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Alaska's Timber Harvest and Forest Products Industry, 2011

Erik C. Berg, Charles B. Gale, Todd A. Morgan, Allen M. Brackley, Charles E. Keegan, Susan J. Alexander, Glenn A. Christensen, Chelsea P. McIver, and Micah G. Scudder

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Abstract

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This report traces the flow of timber harvested in Alaska during calendar year 2011, 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, export, sales of primary wood products, employment, and emerging issues important to Alaska's forest industry.

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

Highlights

- Alaska's total timber harvest in 2011 was 175.3 million board feet (MMBF) Scribner, approximately 35 percent less than the 2005 timber harvest.
- Sawlogs made up nearly 97 percent of the total harvest. Southeast Alaska boroughs/census areas contributed more than 80 percent of this volume.
- Alaskan log exports increased more than 27 percent between 2005 and 2011.
- A total of 77 Alaska primary wood products facilities were identified as active in 2011:
    - 50 sawmills
    - 18 log home plants
    - 9 other facilities that produced fuelwood products, cedar products, log furniture, tonewood (wood used to make musical instruments), and novelty items.
- Alaska sawmills recovered an average of 1.19 board feet lumber tally per board foot Scribner of log input, a 6-percent decrease from 2005. This reduction in overrun parallels findings in other Western States.
- Although the number of active Alaska sawmills remained unchanged from 2005, 13 of the sawmills active in 2005 became inactive, and 5 sawmills had closed permanently by 2011.
- Alaska's 50 sawmills produced just over 21.2 MMBF of lumber, 38 percent less than in 2005. House log production fell by more than 55 percent from 2005 to 2011.
- Timber-processing capacity of active facilities in the sawmill sector fell by more than 40 percent since 2005 to 108.8 MMBF Scribner annually.
- Capacity utilization in Alaska's sawmill and house log sectors fell to less than 16 percent in 2011, the lowest of any Western State.
- Alaska's primary forest products industry shipped products valued at $17.4 million (freight on board [f.o.b.] the producing mill) in 2011. Sawlog and pulpwood exports contributed an additional $115.8 million to sales.
- Fuelwood products (firewood and wood pellets) generated more than $3 million in sales. The majority of these 2011 products were sold in interior Alaska. Alaskans are progressively turning to wood as a primary heating fuel.

Contents

Introduction

This report details timber harvest and describes the composition and operations of the primary forest products industry in Alaska during calendar year 2011, and compares these results to 2005 findings (Halbrook et al. 2009). It presents a brief history of Alaska's forest industry and timber harvest and summarizes emerging forest issues. Alaska's 2011 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 reviewed by major sector. Timber-processing and production capacities, utilization of mill residue, forest product exports, and sales and employment are also discussed.

The focus of this report is timber used in the direct manufacture of wood products. Products directly manufactured from timber are referred to as "primary products" and include lumber, boards, timbers, house logs, log furniture, cedar products (mostly shingles), and tonewood. 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.

Methods

The foremost source of data for this report was a statewide census of Alaska's primary timber processors operating during 2011. Firms were identified through Internet searches, telephone directories, directories of the forest products industries, expert knowledge, and with assistance from the Juneau Economic Development Council (JEDC). The JEDC surveyed both logging and primary timber processing facilities in 2011, and this census built on JEDC survey results to characterize Alaska's 2011 forest industry. Technical terms are defined in the glossary.

Forest Industries Data Collection System

This census of Alaska timber processors is a cooperative effort between The University of Montana's Bureau of Business and Economic Research (BBER) and the Pacific Northwest (PNW) Research Station Forest Inventory and Analysis program. The BBER, in cooperation with the Forest Inventory and Analysis (FIA) programs in the 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. The FIDACS is based on a census of primary forest product manufacturers.

Through a written questionnaire or telephone interview, manufacturers provided the following information for each of their facilities for 2011:

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

This effort is the second application of FIDACS in Alaska; the first census of the Alaskan industry was based on calendar year 2005 operations (Halbrook et al. 2009). The BBER and the Forest Service research stations have been reporting on the forest industries in all Rocky Mountain and Pacific Coast States except Washington for more than 30 years. The Washington Department of Natural Resources reports on periodic surveys of that state's industry (WDNR 2014). Information collected through FIDACS is stored at the BBER in Missoula, Montana. Additional information is available by request; however, individual firm-level data are confidential and will not be released.

Historical Overview

This section builds on BBER's previous summary of Alaskan timber industry history (Halbrook et al. 2009) and highlights industry developments since 2005. Prior to World War I, Alaska's timber industry supported local mining and fishing industries by providing wood for constructing fish traps, fish packing cases, harbor pilings, wharf material, mine timbers, and railroad ties (Hoffman 1913). Annual Alaska timber harvest summed to less than 30 million board feet (MMBF) Scribner until World Wars I and II increased demand for aircraft-quality spruce, and led to construction projects that spurred additional timber harvest and new sawmill construction. Timber harvest in southeast Alaska reached approximately 90 MMBF by the end of World War II (Halbrook et al. 2009).

After World War II, timber harvest volumes ramped up to meet the increasing demands of the rayon industry in Japan and postwar Asian rebuilding needs. The Tongass National Forest provided the vast majority of this harvest through the 1960s and 1970s; total Forest Service timber harvest peaked at 591.6 MMBF in 1973 (fig. 1) (Brackley et al. 2009). This steady upward trend was halted by the passage of The Alaska Native Claims Settlement Act of 1971, (ANCSA), which authorized the transfer of 550,000 acres of the Tongass National Forest to native corporations (Knapp 1992).

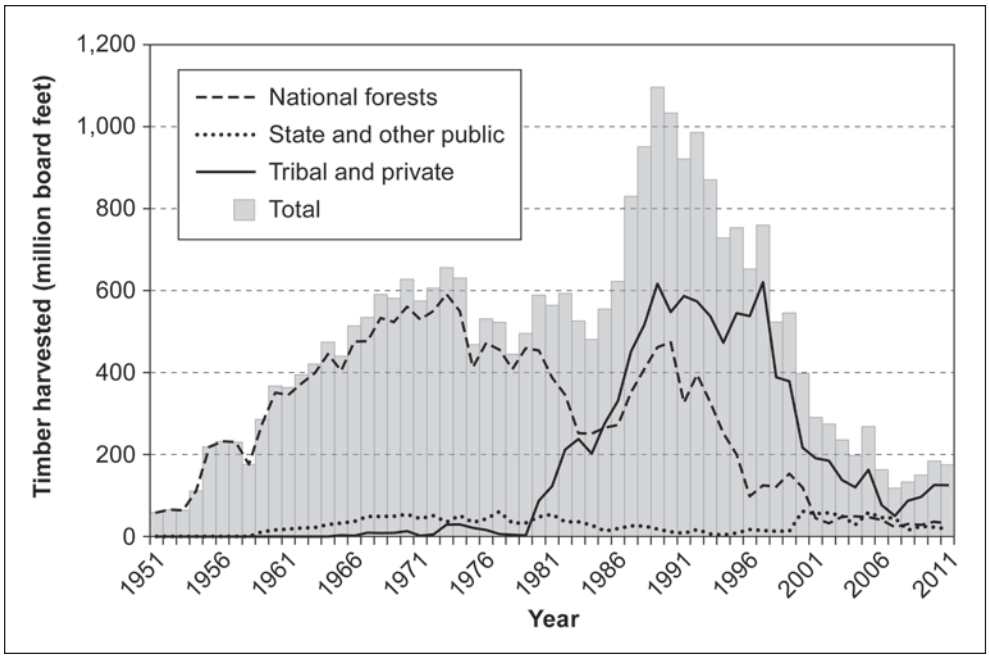

Figure 1—Alaska's timber harvest by ownership, 1951–2011. Sources: Alexander 2012, Brackley et al. 2009, Zhou and Warren 2012.

National forest timber offerings began a precipitous year-by-year decline starting in 1991 in response to forest policy changes stemming from the Tongass Timber Reform Act of 1990, national forest litigation, and reductions in Japanese demand for wood products (Brackley et al. 2009). Native corporations harvested over 500 MMBF annually through most of the 1990s; Native harvest peaked at 620 MMBF in 1998.

Starting in 1921 with the construction of Alaska's first pulp mill, Alaska's forest products industry and timber harvest policies have largely been framed by pulp and paper ventures (Mackovjak 2010). Long-term timber supply contracts authorized by the Tongass Timber Act of 1947 set the stage for an exponential increase in Alaska's forest industry. Most of this expansion was built around two southeast Alaska pulp mills, Ketchikan Pulp and Paper and Alaska Pulp Company in Sitka. Both mills negotiated and signed 50-year timber supply contracts with the Forest Service in the 1950s (Harris and Farr 1974, Smith 1975). Weakening pulp markets, costly upgrades of pollution abatement equipment, and declining availability of affordable timber were cited as reasons for shuttering all pulp facilities in Sitka in 1993 and in Ketchikan in 1997 (Crone 2005, Donovan et al. 2005, Eastin and Braden 2000).

Recent History

The negative financial impacts of "The Great Recession" of 2007 persisted through 2011 and triggered further reductions in Alaskan forest industry outputs.

The 2005 census of the Alaskan industry (Halbrook et al. 2009) occurred during a period of strong wood product markets and easily obtained mortgage credit that fueled speculative housing construction throughout the United States (Woodall et al. 2012). After recognizing that new residential construction had substantially overreached sustainable levels, inventories of unsold homes spiked, construction slowed, and housing prices plummeted (Woodall et al. 2012). Housing starts in the United States fell from more than 2 million units in 2005 to 554,000 in 2009. Alaska housing starts fell from 3,133 units in 2005 to 916 units in 2009 with a rate of decline similar to that of the entire Nation (USDC CB 2013).

The negative financial impacts of "The Great Recession" of 2007 persisted through 2011 and triggered further reductions in Alaskan forest industry outputs (Keegan et al. 2012). Alaska wood products revenues dropped during this downturn, but reductions in wood products sales prices per thousand board feet (MBF) lumber tally were less severe than experienced by facilities in the lower 48 states. Alaska wood products markets are relatively insulated—most mill outputs are sold in-state.[1] To invigorate the Alaskan forest products industry in light of depressed wood products markets, the Tongass National Forest approved interstate export of up to 50 percent of individual timber sale log volumes, including high-value western redcedar and Alaska yellow-cedar in 2007. This policy was expanded to include exports to foreign markets in 2008 (USDA FS 2010). Slow recovery defined most of Alaska's 2012 forest industry with a small rebound in Alaskan production in response to increased residential construction activity in 2012 (994 units) and 2013 (1,081 units).

Robust timber exports, mostly destined for China, have served as the "good news" for the Alaskan forest industry.

United States lumber prices rebounded in late summer and fall of 2013, climbing about 20 percent from early 2013 levels. Both new construction and repairs and remodeling supported the resurgence (Random Lengths 2013). Most observers predict continuing improvement in wood products markets through 2014, with the understanding that fundamental economic drivers of the forest industry remain volatile (APA 2012).

Robust timber exports, mostly destined for China, have served as the "good news" for the Alaskan forest industry (Portman 2012). However, although this export activity has fueled timber harvest on native corporation and private lands, low federal timber harvests and lack of demand for wood products within Alaska chilled mill outputs and sales for much of 2005–2011 (Keegan et al. 2012, Portman 2012).

[1] Brackley, A.M. 2013. Lumber sales values in Alaska. Personal communication. abrackley@fs.fed.us (December 19).

Alaska Timberlands

Forest Inventory and Analysis is piloting a reduced-scale forest inventory of interior Alaska.

Timberland information for this report is based on coastal Alaska permanent-plot-derived forest statistics. There is currently no permanent-plot-based forest inventory program for interior Alaska, and managers lack comprehensive and scalable interior forest data. However, in 2014, FIA will pilot a reduced-scale inventory of interior Alaska through a novel combination of widely spaced permanent forest inventory plots and remote sensing (USDA FS 2013a).

The Coastal Alaska forest inventory unit stretches from Kodiak Island to Ketchikan and covers about 6.0 million ac of timberland. Most coastal timberland is publicly owned, with 3.6 million ac in the Tongass National Forest, 0.3 million ac in the Chugach National Forest, 0.1 million ac in other federal land, and 0.8 million ac in other public (state and local) ownership. Some 24 percent of coastal Alaska's timberland (1.5 million ac) is owned by Alaska Native corporations. Coastal Alaska timberlands support approximately 29 billion cubic feet in growing stock trees, and 157 billion board feet of mostly conifer sawtimber (Barrett and Christensen 2011). Western hemlock dominates growing stock in the coastal inventory unit with 45 percent of all cubic foot stocking, followed by Sitka spruce at 35 percent, 7 percent mountain hemlock, 6 percent Alaska yellow-cedar, and 5 percent western redcedar. The vast majority of coastal forest lands lack feasible access for timber harvest operations. More than 90 percent of federally owned coastal lands are classified as roadless area or other management designations that essentially prohibit logging.[2]

Unlike much of the forested land in other Western States covered with vast acreages of second- or third-growth timber ready to harvest but with little older timber, coastal Alaska's timberland age class distribution is decidedly skewed towards trees aged 200+ years (39 percent of timberland acreage). In comparison, only 2 percent of all U.S. timberlands are populated with 200+-year-old timber (Barrett and Christensen 2011).

Alaska's Timber Harvest and Flow

Timber harvest statistics in Alaska are problematic, especially with respect to log exports. In most Western States, log exports represent a small fraction of harvested volume, and in-state or neighboring state's mills receive the majority of harvested timber (Gale et al. 2012, Morgan et al. 2012, Zhou and Warren 2012). Starting in 2006, reported annual Alaska sawlog export volumes exceeded published total

[2] Spores, S. 2012. Young growth on the Tongass. Unpublished presentation. On file with: U.S. Department of Agriculture, Forest Service, Alaska Region, 709 W. 9th Street, Room 559A, Juneau, AK 99801-1807.

timber harvest volumes by more than 80 MMBF (Alexander 2012, Zhou 2013). This trend continued through 2011, when published sawlog exports equaled 275.1 MMBF and statewide harvest totaled only 175.3 MMBF (Zhou and Warren 2012). Brackley[3] and Alexander[4] have suggested that this disparity largely stemmed from methods used to measure and report exports. Specifically, export log scaling practices and the factors used to convert International Trade Commission reported metric volumes to MBF Scribner have resulted in published sawlog export volumes that exceed reported total timber harvest volumes. Reconciling this discrepancy was one of the most challenging aspects of producing this report.

To remedy these accounting problems, the authors combined information provided by mills responding to the FIDACS census with published data to estimate Alaska's total timber harvest volume, timber volumes processed by Alaska mills, and export timber harvest volume:

Alaskan land managers lack sound timber harvest and export volume information.

- **Total timber harvest**: Zhou and Warren's (2012) reported total 2011 Alaska timber harvest of 175.3 MMBF was used in this report.
- **Timber processed by mills**: Timber volume received and processed by Alaskan mills during 2011 was estimated to be 23.3 MMBF Scribner based on BBER's FIDACS census of Alaska timber processors.
- **Export timber harvest**: Total export timber harvest volume was calculated as a residual value equal to the difference between the state harvest volume and volume processed by Alaskan mills, which equals approximately 152 MMBF.

Land managers lack sound timber harvest and export volume information, which complicates the framing of rational timber harvest policy in Alaska. The authors suggest that research is needed to clearly identify timber harvest and log export volume reporting problems and potential remedies.

Harvest by Ownership

Recent timber harvest levels are on par with the mid 1950s but considerably below harvest levels seen from 1960 through 1999 (fig. 1). Timber harvest in Alaska fell from 1,033 MMBF in 1990 to 268.3 MMBF in 2001 (Halbrook et al. 2009) and then to 175.3 MMBF in 2011. During this period, national forest harvest levels dropped by 90 percent and Native/private harvest by about 80 percent. However, strong

[3] Brackley, A.M. 2011. Causes of timber harvest versus export discrepancies. Personal communications. abrackley@fs.fed.us. (December 21).

[4] Alexander, S.J. 2011. Problems calculating Alaska timber harvest volumes. Personal communications. salexander@fs.fed.us. (December 14).

Asian demand for logs drove Native timber corporation and other private lands harvest up from just over 50 MMBF in 2008 to 128 MMBF in 2011 (Alexander 2012). Although most timber harvested during 2011 came from Native corporations and other private lands, 16.4 percent came from national forests, while state and other public lands supplied the remaining 10.6 percent (table 1). Since the 1950s, the State of Alaska Division of Forestry has been a significant provider of timber, particularly to western, south-central, and interior mills (State of Alaska 2010, 2011). Bureau of Business and Economic Research researchers found that 23 of 44 total mills located in these areas each received more than 75 percent of their raw material inputs from state timber sales.

Sitka spruce accounted for nearly 64 percent of Alaska's 2011 timber harvest of 175.3 million board feet Scribner.

Harvest by Species

Sitka spruce was the leading species harvested in Alaska during 2011, accounting for 111.4 MMBF or 63.5 percent of total harvest (table 2), compared to 47 percent in 2005 (Halbrook et al. 2009), and 19 percent in 1995 (Hill and Hull 1997). Western hemlock followed the opposite trend: 20 percent of harvest in 2011, 29 percent in 2005, and 58 percent in 1995 (Hill and Hull 1997). Hemlock harvest levels in the 1990s were mostly related to Tongass National Forest pulp mill long-term timber sale contracts (Brackley et al. 2009); hemlock is an excellent pulping species. Rising Sitka spruce harvest levels reflects rising demand in foreign markets (Alexander 2012). White spruce was the major species harvested in interior, south-central, and western Alaska in 1995 (Hill and Hull 1997), 2005, and 2011.

Table 1—Alaska timber harvest by ownership class and product type, 2011

Ownership class	Sawlogs	House logs	Fuelwood	Other products[a]	All products
			Thousand board feet, Scribner		
Private—including Native corporations	126,076	191	1,423	300	127,990
National forest	28,381	73	143	91	28,688
State and other public	14,856	1,046	2,689	—	18,590
All owners	169,313	1,309	4,255	391	175,267
			Percentage of harvest		
Private—including Native corporations	74.5	14.6	33.4	76.7	73.0
National forest	16.8	5.5	3.4	23.3	16.4
State and other public	8.8	79.9	63.2	—	10.6
All owners	96.6	0.8	2.4	0.2	100

[a] Other timber products include cedar product logs, logs for furniture, tonewood, and novelty items.

Table 2—Alaska timber harvest by species and product type, 2011

Species	Sawlogs	Other products[a b]	All products
	Thousand board feet, Scribner		
Sitka spruce	111,166	198	111,364
Western hemlock	35,011	148	35,159
Western redcedar	18,042	321	18,362
Alaska yellow-cedar	1,644	142	1,786
White spruce	2,920	3,253	6,173
Birch species	335	1,326	1,660
Other[c]	196	566	762
All species	169,312	5,954	175,267
	Percentage of harvest		
Sitka spruce	65.7	3.3	63.5
Western hemlock	20.7	2.5	20.1
Western redcedar	10.7	5.4	10.5
Alaska yellow-cedar	1.0	2.4	1.0
White spruce	1.7	54.6	3.5
Birch species	0.2	22.3	0.9
Other[c]	0.1	9.5	0.4
All species	96.6	3.4	100

[a] Other products include houselogs, fuelwood logs, cedar products logs, logs for furniture, tonewood, and novelty items.

[b] Products by species were combined to prevent disclosure.

[c] Other species include cottonwood, quaking aspen, black spruce, lodgepole pine, mountain ash, red alder, sugar maple, and Douglas-fir.

Harvest by Product Type

Sawlogs made up 169.3 MMBF, nearly 97 percent of Alaska's 2011 harvest, up from 88 percent in 2005 (table 2). This trend reflects the increase in sawlog exports from 2005 to 2011; 90 percent of all sawlogs were exported in 2011 (Alexander 2012). Native corporations and other private lands contributed almost 58 percent of all sawlogs. State and other public lands supplied approximately 80 percent of house log volume (table 1).

Harvest by Geographic Source

This report uses borough or census area boundaries to define five geographic regions in Alaska—southeast, south-central, interior, western, and far north (fig. 2 and tabulation below). Timber resources can be found in all but the far north; the southeast region historically dominated Alaska's timber harvest. South-central and

western region data are reported together to prevent the possible release of confidential information.

Alaska timber resource and borough/census areas:

Resource area

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

South-central:
- Anchorage Borough
- Kenai Peninsula Borough
- Matanuska-Susitna Borough
- Valdez-Cordova Census Area

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

Western:
- Bethel Census Area
- Kodiak Island Borough

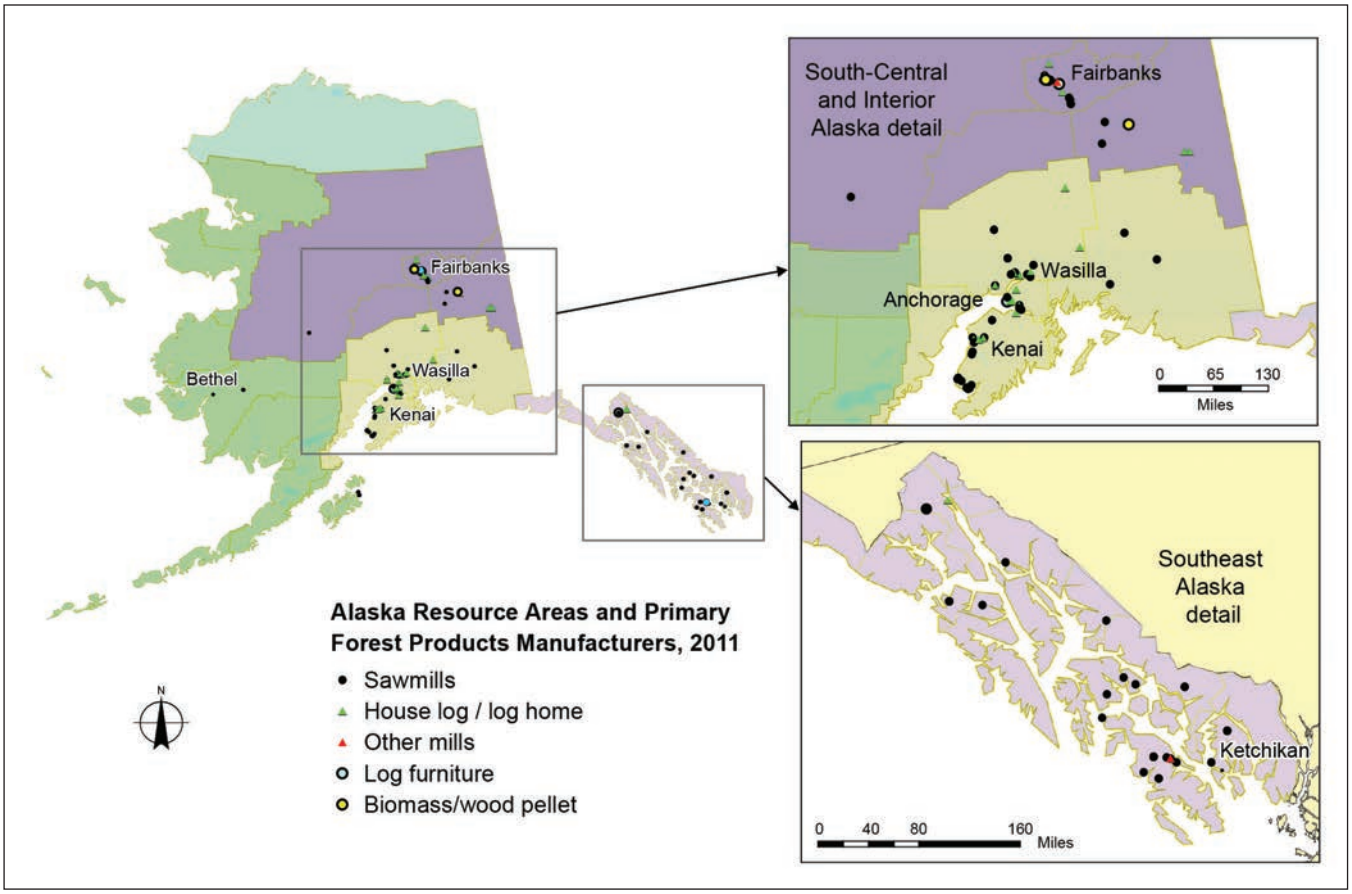

Figure 2—Alaska's resource areas and active primary forest product manufacturers, 2011.

Timber harvest on and around Kodiak Island increased by more than 30 million board feet Scribner from 2005 to 2011.

Timber harvest by resource area shifted dramatically between 2005 and 2011: nearly 37 percent of 2011's timber was harvested in south-central and western Alaska, compared to less than 25 percent in 2005 (table 3). Southeast Alaska's contribution declined from nearly 74 percent in 2005 to 60 percent in 2011. Much of this 2005 to 2011 expansion in the south-central and western resource areas harvest stemmed from an approximately 30 MMBF increase in Native corporation timber harvest on and around Kodiak Island (Alexander 2012). Interior Alaska's contribution may be relatively small (3.7 percent) compared to the state total, but the 2011 interior harvest was 67 percent greater than that of 2005.

Timber Use

Timber use volumes are specified in cubic feet rather than board feet Scribner to allow reporting of mill residues and primary wood products in the same units. Alaska's 2011 timber harvest of approximately 30,612 thousand cubic feet (MCF)

Table 3—Alaska timber harvest by resource area, 2011

Resource area	Harvest volume	Percentage of total
	Thousand board feet, Scribner	
Interior	6,427	3.7
South-central and western[a]	64,448	36.8
Southeast	104,393	59.6
State total	175,267	100

[a] Resource areas combined to avoid disclosure.

was used by five primary manufacturing sectors: sawlog and chip exports, sawmills, log home manufacturers, energy firms, and manufacturers of other products, including tonewood used for musical instruments, novelty items, cedar products, and furniture (fig. 3). Bark is not included in these figures. The following factors were used to convert Scribner board foot volume to cubic feet:

- 5.78 board feet per cubic foot for sawlogs, including exports
- 5.05 board feet per cubic foot for house logs
- 5.00 board feet per cubic foot for fuelwood products
- 4.53 board feet per cubic foot for all other products

These board-foot-to-cubic-foot (bf/cf) ratios were derived using methods outlined by Keegan et al. (2011a). Ratios have changed through time as a result of changes in product recovery and residue production. For example, the Alaskan 2005 sawlog bf/cf ratio was 5.09—substantially less than the 2011 ratio of 5.78. This difference may reflect an increasing use of residues for fuelwood products. When residue production increases relative to product (e.g. lumber) output, bf/cf ratios can increase (Blatner et al. 2012, Keegan et al. 2011a). Changes in log size (i.e., diameter) also influence bf/cf ratios. However, mill census data show that log diameter in timber harvested in Alaska did not change significantly between 2005 and 2011. In 2011, 28 percent of milled timber was less than 10 inches in small-end diameter compared to 24 percent in 2005. Further, 34 percent of 2011 milled timber was greater than 24 inches in diameter compared to 39 percent in 2005.

Figure 3 traces the flow of wood fiber inputs and outputs of Alaska's primary timber industry by sector. For example, of the 2,995 MCF of timber received by sawmills, 1,191 MCF (40 percent) was milled into finished lumber or other sawn products; finished products are located at the end of the solid line "stem" at the bottom of figure 3. Ancillary products, such as residues destined for use by another sector, branch off the stem and are portrayed as dashed lines. Approximately 716

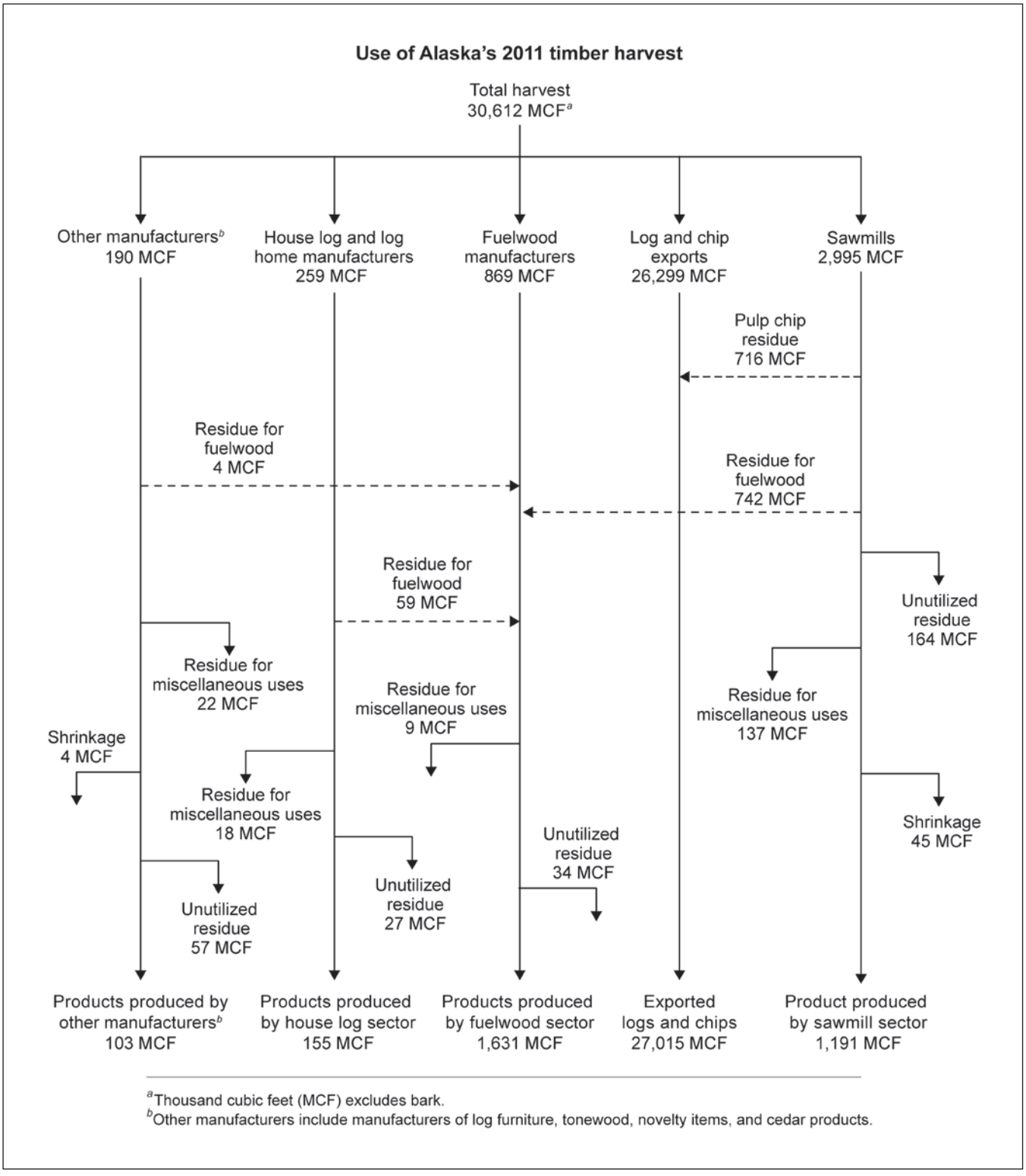

Figure 3—Use of Alaska's 2011 timber harvest.

MCF of chipped roundwood was exported. About 742 MCF of sawmill residue was utilized for energy (firewood, wood pellet production, boilers, etc.). Two remaining categories of residue, unutilized (164 MCF), and residue for miscellaneous uses, such as animal bedding and landscaping (137 MCF), complete the array of Alaska sawmill products. Shrinkage of lumber volume due to moisture lost during drying is also accounted for (45 MCF).

The vast majority (26,299 MCF) of Alaska's 2011 timber harvest was exported (fig. 3). Only 10 percent of total harvest was processed by Alaskan sawmills, compared to 19 percent in 2005. House log volumes received by Alaska facilities declined only 6 percent from 2005 to 2011. Cedar product manufacturing (shakes and shingles) accounted for most of the 264 percent increase in the other product sector between 2005 and 2011. This contrasts sharply with the decline of the cedar products industry noted in Oregon between 2003 and 2008 (Gale et al. 2012).

Reflecting the increasing demand for wood as a heating fuel in Alaska, increased manufacturing of firewood and wood pellets was identified in 2011. Although sawmill residue volume used for fuelwood products in 2011 (742 MCF) is virtually identical to that of 2005 (736 MCF), the percentage of all residues (not including chip exports) used for fuelwood products was 72 percent in 2011, compared to 45 percent in 2005. During periods when fuelwood products such as firewood logs and slabs command high selling prices relative to lumber, mills have little incentive to produce lumber. Instead, mill operators capture added value through the manufacture and marketing of mill residue for fuel.

Timber Received at Alaska Wood Products Facilities

Alaska's proportion of timber harvested for export versus milled in local facilities is radically different from other West Coast states. In 2011, only 13.2 percent (23,259 MBF Scribner) of total harvest was received by Alaskan mills for processing, compared to nearly 80 percent in Oregon (Zhou and Warren 2012).

Volume Received by Ownership and Product Type

Because much of the private/Native corporation lands timber harvest in Alaska is exported, mills in Alaska are highly dependent on federal and state lands for timber. National forests supplied 12.1 MMBF or 52 percent of all timber received by mills in Alaska (table 4), followed by state and other public lands (33.5 percent), and private and Native corporation lands (14.5 percent). Sawlogs accounted for the

Table 4—Timber volume received by Alaska facilities by ownership class and product type, 2011

Ownership class	Sawlogs	House logs	Fuelwood[a]	Other products[b]	2011—All products	2005—All products[c]
			Thousand board feet, Scribner			
Private—including Native corporations	1,450	191	1,423	300	3,364	3,743
National forest	11,792	73	143	91	12,099	23,866
State and other public	4,062	1,046	2,689	0	7,796	17,252
All owners	17,305	1,309	4,255	391	23,259	44,861
			Percentage of volume received			
Private—including Native corporations	8.4	14.6	33.4	76.7	14.5	8.3
National forest	68.1	5.5	3.4	23.3	52.0	53.2
State and other public	23.5	79.9	63.2	0	33.5	38.5
All owners	74.4	5.6	18.3	1.7	100	100

[a] Includes residential firewood and industrial fuelwood received and processed by Alaskan facilities.

[b] Other timber products include logs for furniture, tonewood, novelty items, and cedar products.

[c] From Halbrook et al. (2009).

majority (74 percent) of timber received by Alaskan mills and national forests were the predominant source of these sawlogs. State and other public lands provided the majority of timber used for house logs and fuelwood, corresponding to 5.6 percent and 18.3 percent of the volume received by Alaska timber processing facilities, respectively.

White spruce was the leading timber species received by Alaska facilities in 2011, eclipsing the 2005 leader, western hemlock.

Volume Received by Species and Product Type

Overall, white spruce was the leading species received by Alaska mills in 2011 (table 5), accounting for more than 26 percent of volume received. Western hemlock comprised only 13 percent of volume received by mills, which is a dramatic change from the 2005 census. In 2005, Halbrook et al. (2009) noted that western hemlock made up more than 52 percent of mill receipts, and Bones (1963) reported that 53 percent of all 1961 mill receipts were western hemlock. This major change is due to reductions in southeast Alaska mill outputs and the shuttering and idling of several mills that had processed mostly western hemlock and Sitka spruce while operating in 2005.

Table 5—Timber volume received by Alaska facilities by species and product type, 2011

Species	Sawlogs	House logs	Fuelwood[a]	Other products[b]	2011—all products	2005—all products
			Thousand board feet, Scribner			
Sitka spruce	4,928	128	58	[c]	5,114	10,877
Western hemlock	2,966	83	65	[c]	3,114	23,539
Western redcedar	5,639	21	11	[c]	5,671	1,857
Alaska yellow-cedar	320	29	23	[c]	373	1,099
White spruce	2,920	932	2,321	[c]	6,174	6,154
Birches	335	87	1,239	[c]	1,660	230
Other[d]	196	28	538	391[c]	762	1,105
All species	17,305	1,309	4,255	391	23,259	44,861
			Percentage of volume received			
Sitka spruce	28.5	9.7	1.4	[c]	22.0	24.2
Western hemlock	17.1	6.3	1.5	[c]	13.4	52.5
Western redcedar	32.6	1.6	0.3	[c]	24.4	4.1
Alaska yellow-cedar	1.9	2.2	0.5	[c]	1.6	2.4
White spruce	16.9	71.2	54.6	[c]	26.5	13.7
Birches	1.9	6.6	29.1	[c]	7.1	0.5
Other[d]	1.1	2.1	12.6	391[c]	3.3	2.5
All species	74.4	5.6	18.3	1.7	100	100

[a] Includes residential firewood and industrial fuelwood received and processed by Alaskan facilities.

[b] Other timber products include logs for furniture, tonewood, novelty items, and cedar products.

[c] Species combined to avoid disclosure.

[d] Other species include black cottonwood, quaking aspen, Douglas-fir, sugar maple, lodgepole pine, red alder, willow, mountain ash, and black spruce.

Volume Received by Geographic Source

Approximately 13.8 MMBF or 59 percent of the timber processed by Alaska facilities during 2011 originated in southeast Alaska (table 6) compared to 85 percent in 2005. Interior Alaska timber contributed 28 percent (8 percent in 2005), and south-central and western resource areas provided 13 percent (6 percent in 2005). Changes in receipts among resource areas between 2005 and 2011 can again be attributed to production cutbacks and mill closures in southeast Alaska.

Table 6—Timber volume received by Alaska facilities by resource area and product type, 2011

Resource area	Sawlogs	House logs	Fuelwood[a]	Other products[b]	All products
			Thousand board feet, Scribner		
Southeast	13,136	165	120	391	13,812
South-central and western[c]	1,532	642	848	[d]	3,022
Interior	2,637	502	3,287	—	6,425
All areas	17,305	1,309	4,255	391	23,259
			Percentage of volume received		
Southeast	76	13	3	100	59
South-central and western[c]	9	49	20	[d]	13
Interior	15	38	77	—	28
All areas	74.4	5.6	18.3	1.7	100

[a] Includes residential firewood and industrial fuelwood received and processed by Alaskan facilities.

[b] Other timber products include logs for furniture, tonewood, novelty items, and cedar products.

[c] Resource areas combined to avoid disclosure.

[d] Less than 0.5 MBF Scribner.

Alaska's Forest Products Industry

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, pulp chips from roundwood, cedar products (mostly shingles and shakes), tonewood used for musical instruments, and novelty items such as bowls, spoons, and mugs. Southeast Alaska facilities led with 16.1 MMBF lumber tally or 76 percent of all lumber and sawn product outputs; south-central and western mills led house log production, and interior mills dominated fuelwood outputs (table 7).

The 2011 census tallied 77 active facilities located in 13 of Alaska's 27 borough/census areas (fig. 2; table 8). Total active mill count has changed little over the past 50 years. Bones (1963) identified 72 active Alaska facilities in 1961 (67 sawmills, 2 house log plants, 2 pulp mills, and 1 preservative plant). The 2005 FIDACS census tallied 78 facilities with virtually the same number of mills by sector as found in 2011. However, many facilities changed operating status over the 6 years: 12 facilities active in 2005 were dismantled and permanently closed, 17 facilities active in 2005 were inactive by 2011, and 8 facilities inactive in 2005 were permanently closed by 2011. Mill managers cited lack of available timber and unfavorable market conditions as the primary reasons for idling or closing facilities. Fourteen startup mills were surveyed in 2011; most of these ventures were small facilities with low

Table 7—Alaska lumber, house log, and fuelwood production by resource area, 2011

Resource area	Lumber and other sawn products	House logs	Fuelwood products[a]
	Thousand board feet, lumber tally	*Thousand lineal feet*	*Bone-dry units*[b]
Southeast	16,084	68	391
South-central and western[c]	2,490	184	1,819
Interior	2,648	127	11,112
All areas	21,222	378	13,322

[a] Includes firewood and wood pellets.

[b] Bone-dry unit = 2,400 pounds of oven-dry wood.

[c] Resource areas combined to avoid disclosure.

Table 8—Number of active timber-processing facilities by borough/census area and product produced, 2011

Borough/census area	Lumber	House logs	Other[a]	Total
Anchorage Borough	1	3	1	5
Bethel Census Area	1	—	—	1
Fairbanks North Star Borough	5	3	2	10
Haines Borough	1	1	—	2
Juneau Borough	—	—	—	0
Kenai Peninsula Borough	7	4	1	12
Ketchikan Gateway Borough	4	—	—	4
Kodiak Island Borough	2	—	—	2
Matanuska-Susitna Borough	8	4	—	12
Prince of Wales–Outer Ketchikan Census Area	8	—	4	12
Skagway-Hoonah-Angoon Census Area	3	—	—	3
Southeast Fairbanks Census Area	3	3	1	7
Valdez-Cordova Census Area	1	—	—	1
Wrangell-Petersburg Census Area	6	—	—	6
2011 state total	50	18	9	77
2005 state total[b]	50	20	8	78

[a] Other facilities include producers of fuelwood products, cedar products, log furniture, tonewood, and novelty items.

[b] From Halbrook et al. (2009).

timber processing capacity. Three larger fuelwood processing facilities opened for business since 2005. Small multiproduct mills often shift their product mix to maximize revenues. Multiproduct mills are the norm in Alaska, not the exception, which creates challenges for reporting mills by product type over time.

Forest Industry Sectors

Sawmill Sector

Most Alaskan wood products facilities are equipped with small, portable circle or bandsaws capable of milling multiple products, including lumber, house logs, and fuelwood.

South-central, western, and interior Alaskan facilities are typified by small, portable circle or band sawmills; a few larger mills capable of producing more than 2 MMBF lumber tally per year are located in these regions. Southeast Alaska has historically supported several mills with annual timber processing capacities greater than 20 MMBF (Alexander and Parrent 2012).

The 2011 census identified 50 sawmills operating in Alaska during 2011 that produced nearly 21 MMBF of lumber (f.o.b. the producing mill) (table 9). The seven largest mills produced 85 percent of all lumber produced in the state. About 40 percent of Alaska's sawmill lumber production was dimension and studs, 33 percent board and shop lumber, and 24 percent timbers, while the remaining 3 percent included specialty items such as flooring, siding, and molding.

Alaska sawmills produced approximately 1.19 board feet of lumber for every board foot Scribner of timber processed. This average overrun of 19 percent is the smallest sawmill overrun of any Western State (Keegan et al. 2011b). Overrun declined about 6 percent from the 2005 statewide average of 1.27 mostly as a function of two factors:

- **Smaller proportion of timber processed by large mills in 2011 compared to 2005.** The 2011 census identified fewer active large mills capable of producing more than 1 MMBF lumber tally per year than were found in 2005. Keegan et al. (2011b) noted that large mills typically yield higher overruns than small mills because they often incorporate advanced technologies such as thin-kerf saw blades that enhance lumber recovery.

Many Alaska mill managers shifted production from lumber to fuelwood to maximize 2011 revenues.

- **Increased sawmill production of roundwood firewood and fuelwood residues with commensurate reductions in lumber output.** Many sawmill managers testified of high fuelwood selling prices during the 2011 census. They shifted production from lumber to fuelwood to maximize revenues. Bureau of Business and Economic Research researchers observed sawlog sections with minor defects (even less than 10 percent defect by volume) being merchandised into firewood at several Alaskan sawmills.

Table 9—Alaska annual lumber production and average overrun by mill size, 2011

Annual lumber production size class	Number of mills	2011 lumber production[a]	Percentage of total	Average overrun
		Thousand board feet, lumber tally		
< 150 MBF lumber tally	34	1,189	6	1.17
150 to 500 MBF lumber tally	9	1,813	9	1.03
> 500 MBF lumber tally	7	17,556	85	1.21
Total	50	20,558	100	1.19
2005 state total[b]	50	54,861		1.27

[a] Does not include sawn products from the house log sector.

[b] From Halbrook et al. (2009)

Overrun for 2011 mirrored Kilborn's (2002) findings. He examined overrun for 22 mills between 1997 and 1999 that produced over 90 percent of Alaska's lumber production and found that average overrun equaled 1.18. Brooks and Haynes (1994) reported average Alaska sawmill overruns of 1.20 in 1970, 1.225 in 1980, and 1.265 in 1990.

Most Alaskan lumber is not planed or kiln-dried, and lumber grading is sporadic. Federally funded dry kiln and grading incentive programs have experienced limited success; only 12 percent of Alaska's kiln capacity was used to dry lumber in 2004 (Nicholls et al. 2006). Log scaling at most Alaska mills was often not overseen by independent scaling bureaus. However, the quality of Alaskan dimension and board lumber is generally excellent; Alaskan spruce and cedar species lumber is particularly praised for superb structural quality (Petersen and Bruns 2005).

Log Home Sector

Multi-product log home and sawmill facilities produced most of Alaska's house log outputs during 2011. 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 13 percent were either hand-peeled or milled by lathe. Facilities (including sawmills) that manufactured house logs utilized approximately 1,300 MBF Scribner of timber and produced slightly over 378 thousand lineal feet (MLF) of house logs (tables 6 and 7), less than half of 2005 production. This reduction is likely in response to poor local residential construction markets in 2011 vs. 2005.

Fuelwood Sector

Interior Alaska facilities produced 11,112 bone dry units (BDU) or 83 percent of all statewide fuelwood outputs (i.e., firewood and wood pellets) (table 7). Pellets were produced from mill residue (e.g., sawdust and shavings) and chipped roundwood. Most sawmills and house log plants sold firewood either in roundwood form or in slabs. Bureau of Business and Economic Research researchers found that interior Alaska residents purchased the vast majority of fuelwood products.

Small rural Alaska communities generally do not have access to electricity generated by natural gas or hydropower. Residents of isolated villages can pay very high prices for diesel-generated electric power. For example, residents of Healy Lake paid $0.65 per kilowatt hour for electricity in 2010, more than three times the price paid by residents of Fairbanks (Melendez and Fay 2012). In response to the need for affordable rural power, several sawmills are exploring the possibility of building wood-fueled cogeneration plants (ADECD 2012, Brehmer 2012). Also, the high cost of commercial electricity inhibits production of wood products throughout much of Alaska (Alexander et al. 2010).

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 manufacturers are located in southeast Alaska (table 8). The southeast's highly productive growing sites support large-diameter Sitka spruce and redcedar needed to produce tonewood and cedar products. Cedar product firms salvage much of the timber needed for their mill inputs from logs that have washed-up on ocean beaches (State of Alaska 2011). The sales value of these products was approximately $800,000 in 2011.

Export Sector—Including Sort Yards

During the last decade, strengthening Pacific Rim demand has driven significant increases in Asian log and wood product imports (Alexander 2012, Roos et al. 2010). This expansion has been spurred by growing Asian populations, increased ease of international trade through new legislation, and greater personal and corporate wealth (Wisertrade 2013).

A striking change spanning 2005 to 2011 is the rapid growth in Alaska sawlog exports to China.

Virtually all of Alaska's 2011 forest industry export revenues were derived from sawlogs ($115.8 million) (Alexander 2012). Finished lumber, woodchip, and other product export sales were less than $3 million (Alexander 2012). A striking change spanning 2005 to 2011 is the rapid growth in Alaska exports to China, coupled with substantial reductions in exports to Japan and South Korea. Sales to China

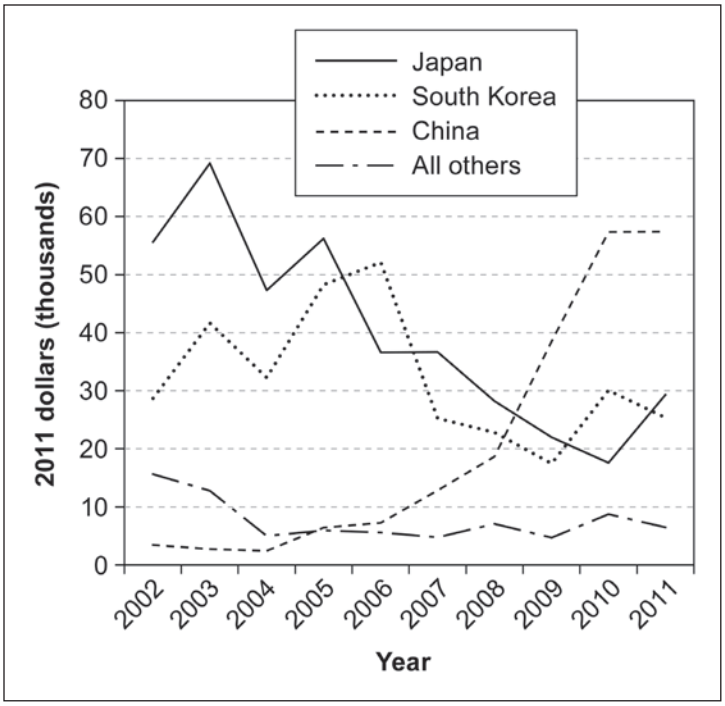

Figure 4—Values of Alaska's wood product exports: 2002–2011. Source: Alexander 2012.

increased from $8.1 million in 2005 (in 2011 dollars) to $57.2 million in 2011, but sales to Japan dropped from $65.9 million to $28.3 million and sales to South Korea shrank from $58.2 million to $25.1 million over the same 6-year period (fig. 4) (Alexander 2012).

Mirroring declining timber values seen across the United States, sales values of exported Alaska logs averaged $639 per MBF in 2005 (in 2011 dollars), then plummeted to $419 per MBF in 2011. Average values rose to $506 per MBF in 2012 (Zhou 2013). The volume of exported logs increased 35 percent during this same 7-year period (fig. 5) (Alexander 2012). Reduced values are partly a response to Chinese demands for lower quality logs to produce concrete forms, which are not as valuable as the high-quality logs typically sent to Japan. Alaska's 2011 share of log exports from primary Western log export states (which include California, Oregon, Washington, Idaho, and Montana) was 292.1 MMBF (18 percent) (WWPA 2012, Zhou 2013).

Timber slated for export is trucked from harvest units to approximately 10 privately owned sort yards located throughout southeast and south-central Alaska, where it is bucked to meet customer length and quality specifications.[5] These newly

[5] Brackley, A.M. 2013. Export sort yards in Alaska. Personal communication. abrackley@fs.fed.us. (December 22).

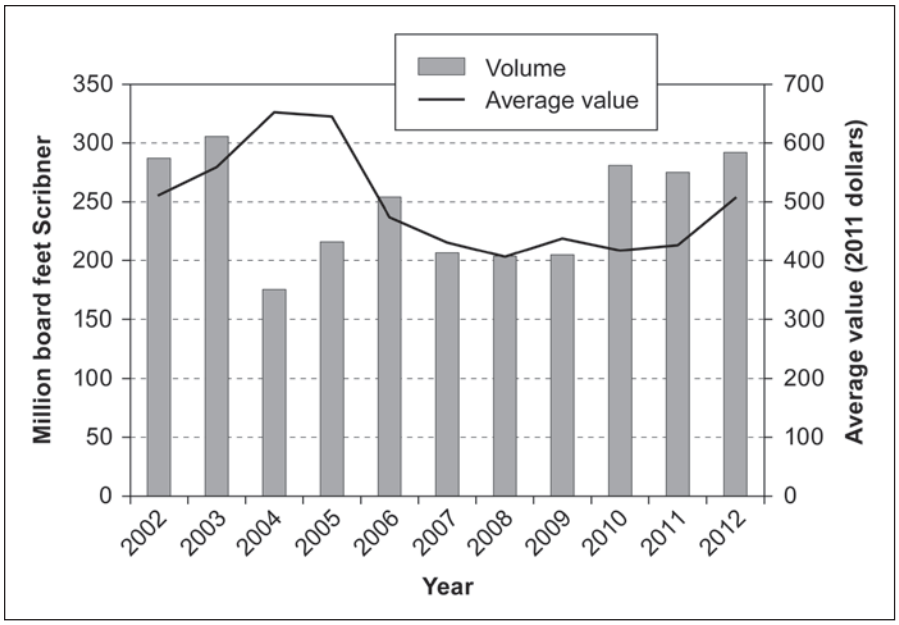

Figure 5—Alaska's log export volume and average value of all timber species: 2002–2012. Sources: Alexander 2012, Zhou 2013.

bucked short logs are then transported to waterfront landings for export. At least 152 MMBF Scribner of the timber harvested in Alaska during 2011 was converted into export-ready logs at these sort yards. The vast majority of this timber was harvested on Native corporation lands. Minor amounts of timber transported to these sort yards were merchandised into short logs and sold to local mills. Sort yard bucking of long logs yields 130 to 150 bone-dry tons per year of residue such as long butts, cull sections, and log ends per processed MMBF Scribner; these residues are a potential source of woody biomass for electric cogeneration (TSS Consultants 2000).

Capacity

The authors characterized Alaska wood products facilities capacities by two different measures: production capacity and timber-processing capacity.

Production capacity: This is the potential ability of a facility to produce **outputs** per shift or per work year. Production capacity was reported by mill owners or managers during the 2011 FIDACS census, assuming firm market demand for mill outputs and sufficient supply of timber inputs. For sawmills, production capacity was expressed as MBF lumber tally output per work year. House log plants reported production capacity as MLF of house log output per work year. The authors used production capacity to characterize potential lumber and house log production by resource area and at the state level. Southeast resource area mills dominated lumber production capacity with 105.7 MMBF lumber tally, down from 218.3 MMBF

lumber tally in 2005. House log production capacity also declined significantly from 2005 to 2011 (table 10).

Timber-processing capacity: This measure gauges the volume of timber mills could use if they operated at stated production capacity and is expressed as MBF Scribner log scale of timber per shift or per work year. The BBER computes a facility's timber-processing capacity by dividing its production capacity by its product recovery ratio. For example, assume that a house log plant's owner-reported production capacity is 100 MLF per work year and its recovery ratio is 0.3 MLF of house log output per 1 MBF Scribner of timber input. The mill's timber-processing capacity would then be 100 MLF/0.3 MLF per MBF Scribner = 333 MBF Scribner.

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 (table 11). Natural resource policymakers find timber-processing capacity useful when setting timber harvest volume targets because timber-processing capacity relates directly to the quantity of **timber** needed to manufacture lumber or other products (Alexander 2012, Alexander and Parrent 2012).

Timber-processing capacity of active facilities in Alaska during 2011 was approximately 133 MMBF Scribner (table 11). Alaska followed the same downward trend in timber-processing capacity and capacity utilization through time as other Western States (Keegan et al. 2006, 2012) (fig. 6).

Of particular concern is the rate of Alaska's timber-processing capacity reduction between 2005 and 2011—a statewide drop of only 2 percent (3.9 MMBF) from 1998 to 2005 (Halbrook et al. 2009, Hill 2000) is dwarfed by the 2005 to 2011

Table 10—Alaska production capacity[a] by resource area and sector, 2011

Resource area[b]	Lumber production capacity	House log production capacity
	Thousand board feet, lumber tally	*Thousand lineal feet*
Southeast	105,695	30
South-central and western[c]	8,906	836
Interior	22,730	874
All resource areas	137,331	1,740
2005—all resource areas	240,159	2,603

[a] Includes mills active during 2011.

[b] See table 8 for a list of borough/census areas located within resource areas.

[c] Resource areas combined to avoid disclosure.

Table 11—Alaska annual timber-processing capacity[a] and use by size class and sector, 2011

Annual timber-processing capacity size class	Number of active facilities	Annual capacity		2011 timber use	
		Timber-processing capacity	Sector capacity	Volume processed	Capacity utilization within size class
Thousand board feet, Scribner		*Thousand board feet, Scribner*	*Percent*	*Thousand board feet, Scribner*	*Percent*
Sawmill sector:					
< 250 MBF	20	2,883	2.6	837	29.0
251–500 MBF	6	2,272	2.1	255	11.2
501–1,000 MBF	11	7,865	7.2	2,392	30.4
>1,000 MBF	13	95,809	88.0	13,831	14.4
Sawmill sector total	50	108,829	100	17,315	15.9
House log and other[b] sectors:					
<500 MBF	23	2,916	12.2	1,119	38.4
>501 MBF	4	21,049	87.8	2,307	11.0
House log sector total	27	23,965	100	3,426	14.3
2011 combined sector totals	77	132,794		20,741	15.6
2005 combined sector totals[c]	77	202,156		46,131	21.4

[a] Includes mills active during 2011 only.

[b] Other sectors include cedar products, log furniture, tonewood, and novelty item manufacturers.

[c] From Halbrook et al. (2009).

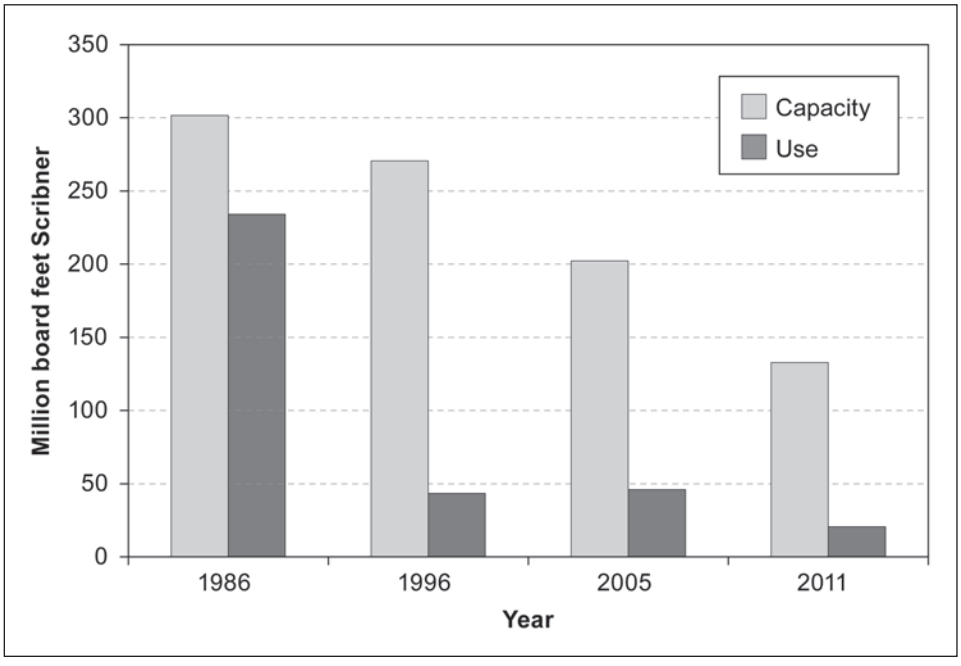

Figure 6—Alaska timber processing capacity and use: 1986, 1996, 2005, and 2011. Sources: Halbrook et al. 2009, Keegan et al. 2006.

plunge of 34 percent (nearly 70 MMBF) (table 11). Other Western States have also seen substantial reductions in annual timber-processing capacity (Gale et al. 2012, Keegan et al. 2012). Most of the 2005 to 2011 loss stemmed from reductions in southeast Alaska large mill (capable of processing more than 1 MMBF annually) capacity.

Only 15.6 percent of the timber-processing capacity in Alaska was utilized in 2011, the lowest of any Western State.

Only 15.6 percent of the timber-processing capacity in Alaska was utilized in 2011 (table 11), the lowest of any Western State (Keegan et al. 2006, Gale et al. 2012). Extremely low utilization carries the risk that additional mills may close in the near future but also suggests the potential for rapid increases in production if market conditions or timber supply improve (Keegan et al. 2012).

Alaskan analysts (Alexander and Parrent 2012, Kilborn et al. 2004, Parrent 2012) have historically reported timber-processing capacity differently than have BBER analysts. They have reported **design or installed capacity** as the maximum timber volume that a mill can process in a 250-day work year based on **machinery capabilities** and two 8-hour shifts per day. Although BBER's and the Alaskan analysts capacity methodologies differ, trends over time and the implications for timber demands by Alaska's industry are similar for both methods.

Mill Residue: Quantity, Types, and Use

Residue volumes and uses were reported by facilities that sold all or most of their residues in 2011. For facilities that did not track residue production, residue volume factors (residue volume generated per unit of finished product) were derived from reporting facilities data and used to estimate missing residue volumes.

Residue factors, bone-dry-units (BDUs) of residue per MBF lumber tally, were computed for "sole-purpose" sawmills that produced only lumber as a primary product (table 12). Trends in residue factors in Alaska are quite different from those observed in other Western States (Blatner et al. 2012). Brooks and Haynes (1994) reported that Alaska sawmill residue factors had **increased** through time: 0.58 in 1975, 0.61 in 1980, and 0.82 in 1990. The total sawmill residue factor for 2011 was 1.05, only 5 percent less than in 2005. Rogers (1991) summarized the percentage of cubic foot solid wood equivalent (SWE) of primary lumber product versus residue. He found that small Alaska sawmills in the 1980s produced 43 percent residues by SWE. The BBER's census found that 2011 sawmill residues, excluding exported chipped roundwood, amounted to 35 percent (summed residues of 1,043 MCF divided by 2,995 MCF sawmill inputs—fig. 3). The 2011 coarse residue factor increased 18 percent from 2005 likely in response to increased markets for slabs used for firewood.

Table 12—Alaska sawmill[a] residue factors, 2011

Type of residue	BDU[b] per MBF lumber tally
Coarse	0.71
Sawdust	0.17
Planer shavings	0.14[c]
Bark	0.17
Total	1.05

[a] Includes sawmills producing only lumber and no other products.

[b] Bone-dry unit (BDU = 2,400 lbs of oven-dry wood) of residue generated for every 1,000 board feet of lumber manufactured.

[c] This factor represents only the few Alaska mills that planed lumber. The combined planer shavings factor was 0.01 for all sawmills, whether or not the mills planed lumber.

Table 13—Production and disposition of mill residue from Alaska's forest products industry, 2011

	Residue disposition				
Type of residue	Pulp chips	Fuelwood[a]	Other uses[b]	Unused	Total
			Bone-dry units[c]		
Coarse[d]	10,090	4,267	103	1,004	15,464
Sawdust	—	2,802	803	593	4,198
Shavings/peelings	—	148	621	167	936
Bark	—	3,232	418	556	4,206
All residues	10,090	10,449	1,945	2,320	24,804

[a] Fuel wood uses include fuel for heating and wood pellet production.

[b] Other uses primarily include animal bedding, mulch, and landscape material.

[c] Bone-dry unit = 2,400 pounds of oven dry wood.

[d] Coarse residue includes chips, edgings, and slabs.

The proportation of unused mill residue dropped from 21 percent to 9 percent between 2005 and 2011, largely in response to increasing demand for fuelwood residues.

Alaska timber processors produced 24,804 BDU of mill residue during 2011, of which 94 percent came from sawmills (table 13). About 9 percent of mill residues were unused, down from 21 percent unused in 2005. This drop likely stemmed from increased demand for fuelwood. Pulp chip production dropped from 26,854 BDUs in 2005 to 10,090 BDUs in 2011 in response to reductions in primary lumber and ancillary chip production, and closure of a chipping operation in south-central Alaska. Unused residue in Alaska frequently is burned, piled, or graded into low-lying areas.

Forest Products Sales

Alaska primary wood product sales (f.o.b. the producing mill or free alongside ship), including log exports and mill residue, totaled more than $134 million during 2011 (table 14), down from $170.1 million (2011 dollars) reported in 2005. Fuelwood sales exceeded $3 million in 2011. Exports of sawlogs and chipped roundwood eclipsed all other revenue sources, with sales totaling $115.8 million and accounting for 86 percent of Alaska's total primary wood product sales. The vast majority of log exports were shipped to Pacific Rim countries, especially China (Alexander 2012, Zhou and Warren 2012). Of $17.4 million in domestic product sales, 72 percent (over $12.6 million) was sold within Alaska.

Sales of exported sawlogs and chipped roundwood accounted for 86 percent of Alaska primary wood products sales.

Employment

United States Department of Commerce Bureau of Economic Analysis (USDC BEA 2013) and Alaska Department of Labor (2013) data were combined to report Alaska primary and secondary forest industries employment (fig. 7). Alaskan forest industry employment has generally paralleled changes in timber harvest volume through time. Of particular note is the complete loss of pulp and paper employment in the late 1990s after all pulp mills had closed. Also, logging and milling employment dropped steeply after the U.S. Forest Service's southeast Alaska 50-year timber sale contracts terminated in the early 2000s (fig. 7) (Alexander 2012).

Table 14—Destination and sales value of Alaska's primary wood products and mill residue, 2011

Product	Alaska	West Coast[a]	Other states	Pacific Rim	Other countries[b]	Total
			Thousands of 2011 dollars			
Lumber	5,312	2,448	673	945	62	9,440
Other[c]	7,304	141	60	120	338	7,963
Total primary product	12,616	2,589	733	1,065	400	17,403
Residues[d]						1,186[e]
Sawlog and pulpwood exports[f]						115,823[e]
2011 total sales value						134,412
2005 total sales value[g]						149,537

[a] West Coast states include California, Hawaii, Oregon, and Washington.

[b] Other countries include Canada and countries located in Europe and the Middle East.

[c] Other products include house logs, firewood, wood pellets, cedar products, furniture, tonewood, and novelty items.

[d] Residue products include firewood, garden mulch, animal bedding, and pulp-quality wood chips.

[e] Data pooled across destinations to prevent disclosure of confidential information.

[f] Derived from Alexander (2012).

[g] From Halbrook et al. (2009).

Alaskan forest industry employment enjoyed a minor rally during the housing boom of 2004 and 2005 when forest industry jobs (full-time equivalents or FTEs) increased from 1,370 in 2003 to 1,417 in 2005 (fig. 7). Primary and secondary forest products industry employment then declined 29 percent from 2005 to 2011 (Keegan et al. 2012). Data from the USDC BEA (2013) and Alaska Department of Labor (2013) suggest that the **rate of decline** in primary and secondary statewide forest industry employment has slowed over the past several years owing in part to industry stabilization after Forest Service long-term timber contracts ended (Alexander 2012). Reductions in **primary** wood product manufacturing employment (based on BBER's 2005 and 2011 surveys) were more acute; primary facility FTEs plummeted 48 percent between 2005 and 2011, with more than 126 jobs lost.

After a precipitous drop starting in 2005, **southeast** Alaska forest industry employment increased from 216 FTEs in 2009 to 262 in 2011 (Alexander 2012). Much of this change was in response to increased logging employment; many southeast Alaska jobs were tied to flourishing Native corporation logging and timber export businesses. Employment recovery has been slower in south-central, western, and interior Alaska (Alaska Department of Labor 2013).

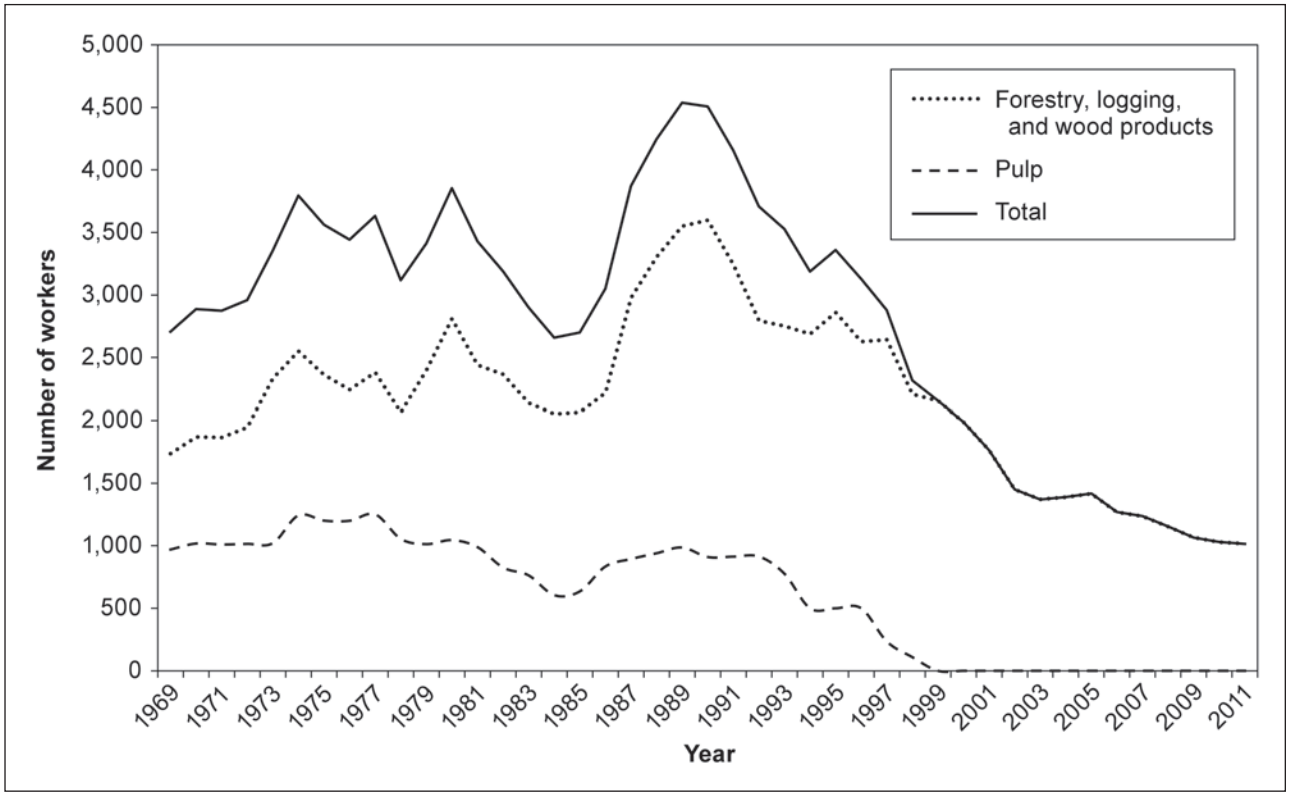

Figure 7—Alaska's forest products industry employment, 1969–2011 (based on analysis of NAICS 113—forestry and logging; NAICS 321—wood products manufacturing; and NAICS 322—pulp and paper manufacturing). Sources: Alaska Department of Labor 2013, USDC BEA 2013.

Emerging Issues

The foremost concern shaping Alaskan forest industry is lack of available timber for log export and processing in Alaska's mills.

The foremost concern shaping Alaskan forest industries is the lack of available timber for log export and processing in Alaska's mills (Portman 2012). The following emerging issues—management of Alaska's young-growth timber, proposed state forest expansion, increased western Alaska native corporation harvesting, and settlement of Sealaska's claims to additional forest lands—are timber availability issues that were frequently mentioned by land and mill managers during BBER's 2011 survey.

- **Young-growth vs. older timber**. Disagreement about uses of southeast Alaska's young-growth timber resource has become a major issue among federal land managers, environmental advocacy groups, and mill owners. Environmental advocates and U.S. Department of Agriculture leaders have touted the ecological benefits of steering timber management away from older timber to younger age classes resulting from timber harvest and natural disturbances such as wind damage (see footnote 2) (Alexander et al. 2010, USDA 2013, USDA FS 2013b). However, southeast Alaska mills have mostly been designed to process large-diameter timber harvested in older stands. Mill managers see little return for investments in machinery capable of efficiently milling smaller diameter timber when young growth will likely not grow to commercial size for at least another 15 to 20 years. They worry that young-growth trees will yield low-grade, low-value lumber. Further, managers predict that abundant small-diameter timber found throughout the lower 48 states will be more efficiently processed by local mills that enjoy low-cost shipping to major lumber markets in the Midwest and Eastern United States (RDCA 2013).
- **State forest expansion**. Largely to meet industrial needs for timber, the state of Alaska has sought to expand its state forest holdings by approximately 2.5 million ac (ADECD 2012). About 80 percent of these lands are currently part of the Tongass National Forest, and the remaining 20 percent are state-owned and located in south-central and interior Alaska.
- **ANCSA settlement**. If made into law, H.R. 740 and S. 340, U.S. House and Senate versions of "The Southeast Alaska Native Land Entitlement Finalization and Jobs Protection Act" would convey about 70,000 ac of the Tongass National Forest (mostly timberlands) to Sealaska Corporation (CBO 2013, Govtrack 2013). This additional land is needed to continue significant Native corporation harvest and export of timber from southeast Alaska over the next several years.

These issues are related to one another and are working in concert to change both the quantities and sizes of timber available for Alaska's domestic mills and the export market. For example, if enacted, ANCSA settlement legislation would change ownership patterns, sustain Sealaska's log export production for at least 3 to 5 years, and change the proportions of managed young-growth and older timber in southeast Alaska.

Common and Scientific Names of Tree Species

Alaska yellow-cedar	*Cupressus nootkatensis* D. Don
Black cottonwood	*Populus balsamifera* L.
Black spruce	*Picea mariana* (Mill.) Britton, Sterns & Poggenb.
Douglas-fir	*Pseudotsuga menziesii* (Mirb.) Franco
Mountain ash	*Sorbus scopulina* Greene var. *scopulina*
Mountain hemlock	*Tsuga mertensiana* (Bong.) Carrière
Birch species (includes Alaska paper birch and Kenai birch)	*Betula papyrifera* Marsh.; *Betula neoalaskana* Sarg.; *Betula papyrifera* Marshall var. *kenaica* (W.H. Evans) A. Henry
Quaking aspen	*Populus tremuloides* Michx.
Red alder	*Alnus rubra* Bong.
Sitka spruce	*Picea sitchensis* (Bong.) Carrière
Sugar maple	*Acer saccharum* Marshall
White spruce	*Picea glauca* (Moench) Voss
Western hemlock	*Tsuga heterophylla* (Raf.) Sarg.
Western redcedar	*Thuja plicata* Donn ex D. Don

Metric Equivalents

When you know:	Multiply by:	To find:
Inches (in)	2.54	Centimeters
Feet (ft)	.305	Meters
Square feet (ft^2)	.093	Square meters
Cubic feet (ft^3)	.028	Cubic meters
Cubic yards (yd^3)	.765	Cubic meters
Acres (ac)	.405	Hectares
Pounds (lbs)	.454	Kilograms
Tons (t)	.907	Tonnes or megagrams

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Glossary

Board foot—A unit of measure applied to lumber that is 1-ft long, 1-ft wide, and 1-in thick (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 lb (1,088 kg) at 0 percent moisture content. One BDU equals approximately 9.49 yd^3 or 96 ft^3 of solid wood.

Cubic foot—A unit of true volume that measures 1 by 1 by 1 ft (30.48 by 30.48 by 30.48 cm).

Forest land—Land at least 10-percent stocked with trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. (Note: Stocking is measured by comparing specified standards with basal area and/or number of trees, age or size, and spacing.) The minimum area for classification of forest land is 1 ac. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 ft to qualify as forest land. Unimproved roads and trails, streams or other bodies of water, or clearings in forest areas shall be classified as forest if less than 120 ft wide.

Growing stock—All live trees 5.0 in (12.7 cm) diameter at breast height (d.b.h.) or larger that meet (now or prospectively) regional merchantability requirements in terms of saw-log length, grade, and cull deductions. Excludes rough and rotten cull trees.

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—"green" logs usually require drying before they can be used for construction) and of lower value than sawlogs.

Lumber recovery factor (LRF)—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.

Nonforest land—Land that does not support or has never supported forests and lands formerly forested where use for timber management is precluded by development for other uses. Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining rights-of-way, power line clearings of any width, and non-census water. If intermingled in forest areas, unimproved roads and nonforest strips must be >120 ft wide, and clearings, etc., >1 ac, to qualify as nonforest land.

Nonreserved forest land—Forested land available for wood products utilization through statute or administrative designation.

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

Production capacity (owner reported)—Potential facility product output per shift or 240-day 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 lumber tally per shift or per year.

Recovery—The volume of output per unit of input, a measure of mill efficiency.

Reserved forest land—Land permanently reserved from wood products utilization through statute or administrative designation.

Residue—The wood or bark that is left after manufacturing of timber. Three types are generated:

Coarse—edgings, slabs, trim, mis-cuts, log ends.

Fine—sawdust and planer shavings.

Bark.

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

Scaling—Or "log scaling;" the measurement of volume in a log based on specific log rules, for example the Scribner log rule. In this report, all scaled volumes are reported in Scribner. Two versions of Scribner log scale are commonly used—west side and east side. Maximum log length is 40 ft for west-side Scribner, and 20 ft for east-side scale.

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

Standing volume—Total aboveground stem volume, net of cull, calculated on a cubic-foot basis for all trees larger than 5 in diameter at breast height (d.b.h.). Scribner board-foot volume, net of cull, was calculated for all trees larger than 9 in d.b.h.

Timberland—Forest land that is producing or capable of producing in excess of 20 ft^3 per acre per year of wood at culmination of mean annual increment. Timberland excludes reserved forest lands.

Timber-processing capacity—The volume of timber reported in MBF Scribner that could be processed given sufficient supplies of raw materials and firm market demand for products—estimated for each facility by applying the product recovery ratios to production capacity.

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