

Timber-processing Capacity & Capabilities in the Western U.S.

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Capacity Study Objectives

- Quantify current and historic timber-processing capacity in the Western United States
- Estimate proportions of capacity capable of processing trees of various size classes
- Quantify current total timber use by tree size

Note: Pulpwood, industrial fuelwood, and log exports are treated separately

Specific objectives of this analysis are presented in the slide. The specific states and regions analyzed are:

- The Northern Rockies (Idaho, Montana, Wyoming)
- The Four Corners States (Arizona, Colorado, New Mexico, Utah)
- The Pacific Coast States (Alaska, California, Nevada, Oregon, and Washington)

Capacity, utilization, and capability were developed by summarizing mill level data.

The facilities included in the calculation of capacity include plants utilizing timber to manufacture:

- lumber and other sawn products;
- veneer/plywood;
- utility poles and pilings
- posts, small poles, stakes, and roundwood furniture;
- house logs and log homes;
- cedar products—shakes, shingles, and split rail fencing;

Because of their volatility and the difficulty of defining a capacity, roundwood pulpwood, industrial fuelwood, and log exports are treated separately and not included in the capacity figures. The ranges of volumes used and exported are discussed.

Definitions

- **Timber-processing capacity:**
volume of timber that could be used by existing timber processors if demand for products were firm and sufficient raw material were available
- **Capability by size class:**
volume of trees by tree DBH class that could be processed efficiently

In this report capacity is expressed in units of timber input. Finished product output and log input were used to calculate recovery factors (unit output per unit input). These recovery factors were applied to mill capacity--expressed in units of output--to express capacity in units of timber input.

Timber-processing capacity is the volume of timber that could be used by existing timber processors if demand for products were firm and sufficient raw material were available.

Timber-processing capability by size class is the volume of trees that could be processed efficiently—at prices comparable to 1999-2001. Three tree diameter classes were identified to categorize timber use and milling capacity: trees < 7" diameter at breast height (DBH), trees 7" to 9.9" DBH, and trees ≥10" DBH.

Conversions among units were calculated based on information provided by mills and Avery and Burkhart (1994), Briggs (1994), and Hartman et al. (1981).

Methods

- **Current and historic information from periodic state censuses**
- **Published information on the forest products industry**
- **Interviews/discussions with mill managers, state and federal utilization specialists**

The primary sources of data for this project were periodic forest industry surveys and censuses done for or by the Interior West (IW) and Pacific Northwest (PNW) Forest Inventory and Analysis (FIA) Programs of the USDA Forest Service, Rocky Mountain and Pacific Northwest Research Stations. In the Rocky Mountain States, California, and Oregon these surveys were done by the Bureau of Business and Economic Research (BBER) at The University of Montana, under joint venture agreements with the FIA units (Benson and Green 1987; FIDACS 2004; Howard and Ward 1988; Keegan et al. 2001a, b, c; Keegan et al. 1997; Keegan et al. 1995a, b; McLain 1988; McLain 1989; McLain et al. 1997; Morgan et al. 2004a, b; Morgan et al. In press; Ward et al. 2000; Ward 1997). For some previous years the FIA units did surveys. For Washington periodic industry surveys have been done by the Washington DNRC under partial sponsorship of the PNW FIA (Larsen and Aust 2000; Larsen 1990). Current Washington data were developed by Keith A. Blatner (2004) of Washington State University in cooperation with Bruce P. Glass of Washington DNRC. In Alaska PNW FIA and National Forest Systems as well as the State of Alaska have contributed to periodic surveys (Kilborn 2004).

Forest Industry Censuses (with IW & PNW FIA)

- Mill type, capacity, equipment
- Timber harvest volume, use, species, size, county, & ownership
- Product volume, sales, & geographic distribution
- Mill residue/wood fiber use
- Associated employment

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The BBER periodic censuses are done on a state level about every five years to collect the information indicated on the slide. The Washington surveys collect much of the same information on a two-year basis. Surveys on Alaska's industry have been more variable in time frame and information collected. Because the censuses or surveys did not always provide data for the specific years used in this analysis (1986, 1996, 2003), other sources were used to update most recent survey data to 2003 (Adair 2004a,b; Blatner et al. 2004; Cohn and Blatner 2003; Ehinger 2004; Random Lengths 2004; Spelter 2002; Warren 1986-2003; WWPA 1986-2003).

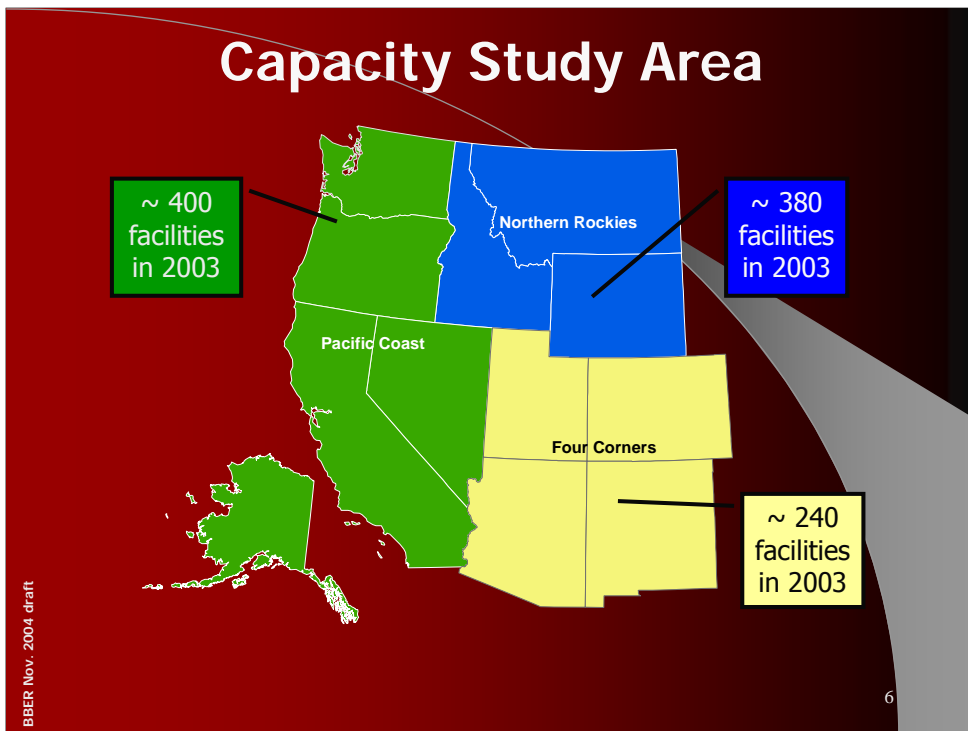
The actual volumes processed in various size classes and proportions of mill capacity capable of processing trees in each of the three size classes were based on industry census information on:

- Size of timber used
- Mill equipment and configurations
- Products produced

Discussions with mill operators, simulations of processing a range of log sizes through different mill configurations (Wagner et al. 1998 and 2000, Stewart et al. in press), and the authors' professional judgment were also incorporated.

In considering capability to efficiently process timber of various sizes, wood product prices for the period 1999-2001 were assumed.

Again, the goal was to provide estimates of the capacity to utilize trees in the three size classes; in effect this meant identifying the proportion of capacity which could not efficiently process timber < 10" DBH and the portion that could process timber in the smaller size classes. Most mills capable of efficiently processing trees in the smaller categories were also capable of processing trees from larger size classes.



The state groupings were:

The Northern Rockies (Idaho, Montana, Wyoming)

The Four Corners States (Arizona , Colorado, New Mexico, Utah)

The Pacific Coast States (Alaska, California, Nevada, Oregon, and Washington)

More than 1,000 timber-processing facilities operated in these states in 2003; approximately half used some National Forest timber.

Changes in Capacity

- Declining timber harvest levels have directly led to declining timber-processing capacity in the West.
- Capacity declined despite high prices and high demand for wood products.
- Declines were greatest in areas with greater dependence/use of National Forest timber (i.e. Four Corners).

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Since 1986, capacity to process timber has declined in all regions.

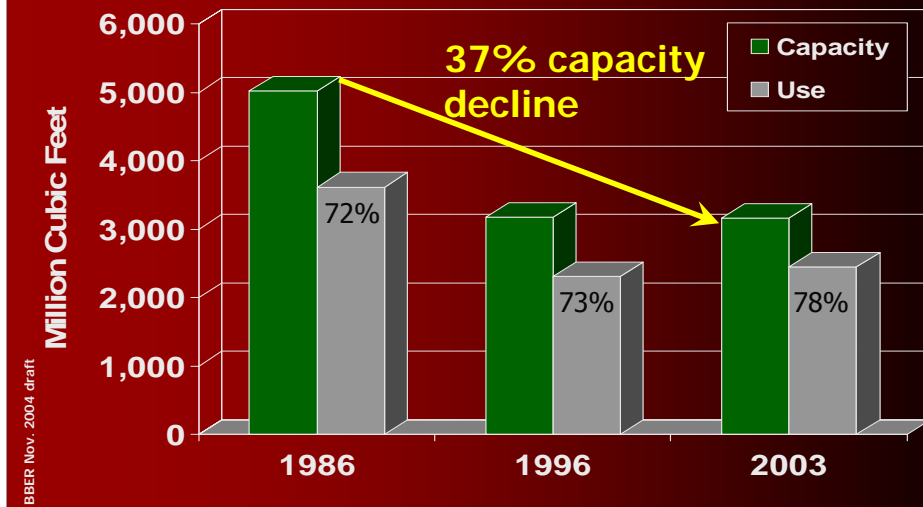
Declining timber harvest levels have led to declining timber-processing capacity in the West.

Capacity declined sharply in many areas even during periods of high prices for lumber and other wood products.

Declines were greatest in areas with greater dependence on National Forest timber (i.e. Four Corners).

Sources: Adair 2004b; Benson and Green 1987; Ehinger 2004; FIDACS 2004; Howard and Ward 1988; Keegan et al. 2001a, b, c; Keegan et al. 1997; Keegan et al. 1995a, b; Larsen 1990; Larsen and Aust 2000; McLain et al. 1997; McLain 1989; McLain 1988; Miller Freeman 1986-1999; Morgan In press; Morgan et al. 2004a, b; Random Lengths 2001-2004; Spelter 2002; Ward et al. 2000; Ward 1997; Warren 1986-2003; WWPA 1986-2003.

Western U.S. Timber-processing Capacity and Timber Use

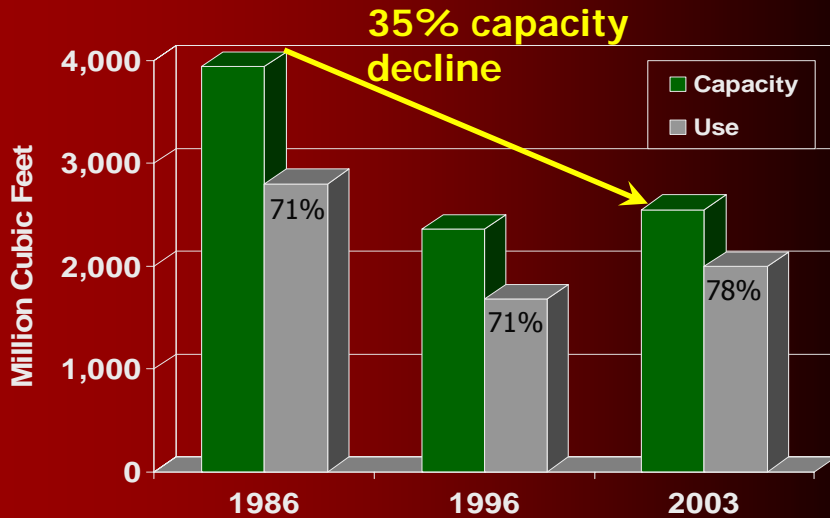


West-wide there was a 37 percent decline in capacity to process timber and a 32 percent decline in timber use from 1986 to 2003. Capacity utilization increased somewhat from 72 percent to 78 percent. Most of the capacity decline (from 5.0 to 3.18 billion cubic feet) occurred between 1986 and 1996. Capacity increased 6 percent from 1996 to 2003.

In the late 1980s, the Western U.S. received about 40 percent of its timber from National Forests. In 2003, less than 10 percent of timber harvested from these states came from National Forests. Washington was the least dependent on National Forest timber at just under 20 percent in 1986. The Four Corners states were dependent on National Forest for more than 70 percent of their timber in the late 1980s.

Sources: Adair 2004b; Benson and Green 1987; Cohn and Blatner 2003; Ehinger 2004; FIDACS 2004; Howard and Ward 1988; Keegan et al. 2001a, b, c; Keegan et al. 1999; Keegan et al. 1997; Keegan et al. 1995a, b; Kilborn 2004; Kuhns et al. 1997; Larsen 1990; Larsen and Aust 2000; McLain et al. 1997; McLain 1989; McLain 1988; Miller Freeman 1986-1999; Morgan In press; Morgan et al. 2004a, b; Random Lengths 2001-2004; Ward et al. 2000; Ward 1997; Warren 1986-2003; WWP 1986-2003.

Pacific Coast Timber-processing Capacity and Timber Use



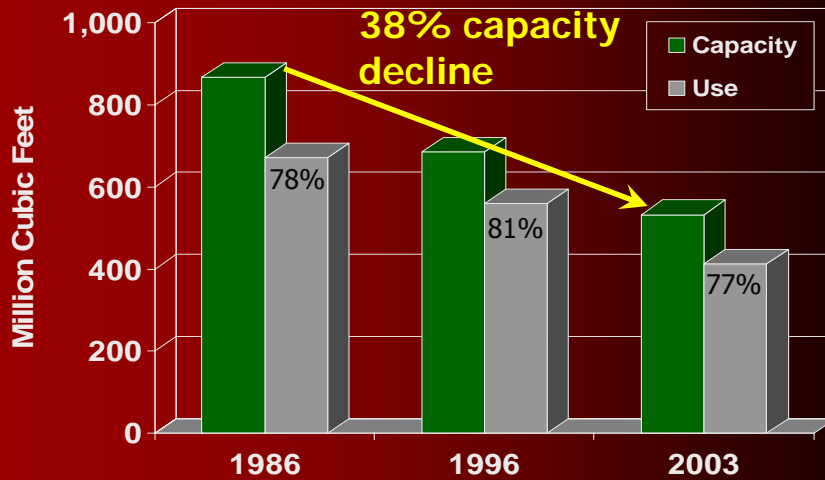
Among the Pacific Coast states (Alaska, California, Nevada, Oregon, and Washington), there was a 35 percent decline in capacity to process timber and a 29 percent decline in timber use from 1986 to 2003. Capacity utilization increased from 71 percent to 78 percent. Capacity increased 8 percent from 1996 to 2003 and the volume of timber processed increased 19 percent. California and Alaska showed declines in both capacity and utilization from 1996 to 2003; while Oregon and Washington had increases.

Washington's capacity to process timber increased 1 percent (7 million cubic feet) from 1986 to 2003; however, log exports and roundwood pulpwood from Washington decreased by over 300 million cubic feet (MMCF).

In the late 1980s, National Forests provided about 35 percent of the region's timber harvest. Washington was the least dependent on National Forest timber at slightly less than 20 percent in 1986. In the other states more than 40 percent of their timber harvested was from the National Forests in the late 1980s. In 2003, less than 10 percent of the timber harvest from these states came from National Forests.

Sources: Adair 2004b; Cohn and Blatner 2003; Ehinger 2004; FIDACS 2004; Howard and Ward 1988; Kilborn 2004; Larsen 1990; Larsen and Aust 2000; Miller Freeman 1986-1999; Morgan et al. 2004a; Random Lengths 2001-2004; Ward et al. 2000; Ward 1997; Warren 1986-2003; WWPA 1986-2003.

Northern Rockies Timber-processing Capacity and Timber Use



In the Northern Rockies (Idaho, Montana, Wyoming), there was a 38 percent decline in capacity and timber use from 1986 to 2003. Percent of capacity utilized was 78 percent in 1986 and 77 percent in 2003.

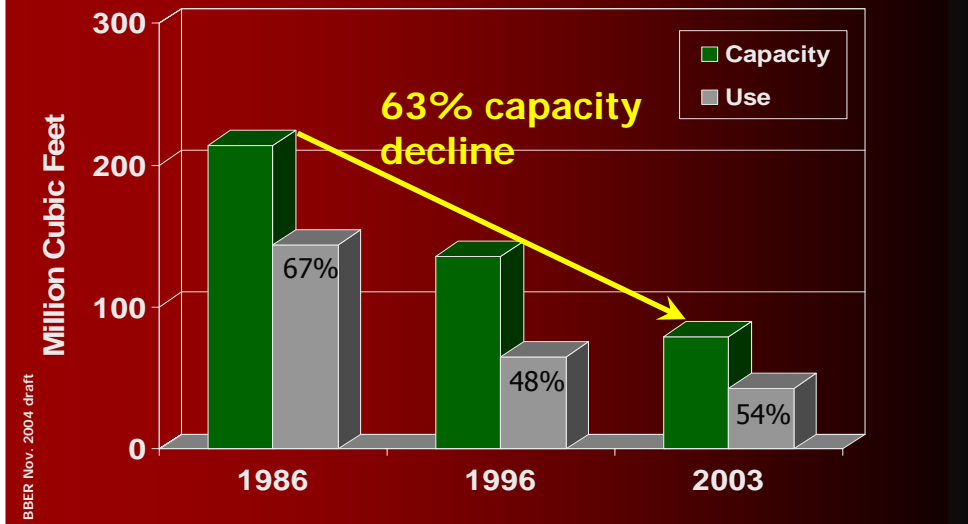
Capacity declines from 1996 to 2003 were nearly as large (153 MMCF) as they were from 1986 to 1996 (181 MMCF).

In the late 1980s, about 45 percent of the timber processed was from National Forests.

In the mid 1990s, about 25 percent; and in 2003, less than 20 percent came from National Forests.

Sources: FIDACS 2004; Keegan et al. 2001a; Keegan et al. 1997; Keegan et al. 1995; Miller Freeman 1986-1999; Morgan In press; Morgan et al. 2004b; Random Lengths 2001-2004.

Four Corners Timber-processing Capacity and Timber Use

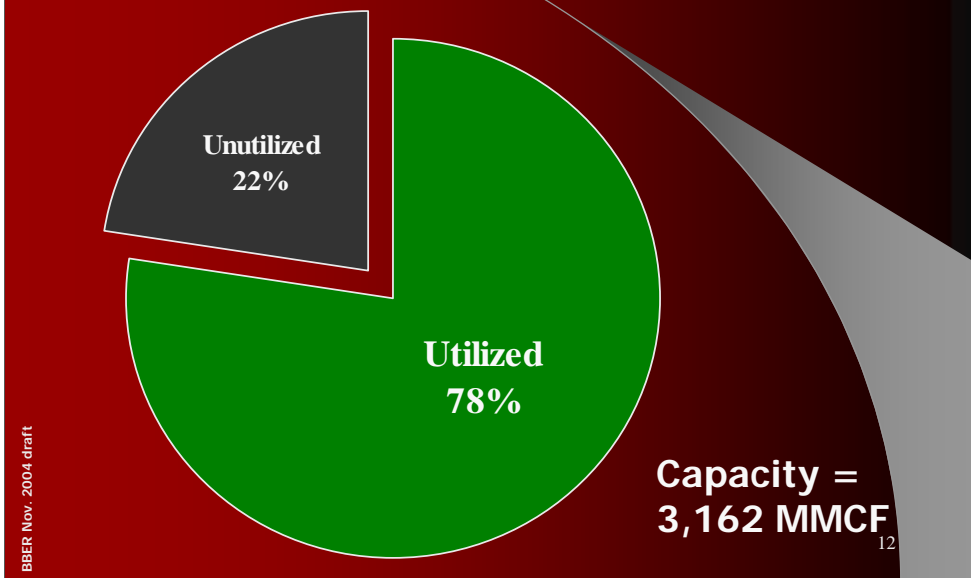


In the Four Corners states (Arizona, Colorado, New Mexico, Utah), capacity to process timber declined from 214 MMCF in 1986 to 79 MMCF in 2003. This 63 percent decline was proportionately much greater than in the other regions. Volume processed was down 70 percent from 1986 to 2003. Capacity declines were substantial both from 1986 to 1996 (78 MMCF) and from 1996 to 2003 (57 MMCF).

This region was more dependent on National Forest timber (more than 70 percent of harvest in late 1980s) than any other region. In recent years, about 25 percent of the harvest from the four-state area has been from National Forests.

Sources: Benson and Green 1987; FIDACS 2004; Keegan et al. 2001b, c; Kuhns et al. 1997; McLain et al. 1997; McLain 1989; McLain 1988; Miller Freeman 1986-1999; Random Lengths 2001-2004.

Timber-processing Capacity and Use in the Western U.S. 2003



In 2003, annual capacity to utilize timber (**excluding roundwood pulpwood, log exports, and industrial fuelwood**) in the Western U.S. was nearly 3.2 billion cubic feet, of which 78 percent was utilized.

Sources: Adair 2004b; Benson and Green 1987; Cohn and Blatner 2003; Ehinger 2004; FIDACS 2004; Howard and Ward 1988; Keegan et al. 2001a, b, c; Keegan et al. 1999; Keegan et al. 1997; Keegan et al. 1995a, b; Kilborn 2004; Kuhns et al. 1997; Larsen 1990; Larsen and Aust 2000; McLain et al. 1997; McLain 1989; McLain 1988; Miller Freeman 1986-1999; Morgan In press; Morgan et al. 2004a, b; Random Lengths 2001-2004; Ward et al. 2000; Ward 1997; Warren 1986-2003; WWPA 1986-2003.

Timber-processing Capacity and Use, 2003

State	Capacity (MMCF)	Use (MMCF)	Percent Utilized
Alaska	47.0	6.0	13%
Arizona	18.7	12.9	69%
California	558.7	363.1	65%
Colorado	35.0	16.9	48%
Idaho	264.9	222.1	84%
Montana	226.6	173.7	77%
New Mexico	12.3	7.3	59%
Oregon	1,104.0	956.0	87%
Utah	12.7	6.2	49%
Washington	840.0	671.0	80%
Wyoming	41.9	17.2	41%
Total	3,161.8	2,452.4	78%

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Capacity utilization in 2003 ranged from 13 percent in Alaska to 87 percent in Oregon. Alaska, Colorado, Utah, and Wyoming utilized less than half of their capacity.

Oregon had the greatest capacity to process timber at just over 1.1 billion cubic feet. After Nevada, which had no operating mills identified in 2003, New Mexico had the least capacity at 12.3 million cubic feet.

Sources: Adair 2004b; Benson and Green 1987; Cohn and Blatner 2003; Ehinger 2004; FIDACS 2004; Howard and Ward 1988; Keegan et al. 2001a, b, c; Keegan et al. 1999; Keegan et al. 1997; Keegan et al. 1995a, b; Kilborn 2004; Kuhns et al. 1997; Larsen 1990; Larsen and Aust 2000; McLain et al. 1997; McLain 1989; McLain 1988; Miller Freeman 1986-1999; Morgan In press; Morgan et al. 2004a, b; Random Lengths 2001-2004; Ward et al. 2000; Ward 1997; Warren 1986-2003; WWPA 1986-2003.

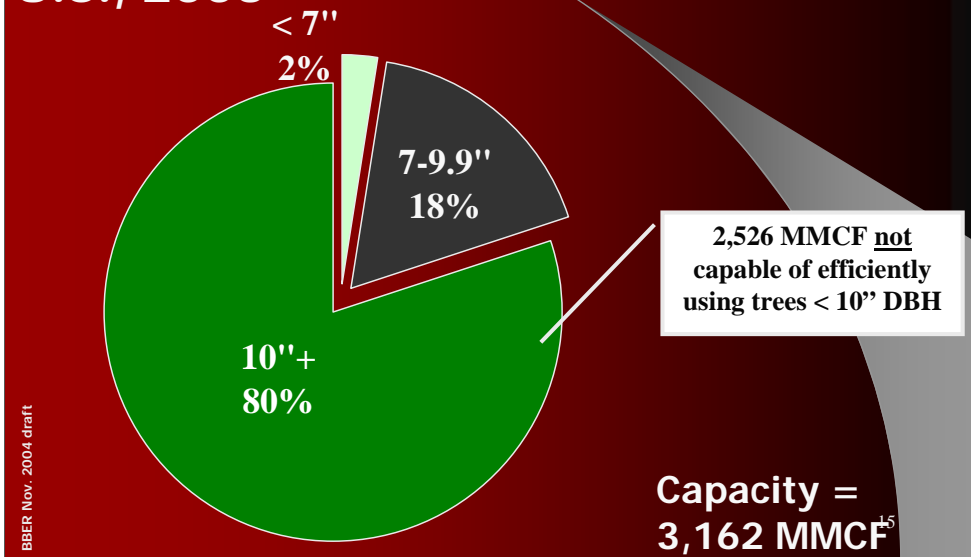
Capability to Process Timber by Tree Size

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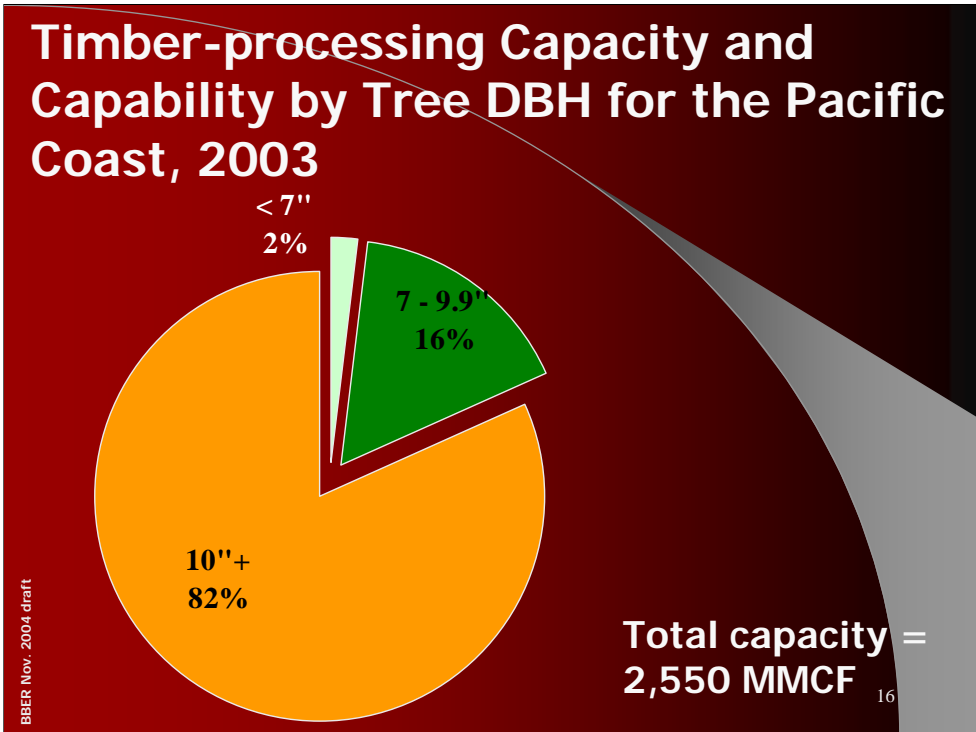
This next section deals with the capability of the industry to efficiently use timber from trees of various sizes.

Timber-processing Capacity and Capability by Tree DBH in the Western U.S., 2003



Excluding bioenergy and roundwood pulpwood, an estimated 2,526 MMCF (80 percent) of capacity was not capable of efficiently using trees < 10" DBH in 2003.

Sources: Adair 2004b; Benson and Green 1987; Cohn and Blatner 2003; Ehinger 2004; FIDACS 2004; Howard and Ward 1988; Keegan et al. 2001a, b, c; Keegan et al. 1999; Keegan et al. 1997; Keegan et al. 1995a, b; Kilborn 2004; Kuhns et al. 1997; Larsen 1990; Larsen and Aust 2000; McLain et al. 1997; McLain 1989; McLain 1988; Miller Freeman 1986-1999; Morgan In press; Morgan et al. 2004a, b; Random Lengths 2001-2004; Ward et al. 2000; Ward 1997; Warren 1986-2003; WWPA 1986-2003.



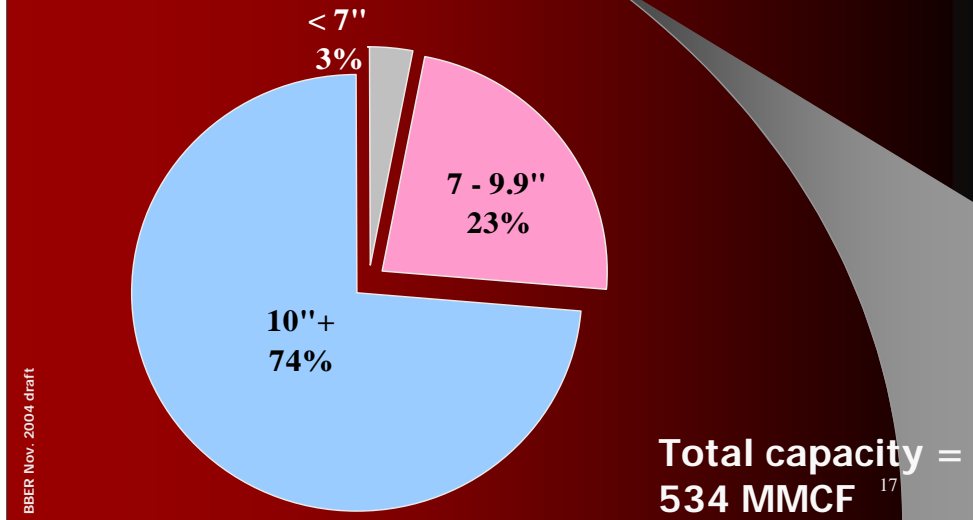
The Pacific Coast possessed 81 percent of the Western U.S. capacity to process timber and 73 percent of the Western U.S. capacity to process trees < 10" DBH.

About 2,083 MMCF (82 percent) of timber-processing capacity in the Pacific Coast Region cannot efficiently process trees < 10" DBH.

A smaller proportion of capacity in the Pacific Coast is capable of efficiently processing small diameter timber -- 18 percent versus 26 percent for the Northern Rockies and 36 percent for the Four Corners.

Sources: Adair 2004b; Blatner et al. 2004; Ehinger 2004; FIDACS 2004; Howard and Ward 1988; Kilborn 2004; Larsen 1990; Larsen and Aust 2000; Miller Freeman 1986-1999; Morgan et al. 2004a; Random Lengths 2001-2004; Ward et al. 2000; Ward 1997; Warren 1986-2003; WWPA 1986-2003.

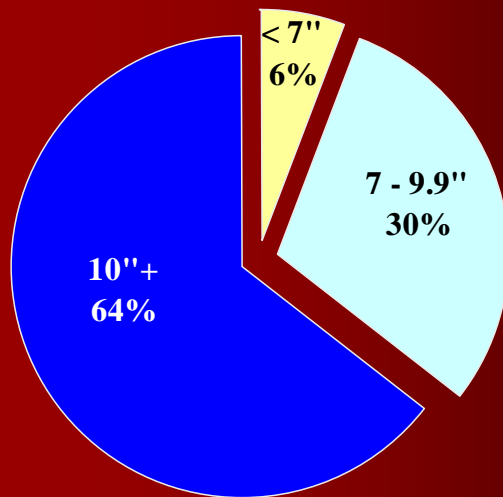
Timber-processing Capacity and Capability by Tree DBH for the Northern Rockies, 2003



The Northern Rockies contained 17 percent of the timber processing capacity in the Western U.S. Approximately 26 percent of that capacity could efficiently process trees < 10" DBH.

Sources: FIDACS 2004; Keegan et al. 2001a; Keegan et al. 1997; Keegan et al. 1995; Miller Freeman 1986-1999; Morgan In press; Morgan et al. 2004b; Random Lengths 2001-2004.

Timber-processing Capacity and Capability by Tree DBH for the Four Corners, 2003



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Total capacity =
79 MMCF¹⁸

The Four Corners States contained only 2 percent of the timber processing capacity in the Western U.S. However, there was proportionately more small-tree capacity in the Four Corners – 36 percent versus 26 percent in the Northern Rockies and 18 percent in the Pacific Coast.

Sources: Sources: Benson and Green 1987; FIDACS 2004; Keegan et al. 2001b, c; Kuhns et al. 1997; McLain et al. 1997; McLain 1989; McLain 1988; Miller Freeman 1986-1999; Random Lengths 2001-2004.

Small-diameter Timber-processing Capability by State (MMCF)

State	Tree DBH < 7.0"	Tree DBH 7.0"-9.9"
Alaska	<.05	2.0
Arizona	0.2	1.1
California	9.4	60.0
Colorado	3.0	16.2
Idaho	3.9	34.5
Montana	9.1	77.3
New Mexico	0.4	1.4
Oregon	27.0	225.0
Utah	1.2	4.8
Washington	17.0	126.0
Wyoming	3.7	12.8
Total	74.9	561.1

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Only 75 MMCF out of the 636 MMCF capable of efficiently using timber < 10" DBH could efficiently use timber < 7" DBH.

Sources: Adair 2004b; Benson and Green 1987; Cohn and Blatner 2003; Ehinger 2004; FIDACS 2004; Howard and Ward 1988; Keegan et al. 2001a, b, c; Keegan et al. 1999; Keegan et al. 1997; Keegan et al. 1995a, b; Kilborn 2004; Kuhns et al. 1997; Larsen 1990; Larsen and Aust 2000; McLain et al. 1997; McLain 1989; McLain 1988; Miller Freeman 1986-1999; Morgan In press; Morgan et al. 2004a, b; Random Lengths 2001-2004; Ward et al. 2000; Ward 1997; Warren 1986-2003; WWPA 1986-2003.

Timber Use by Tree Size

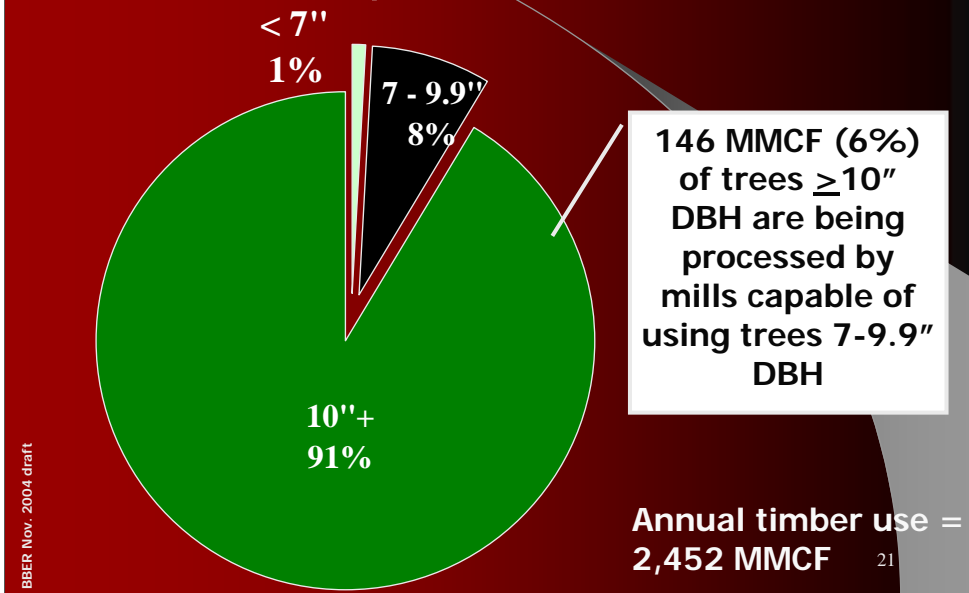
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This next section describes timber use by tree size classes.

A key point is that mills may have the capability to efficiently use timber of a given size but prefer larger timber when it is available.

Timber Use by Tree DBH in the Western U.S., 2003

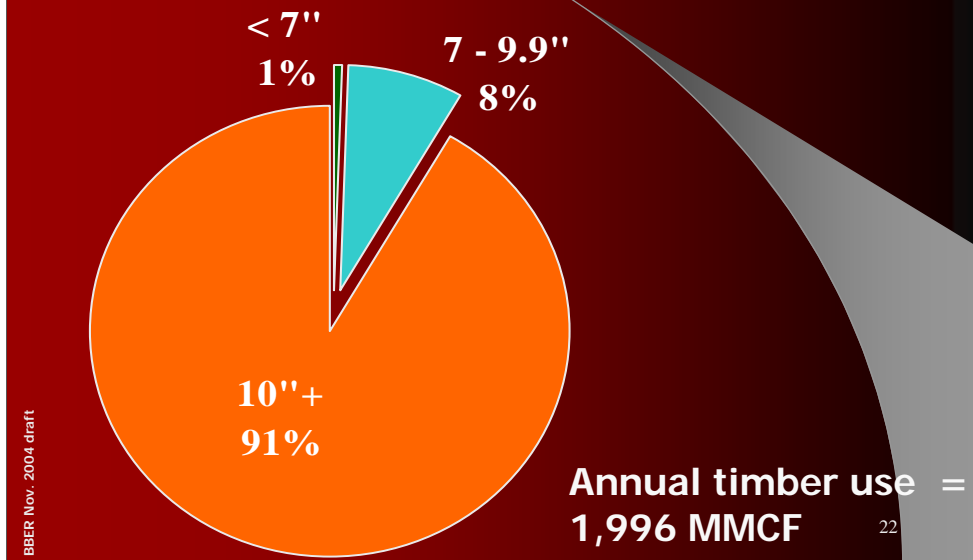


Excluding bioenergy and roundwood pulpwood, 91 percent of the timber used in the Western U.S. during 2003 was from trees $\geq 10''$ DBH.

146 MMCF (6 percent) of trees $\geq 10''$ DBH were being processed by mills capable of using trees 7-9.9" DBH.

Sources: Adair 2004b; Benson and Green 1987; Cohn and Blatner 2003; Ehinger 2004; FIDACS 2004; Howard and Ward 1988; Keegan et al. 2001a, b, c; Keegan et al. 1999; Keegan et al. 1997; Keegan et al. 1995a, b; Kilborn 2004; Kuhns et al. 1997; Larsen 1990; Larsen and Aust 2000; McLain et al. 1997; McLain 1989; McLain 1988; Miller Freeman 1986-1999; Morgan In press; Morgan et al. 2004a, b; Random Lengths 2001-2004; Ward et al. 2000; Ward 1997; Warren 1986-2003; WWPA 1986-2003.

Timber Use by Tree DBH for the Pacific Coast, 2003

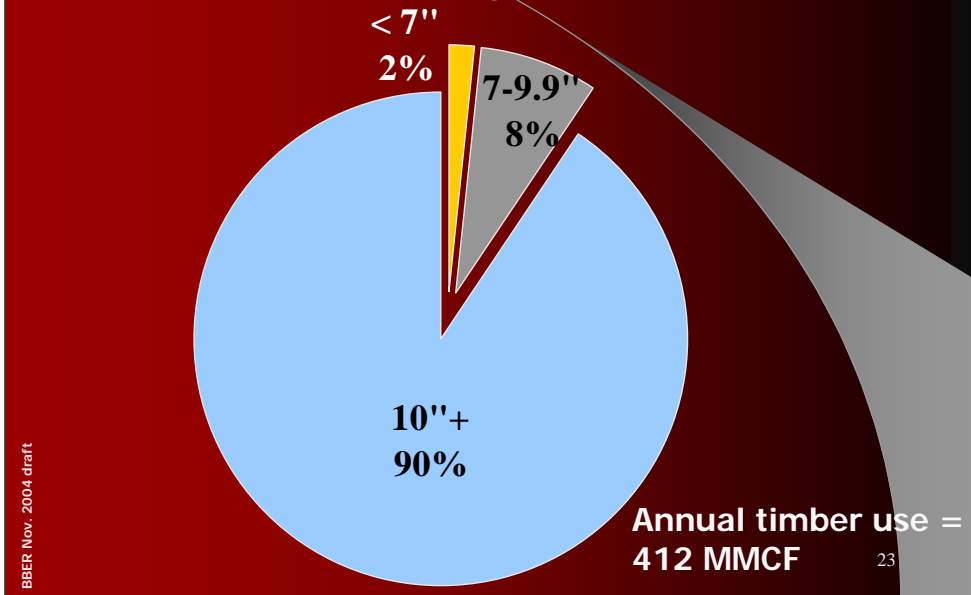


Excluding bioenergy and pulpwood, only about 9 percent of the timber used in the Pacific Coast States in 2003 was from trees < 10" DBH.

Timber use in the Pacific Coast accounted for 81 percent of timber use throughout the Western U.S. during 2003.

Sources: Adair 2004b; Cohn and Blatner 2003; Ehinger 2004; FIDACS 2004; Howard and Ward 1988; Kilborn 2004; Larsen 1990; Larsen and Aust 2000; Miller Freeman 1986-1999; Morgan et al. 2004a; Random Lengths 2001-2004; Ward et al. 2000; Ward 1997; Warren 1986-2003; WWPA 1986-2003.

Timber Use by Tree DBH for the Northern Rockies, 2003

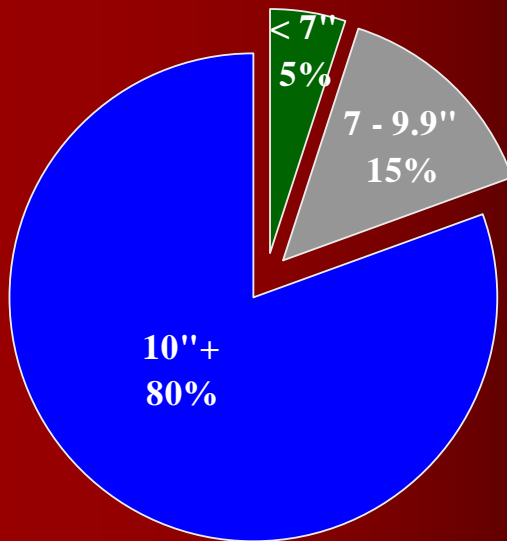


Similarly, about 10 percent of the timber used in the Northern Rockies during 2003 was from trees < 10" DBH.

Timber use in the Northern Rockies accounted for 17 percent of timber use throughout the Western U.S. during 2003.

Sources: FIDACS 2004; Keegan et al. 2001a; Keegan et al. 1997; Keegan et al. 1995; Miller Freeman 1986-1999; Morgan In press; Morgan et al. 2004b; Random Lengths 2001-2004.

Timber Use by Tree DBH for the Four Corners, 2003



Annual timber use =
43 MMCF

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The Four Corners' mills, with 20 percent of timber processed from trees < 10" DBH, utilized twice the proportion of small timber that mills in the Northern Rockies or Pacific Coast used. Timber use in the Four Corners states accounted for 2 percent of timber use throughout the Western U.S. during 2003.

Sources: Benson and Green 1987; FIDACS 2004; Keegan et al. 2001b, c; Kuhns et al. 1997; McLain et al. 1997; McLain 1989; McLain 1988; Miller Freeman 1986-1999; Random Lengths 2001-2004.

Small-diameter Timber Use by State and Tree Size Class (MMCF)

State	Tree DBH < 7.0"	Tree DBH 7.0"-9.9"
Alaska	<.05	<.05
Arizona	0.2	1.2
California	0.5	13.3
Colorado	1.3	3.6
Idaho	3.0	11.4
Montana	2.7	20.2
New Mexico	0.1	0.8
Oregon	9.0	115.0
Utah	0.5	1.0
Washington	<.05	27.0
Wyoming	1.1	1.0
Total	18.4	194.5

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In 2003, 212.9 MMCF of trees < 10" DBH were used, excluding bioenergy and roundwood pulpwood. Of that, 9 percent (18.4 MMCF) came from trees < 7" DBH.

Sources: Adair 2004b; Benson and Green 1987; Cohn and Blatner 2003; Ehinger 2004; FIDACS 2004; Howard and Ward 1988; Keegan et al. 2001a, b, c; Keegan et al. 1999; Keegan et al. 1997; Keegan et al. 1995a, b; Kilborn 2004; Kuhns et al. 1997; Larsen 1990; Larsen and Aust 2000; McLain et al. 1997; McLain 1989; McLain 1988; Miller Freeman 1986-1999; Morgan In press; Morgan et al. 2004a, b; Random Lengths 2001-2004; Ward et al. 2000; Ward 1997; Warren 1986-2003; WWPA 1986-2003.

Western Roundwood Pulpwood, and Industrial Fuelwood

Annual use is variable, ranging from about 100 MMCF to nearly 300 MMCF annually.

In recent years, the total annual use of roundwood for pulp and industrial fuel has been near the low end of that range.

More than 60 percent was from live trees $\geq 10''$ DBH.

Sources: FIDACS 2004; Howard and Ward 1988; Keegan et al. 1995; Keegan et al. 1997; Keegan et al. 2001; Kilborn 2004; Larsen 1990; Larsen and Aust 2000; Morgan In Press; Morgan et al. 2004a, b; Ward et al. 2000; Ward 1997; Warren 1986-2003; WWPA 1986-2003.

Western Log Exports

Log exports during the 1986 - 2003 period ranged from over 850 MMCF annually in the late 1980s to less than 200 MMCF in recent years.

Virtually all of this timber has been >10" DBH.

Sources: FIDACS 2004; Howard and Ward 1988; Keegan et al. 1995; Keegan et al. 1997; Keegan et al. 2001; Larsen 1990; Larsen and Aust 2000; Morgan In Press; Morgan et al. 2004a, b; Ward et al. 2000; Ward 1997; Warren 1986-2003; WWPA 1986-2003.

Summary Points

- Capacity to process timber in the Western U.S. declined by 37 percent since 1986. The greatest capacity decline (63 percent) was in the Four Corners. This area was the most dependent on National Forest timber.
- Capacity in 2003 was 3.16 billion cubic feet, with 78 percent utilized. Capacity and utilization was substantially greater for trees ≥ 10 " DBH versus smaller trees.
- 636 MMCF (20 percent) of timber-processing capacity in the Western U.S. can efficiently process trees < 10 " DBH (excluding industrial fuelwood and pulpwood). Only 75 MMCF can efficiently process trees < 7 " DBH.

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