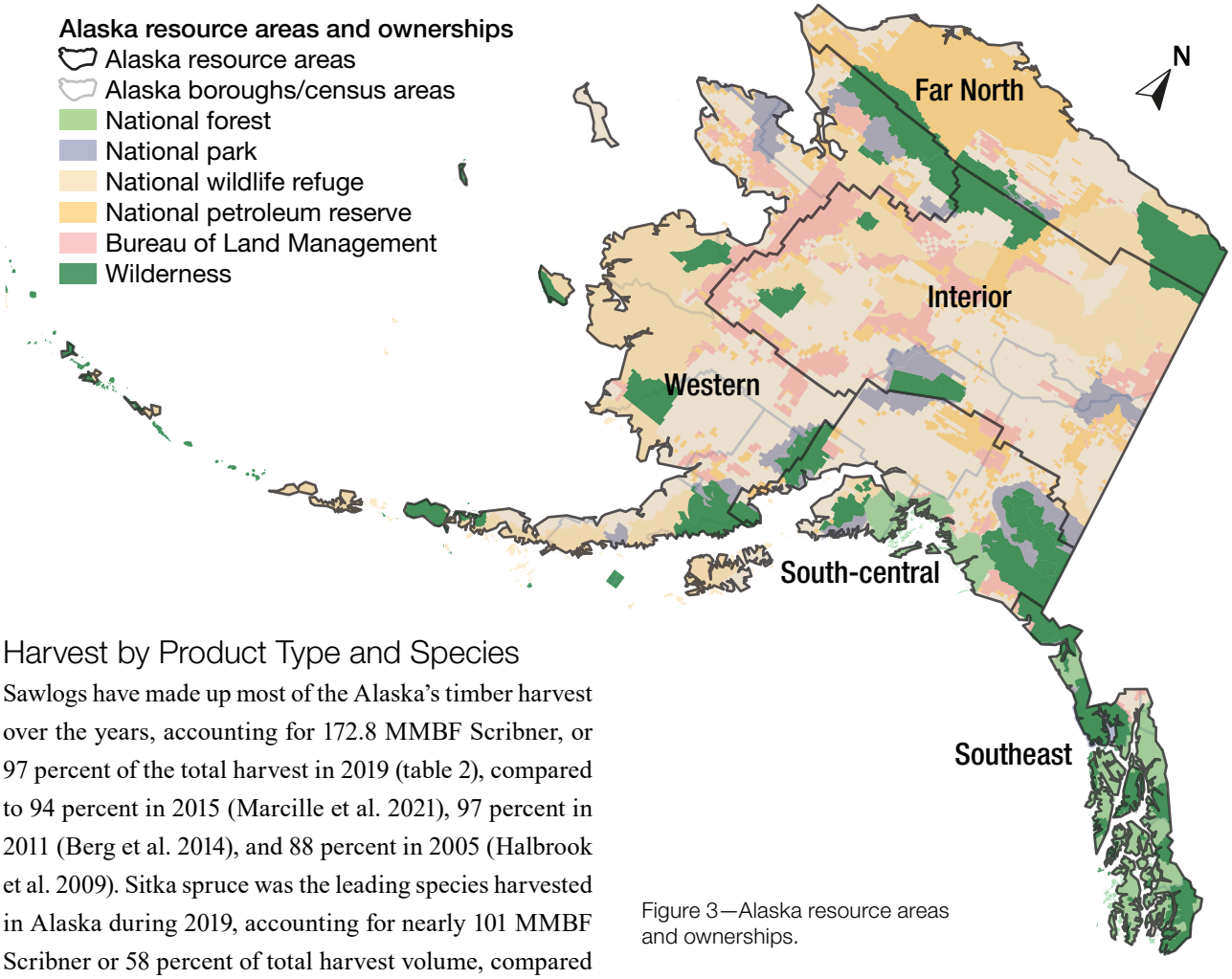

Figure 3—Alaska resource areas and ownerships.

Harvest by Product Type and Species

Sawlogs have made up most of the Alaska's timber harvest over the years, accounting for 172.8 MMBF Scribner, or 97 percent of the total harvest in 2019 (table 2), compared to 94 percent in 2015 (Marcille et al. 2021), 97 percent in 2011 (Berg et al. 2014), and 88 percent in 2005 (Halbrook et al. 2009). Sitka spruce was the leading species harvested in Alaska during 2019, accounting for nearly 101 MMBF Scribner or 58 percent of total harvest volume, compared to 71 percent in 2015. Western hemlock increased from 11 percent of the total in 2015 to 26 percent in 2019, an increase of more than 30 MMBF Scribner. Western redcedar and Alaska yellow-cedar consistently hovered around 10 and 2 percent of harvest over time, respectively. Timber received by Alaska's processors for other products mirrors trends in timber harvest (see table 6 for more detail on the volume of species by log product type).

Harvest by Geographic Source

Rather than counties, Alaska state is divided into 18 boroughs and 12 census areas and municipalities. This report uses borough or census area boundaries to define five geographic regions in Alaska—southeast, south-central, interior, western, and far north (fig. 3; table 3). Timber resources can be found in all but the far north, with the southeast region historically dominating Alaska's timber harvest. South-central and western region data are combined to prevent any disclosure of proprietary information.

Table 4 shows that timber harvest by resource area shifted somewhat between 2015 and 2019. In 2019, 29 percent was harvested in south-central and western Alaska compared to nearly 39 percent in 2015. Further, harvest in the southeast increased from 56 percent in 2015 to 67 percent in 2019. Interior Alaska's contribution has remained relatively stable at around 4 to 6 percent of the statewide total since 2011.

Timber Use

Timber use is reported in cubic feet rather than board feet Scribner to report timber inputs to mills, mill residues, and primary wood products in the same unit of measure. Bark is not included. Alaska's 2019 timber harvest of about 36,554 thousand cubic feet (MCF) was used in five primary manufacturing sectors: sawlog and chip exports, sawmills, log home manufacturers, wood energy firms, and manufacturers of other products.

BBER derived the following board foot to cubic foot ratios from data obtained in the study to convert board foot Scribner to cubic foot volumes:

Table 3—Alaska timber resource and boroughs/census areas

Resource area	Borough/census area
Interior	Denali borough
	Fairbanks North Star borough
	Southeast Fairbanks census area
	Yukon-Koyukuk census area
South-central	Anchorage municipality
	Chugach census area
	Copper River census area
	Kenai Peninsula borough
	Matanuska-Susitna borough
Southeast	Haines borough
	Hoonah-Angoon borough
	Juneau borough
	Ketchikan Gateway borough
	Petersburg borough
	Prince of Wales-Hyder census area
	Sitka borough
	Skagway municipality
	Wrangell borough
	Yakutat borough
Western	Aleutians East borough
	Aleutians West census area
	Bethel census area
	Bristol Bay borough
	Dillingham census area
	Kodiak Island borough
	Kusilvak census area
	Lake and Peninsula borough
	Nome census area
	Northwest Arctic borough
Far North	North Slope borough

- 5.23 board feet per cubic foot for sawlogs (not including export logs)
- 4.88 board feet per cubic foot for log exports
- 5.95 board feet per cubic foot for house logs
- 5.14 board feet per cubic foot for cedar products
- 3.11 board feet per cubic foot for log furniture and other products

We used methods outlined by Keegan et al. (2010) to derive these board-foot-to-cubic-foot ratios. Changes in log size over time (i.e., diameter) can influence these ratios. However, mill census data in 2005, 2011, 2015, and 2019 show that the size of logs harvested in Alaska has changed relatively little during these times.

Figure 4 traces the flow of Alaska's primary timber industry wood fiber inputs and outputs by sector. Sawmills received 5,601 MCF (15 percent) of the harvest volume and produced 2,323 MCF (41 percent of input volume) in finished lumber or other sawn products. About 1,855 MCF in residual woodchips were exported, while about 962 MCF of other sawmill residue was utilized for energy (e.g., firewood, wood pellet production, chips for boilers). Residuals for other uses, such as animal bedding and landscaping accounted for 310 MCF, and shrinkage of lumber volume due to moisture lost during drying accounted for 46 MCF. About 105 MCF (2 percent) of the log input went unused by Alaska sawmills during 2019.

Figure 4 shows that 29,757 MCF (81 percent) of Alaska's 2019 timber harvest was exported in roundwood log form. This trend in log exports relative to total harvest volume is consistent with previous findings. Most of the timber harvested in Alaska has been exported to foreign destinations as roundwood logs for decades. Since export logs are not processed in Alaska, and overseas uses are unknown, utilization attributes are uncertain.

Table 4—Alaska timber harvest by resource area, select years

Resource area	Percentage of total	2019 harvest	2015 harvest	2011 harvest	2005 harvest
		THOUSAND BOARD FEET, SCRIBNER			
Southeast	67	119,776	75,961	104,393	198,346
South-central and western[a]	29	52,299	52,547	64,448	66,096
Interior	4	6,583	7,863	6,427	3,839
State total	100	178,658	136,371	175,267	268,281

[a] Resource areas combined to avoid disclosure.

Sources: Berg et al. 2014, Halbrook et al. 2009, Marcille et al. 2021.

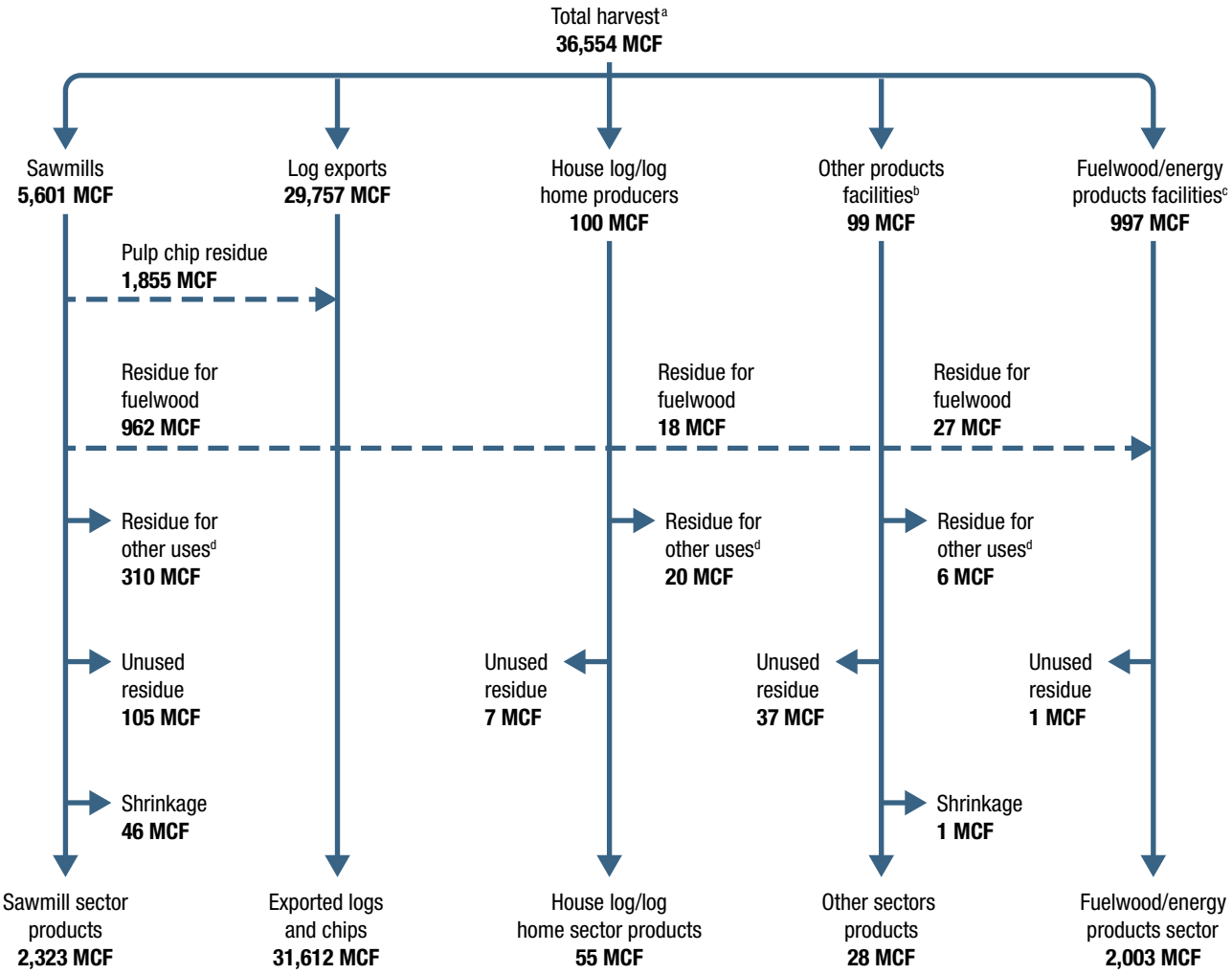

Figure 4—Alaska's timber harvest by mill type and disposition, 2019.
[a] Harvest volume does not include bark.
[b] Other products facilities include producers of tonewood and cedar products.
[c] Fuelwood energy products include firewood and compressed wood products.
[d] Other uses include landcape, mulch, and animal bedding.

Alaska's Forest Products Industry

The 2019 FIDACS census tallied 48 active facilities in 11 of Alaska's 30 boroughs or census areas (table 5; fig. 5). In contrast, the 2005 FIDACS census identified 78 facilities, but the number of active mills dropped rapidly in subsequent years. Timber export facilities are not identified by location because individual export firms use export landings located in several boroughs or census areas, and the frequency of individual landing use varies widely. Primary timber processors in Alaska produced an array of products, including dimension lumber, board and shop lumber, timbers, finished house logs, log homes, energy wood products (wood pellets and firewood), log furniture, woodchips from roundwood, cedar products (mostly shingles and shakes), tonewood for musical instruments, and novelty items such as bowls, spoons, and mugs.

Timber Received at Alaska Wood Products Facilities

Volume received by ownership and product type

The majority of private timber harvest occurred on Alaska Native corporation lands and was exported to Asian markets. As a result, mills in Alaska have depended on federal and state sources for their timber supply. FIDACS censuses conducted in 2005, 2011, and 2015 found that national forests supplied more than 50 percent of timber utilized by Alaska producers, an amount that dropped precipitously after 2015, mainly because of declining harvest from the Tongass National Forest. By 2019, national forest timber composed only 3 percent of 2019 mill inputs (table 6). Instead, timber from state and other ownerships increased from 11,561,000

Table 5—Number of active timber-processing facilities by resource area, borough/census area, and product produced, 2019[a]

Resource and borough/census area	Lumber	House logs	Other[b]	Total
Southeast	14	—	7	21
Haines	2	—	—	2
Ketchikan Gateway	1	—	—	1
Prince of Wales-outer Ketchikan	6	—	6	12
Skagway-Hoonah-Angoon	1	—	—	1
Wrangell-Petersburg	4	—	1	5
South-central and western	7	7	1	15
Anchorage	1	3	—	4
Kenai Peninsula	2	2	1	5
Kodiak Island	1	—	—	1
Matanuska-Susitna	3	2	—	5
Interior	8	1	3	12
Fairbanks North Star	5	1	2	8
Southeast Fairbanks	3	—	1	4
TOTAL	29	8	11	48
Previous years				
2015 state total	39	11	10	60
2011 state total	50	18	9	77
2005 state total	50	20	8	78

[a] Does not include timber exporters.
[b] Other facilities include producers of fuelwood, wood pellets, cedar products, and tonewood.
Sources: Berg et al. 2014, Halbrook et al. 2009, Marcille et al. 2021.

board feet (11,561 MBF) Scribner, or 37 percent of the total volume received by Alaska mills in 2015, to 30,499 MBF, or 91 percent of the total volume received in 2019. Sawlogs accounted for most (82 percent) of the timber received by Alaska mills, and state (i.e., ADNR Division of Forestry, Alaska Municipal Health Trust Authority, and University of Alaska System) and other public lands (e.g., U.S. Department of the Interior Bureau of Land Management and municipal) were the predominant source of these sawlogs. State and other public lands also provided most of the timber used for house logs, fuelwood, and other products (table 6).

Volume received by species and product type

Overall, Sitka spruce was the leading species received by Alaska mills in 2019 (table 7), accounting for 30 percent of volume. White spruce (*Picea glauca* (Moench) Voss) composed 18 percent of volume received, a reduction from 2015 (25 percent) and 2011 (27 percent). Western hemlock made up 22 percent of 2019 timber receipts, up from only 5 percent in 2015 and 13 percent in 2011, but far less than 2005 western hemlock inputs, which constituted 52 percent of total receipts. By far, most of the volume was sawlogs (82 percent), followed by other products such as cedar shingles and tonewood, fuelwood, and house logs.

Volume received by geographic source

About 25.1 MMBF Scribner, or 75 percent of the timber processed by Alaska facilities during 2019, originated in the southeast resource area (table 8). About 20 percent came from interior Alaska, and south-central and western resource areas combined provided 5 percent. Changes in the proportions received from various resource areas have fluctuated over time but have remained relatively consistent between 2005 and 2019. Sawlogs originating in the southeast composed most of the timber processed in 2019, mirroring trends from previous years.

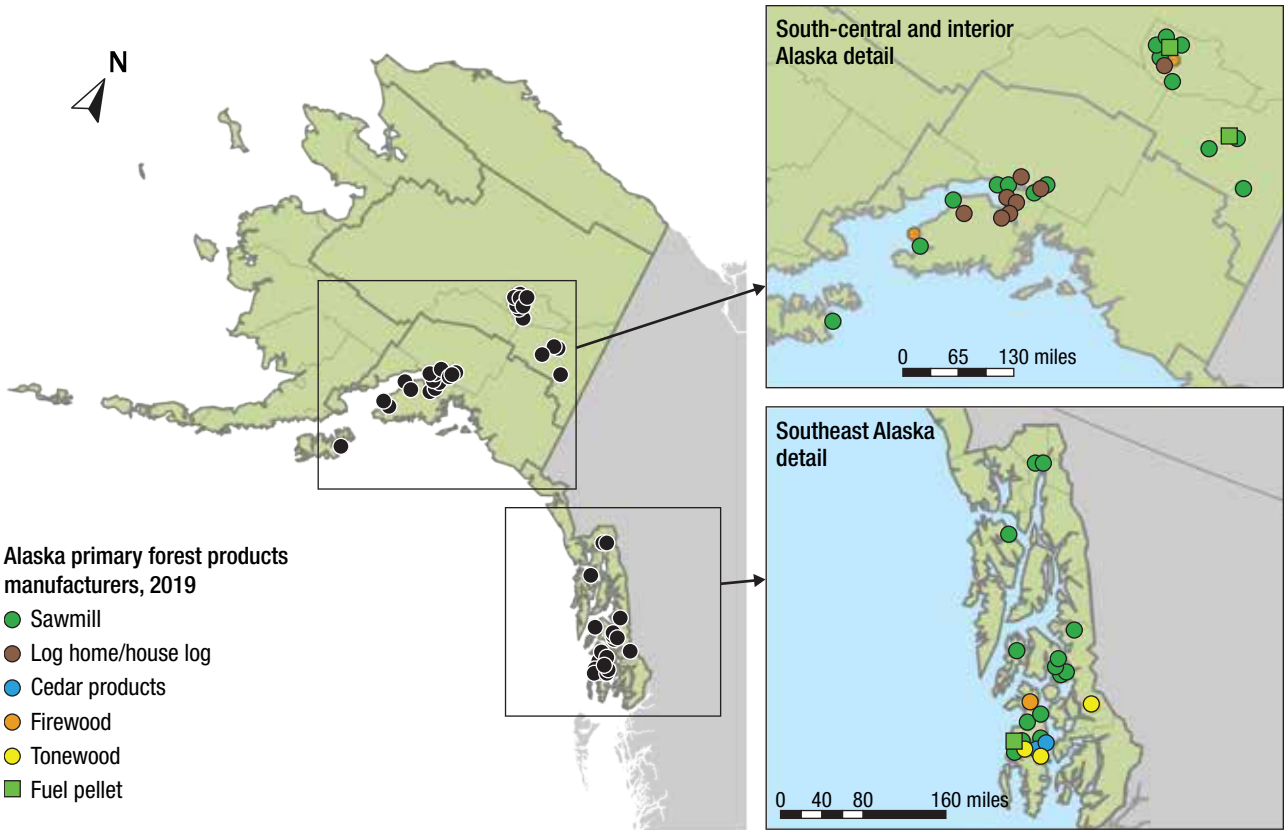

Figure 5—Primary forest product manufacturers in Alaska in 2019.

Table 6—Timber received by Alaska timber-processing facilities by ownership class and product type, select years

Ownership class	Sawlogs[a]	House logs	Fuelwood[b]	Other products[c]	2019 All products	2015 All products	2011 All products	2005 All products
	THOUSAND BOARD FEET, SCRIBNER							
Private, incl. Alaska Native corporations	1,277	62	391	123	1,852	2,848	3,364	3,743
National forest	871	184	28	66	1,149	16,870	12,099	23,866
State and other[d]	25,483	746	1,100	3,171	30,499	11,561	7,796	17,252
All owners	27,631	992	1,519	3,360	33,500	31,280	23,259	44,861
	PERCENT OF VOLUME RECEIVED							
Private, incl. Alaska Native corporations	5	6	26	4	7	9	14	8
National forest	3	19	2	2	3	54	52	53
State and other[d]	92	75	72	94	91	37	34	38
All owners[e]	82	3	5	10	100	100	100	100

[a] Timber received by log exporters not included.
[b] Includes timber used for residential firewood, industrial fuelwood for pellet manufacturing and chips for park/playground fill.
[c] Includes cedar products and tonewood logs.
[d] Includes other public ownerships and timber received from unspecified ownerships.
[e] Columns may not sum to total because of rounding.
Sources: Berg et al. 2014, Halbrook et al. 2009, Marcille et al. 2021.

Table 7—Timber received by Alaska timber-processing facilities by species and product type, select years

Species	Sawlogs[a]	House logs	Fuelwood[b]	Other products[c]	2019 All products	2015 All products	2011 All products	2005 All products
	THOUSAND BOARD FEET, SCRIBNER							
Sitka spruce	9,988	140	34	2	10,165	7,722	5,114	10,877
Western redcedar	7,112	20	0	257	7,389	10,891	5,671	1,857
Western hemlock	7,293		12	1	7,305	1,696	3,114	23,539
White spruce	1,977	745	735	2,720	6,178	7,726	6,174	6,154
Birch species	282	54	637	338	1,310	2,014	1,660	230
Alaska cedar	486			2	487	858	373	1,099
Other[d]	494	33	101	39	667	373	1,153	1,105
All species[e]	27,631	992	1,519	3,359	33,500	31,280	23,259	44,861
	PERCENT OF VOLUME RECEIVED							
Sitka spruce	36	14	2	0	30	25	22	24
Western redcedar	26	2	0	8	22	35	24	4
Western hemlock	26	0	1	0	22	5	13	52
White spruce	7	75	48	81	18	25	27	14
Birch species	1	—	42	10	4	6	7	1
Alaska cedar	2	—	—	0	1	3	2	2
Other[d]	2	3	7	1	2	1	5	2
All species[e]	82	3	5	10	100	100	100	100

[a] Timber received by log exporters not included.

[b] Includes timber used for residential firewood, industrial fuelwood for pellet manufacturing, and chips for park/playground fill.

[c] Includes cedar products and tonewood logs.

[d] Species combined to avoid disclosure. Other species include cottonwoods, balsam poplar, quaking aspen, and black spruce.

[e] Columns may not sum to total because of rounding.

Sources: Berg et al. 2014, Halbrook et al. 2009, Marcille et al. 2021.

Table 8—Timber received by Alaska timber-processing facilities by resource area and product type, select years

Resource area	Sawlogs[a]	House logs	Fuelwood[b]	Other products[c]	2019 All products	2015 All products	2011 All products	2005 All products[d]
	THOUSAND BOARD FEET, SCRIBNER							
Southeast	24,728	84	46	262	25,120	20,869	13,812	37,982
South-central and western[e]	999	555	131	112	1,797	2,547	3,022	2,900
Interior	1,904	352	1,342	2,985	6,583	7,863	6,425	3,729
All areas[f]	27,631	992	1,519	3,359	33,500	31,280	23,259	44,861
	PERCENT OF VOLUME RECEIVED							
Southeast	89	9	3	8	75	67	59	85
South-central and western[e]	4	56	9	3	5	8	13	6
Interior	7	36	88	89	20	25	28	8
All areas[f]	82	3	5	10	100	100	100	100

[a] Timber received by log exporters not included.
[b] Includes timber used for residential firewood, industrial fuelwood for pellet manufacturing, and chips for park/playground fill.
[c] Includes cedar products and tonewood logs.
[d] Includes 250 thousand board feet Scribner from outside the state of Alaska (Halbrook et al. 2009).
[e] Resource areas combined to avoid disclosure.
[f] Columns may not sum to total because of rounding.
Sources: Berg et al. 2014, Halbrook et al. 2009, Marcille et al. 2021.

Industry Trends

Between 2005 and 2019, Alaska's total lumber production declined by 40 percent, from 55- to 33-MMBF Scribner lumber tally (table 9). The lowest level of production, 21 MMBF Scribner, occurred in 2011, immediately following the Great Recession, but has increased in subsequent census years. House log production has declined steadily in each census, from 805,000 lineal feet (805 MLF) in 2005 to 217 MLF in 2019. In 2005, about 28 MMBF Scribner of logs were processed to provide nearly 80,000 bone-dry units, or BDU (1 BDU is equivalent to about 2,400 pounds of oven-dried wood), of chips for export (Halbrook et al. 2009). Since 2005, the processing of logs for exported chips has declined, and in 2019, no log volume reported was chipped for export. In 2019, more than 5,336 BDU of chips were exported from Alaska to destinations in Canada (USITC 2022b), likely from mill residuals.

Southeast Alaska had most of the timber products facilities and associated products outputs. In 2019, southeast Alaska facilities produced a 28.6-MMBF Scribner lumber tally, or 85 percent of all lumber and sawn product outputs; south-central and western Alaska mills led house log production; and interior Alaska mills dominated fuelwood outputs (table 9).

Industry Sectors

Sawmill sector

South-central, western, and interior Alaska facilities are characterized by small, portable sawmills, with only a few larger mills that have a capacity for more than 2 MMBF Scribner lumber tally per year. Not surprisingly, most of the lumber production has been concentrated among the handful of larger mills in the state. In 2019, the 12 mills producing 500 MBF lumber tally or more generated 95 percent of all lumber produced in Alaska (table 10). Production of lumber has increased over time—lumber outputs composed only 40 percent of total sawmill production in 2011 compared to 51 percent in 2019. In addition to lumber during 2019, board and shop products composed 27 percent of total sawmill production; timbers composed 21 percent; while specialty items, such as flooring, siding, and molding composed the remaining 1 percent.

Alaska sawmills recovered an average of 1.33 board feet lumber tally per board foot Scribner of log input, showing no change from 2015.

Table 9—Alaska lumber, house log, and fuelwood production by resource area, 2019 and select years

Resource area	Lumber and other sawn products[a]	House logs and poles	Fuelwood and chipped log products[b]
	THOUSAND BOARD FEET, LUMBER TALLY	THOUSAND LINEAL FEET	BONE-DRY UNITS[c]
Southeast	28,574	[d]	2,515
South-central and western[d]	1,134	137	763
Interior	3,935	80	10,093
All areas[e]	33,643	217	13,371
Previous years			
2015 all areas	32,793	318	14,969
2011 all areas	21,222	378	13,322
2005 all areas	55,404	805	79,700

[a] Includes cedar products and tonewood. Does not include sawn house logs.
[b] Includes firewood, wood pellets, and logs chipped for other products.
[c] 1 bone-dry unit = 2,400 pounds of oven-dried wood.
[d] Volume produced in Southeast Alaska is combined with South-central and western to prevent disclosure
[e] Columns may not sum to total because of rounding.
Sources: Berg et al. 2014, Halbrook et al. 2009, Marcille et al. 2021.

Table 10—Alaska annual lumber production and average overrun by sawmill size, 2019

Annual lumber production size class	Number of active sawmills	2019 lumber production[a]	Percentage of total	Average overrun[b]
		MBF[c]		
<150 MBF lumber tally	13	545	2	1.04
150 to 500 MBF lumber tally	4	1,123	3	1.17
>500 MBF lumber tally	12	30,702	95	1.36
2019 State Total	29	32,370	100	1.33
Previous years				
2015 State Total	39	30,719	—	1.33
2011 State Total	50	20,558	—	1.19
2005 State Total	50	54,861	—	1.27

[a] Does not include sawn products from the house log sector.
[b] Board foot lumber tally per board foot Scribner log input.
[c] Thousand board feet, lumber tally.
Source: Berg et al. 2014, Halbrook et al. 2009, Marcille et al. 2021.

In 2019, Alaska sawmills recovered about 1.33 board feet of lumber for every board foot Scribner of timber processed. This average sawmill overrun matched that of 2015 (Marcille et al. 2021) and was substantially greater than the 1.19 overrun seen in 2011 (Berg et al. 2014). Changes in recovery (i.e., overrun) can be related to mills shifting production among varied outputs. For example, production shifted to favor firewood in 2011 during the height of the Great Recession when demand for softwood lumber was reduced. Lumber recovery then increased during times when lumber production was prioritized (table 9). This change in product allocation and subsequent shift in overrun is a function of the differences between 2011 and 2019 mill activity. In 2011, 18 percent of all timber was allocated to fuelwood versus only 5 percent in 2019; and 74 percent of all mill-received timber was delivered to sawmills versus 82 percent in 2019. In addition, the improvement in 2019 sawmill overrun could be related to the equipment installed. As Keegan et al. (2010) noted,

larger mills often incorporate more advanced technologies such as thin-kerf saw blades that improve recovery. In 2019, 95 percent of lumber was sawn in the largest Alaska mills, compared to only 85 percent in 2011.

Log home sector

Multiproduct facilities and sawmills produced most of Alaska's house logs during 2019. Most products were sawn double round logs and "D" logs (logs sawn on one side only, which creates a "D" shape when viewed from the log end) used in cabin kits; only 29 percent of house log output was either hand peeled or milled by lathe. Facilities that manufactured house logs (including sawmills) utilized about 992 MBF Scribner of timber and produced 217 MLF of house logs, less than in previous years (table 9).

Fuelwood sector

Alaskans have long depended on woody biomass (firewood and pellets) for residential heating (Berg et al. 2011). Demand for woody biomass for heating fuel is particularly acute in interior Alaska, and biomass energy firms, such as Usibelli Mines, seek to capitalize with new biomass fuelwood plants (Bradner 2022). These ventures are not limited to residential uses. For example, the Alaska Gateway School District in Tok installed an innovative wood-fired boiler system that supplies both heat and electric power for school facilities (Hillman 2014).

Interior Alaska facilities produced 10,093 BDU of fuelwood (i.e., firewood and wood pellets), 75 percent of all statewide fuelwood outputs (table 9). Pellets were produced from mill residue (e.g., sawdust and shavings) and chipped roundwood. Most sawmills and house log plants sold firewood in roundwood or cordwood form or in slabs, mostly to purchasers within Alaska.

Other-products sector

Alaska's other-products facilities manufacture tonewood, cedar products (shingles and shakes), furniture, and novelty items, such as cups and bowls. Most of these facilities are in southeast Alaska (fig. 5), where highly productive growing sites support the Sitka spruce and western redcedar needed to manufacture these products. In particular, tonewood timber must be tight grained with few or no imperfections such as knots to produce high-quality musical instruments. Wood with these characteristics tends to come from old-growth trees. Tonewood producers are often able to utilize long butts and other residual pieces left in log decks rather than harvesting whole trees (Berg et al. 2014).

Export-sector

During the past two decades, strengthening demand has driven significant increases in roundwood log and wood product exports from Alaska to Asian countries on the Pacific Rim (Alexander 2011, Roos et al. 2010). However, Chinese tariffs of 20 to 25 percent triggered in 2018 on both U.S. lumber and softwood log exports to China slashed U.S. revenues by 42 percent from late 2018 through March of 2019 (Greene 2019); reduced revenues persisted throughout 2019 (Muhammad 2020). Chinese tariffs directly reduced Alaska timber export company revenues starting in late 2018 (Jenkins 2018) and forced Alaska export companies to lay off workers (Daye and Lei 2021).

At least 140 MMBF Scribner of the timber harvested in Alaska during 2019 was converted into export-ready logs at export sort yards. Most of this timber was harvested on Alaska Native corporation lands. Additionally, during 2019, 4.2 MMBF Scribner of timber from the Tongass National Forest was exported to other Pacific Rim countries, a substantial decline from the 13.4 MMBF Scribner exported in 2015 (USDA FS 2023).[1] State of Alaska Mental Health Trust Authority and ADNR Division of Forestry lands contributed about 10 MMBF Scribner of log exports to other Pacific Rim countries. Modest amounts of timber transported to export yards were merchandised into short logs and sold to local mills rather than exported.

Capacity

Two different measures characterize wood products facility capacity—production capacity and timber-processing capacity.

Production capacity is the potential ability of a facility to produce **outputs** per shift or per work year (i.e., how much total product could be made annually). Production capacity is reported by mill owners or managers during the FIDACS censuses, assuming firm market demand for mill outputs, sufficient supply of timber inputs, and normal maintenance downtime. For sawmills, production capacity was expressed as thousand board feet (MBF) lumber tally outputs per year. House log plants reported production capacity as thousand lineal feet (MLF) house log outputs per year. We used production capacity to characterize

[1] U.S. Department of Agriculture, Forest Service [USDA FS]. 2023. Tongass National Forest log exports and interstate shipments. Data compiled and provided by Tongass National Forest, Jean Daniels, January 17, 2023.

potential lumber and house log production by resource area and at the state level. In Alaska, total lumber production capacity declined from 124.3 MMBF Scribner in 2015 to 111.4-MMBF Scribner lumber tally annually in 2019 (table 11). These production capacity levels are dwarfed by the production capacity of 240.2 MMBF Scribner observed in 2005 (Halbrook et al. 2009). Southeast Alaska resource area sawmills accounted for most of the lumber production capacity at 88.9-MMBF lumber tally. House log production capacity also declined over time, with 2019 house log capacity being less than one-third of 2005 house log production capacity.

Timber-processing capacity is a measure of the volume of timber that mills could use if they operated at their stated production capacity and is expressed as MBF Scribner log scale of timber per shift or per year. In other words, timber-processing capacity focuses on **inputs** and is computed by dividing production capacity by product recovery. Since timber processing capacity is generally expressed in MBF Scribner log scale, regardless of the wood products manufacturing sector, it is useful in characterizing the timber supply needs of a state's entire forest products industry regardless of varying units of measure in product outputs. For example, if a house log plant's reported production capacity is 100 MLF per year and its recovery ratio is 0.3 MLF of house log output per 1 MBF Scribner of timber input, the timber-processing capacity equals 100/0.3 MLF per MBF Scribner, or 333 MBF Scribner. Alternatively, for a sawmill, production capacity may be 200-MBF lumber tally, while recovery may be 2 MBF lumber tally per MBF of Scribner log input, thus making the timber-processing capacity of the mill 100 MBF Scribner of log inputs. The mill's ability to process logs is in this way converted from differing units of measure in outputs to MBF Scribner inputs. Timber-processing capacity estimates are useful because they correspond to the quantity of timber needed to manufacture a given volume of lumber or other products (Alexander 2011, Alexander and Parrent 2012).

Overall, 2019 timber-processing capacity was less than one-half of what it was in 2005 (table 12). Between 2005 and 2011, capacity plunged 34 percent (by nearly 70 MMBF), then dropped further to about 93 MMBF Scribner by 2019. Most of the loss stemmed from mill closures; from 2005 to 2019, the number of active timber-processing facilities fell from 77 to 45. Alaska's declining timber-processing capacity between 2005 and 2019 mirrors trends in timber harvest over time.

The number of timber processing facilities dropped by more than 40 percent, and timber processing capacity declined by more than 30 percent, from 2005 to 2019.

Figure 6 shows timber-processing capacity and capacity-utilization rates in Alaska since the 1980s. Timber-processing capacity averaged around 286 MMBF Scribner

Table 11—Alaska production capacity[a] by resource area and sector, 2019

Resource area[b]	Lumber production capacity	House log production capacity
	THOUSAND BOARD FEET, LUMBER TALLY	THOUSAND LINEAL FEET
Southeast	88,907	200
Interior	19,128	150
South-central and western[c]	3,352	450
2019-all resource areas	111,387	800
Previous years		
2015-all resource areas	124,340	827
2011-all resource areas	137,331	1,740
2005-all resource areas	240,159	2,603

[a] Includes only facilities active during 2019.
[b] See table 3 for a list of borough/census areas located within resource areas.
[c] Resource areas combined to avoid disclosure.
Sources: Berg et al. 2014, Halbrook et al. 2009, Marcille et al. 2021.

log scale in 1986 and 1996, then began falling steadily to a little less than 93 MMBF by 2019. Capacity utilization rates dropped sharply in 1996, reaching an all-time low of 16 percent in 2011. Despite modest recovery in 2015 and 2019, Alaska sawmills timber-processing capacity remained significantly underused with only 27 percent of the existing timber-processing capacity utilized in 2019. Low capacity utilization rates carry the risk of additional mill closures in the near term but also suggest the potential for rapid increases in production if market conditions improve (Keegan et al. 2012).

The sawmill assessments conducted by the USDA Forest Service Alaska Region in southeast Alaska have historically reported capacity differently from BBER (Morris and Daniels 2021). Although capacity methodologies differ, both methods have consistently found low capacity utilization among Alaska's mills over time.

Table 12—Alaska annual timber-processing capacity[a] and use by size class and sector, 2019

		Annual timber-processing capacity		2019 Timber use	
Annual timber-processing capacity size class	Number of active facilities	Timber-processing capacity	Size class capacity	Volume processed	Capacity utilization within size class
		MBF[b]	PERCENT	MBF[b]	PERCENT
Sawmill sector					
<100 MBF	11	498	1	278	56
100–500 MBF	6	1,108	1	447	40
501–1000 MBF	5	3,986	4	997	25
>1000 MBF	7	83,690	94	22,256	27
Sawmill sector total[c]	29	89,281	100	23,977	27
House log & other[d] sectors	16	3,417	100	1,362	40
2019 combined sector totals	45	92,699		25,339	27
Previous years					
2015 combined sector totals	47	114,785	—	24,689	22
2011 combined sector totals	77	132,794	—	20,741	16
2005 combined sector totals	77	202,156	—	46,131	21

[a] Includes facilities active during 2019 only. Does not include timber exporters.
[b] Thousand board feet, Scribner.
[c] Columns may not sum to total due to rounding.
[d] Other sectors include cedar products, tonewood and firewood (excluding wood pellet) manufacturers.
Source: Berg et al. 2014, Halbrook et al. 2009, Marcille et al. 2021.

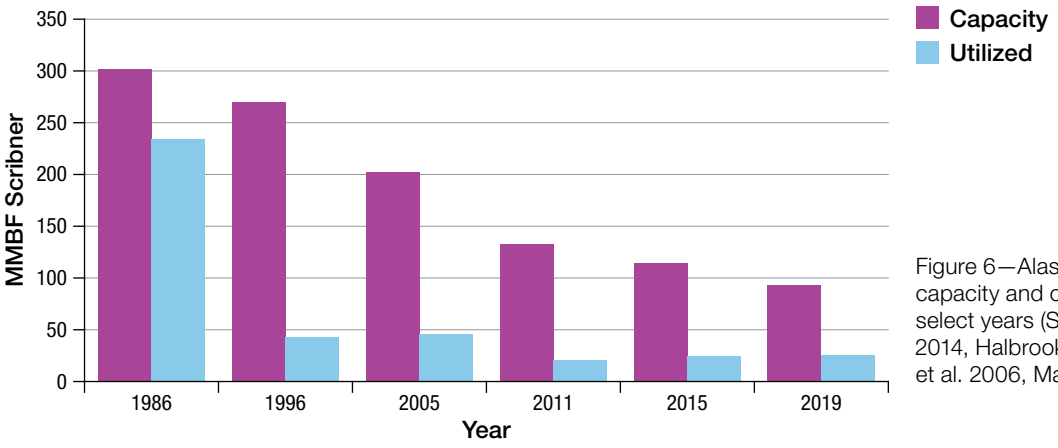

Figure 6—Alaska timber-processing capacity and capacity utilization by select years (Sources: Berg et al. 2014, Halbrook et al. 2009, Keegan et al. 2006, Marcille et al. 2021).

Mill Residue: Quantity, Type, and Use

Facilities that sold all or most of their residues during 2019 typically reported residue quantities and uses for that year. For facilities that did not report residue production, missing residue volumes were estimated based on their timber inputs and product outputs.

Residue volume factors, calculated as bone-dry units of residue per thousand board feet lumber tally, were computed for sawmills that produced only lumber as a primary product. The total sawmill residue factor for 2019 was 0.95, the same factor found in 2015, down from 1.05 in 2011 and 1.10 in 2005 (table 13), suggesting improved milling efficiency reflected in higher overruns reported in table 10.

Alaska's timber processors produced in total 35,387 BDU of mill residue during 2019 (table 14). About 8 percent of mill residue was unused, down slightly from 9 percent in 2011 and 2015. Woodchip production dropped from 26,854 BDU in 2005 to 10,090 BDU in 2011, 14,436 BDU

About 8 percent of mill residue was unused in 2019, down from 9 percent in 2011 and 2015. Unused residue is burned, piled, or used as landfill.

Table 13—Alaska sawmill[a] residue factors, select years

Type of residue	2019	2015	2011	2005
	Bone-dry units[b] per thousand board feet, lumber tally			
Coarse	0.60	0.60	0.71	0.60
Sawdust	0.17	0.17	0.17	0.19
Planer shavings[c]	<0.01	0.09	0.14	0.10
Bark	0.17	0.17	0.17	0.21
Total	**0.95**	**0.95**	**1.05**	**1.10**

[a] Includes sawmills producing only lumber and no other products.
[b] A bone-dry unit = 2,400 pounds of oven-dried wood.
[c] This factor represents Alaska sawmills that planed lumber.
Sources: Berg et al. 2014, Halbrook et al. 2009, Marcille et al. 2021.

Table 14—Production and disposition of mill residue from Alaska's forest products industry, 2019

	Residue use				
Type of residue	Woodchips	Fuelwood[a]	Other uses[b]	Unused	Total
	Bone-dry units[c]				
Coarse[d]	15,274	3,836	1,122	981	21,214
Sawdust	550	4,755	675	347	6,326
Shavings/peelings	—	162	1,129	151	1,443
Bark	—	3,689	1,491	1,225	6,405
All residues[e]	15,825	12,442	4,416	2,705	35,387
Previous years					
2015	14,436	13,029	4,196	3,262	34,923
2011	10,090	10,449	1,945	2,320	24,804
2005	26,854	15,179	3,289	12,360	57,682

[a] Fuelwood uses include fuel/firewood for heating and wood pellet production.
[b] Other uses primarily include animal bedding, mulch, and landscape material.
[c] 1 bone-dry unit = 2,400 pounds of oven-dried wood.
[d] Coarse residue includes chips, edgings, slabs, cull sections of logs and log ends.
[e] Columns may not sum to total because of rounding.
Sources: Berg et al. 2014, Halbrook et al. 2009, Marcille et al. 2021.

in 2015, and 15,825 BDU in 2019, in response to reductions in lumber production with ancillary residual chip production and the closure of a chipping operation in south-central Alaska (Berg et al. 2014, Halbrook et al. 2009). Unused residue in Alaska is frequently burned, piled, or moved into low-lying areas as landfill.

Sales, Employment and Contribution to the State Economy

Alaska primary wood product sales (free on board the producing mill or free alongside ship), including log exports and mill residue, totaled more than $155 million during 2019 (table 15), up from $123 million (2019 dollars) reported in 2015. Exports of sawlogs eclipsed all other revenue sources, with sales totaling $127.1 million and accounting for 82 percent of Alaska's total primary wood product sales. The majority of log exports were shipped to other Pacific Rim countries, primarily China (Daniels and Wendel 2020). Of the $22.8 million in domestic product sales, 64 percent (more than $14.6 million) was sold within Alaska. This represented a 26-percent increase from the $123 million in sales reported in 2015 (Marcille et al. 2021). Adjusted for inflation, total sales value in 2019 was about 2 percent higher than in 2011 and 19 percent lower than in 2005.

Primary Product Sales Value and Markets

By far, log exports generated the majority of sales value. Excluding log exports, the primary wood products industry generated a sales value close to $23 million during 2019, with an additional $5.3 million generated from residue sales. Of this sales value, lumber accounted for 45 percent, other products accounted for 36 percent, and residues accounted for 19 percent. With respect to destinations, most (64 percent) of the manufactured primary product sales value remained in Alaska. Most (55 percent) lumber produced in Alaska was sold to west coast states in the contiguous United States. The remaining 45 percent was sold in-state or shipped to Canada in minor quantities. By far, most other product sales (88 percent) were within Alaska. The distribution of sales by destination shows that products in the "other products" category reached a greater variety of destinations compared to finished

Alaska's primary forest products industry shipped products valued at $22.8 million in 2019. Sawlog and pulpwood exports added $127 million to sales, for an overall sales increase of 26 percent from 2015.

Table 15—Destination and sales value of Alaska's primary wood products and sawmill residue, free on board producing facility in 2019

Product	Alaska	West coast[a]	Other states	Pacific Rim	Canada	2019 total
	THOUSANDS OF 2019 DOLLARS					
Lumber	5,719	6,947			13	12,678
Other[b]	8,909	588	489	25	100	10,111
Total primary product[c]	14,627	7,535	489	25	113	22,789
Residues[d,e]						5,324
Sawlog and pulpwood exports[e]						127,080
2019 total sales value						**155,193**
Previous years sales values in 2019 dollars						
2015 total sales value						123,143
2011 total sales value						151,937
2005 total sales value						190,815

[a] West coast states include California, Hawaii, Oregon, and Washington.
[b] Other products include house logs, firewood, wood pellets, cedar products, and tonewood.
[c] Columns may not sum to total because of rounding.
[d] Residue products include firewood, garden mulch, animal bedding, and woodchips for park/playground fill and landscaping.
[e] Data pooled across destinations to prevent disclosure of confidential information.
Sources: Berg et al. 2014, Halbrook et al. 2009, Marcille et al. 2021.

lumber products, which were only sent to destinations within Alaska and the other west coast states during 2019. Generally, the flow of finished products in 2019 was consistent with previous census findings.

Although 8 percent of residual material generated from the manufacturing of primary wood products remained unused in 2019, more than 32,000 BDU of residue was repurposed and sold in the form of firewood, wood pellets, garden mulch, animal bedding, and woodchips used for playground fill and landscaping. Estimated sales generated from residues remained steady from 2015 to 2019, at about $5.3 million. Most (62 percent) of utilized residues were coarse residue, including chips, edgings, slabs, cull sections of logs, and log ends, which were sold to out-of-state markets.

Log exports

International trade statistics discussed below were obtained from the U.S. International Trade Commission online searchable database for Alaska (USITC 2022a, 2022b), not from the FIDACS census of Alaska's wood products firms. Over the past two decades, the volume of international log exports from Alaska has varied greatly, with a high of 437 MMBF Scribner in 2000 dropping to 175 MMBF Scribner in 2004, before climbing to 297 MMBF Scribner in 2012 (fig. 7). Total log exports from Alaska fell to 127 MMBF Scribner in 2017, the lowest volume of the time series, before rebounding slightly to 147 MMBF Scribner in 2019. When considering sales value, the greatest value of exports went to China in 2019, which replaced Japan as Alaska's leading log export recipient by value in 2009. Total export value for the 2000–2019 period peaked in 2000 at close to $268 million (2019 dollars), primarily to Japan, and dropped to a low of $70 million in 2017, primarily to China. Log export value rebounded slightly to $83 million in 2019. Changes in demand by international purchasers as well as timber availability and harvest from Alaska Native corporation lands and the Tongass National Forest 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' timber use, production, and sales characterized in the FIDACS census constitute only one component of the broader forest industry sector in Alaska. The classification of the forest industry sectors used in this section follows the North American Industry Classification System (NAICS), available from the U.S. Department of Commerce (USDC) Bureau of Economic Analysis. Alaska's current forest industry sector can be described using the following categories: NAICS 113—forestry and logging, NAICS 1153—support activities for forestry, and NAICS 321—wood products manufacturing. These categories include employees who work in or support both the primary and secondary wood products industries

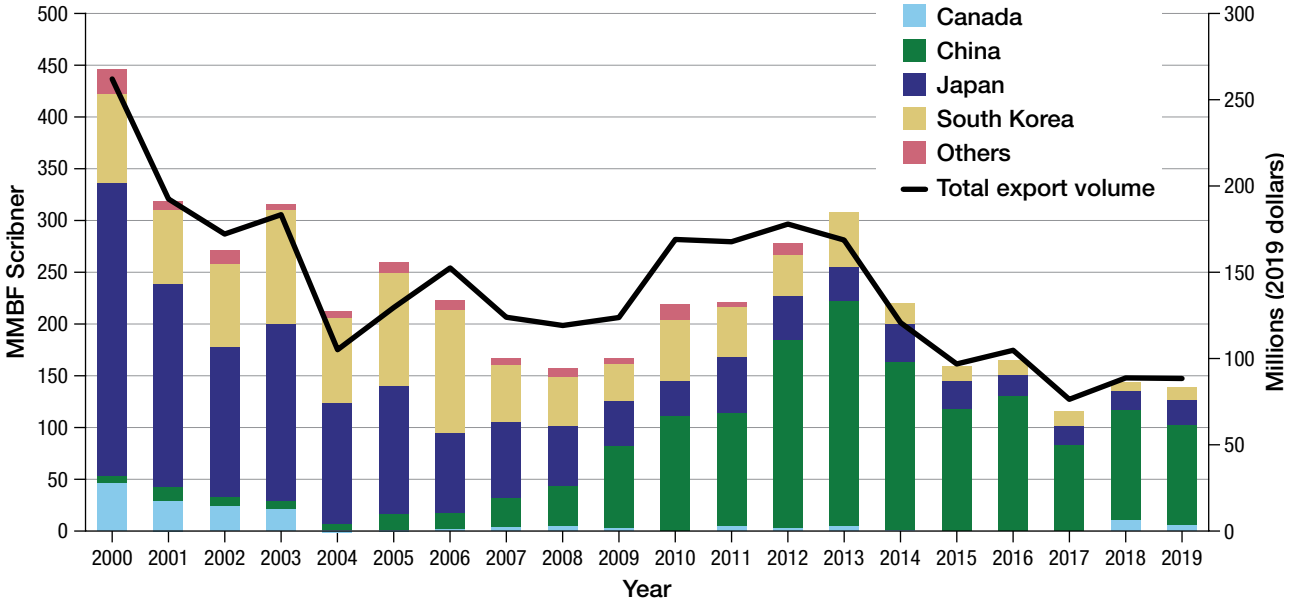

Figure 7—Total value of Alaska log exports (inflation-adjusted millions of 2019 dollars) by destination country and total export volume in millions of board feet (MMBF) Scribner, 2000–2019 (USITC 2022). Volume originally reported in metric units is converted to MMBF Scribner using a conversion factor of 4.53 m^3/MBF (Daniels and Wendel 2020).

but are likely to underestimate total employment in the forest industry sector because they do not include log hauling (trucking) companies, lumber and construction material wholesalers, road construction and maintenance contractors, or forest management services performed by government agencies or nonprofit organizations. Publicly available data from the USDC Bureau of Economic Analysis, U.S. Department of Labor Bureau of Labor Statistics, and the U.S. Census Bureau complement BBER's estimates of employment and labor income for forest products manufacturers and provide information on the larger forest industry in the state.

Alaska forest industry employment trends have generally paralleled changes in timber harvest volume over time (Berg et al. 2014, Halbrook et al. 2009, Marcille et al. 2021) (fig. 8). In 2015, total employment in the combined sectors of wood products manufacturing, forestry and logging, and forestry support services totaled 1,530 but had fallen to an estimated 1,198 full- and part-time workers in 2019—a 22-percent decrease (USDC BEA 2022, USDL BLS 2022). Of these, about 518 workers (43 percent) were employed in the wood products manufacturing sector. Further, an estimated 468 workers (39 percent) were employed in forestry and logging, and 212 workers (18 percent) were employed in support services for forestry during 2019.

Between 2015 and 2019, inflation-adjusted earnings across all forest industry sectors fell from ~$96 million in 2015 to $59 million in 2019.

Between 2015 and 2019, inflation-adjusted earnings across all forest industry sectors saw decreases that were greater than those for employment. Total labor income fell from close to $96 million in 2015 to $59 million in 2019, a drop of 46 percent (fig. 9). This decrease in earnings reflects a spike in labor income in 2015, whereas earnings in 2019 were more similar to earlier years. The 2015 spike was also caused by a temporary increase in wood products manufacturing where the number of facilities manufacturing prefabricated wood buildings doubled. There was a corresponding increase in employment, but average earnings per employee more than doubled, causing labor income for the sector to spike. With the return to more typical conditions in 2019, average earnings per worker fell from $73,000 in 2015 to $49,260 in 2019. Forestry and logging (NAICS 113) had the highest wages, exceeding $77,000 per worker in 2019.

It is not unusual to see a greater change in labor income than employment. During periods of increased production, employees who were previously part time or seasonal may add more hours or days of work, or extend employment into shoulder seasons, all of which increase wages paid by businesses but have less impact on overall employment estimates. Similarly, decreases in wages paid without equivalent decreases in employment could be the result of reduced work hours rather than a reduction in the number of workers.

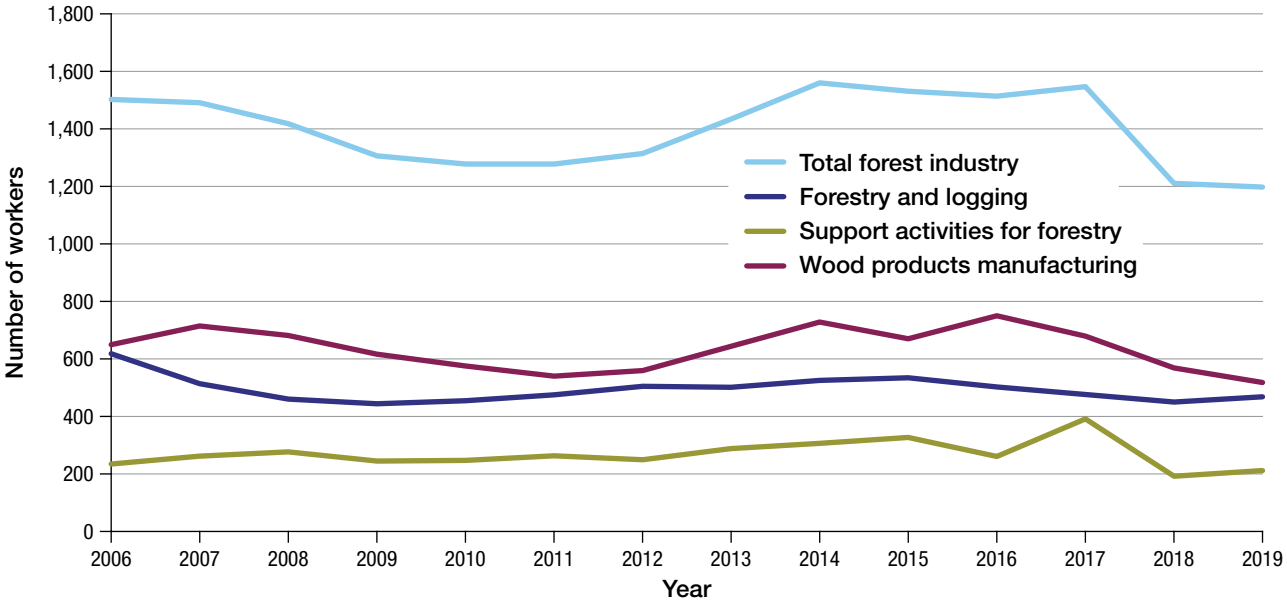

Figure 8—Forest industry employment, 2006–2019 (Sources: USDC BEA 2022, USDL BLS 2022).

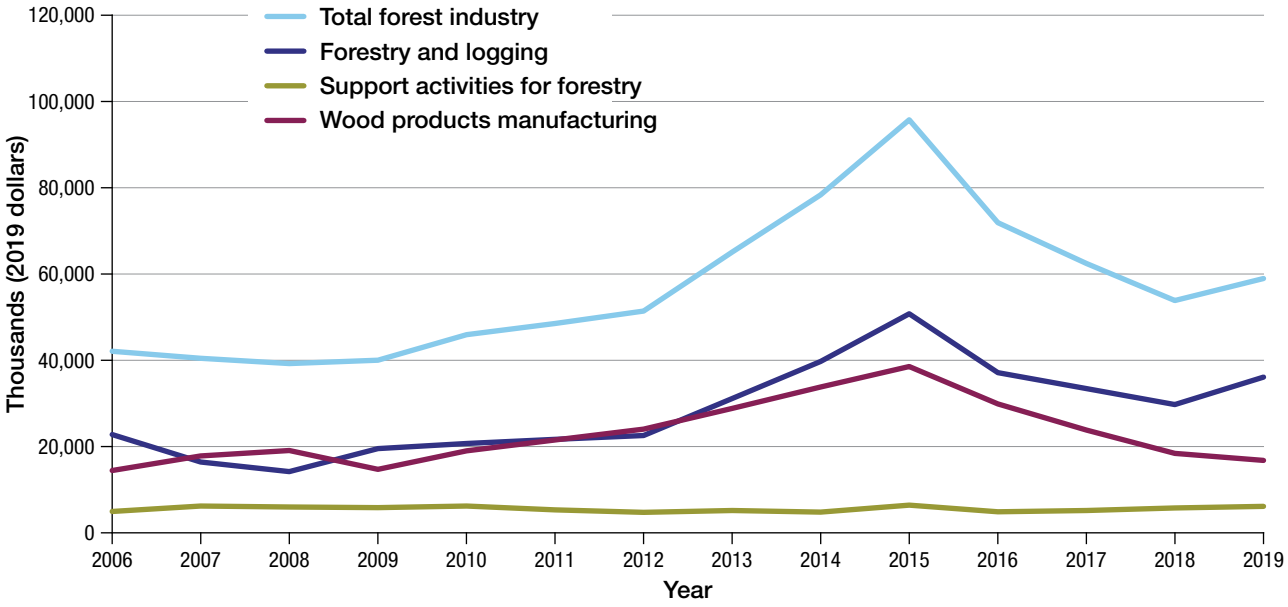

Figure 9—Alaska's forest industry labor income, 2006–2019 (Sources: USDC BEA 2022, USDL BLS 2022).

Economic Contribution of Alaska's Forest Industry to the State Economy

Economic contribution analyses measure gross changes in economic activity associated with an industry, an event, or a policy on an existing regional economy. The economic contribution of Alaska's forest industry includes the direct economic activity discussed above as well as indirect and induced economic activity generated as additional spending cycles through the state's economy (Crandall et al. 2017). For this report, the contribution of Alaska's forest industry was estimated in terms of dollars spent by businesses on intermediate inputs, taxes, and labor and, in turn, dollars spent by households.

In 2019, 1,198 workers engaged in forestry and logging, wood products manufacturing, and forestry support activities, earning $59 million.

In 2019, 1,198 workers engaged in forestry and logging, wood products manufacturing, and forestry support activities, earning $59 million in labor income (tables 16 and 17). The activity associated with this direct employment generated additional economic opportunities by relying upon other industries for intermediate inputs and services, thus indirectly bolstering employment and wages in other sectors. Using regional data and existing linkages within Alaska's economy estimated by the USDC Bureau of Economic Analysis's (BEA) RIMS II multipliers[2] (USDC BEA 2022), BBER estimated that the wood products manufacturing sector alone supported about 1,146 full- and part-time jobs and an associated $44.7 million in labor income in 2019. Thus, for every wood products industry manufacturing job in the state, another 1.2 jobs were generated in supporting sectors, while for every $1 paid in labor income by wood products manufacturers another $1.67 was paid in supporting sectors, including forestry and logging, forestry support, trucking, wholesale trade, and management.

Further, the 468 people employed in the forestry and logging sector supported an additional 391 full- and part-time jobs along with $22.9 million in labor income in supporting sectors such as equipment sales and repair. Finally, the 212 workers providing support services for forestry supported 41 more workers in associated sectors and generated an additional $2.1 million in labor income.

It should be noted that sectors are not aggregated, nor did we provide estimates for the total employment and labor income contribution of the entire forest industry. This is to avoid double counting, as some employment and labor

[2] The USDC Bureau of Economic Analysis does not endorse any resulting estimates or conclusions about the contribution of a given sector on an area.

Table 16—Average annual employment contributions from Alaska's forest industry, 2015 and 2019

Sector	Direct employment	Indirect and induced employment	Total employment contribution	Direct employment	Indirect and induced employment	Total employment contribution
	2019			2015		
	Number of jobs					
Forestry and logging	468	391	859	534	541	1,075
Forestry support activities	212	41	253	326	69	395
Wood products manufacturing	518	628	1,146	670	851	1,521
Total forest industry	1,198	[a]	[a]	1,530	[a]	[a]

[a] Indirect and induced employment and labor income should not be summed for multiple sectors because some employment constitutes both a direct contribution to their sector and an indirect contribution to other sectors.

Table 17—Average annual labor income contributions from Alaska's forest industry, 2015 and 2019

Sector	Direct labor income	Indirect and induced labor income	Total labor income contribution	Direct labor income	Indirect and induced labor income	Total labor income contribution
	2019			2015		
	Thousands of 2019 dollars					
Forestry and logging	36,062	22,921	58,983	68,385	46,686	115,071
Forestry support activities	6,153	2,082	8,235	5,929	2,007	7,936
Wood products manufacturing	16,756	27,904	44,660	45,220	81,857	127,077
Total forest industry	58,971	[a]	[a]	119,534	[a]	[a]

[a] Indirect and induced employment and labor income should not be summed for multiple sectors because some employment constitutes both a direct contribution to their sector and an indirect contribution to other sectors.

income are included both as direct contributions to their sector as well as indirect contributions to other sectors. For example, direct employment and labor income in the forestry and logging sector would be included with the indirect and induced contributions from wood products manufacturing as these manufacturers rely upon forestry and logging businesses to supply raw material needs.

Industry Challenges

Progressive reduction in available timber for log export and processing in the state's mills through time continues to be the foremost issue for Alaska's timber industry (Portman 2012, RDCA 2022). This is particularly the case regarding Sealaska Native corporation's curtailment of timber harvest in favor of carbon offset credits announced in 2018 (Resneck 2021) and its effect on statewide timber supply and product sales revenues. In addition, national forest timber harvest volume has steadily declined in Alaska (fig. 2), and the Tongass National Forest is steering timber harvest toward the young-growth timber base. This shift has been formalized with the Southeast Alaska Sustainability Strategy announcement (USDA FS 2022), which specifies limiting USDA Forest Service old-growth harvest at 5 MMBF Scribner per year on average and emphasizing the continuing transition to harvesting young growth. Implementation of this plan includes the announced Thorne Bay Basin Integrated Resource Management Project, which outlines the harvest of 5,800 acres of young-growth forest from the Tongass National Forest over 15 years (Miller 2022).

Progressive reduction in available timber for log export and processing continues to be the foremost issue for Alaska's timber industry. The transition to young-growth policy is contentious.

The transition to young-growth policy is contentious and has been both criticized and supported by various stakeholders (Brehmer 2016). Historically, southeast Alaska sawmills were built to process large-diameter timber, and large-log mill managers see little return on investments in machinery capable of efficiently milling smaller diameter timber when a reliable supply of young growth will likely not be available for many years. However, some small-sawmill owners have stated they prefer young-growth timber because of its uniformity and lack of defect (Daniels et al. 2022).

Conclusions

The most notable changes in Alaska's forest products industry and timber harvest since 2015 were the 64-percent decline in national forest timber harvest and the more than doubling of the state and other public timberlands harvest volumes. Between 2015 and 2019, the number of wood processors operating in Alaska fell from 60 to 48, a loss of 22 MMBF Scribner in timber-processing capacity with corresponding losses in sales values, employment, other economic contributions, and the capacity for managers to carry out land management activities.

Although Alaska's forest products industry has experienced dynamics similar to the industry throughout the Western United States in the past three decades, it faces unique challenges (Hayes et al. 2021; Simmons et al. 2014, 2021). By far, the federal government manages the most timberland. The industry boomed while timber harvest volumes were high, especially those from federal timberlands, and subsequently contracted with the decline in harvest volume. Most of the timber harvested in Alaska in the past two decades originated from private timberlands and was exported as logs. With only a fraction of wood supplied to in-state facilities, Alaska's mill owners are highly dependent on public timber harvest, especially from the State of Alaska and the Tongass National Forest. The reduction in available timber for log export and processing in the state's mills continues to challenge Alaska's timber industry. Harvests from Alaska Native corporation timberlands are declining, and the USDA Forest Service plans to steer timber harvests toward the young-growth timber base. It remains to be seen how existing mills will adapt to ongoing changes in timber availability.

Acknowledgments

The authors gratefully acknowledge the USDA Forest Service Pacific Northwest Research Station Forest Inventory and Analysis program for funding this work. The authors also thank Kate Marcille, economist, USDA Forest Service Washington Office, Ecosystem Management Coordination; Dr. Priscilla Morris, wood biomass and forest stewardship coordinator, USDA Forest Service State and Private Forestry, Alaska Region; and Karen Peterson, biomass coordinator, Southeast Conference, Thorne Bay, Alaska, for assisting in data collection and manuscript review.

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Glossary

board foot—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—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).

bone-dry unit (BDU)—The amount of wood residue that weighs 2,400 pounds (1088 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—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 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 (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 or 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 volume 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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