



# Impact of the Great Recession and Housing Collapse on the Forest Products Industry in the Western United States

**Authors:** Keegan, C.E., Sorenson, C.B., Morgan, T.A., and Hayes, S.W.  
The University of Montana, Bureau of Business and Economic Research, Missoula, MT 59812

**Daniels, J.M.**  
USDA Forest Service, Pacific Northwest Research Station, Portland, OR 97205

## ABSTRACT

The first decade of the Twenty-first Century proved tumultuous for the West's forest products industry. A strong economy, low interest rates, easy access to credit, and real estate speculation fostered more than two million U.S. housing starts in 2005 and record lumber consumption from 2003 to 2005. With the decline in U.S. housing beginning in 2006, the 2008 global financial crisis, an over 50-year record low 554,000 housing starts in 2009, wood product prices and production fell dramatically. In 2009 and 2010, virtually every major western mill suffered curtailments and 30 large mills closed permanently. Sales value of wood and paper products in the West dropped from \$49 billion in 2005 to \$34 billion in 2009. Employment declined by 71,000 workers and lumber production fell by almost 50 percent from 2005 to 2009. Capacity utilization at sawmills and other timber-using facilities in the West fell from over 80 percent in 2005 to just over 50 percent in 2009 and 2010. With the exception of exports and some paper markets, U.S. wood products markets have improved little since the recession officially ended in 2009. Modest improvements are expected in domestic markets in the short term but substantial improvements are unlikely until 2014 or later, as U.S. home building recovers and global demand increases. Much of the West retains the bulk of its pre-recession (2006) capacity and mills could respond quickly to increased demand spurred by economic recovery.

## INTRODUCTION

The forest products industry (Table 1) is a major industry group in the western U.S. (i.e., Alaska, Arizona, California, Colorado, Hawaii, Idaho,

Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming). In the West, the forest products industry accounts for more than 6 percent of manufacturing employment, 5 percent

of worker earnings among manufacturers, and just under 3 percent of manufacturing gross domestic product (GDP) (BEA 2012).

Table 1. North American Industry Classification System (NAICS) forest products industry sectors

NAICS 113	Forestry and Logging
NAICS 1153	Support Activities for Forestry
NAICS 321	Wood Product Manufacturing
NAICS 322	Paper Manufacturing

Source: U.S. Census (2011a)

The relative size and direct economic impact of forest industries varies among the states. For example, the forest products industry accounts for more than 23 percent of direct manufacturing employment in Montana, almost 19.5 percent in Oregon, and 11 percent in Washington. Even in California, with the largest manufacturing employment in the country (more than 1.3 million manufacturing workers), forest products account for almost 4 percent of direct manufacturing employment, 2 percent of manufacturing GDP, and California's forest industry workers earn more than \$3.3 billion annually. Therefore, events that impact the forest products industry can have significant direct economic impacts on state and regional economies, as well as in the numerous counties and small communities where individual wood and paper facilities and forest workers reside.

Historically, the West's forest products industry has supplied just under half (48 percent) of the softwood lumber produced in the U.S. (WWPA various years) and has been a major source of structural panels, pulp and paper, and reconstituted boards. The operations of the forest products industry are influenced by many factors; among the most significant are market conditions, technological advances in wood processing, foreign competition, and timber availability. The combined influence of these over time has shaped the structure, size, and output of the industry and has substantially influenced the industry in the western U.S. Recently, market fluctuations have exerted a major and historic impact. This report focuses on the impact of the 2007-2009 "Great Recession" and the ensuing slow recovery in

housing and wood markets on the forest products industry in the western states. Measures of the West's forest products industry are provided with emphasis on the primary (i.e., timber harvesting and processing) components of the industry.

The first decade of the Twenty-first Century proved tumultuous for the global and U.S. economies and the western forest products industry. Following a relatively mild recession in 2001, a booming economy, low interest rates, easy access to credit, and real estate speculation fostered more than two million U.S. housing starts in 2005 and record lumber consumption from 2003 to 2005 (WWPA 2010). The falloff in U.S. housing markets beginning in 2006 abruptly ended the credit-fueled growth that was based on the rapid increase in home prices up to that point. This period was followed by an official recession from December 2007 through June 2009 (NBER 2010), a massive decline in home values and housing-related financial instruments, and ultimately a global financial crisis in the last quarter of 2008. With tightening credit, an oversupply of foreclosed homes, and a collapse in speculative housing investment, 2009 through 2011 saw the worst home building and wood products markets since the Great Depression. Housing starts hit a 50-year record low of 554,000 in 2009, with only slight increases during 2010 and 2011. Wood product prices and production fell dramatically during the recession and have remained quite low throughout the post-recession "recovery."

The forest products industry can be viewed in two segments, primary and secondary; both are addressed in this paper. The primary forest products industry, as defined in this report, includes the harvesting and processing of timber and the use of the wood residue from facilities that process timber. This industry includes logging, processing logs into lumber and other wood products like veneer or log homes, and processing wood residues from timber-using facilities into outputs such as paper, particleboard, fiberboard, or energy products. Limiting the primary sector to industries that harvest and use timber or mill residue provides a more precise look at those sectors that are directly linked to the timber

resource and the timber products produced from that resource.

The secondary industry includes facilities that process outputs from primary manufacturers. The secondary wood products sector includes window and door manufacturing, cabinetry, and truss manufacturing, which use lumber and reconstituted board products as their inputs. The secondary paper sector includes those facilities that purchase market pulp or use paper or linerboard outputs from other facilities to manufacture items like tissue, cardboard boxes, or other paper-based consumer goods.

### **DATA SOURCES**

The USDA Forest Service's Forest Inventory and Analysis (FIA) Program (FIA) conducts Timber Products Output (TPO) studies to estimate industrial and non-industrial uses of roundwood timber and mill residue on a state-by-state basis. To estimate industrial uses of timber, all primary timber-using mills in a state are canvassed. These periodic censuses of the primary industry produce data on the number and kind of facilities in a state and region, quantity of timber and mill residue used, and additional information which varies somewhat by region. See Brandt et al. (2012) and Halbrook et al. (2009) for more details on the periodic censuses and information produced in the western U.S.

TPO analyses in the western states are based on individual mill data from ongoing industry censuses performed by The University of Montana's Bureau of Business and Economic Research (BBER) in cooperation with the USDA Forest Service's Rocky Mountain Research Station Forest Inventory and Analysis (RMRS-FIA) and Pacific Northwest Research Station Forest Inventory and Analysis (PNW-FIA). The BBER maintains state-by-state information on the characteristics of the primary industry in the 13 western states, the source and volume of timber used, the products and mill residue generated, and associated information on product values, employment, and capacity of the various industry sectors.

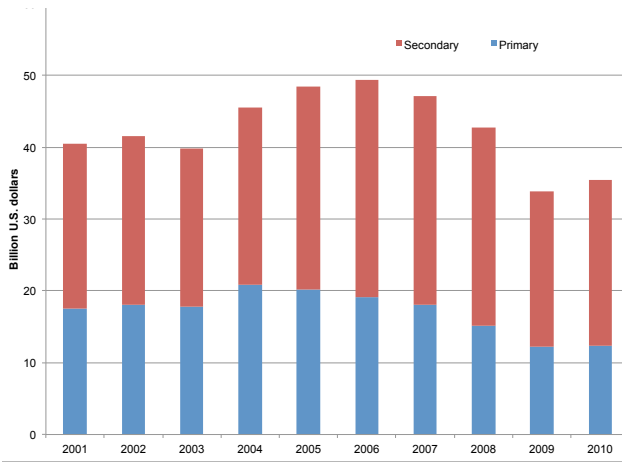
Primary industry censuses are conducted on a five-year cycle for the western states. In addition to the industry censuses, the following sources were used to produce annual estimates of key aspects of the primary forest industry in the West and to assess the impacts of the extremes in market conditions between 2000 and 2010: Gebert et al. (2002), Ehinger (2009, 2011), APA-The Engineered Wood Association (APA 2009), U.S. Census (2010, 2011b), Lockwood Post (2011), the Western Wood Products Association (WWPA various years), Random Lengths (1976-2010, 2007-2010, 2005-2011), Warren (various years), the Washington State Department of Natural Resources (Smith and Hiserote 2010), the Bureau of Economic Analysis Regional Economic Information System (BEA 2012), and industry directories and harvest reports from various states.

### **IMPACTS ON THE FOREST PRODUCTS INDUSTRY IN THE WEST**

During the strong market years of 2004 through 2006, the West's primary and secondary industry combined had an annual sales value, fob the producing plant, of nearly \$50 billion. The value of outputs from the primary sector was approximately \$20 billion, with the secondary industry adding an additional \$28 billion during 2005 (Figure 1). The West's forest industry directly employed almost 250,000 workers in 2005 (Table 2), with 117,000 in primary sectors and 132,000 in secondary sectors. Over 90 percent of the primary forest industry workers in the West are employed in Alaska, northern California, Idaho, Montana, Oregon, Washington, and Wyoming. Although the primary sector is a relatively small portion of the forest products industry in southern California and the central and southern Rocky Mountain states, it represents the majority of the industry in many communities and sub-state regions throughout the West (Spoelma et al. 2008; Brandt et al. 2009, 2012; Halbrook et al. 2009; Hayes et al. 2012; Gale et al., in press; Morgan et al., in press).

The Great Recession and housing collapse had large-scale impacts on the western forest products

Figure 1. Sales value of the primary and secondary forest products industry in the western states



industry. Value of industry outputs fell 31 percent from \$49 billion in 2006 to \$34 billion (for the producing mill) in 2009. Employment dropped 29 percent from 249,000 workers in 2005 to 177,000 in 2009 (Table 2) and further to 170,000 in 2010 (Figure 2), while earnings of workers fell almost 22 percent from \$12.9 billion in 2005 to \$10.1 billion in 2009 and 2010.

Value of outputs from the forest industry in the five Pacific Coast states (Alaska, California, Hawaii, Oregon, and Washington) fell from just under \$40 billion in 2005 and 2006 to approximately \$28 billion in 2009 and 2010. Interior West states saw sales drop 39 percent from \$10.5 billion to \$6.6 billion over the same period. Employment in the Pacific Coast states forest products industry fell

Figure 2. Forest products industry worker earnings and employment in the West, 2001-2010

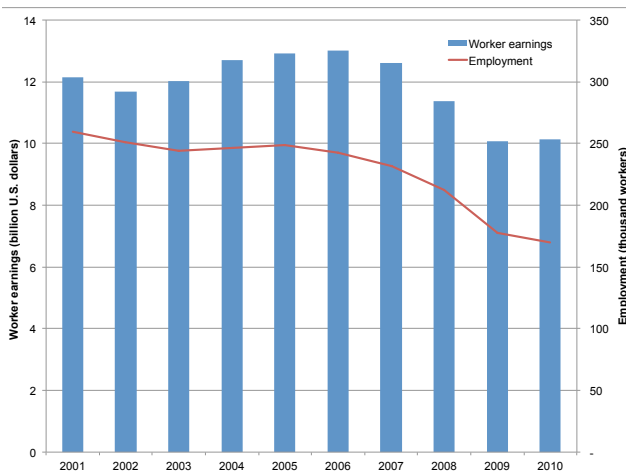


Table 2. Western states forest products industry employment, 2005 vs. 2009

	2005	2009	Net change	% Change
<i>Pacific Coast states</i>				
Alaska	1,805	1,465	(340)	-19%
California	79,513	56,630	(22,883)	-29%
Hawaii	1,091	984	(107)	-10%
Oregon	58,858	42,578	(16,280)	-28%
Washington	44,416	32,612	(11,803)	-27%
<b>Pacific Coast subtotal</b>	<b>185,683</b>	<b>134,269</b>	<b>(51,414)</b>	<b>-28%</b>
<i>Interior West states</i>				
Arizona	14,222	7,160	(7,062)	-50%
Colorado	9,521	7,293	(2,228)	-23%
Idaho	14,116	10,028	(4,088)	-29%
Montana	9,783	7,464	(2,319)	-24%
Nevada	3,358	2,003	(1,355)	-40%
New Mexico	3,715	2,623	(1,092)	-29%
Utah	7,282	5,941	(1,341)	-18%
Wyoming	1,148	629	(519)	-45%
<b>Interior West subtotal</b>	<b>63,145</b>	<b>43,141</b>	<b>(20,004)</b>	<b>-32%</b>
<b>Grand Total</b>	<b>248,827</b>	<b>177,410</b>	<b>(71,418)</b>	<b>-29%</b>

Sources: U.S. Department of Commerce, Bureau of Economic Analysis; Bureau of Labor Statistics; University of Montana Bureau of Business and Economic Research

by over 51,000 jobs or 28 percent, from 185,683 in 2005 to 134,269 in 2009, and employment dropped another 4 percent or 5,800 jobs in 2010. At 32 percent, job losses were relatively more severe in the Interior West, even though the industry is smaller. Primary forest industry employment in the Pacific Coast states dropped from over 93,600 workers in 2005 to just over 70,000 in 2009, down by almost 25 percent or 23,000 workers. The drop in employment in the Rocky Mountain states was similar—down 22 percent from 23,400 to 18,200 workers.

Every sector of the western forest products industry was negatively impacted by the economic downturn. The wood products sectors, which are more heavily dependent on housing and construction than paper products, experienced the largest impacts. Sales value of primary and secondary wood products fell from \$28 billion in 2005 to \$14 billion in 2009, while the primary and secondary pulp and paper industry was virtually unchanged at \$21 billion (in current year dollars) over the same period.

Both the primary and secondary wood product industries were severely impacted by the housing collapse. The largest markets for lumber produced throughout the West are southern California and the Southwest, and much of the secondary industry is located in close proximity to major population centers such as Las Vegas, Los Angeles, Phoenix, and San Diego, which are among the areas where

the housing collapse was at its worst. For example, November year-to-date building permits in 2010 and 2011 were just 14 percent of their 2004 and 2005 levels in Las Vegas and Phoenix, and in Los Angeles and San Diego they were 35 percent and 29 percent, respectively, of their pre-recession levels (Random Lengths 2005-2011). Taken together, these four metropolitan areas account for about one-quarter of all housing permits in the West, where housing permits in 2010 and 2011 were 25 percent of their 2004 and 2005 levels.

During the strong market years of 2004 and 2005, there were over 1,100 primary wood and paper products plants in the West producing a wide variety of products. Beyond traditional lumber and plywood, mills produced veneer, pulp and paper, reconstituted boards such as particleboard and medium density fiberboard, poles, posts, wood pellets, and house logs. The severe market conditions led to numerous mill closures and curtailments among the West's primary forest industry, so that by 2010 the number of active mills in the West had dropped by more than 25 percent to approximately 800. Although these were not all permanent closures, by the end of 2010, more than 30 large primary mills and scores of smaller ones had closed permanently.

The largest component of the decline in total sales value was in primary wood and paper products, which fell by 40 percent from \$20 billion in 2005 to \$12 billion in 2009 (Figure 1). Value of outputs from the secondary industry fell just 23

percent from \$28 billion in 2005 to \$22 billion in 2009. Total sales value of the Pacific Coast region's primary wood and paper products (fob the producing mill) fell by 41 percent, from approximately \$17 billion annually in the strong market years of 2004 and 2005 to \$10 billion in 2009 and \$11 billion in 2010. The sales decline in the Interior West's primary industry was 39 percent, from \$3.4 billion in 2005 to \$2.1 billion in 2009.

Based on value of output, the primary wood products industry accounted for two-thirds of the West's primary forest products industry in 2005, with the primary pulp and paper industry (NAICS 3221) accounting for about one-third of the output value. With the disproportionately negative impacts of the housing collapse on wood products, by 2009 less than half of the sales value—\$6 billion out of \$13 billion in primary sales—came from wood product manufacturing.

Primary forest industry employment dropped by almost 30 percent from 2005 to 2009—from over 117,000 workers in 2005 to just over 88,000 in 2009—and secondary industry employment fell 33 percent from 132,000 to 89,000 over the same period. Worker earnings in the primary sector dropped 23 percent from \$6.4 billion in 2005 to under \$5 billion in 2009.

Quantifying the changes in employment and earnings from the forestry and logging sector (NAICS 113) of the western Forest Products industry elucidates recent trends with the “in-

Table 3. Forestry and Logging (NAICS113) employment and earnings in the West, 2005 vs. 2009

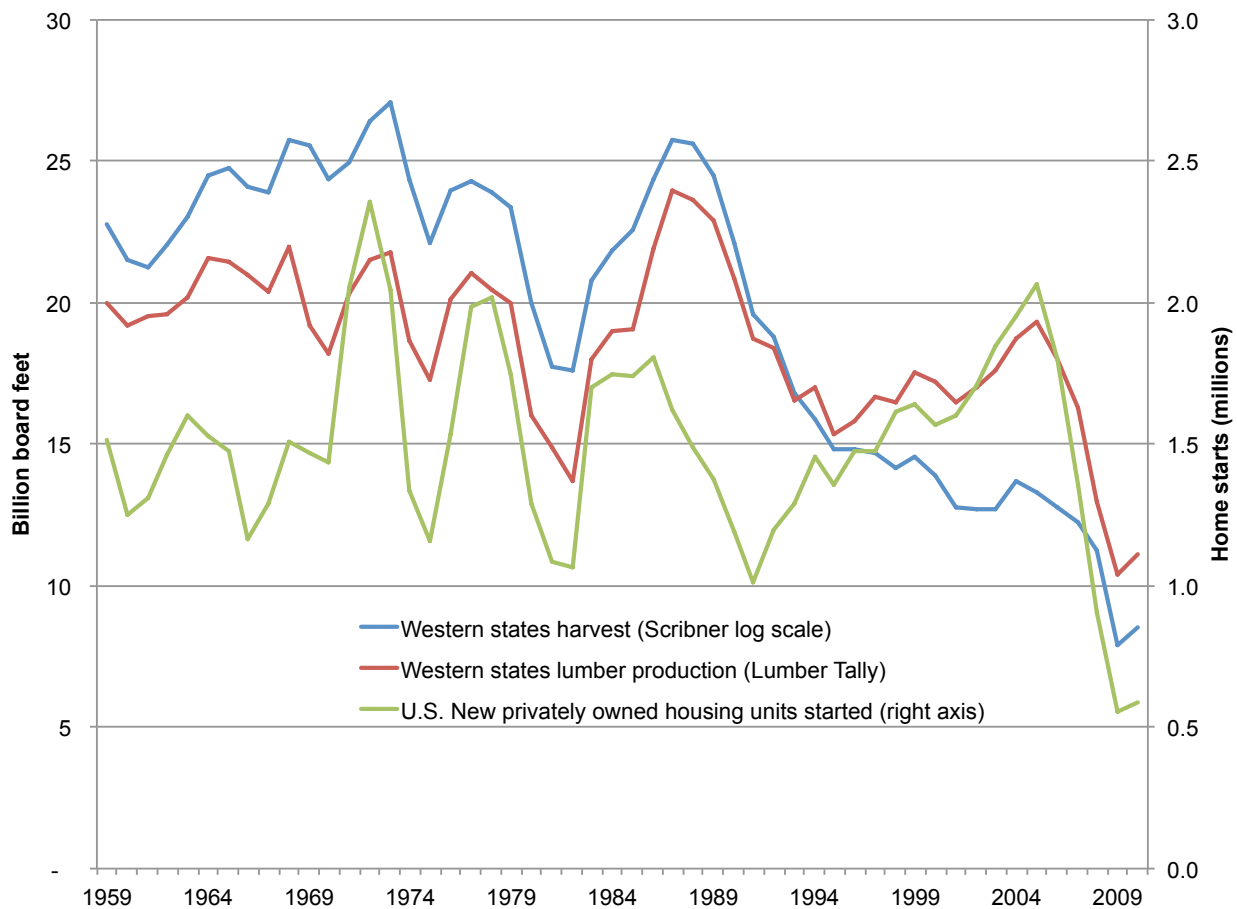
	Employment				Earnings (\$1000s)			
	2005	2009	Net Change	% Change	2005	2009	Net Change	% Change
<i>Pacific Coast states</i>								
Alaska	743	440	(303)	-41	46,455	27,723	(18,732)	-40
California	5,815	4,843	(972)	-17	264,945	203,615	(61,330)	-23
Hawaii	81	117	36	44	1,365	2,590	1,225	90
Oregon	11,279	8,650	(2,629)	-23	1,038,660	784,584	(254,076)	-24
Washington	8,833	6,480	(2,353)	-27	489,980	413,545	(76,435)	-16
<b>Pacific Coast subtotal</b>	<b>26,751</b>	<b>20,530</b>	<b>(6,221)</b>	<b>-23</b>	<b>1,841,405</b>	<b>1,432,057</b>	<b>(409,348)</b>	<b>-22</b>
<i>Interior West states<sup>1</sup></i>								
Arizona	325	319	(6)	-2	8,252	8,364	112	1
Idaho	3,204	2,133	(1,071)	-33	137,343	94,869	(42,474)	-31
Montana <sup>2</sup>	2,228	1,400	(828)	-37	84,542	55,743	(20,141)	-14
Utah	196	182	(14)	-7	3,891	3,469	(422)	-11
<b>Interior West subtotal</b>	<b>6,278</b>	<b>4,034</b>	<b>(1,919)</b>	<b>-31</b>	<b>239,796</b>	<b>162,445</b>	<b>(62,925)</b>	<b>-26</b>
<b>Grand Total</b>	<b>33,029</b>	<b>24,564</b>	<b>(8,140)</b>	<b>-25</b>	<b>2,081,201</b>	<b>1,594,502</b>	<b>(472,272)</b>	<b>-23</b>

Source: U.S. Department of Commerce, Bureau of Economic Analysis

<sup>1</sup>Excluded Colorado, Nevada, New Mexico, and Wyoming; data made unavailable to avoid disclosure of confidential information

<sup>2</sup>2009 not disclosed; values estimated by The University of Montana Bureau of Business and Economic Research

Figure 3. New U.S. home construction and western states timber harvest and lumber production, 1959-2010.



woods” labor force of the region. Forestry and logging employment across the West declined by more than 8,000 workers over the period, representing a 25 percent drop in employment between 2005 and 2009 (Table 3). Though the earnings decline was not as extreme as the drop in employment, nominal earnings for the sector did decline more than 20 percent. In the Pacific Coast states, the overall declines were due in large part to the combined loss of nearly 5,000 jobs and over \$330 million in earnings in Oregon and Washington. In the Interior West, Idaho and Montana accounted for declines of nearly 2,000 jobs and \$63 million in earnings from the forestry and logging sector.

### LUMBER PRODUCTION AND TIMBER HARVEST

For at least 50 years prior to the recent housing collapse, the West was the major softwood lumber producing region in the country. Softwood lumber

was the largest single component of the industry in the West, accounting for approximately \$8 billion per year or almost 40 percent of total value from the primary industry in 2004 and 2005. With U.S. housing starts falling by 75 percent and the U.S. consumption of softwood lumber dropping by half, lumber production in the West fell from over 19 billion board feet (BBF) lumber tally (48 percent of U.S. production) in 2005 to an estimated 10.4 and 11.1 billion board feet in 2009 and 2010, respectively (less than 45 percent of U.S. production). In 2007, output of softwood lumber from the South exceeded output from the West for the first time since at least 1955. In 2009, lumber production in the West was at its lowest level in more than 50 years (Figure 3). Because of the substantial decline in both prices and production, the value of lumber produced by western sawmills fell by over 60 percent (in current year dollars) from nearly \$8 billion in

2004 and 2005 to under \$3 billion in 2009 and 2010.

With over 70 percent of the logs harvested in the West during 2004 and 2005 used to produce lumber, timber harvest volume in the West also fell dramatically during the downturn, from over 13 BBF Scribner in 2004 and 2005 to 7.9 BBF in 2009 (Figure 3). During 2009 and 2010, west-wide harvest and lumber output were at the lowest levels since the late 1940s. These extremely low timber harvest and lumber production figures are particularly notable, when considering U.S. population in the late 1940s was less than half of the 2011 population of 311 million people. Timber harvest fell by just over 40 percent in both the Pacific Coast and Interior West regions from 2005 to 2009, while lumber production fell more than 45 percent.

### LOSSES IN INDUSTRY INFRASTRUCTURE: TIMBER PROCESSING CAPACITY

As indicated earlier, there were 30 percent fewer active mills in 2009 and 2010 versus the strong market years of 2004 and 2005, but changes in number of mills is not the best measure of changes in the size and capacity of the industry. Individual mills can range from a few thousand board feet of lumber to tens of millions of board feet of lumber produced annually. Likewise, a single mill may employ five or fewer workers or several hundred workers. A more relevant and useful measure of the forest products industry and changes in size of the infrastructure is timber-processing capacity, which refers to the total volume of timber (excluding pulpwood and roundwood fuelwood) that existing mills could utilize annually given firm demand for products and sufficient raw material supplies (Keegan et al. 2006).

Annual timber-processing capacity in the West was relatively stable from the 1970s through the late 1980s at approximately 25 BBF Scribner. Changes in output from the West's industry are reflected not in capacity but in capacity utilization - the portion of capacity that is used annually. Capacity utilization for non-recession years was likewise fairly stable at approximately 70 percent (Figure 4; Keegan et al. 2006). Following the

steep decline in federal timber offerings after 1989, capacity declined more than 40 percent to approximately 14 BBF in the late 1990s. In subsequent years, capacity remained relatively stable, and at the start of the Great Recession, annual capacity to process timber in the West was an estimated 14.4 BBF. By 2010, capacity had declined to an estimated 13 BBF; this 10 percent decline in processing capacity from 2005 to 2010 was substantially less than the 25 percent decline in the number of active mills would indicate. Capacity utilization was around 80 percent during the 2003 to 2006 period. However, with the housing market collapse, capacity utilization fell dramatically to 64 percent in 2008 and 56 percent in 2010.

In 2005, capacity to process timber was 11.2 BBF in the Pacific Coast States, and mills utilized 83 percent of that capacity. Capacity rose to just under 12 BBF in 2007, but by 2010 had dropped about 10 percent to under 11 BBF, and utilization dropped to just 56 percent of capacity. The Interior West suffered a much larger proportionate drop in timber-processing capacity (27 percent) and utilization fell from 69 to 54 percent from 2005 to 2010.

### EXPORTS

Strong demand from China and weak demand in the U.S. have led to increased exports of finished products and logs in recent years. The value and volume of solid wood products exported from

Figure 4. Western states timber processing capacity and use, selected years

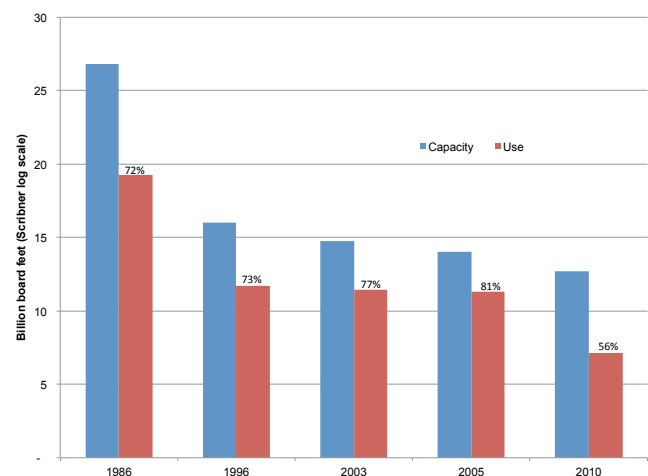
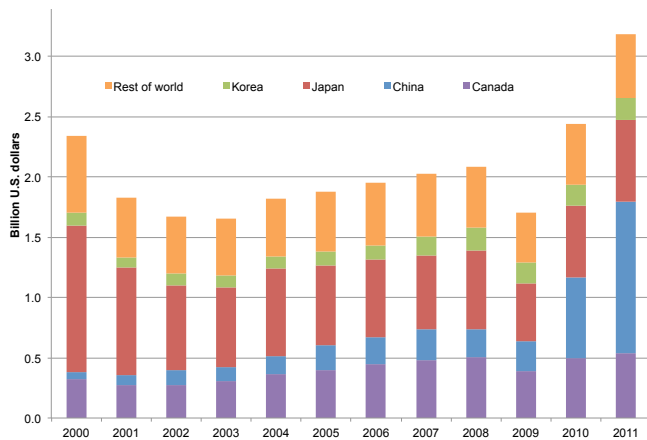


Figure 5. Value of solid wood product exports from western customs districts, 2000 to 2011



western customs districts and the share of foreign destinations for shipments remained relatively stable from 2000 through 2008 (Figure 5; U.S. Department of Commerce 2012). After falling 18 percent during 2009, the value of wood products shipments from the West (including all ports in Alaska, Washington, Oregon, Arizona, and Montana) jumped by 87 percent, reaching just over \$3 billion in 2011. This jump is almost exclusively attributable to expansion of shipments to China.

Log exports have a long and contentious history in the West (Daniels 2005). In general, private forest land owners favor log exports because they lead to higher prices for their timber and provide markets when domestic demand slumps. Mill owners tend to disfavor log exports for similar reasons; domestic mills compete with foreign buyers for logs and thus face higher raw material costs and reduced access to supplies of timber when foreign log buyers are active.

From 2000 to 2009, log exports from the West remained relatively consistent, and Japan was the dominant destination (Figure 6). This trend began to change in 2009 when the proportion of log exports going to China began to rise. By 2011 the volume of logs shipped to China had jumped by almost 600 percent to reach 1.2 BBF Scribner—equivalent to 14 percent of west-wide harvest in 2010. This log export trend is likely to persist until domestic demand for wood products

Figure 6. Volume of softwood logs exported from western customs districts, 2000 to 2011



returns, Chinese demand decreases, or policy changes impact log exports.

## FUTURE OUTLOOK

As this report is going to press, there has been little improvement in U.S. lumber and wood products markets, although export markets for logs, lumber, and paper products increased notably during 2010 and 2011. Improved export markets have been a mixed blessing for the Pacific Coast's industry. Higher log prices have benefitted timberland owners, while simultaneously increasing raw material costs for domestic sawmills and other timber processors, particularly in western Oregon and western Washington. Low capacity utilization rates in the West suggest the possibility of additional mill closures, but because much of the reduced output is due to curtailments rather than permanent closures, the industry retains the ability to quickly increase production at existing mills when market conditions improve.

Modest improvements are expected in domestic wood products markets in 2012, with substantial improvements not predicted until 2014 or beyond, as U.S. home building recovers and global demand continues to increase.



## LITERATURE CITED

- APA-The Engineered Wood Association (APA). 2009. Regional Production and Market Outlook, U.S. Structural Panel Production by State, 2009. Tacoma, WA.
- Brandt, J.P., T.A. Morgan, C.E. Keegan, J.M. Songster, T.P. Spoelma, and L.T. DeBlander. 2012. Idaho's forest products industry and timber harvest, 2006. Resource Bull. RMRS-RB-12. USDA, Forest Service, Rocky Mountain Research Station, Fort Collins, CO. 45 pp.
- Brandt, J.P., T.A. Morgan, and M.T. Thompson. 2009. Wyoming's forest products industry and timber harvest 2005. Resour. Bull. RMRS-RB-9. USDA, Forest Service, Rocky Mountain Research Station. Fort Collins, CO. 28 pp.
- Bureau of Economic Analysis (BEA). 2012. United States Department of Commerce, Bureau of Economic Analysis, Regional accounts data. <http://www.bea.gov/regional/spi/default.cfm?selTable=SA25N&selSeries=NAICS>. Last accessed February 2012.
- Daniels, J.M. 2005. The rise and fall of the Pacific Northwest log export market. General Technical Report PNW-GTR-624. USDA, Forest Service, Pacific Northwest Research Station, Portland, OR. 80 pp.
- Ehinger, P.F. 2009. Forest Industry Data: Oregon, Washington, Idaho, Montana, and California. Operating Mills and Other Data. Consulting Forester, Paul F. Ehinger & Associates, 2300 Oakmont Way, #212, Eugene, OR 97401.
- Ehinger, P.F. 2011. Personal communication. Consulting Forester, Paul F. Ehinger & Associates, 2300 Oakmont Way, #212, Eugene, OR 97401.
- Gale, C.B., C.E. Keegan, E.C. Berg, J.M. Daniels, G. A. Christensen, C.B. Sorenson, T.A. Morgan, and P.E. Polzin. In press. Oregon's forest products industry and timber harvest, 2008: Industry trends and impacts of the Great Recession through 2010. General Technical Report. PNW-GTR-XXX. USDA, Forest Service, Pacific Northwest Research Station, Portland, OR
- Gebert, K.M., C.E. Keegan III, S. Willits, and A. Chase. 2002. Utilization of Oregon's timber harvest and associated direct economic effects, 1998. General Technical Report PNW-GTR-532. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR. 16 pp.
- Halbrook, J.M., T.A. Morgan, J.P. Brandt, C.E. Keegan, T. Dillon, and T.M. Barrett. 2009. Alaska's timber harvest and forest products industry, 2005. General Technical Report. PNW-GTR-787. USDA Forest Service, Pacific Northwest Research Station, Portland, OR. 30 pp.
- Hayes, S.W., T.A. Morgan, E.C. Berg, J.M. Daniels, and M.T. Thompson. 2012. The Four Corners timber harvest and forest products industry, 2007. Resource Bulletin. RMRS-RB-13. USDA, Forest Service, Rocky Mountain Research Station, Fort Collins, CO. 61 pp.
- Keegan, C.E., T.A. Morgan, K.M. Gebert, J.P. Brandt, K.A. Blatner, and T.P. Spoelma. 2006. Timber-processing capacity and capabilities in the Western United States. *J. Forestry* 104(5):262-268
- Lockwood-Post. 2011. Directory of pulp and paper mills. The Americas, Traveler's Edition. RISI, Atlanta, GA. 515 pp.
- Morgan, T.A., J.P. Brandt, K.E. Songster, C.E. Keegan, and G.A. Christensen. (In Press). California's forest products industry and timber harvest, 2006. Gen. Tech. Rep. PNW-GTR-XXX. USDA, Forest Service, Pacific Northwest Research Station, Portland, OR.
- National Bureau of Economic Research (NBER). 2010. US Business Cycle Expansions and Contractions. <http://www.nber.org/cycles.html>. Last accessed February 21, 2012.

Random Lengths. 1976-2010. Random Lengths yearbook: forest product market prices and statistics. Eugene, OR.

Random Lengths. 2007-2010. Big Book: the buyers and sellers directory of the forest products industry. Eugene, OR.

Random Lengths. 2005-2011. Yardstick. <http://www.randomlengths.com/base.asp?s1=Newsletters&s2=Yardstick>. Last accessed November 2011.

Smith, D., and B. Hiserote. 2010. Washington Mill Survey 2008. Series Report #20 Washington State Department of Natural Resources, Olympia, WA. 98 pp.

Spoelma, T.P., T.A. Morgan, T. Dillon, A.L. Chase, C.E. Keegan, and L.T. DeBlander. 2008. Montana's forest products industry and timber harvest, 2004. Resource Bulletin. RMRS-RB-8. USDA, Forest Service, Rocky Mountain Research Station, Fort Collins, CO. 36 pp.

U.S. Census Bureau (U.S. Census). 2010. Annual Survey of Manufactures. [http://factfinder.census.gov/servlet/DatasetMainPageServlet?\\_program=EAS](http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS). Last accessed January 2012.

U.S. Census Bureau (U.S. Census). 2011a. North American Industry Classification System (NAICS). <http://www.census.gov/eos/www/naics/>. Last accessed March 2012.

U.S. Census Bureau (U.S. Census). 2011b. County Business Patterns. <http://censtats.census.gov/cbpnaic/cbpnaic.shtml>. Last accessed July 2011.

U.S. Department of Commerce. 2012. U.S. International Trade Commission Interactive Tariff and Trade Dataweb. [http://dataweb.usitc.gov/scripts/user\\_set.asp](http://dataweb.usitc.gov/scripts/user_set.asp). Last accessed February 23, 2012.

U.S. Department of Labor. 2011. Bureau of Labor Statistics. <http://www.bls.gov/>. Last accessed June 2011.

Warren, D.D. Various years. Production, prices, employment, and trade in Northwest forest industries. USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Western Wood Products Association (WWPA). Various years, 1964-2010. Statistical yearbook of the Western lumber industry. WWPA, Portland, OR.